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PRESENTACIÓN:

Estimados lectores:

Con esta tercera edición retomamos de nuevo la difusión de material de investigación centrado en los sistemas y el diseño. En este segundo volumen se recogen tres números correspondientes a los temas: Aspectos intangibles, Funciones de transformación y Aspectos tangibles; que comprendieron el ***“6th International Forum of Design as a Process. Systems & Design: Beyond Processes and Thinking”*** celebrado en Junio de este año en la Universitat Politècnica de València y del cual este equipo editorial, siendo parte de la *Red internacional de investigación en diseño (rDis)*, junto con la *Latin Network for the Development of Design Processes (LNDP)* tuvimos la oportunidad de organizar.

Este número en particular (V2N1) corresponde a los *Aspectos Intangibles* que intervienen en el universo de la información inmaterial en las diversas dimensiones: sociocultural, económica, tecnológica y territorial; obteniendo como resultado: leyes, teorías, tesis, teoremas, etc... que favorecen el desarrollo del conocimiento humano de su entorno.

Desde **rdis®** esperamos que este material sea de interés y que contribuya a la motivación de los actores que intervienen en el desarrollo de la temática abordada a publicar en futuras ediciones.

Dr. Bernabé Hernandis Ortuño
Director **rdis®**

Aspectos intangibles

Diseño inmaterial - Hacia la desmaterialización y digitalización de productos y servicios como herramienta de sostenibilidad

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Resumen

La crisis ambiental es también un problema de comportamiento, y no está limitado solamente a tecnología, producción y volumen. Por lo tanto, con la evolución y los avances en la tecnología, los procesos y métodos de producción para desarrollar nuevos productos y servicios, es necesario analizar el nuevo papel del diseño en la sociedad actual. El objetivo propuesto de este estudio es el de describir la relación entre dinámicas de desmaterialización y digitalización (o informacionalización) de productos y servicios y la sostenibilidad.

La investigación se lleva a cabo a partir de un estudio de caso con un enfoque cualitativo y un énfasis analítico-descriptivo, sobre la manera en que factores tales como los avances tecnológicos, junto con los comportamientos y las emociones de los usuarios influyen en la configuración de productos y servicios y su relación con la sostenibilidad. Es importante resaltar hasta qué punto se puede sentir amenazado el "know how" del diseñador con la aparición, cada vez más frecuente, de productos y servicios desmaterializados y/o digitalizados. En este sentido, se plantea que, más que una amenaza, puede ser una oportunidad para evolucionar, considerando enfoques sistémicos desde una perspectiva multi-objetivo, multidimensional y multidisciplinaria. El presente análisis podría proporcionar pistas en el campo del diseño, teniendo en cuenta el contexto inmaterial para desarrollar productos y servicios desmaterializados y digitalizados, comprometidos con una sociedad más sostenible.

Palabras clave: *Diseño, inmaterial, desmaterialización, digitalización, sostenibilidad.*

Abstract

The environmental crisis is also a behavioral issue, and not one simply of technology, production, and volume. Thus, with the evolution and advances in technology, processes and production methods for development of new products, it is necessary to analyze the new role of design in today's society. The proposed aim of this paper is to describe the relationship between dematerialization and digitalization (or informationalization) of products and services into sustainability.

The research is carried out from a case study with a qualitative approach and an analytical-descriptive emphasis, how factors such as technological advances along with behavior and emotions of users influence the configuration of products and services and its relationship to sustainability. It is important to stress to what extent the "know how" from the Designer can feel threatened with the appearance of increasingly frequent dematerialized and/or digitalized products and services. And in this sense, it might be stated that rather than a threat, it could be an opportunity to evolve, considering systemic approaches from a multi-objective, multidimensional and multidisciplinary perspective. This analysis could provide clues to field of knowledge taking into account the immaterial context, to develop dematerialized and/or digitalized products and services committed with a more sustainable society.

Keywords: Design, immaterial, dematerialization, digitalization, sustainability.

1. Introducción

La actividad del Diseño tiene una gran responsabilidad del actual estado del medio ambiente, además de un papel fundamental en la búsqueda de la sostenibilidad. En el contexto actual, enfocado hacia una sociedad sostenible, es conveniente reflexionar sobre la influencia que tiene el diseño sobre productos y servicios, a modo de lograr un planteamiento, desarrollo y puesta en funcionamiento -o uso- de los mismos de manera sostenible. Del mismo modo, es necesario reflexionar sobre la forma de abordar los problemas de la sostenibilidad, pues se considera que aunque ya se han logrado algunos avances, es un campo aún por explorar. De hecho, hasta hace poco, las metodologías de diseño sostenible raramente estaban comprometidas con las cuestiones más fundamentales como el sentido y el lugar de los productos y servicios en nuestras vidas, y la contribución de los bienes materiales a lo que podría ser definido ampliamente como el esfuerzo humano (Chapman, 2009). Aunque las cuatro décadas y media de actividades del diseño sostenible, según y cómo lo afirma Chapman, “*han hecho este desperdicio e ineficiencia ligeramente menos derrochadora e ineficiente*” (2009, pág. 30), es una perspectiva de sostenibilidad limitada e insuficiente desde un punto de vista evolutivo y de proyección en el tiempo, por lo que se hace indispensable un abordaje desde otras perspectivas, en términos de proponer alternativas y medios que permitan alcanzar una sociedad sostenible en todos los niveles.

La sostenibilidad está evolucionando, actualmente su naturaleza va más allá de los tres pilares básicos con que era concebida (ecológico, económico y social), por lo que es conveniente analizar si hay una nueva visión de la sostenibilidad, en la cual a través de una perspectiva holística y sistémica de las alteraciones ambientales, sea posible encontrar soluciones que incluyan elementos *materiales e inmateriales* relacionados con el comportamiento humano y las dimensiones culturales. Planteamientos propuestos por autores como Walker (2006), Wahl & Baxter (2008), González (2013) o Wigum (2004), destacan la importancia de las motivaciones esenciales de los individuos, como una la fuerza dinámica que permita un cambio en productos y servicios, a través de las demandas y aspiraciones reales, que no pueden llevarse a cabo y definirse sólo a través de hechos físicos.

Autores como Mugge, Schoormans, & Schifferstein (2007) se cuestionan sobre el porqué las personas desarrollan relaciones sólidas hacia determinados productos y cómo los diseñadores pueden influir en el grado de apego a través del diseño de productos. Aunque lo anterior se refiere a productos tangibles, se

plantea que también se puede presentar en productos y servicios intangibles. Lo cual es una gran oportunidad para que, diseñadores y desarrolladores de productos y servicios, lo enfoquen hacia su área de estudio, y en éste caso en especial hacia “la sostenibilidad”.

Por otro lado, también es importante tener en cuenta al usuario o consumidor y su percepción sobre la sostenibilidad, a modo de identificar cuales son los rasgos, aspectos o atributos que deben poseer productos y servicios sostenibles, según sus criterios. Esto puede servir para identificar, cómo se le puede dar un nuevo enfoque a la sostenibilidad -en caso de ser necesario- o comprobar si el modelo actual es el adecuado; con el fin de ratificar o replantear el concepto que la sociedad tiene de la sostenibilidad. Para ello se debe ir más allá de la caracterización del fenómeno. Es decir, saber si el fenómeno de la sostenibilidad hoy en día se caracteriza por reparación, reuso, uso secundario, mínimo consumo de recursos, recuperación, reciclaje, compostaje, etc., o si se está caracterizando por otros aspectos basados en actualización, cambio de formato (producto a servicio), desmaterialización, sustitución, virtualización, multifuncionalidad, optimización de la vida útil, uso compartido, creación de experiencias, vínculo emocional y otros elementos que podrían hacer parte de ese *contexto inmaterial*, relacionado con las emociones y los valores, y que posiblemente no sean considerados en la actualidad como impulsores de la sostenibilidad.

El propósito del actual estudio es, desde una perspectiva sistémica, reflexionar sobre unas dimensiones material (*contexto material*) e inmaterial (*contexto inmaterial*), que se creen presentes en el planteamiento, desarrollo y puesta en funcionamiento -o uso- de productos y servicios, a modo de identificar un *diseño inmaterial* que relacione las actuales dinámicas de *desmaterialización* y *digitalización -o informacionalización-* de productos y servicios con la sostenibilidad. Con base en lo mencionado, se plantea el análisis de un estudio de caso en el que se consideren enfoques y estudios basados en las necesidades de los seres humanos, así como las emociones y sistemas de valores, que permitan reconocer puntos clave pertenecientes a esa *dimensión inmaterial*, los cuales a menudo se pasan por alto en la configuración de un producto o servicio y que se cree son relevantes al momento de generar una solución de diseño sostenible.

2. Marco conceptual

2.1. El modelo de diseño concurrente

El presente estudio se basa en el *Modelo de Diseño Concurrente* (MDC) de Hernandis, B. (2003). El modelo consta principalmente de un *sistema exterior* y de un *sistema de referencia* o sistema en estudio. En el *sistema exterior* se consideran tanto los aspectos relacionados con la *dimensión más tangible* del diseño del producto/servicio (materias primas, procesos, tecnologías, funcionalidad, distribución, proveedores, infraestructuras, entre otros), así como los aspectos más próximos a una *dimensión intangible* (cultura, sociedad, emociones y valores de los usuarios, percepción y motivaciones de las personas, entre otros) y demás aspectos que aportan consideraciones y restricciones que influyen sobre el problema de diseño.

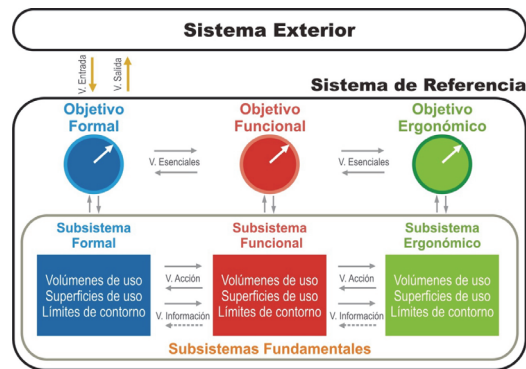


Fig. 1 Modelado teórico. Fuente: adaptado de Hernandis (2003)

Se parte de la idea de que en el *sistema exterior* se encuentran los *suprasistemas* (o subsistemas del *sistema exterior*), que abarcan la realidad que nos rodea y pueden definir las variables que permiten la configuración de un producto, sistema o proceso; y es en ésta fase del diseño conceptual en la que se deben aplicar los criterios para generar una respuesta sostenible a un problema planteado. Desde esta perspectiva, Vezzoli & Manzini (2008, pág. 238) afirman que, "mejorar el impacto de productos es más probable durante las primeras fases de desarrollo, cuando la innovación tiene una mayor magnitud".

2.2. Derivación del sistema exterior

Cualquier problema de diseño, abordado desde la sistémica, se debe asumir como un sistema que se compone de subsistemas en donde la respuesta, acertada o no, depende de las interacciones y relaciones de estos subsistemas o componentes, en donde, según Wahl & Baxter (2008), es pertinente abarcar otra dimensión, además de la física, para obtener respuestas acertadas. En este sentido, existen dos extremos específicos: el primero, a partir de artefactos culturales, instituciones, patrones de producción y consumo, que expresan la *intencionalidad material*; y el segundo, en la *dimensión inmaterial*, el "metadiseño" de nuestro conocimiento consciente, sistemas de valores, cosmovisiones y aspiraciones que definen la intencionalidad detrás del diseño materializado.

Se propone una perspectiva de sostenibilidad apoyada en una visión holística y sistémica, que abarque varias disciplinas, panoramas y enfoques, que permitan y faciliten una acertada toma de decisiones. Para ello Rivera et al (2013), plantean dos contextos como componentes del *sistema exterior*, el *contexto material* y el *contexto inmaterial*, a manera de reconocer criterios que validen los supuestos o conocimientos sobre los conceptos identificados de la realidad percibida.



Fig. 2 Esquema de derivación del Sistema Exterior. Fuente: adaptado de Rivera et al (2013)

Resultado de estos análisis se ha identificado, que además de las variables de entrada, relacionadas con el *contexto material* de un problema de diseño, hay otras asociadas con un *contexto inmaterial* en el que se consideran aspectos emocionales y valores, como factores psicológicos y psicosociales, que satisfacen necesidades no materiales de los usuarios/consumidores.

2.2.1. Contexto material

En el *contexto material*, se suponen aspectos ligados a los conceptos físicos de productos y servicios, en donde son analizadas las características, materiales, producción, energía, etc., además de las relaciones e interacciones de elementos ya desarrollados y el medio en que se utilizan. A este respecto, Wahl & Baxter (2008), indican que la intencionalidad que hay materialmente detrás del diseño, “se expresa a través de las interacciones y relaciones formadas por productos de consumo, sistemas de transporte, economías, sistemas de gobierno, patrones de asentamiento, y los recursos y la energía utilizados, con la complejidad de los procesos sociales y ecológicos (pág. 74). Bajo esta perspectiva, se propone que durante el planteamiento y desarrollo de una solución a un problema de diseño se debe realizar un “*análisis físico*” en el que se consideren aspectos relacionados con el componente tangible o *contexto material* del proyecto.

2.2.2. Contexto inmaterial

En este contexto, se formulan análisis relacionados con conceptos psicológicos y sociológicos que estén ligados a las diversas cosmovisiones, ideas, sistemas de valores y aspiraciones de la sociedad. Wahl & Baxter (2008), señalan que, inmaterialmente nuestras ideas de organización, cosmovisiones y sistemas de valores, expresan cómo damos sentido a nuestra experiencia de la realidad a través del metadiseño (pág. 74). Aquí esta formación del sentido por medio del metadiseño, va más allá de los aspectos tangibles del *contexto material*, para lograr una relación con conceptos y supuestos psicológicos y sociológicos. En esa dirección, Stegall (2006) afirma, que el nuevo objetivo es diseñar productos que sean más que simplemente no tóxicos o reciclables, en realidad sirvan como herramientas para formar personas, vidas y valores, para lo cual es necesario examinar los rasgos, valores y comportamientos que las personas deben tener en una sociedad sostenible (pág. 58). Para ello, es necesario un enfoque holístico en el que se incluyan diversas disciplinas académicas y profesionales, visiones y enfoques diferentes.

Lo que se pretende con la derivación del *sistema exterior*, es observar en el *contexto inmaterial*, si algunos de sus componentes -necesidades, emociones y valores-, que a menudo son ignorados en la configuración de un producto o servicio, pueden ser relevantes al generar soluciones de diseño sostenible. A partir de este planteamiento, se analizan los anteriores contextos, para identificar elementos que estén en línea con la sostenibilidad, considerando teorías relacionadas con las necesidades humanas, las emociones y los valores, desde lo que se ha denominado *diseño inmaterial*, mediante dinámicas sostenibles emergentes de *desmaterialización* y *digitalización* de productos y servicios.

2.3. Dinámicas sostenibles emergentes

El diseño sostenible está madurando, se cree que hay un cambio hacia una nueva dimensión, en donde una serie de motivaciones (necesidades, emociones y valores) traen consigo una nueva visión de la sostenibilidad que pasa por la *desmaterialización* y *digitalización* de productos y servicios. En el *Atlas del Diseñador de Sostenibilidad*, Thorpe (2010) se refiere a esta mayoría de edad como la segunda etapa en un debate en el cual el rol del diseño en aspectos económicos y sociales de la sostenibilidad está más plenamente explorado, además de la atención ya establecidos en materia de energía y materiales (Thorpe, 2010, pág. 5). Para Chapman (2009), la crisis de la sostenibilidad es un problema de conducta, y no simplemente de tecnología, producción y volumen. Las condiciones de comportamiento que ambos

manejan y los patrones de la influencia del consumo de materiales son complejos, pero fundamentales para un compromiso efectivo con una agenda contemporánea de diseño sostenible.

Afirmaciones como las anteriores hacen que emerjan interrogantes sobre las perspectivas de la sostenibilidad y los roles de cada uno de los actores involucrados en alcanzarla, así como del surgimiento de dinámicas sostenibles emergentes como la *desmaterialización* y la *digitalización* de productos y servicios que consoliden una nueva dimensión de sostenibilidad, en donde, y siguiendo a Robèrt et al (2002), se genere una transformación cultural que cambie el foco en los productos y servicios, a fin de encontrar completamente nuevas formas de satisfacer las mismas necesidades en los usuarios/consumidores, sean estas necesidades básicas o de autorealización.

2.3.1. Desmaterialización

En primer lugar, se harán algunas aclaraciones sobre el concepto de “*desmaterialización*” utilizado en el presente estudio, debido a que este término tiene varias interpretaciones. En este caso en particular, el término *desmaterialización* es tomado como una estrategia que apoya a la sostenibilidad, con antecedentes asociados desde la *Rueda de LiDs* (Lifecycle Design Strategies) de Brezet & van Hemel (1997) hasta enfoques más contemporáneos que podrían estar asociados al bienestar humano; tal como sugieren Beuren, Ferreira, & Miguel (2013), quienes citando a Baines et al., (2007), indican que la desmaterialización de productos, además de haber sido discutida en la literatura por autores como Mont (2001), Ehrenfeld (2001), Manzini & Vezzoli (2003), Wong (2004) y Tomiyama (2001), también ha sido utilizada como un objetivo para los *sistemas producto-servicio* (PSS en inglés product service-systems).

Li, Zhang, Li, & Tong (2010), afirman que la *desmaterialización* se ha convertido en un concepto importante en la ecología industrial, el cual ha penetrado en todas las fases del ciclo de vida del producto. A lo que Beuren et al (2013) interpretan, que consecuencia de ello, un producto puede ser desmaterializado mediante la inclusión de servicios que reducen la cantidad de materiales consumidos en el ciclo de vida de un producto, no sólo en su creación sino también en su uso, reutilización y reciclaje; en ese sentido Kestemont & Kerkhove (2010) aseveran, que la idea es tender hacia un desarrollo más sostenible y eficiente para “producir más bienestar humano utilizando menos recursos naturales”, es decir, desvinculando el crecimiento económico del uso de material, mediante la utilización de menos “cosas”, o en su defecto de productos y servicios más eficientes, proyectados y desarrollados desde la *desmaterialización*. En este caso, no se trataría solamente de la *desmaterialización* a través de la cantidad de material consumido, sino y como afirma Cleary (2010), con posibles escenarios de gestión de residuos, incluyendo la prevención de residuos, mediante la ampliación de los límites del sistema. Lo cual podría ser la prevención de residuos a razón de la desmaterialización, en donde los propios usuarios/consumidores tomaran conciencia de algún tipo de bienestar humano, logrado a raíz de la utilización de menos recursos naturales o la reutilización de productos.

Para el desarrollo del presente estudio, y siguiendo a Beuren et al (2013), se toma como principal objetivo de la *desmaterialización*, el de mejorar el bienestar de la sociedad, mediante el desarrollo más eficiente y sostenible, en donde, y coincidiendo con Baines et al., (2007), la *desmaterialización* sea una oportunidad para que sistemas producto-servicio, rompan el vínculo entre el valor entregado al cliente/usuario y la cantidad de material físico necesario para crear ese valor.

2.3.2. Digitalización o informacionalización (de átomos a bits)

El principio que se expone a continuación, pueden ser reconocido por otros nombres como *Transmaterialización* y *Servicing* (prestación de servicios), pero se ha considerado que los conceptos de “*digitalización*” e “*informacionalización*”, son los que se aproximan más al principio que se propone, a efectos del presente estudio, para ello se ha partido de diferentes aproximaciones teóricas.

Singh (2002) afirma, que en la era industrial, la atención estaba enfocada en los bienes tangibles, pero que en la era postindustrial, la atención se centra en la producción y el uso de bienes intangibles, relacionados con la información y el conocimiento. Del mismo modo, sostiene que en la era industrial la persona promedio estaba más preocupada por los bienes materiales, pero que en la emergente *sociedad de la información*, la persona promedio está más interesada en aspectos psicológicos y espirituales de la existencia, afirmando que de esta manera, mediante la digitalización se ha pasado “*de átomos a bits*”.

Shedroff (2009) por su parte propone, que con la informacionalización se pueda replantear un problema y su contexto, en donde por medio de la reducción de recursos se logre convertir “*algo en casi nada*”, a modo de buscar como objetivo principal el tratar de enviar mensajes, recetas, datos, etc. cuando sea y donde sea, para que ese algo en sí mismo -material o inmaterial-, pueda ser replicado en el destino.

En el contexto del diseño de productos y de acuerdo a planteamientos como los propuestos por Vezzoli & Manzini (2008), referentes a la digitalización de productos o algunos de sus componentes; Garetti, Rosa, & Terzi (2012), proponen una optimización general para alcanzar una condición más sostenible, la cual sólo puede obtenerse mediante la acumulación y la eficiente gestión de un profundo conocimiento de todo el ciclo de vida del sistema, y la implementación de herramientas avanzadas.

En esta misma dirección, Stevels (2007) afirma que mediante los avances en las tecnologías y la *digitalización*, se fortalece la entrega de más funciones por unidad de carga ambiental. Lo cual puede ser aprovechado a nivel de producto y servicio, con el fin de sustituir la *Tecnología Mecánica* (TM) por *Tecnologías de la Información* (TI) y *Tecnología Óptica* (TO) o combinar TM, TI y TO de manera inteligente. Esto ya está sucediendo con los actuales *Smartphones* y *Tablets*, así como con la transformación de productos en servicios, lo cual, además de haber generado una revolución frente al diseño clásico, disminuye notablemente las cargas ambientales, y va en línea con el aumento de satisfacción emocional del usuario/consumidor.

Desde esta perspectiva, y con base en los anteriores planteamientos, a continuación se nombrarán algunos ejemplos del principio de *digitalización -informacionalización-*, en donde algunos productos y servicios están desapareciendo y otros han cambiado su estado en bits a partir de átomos. En la música, por ejemplo, lo que anteriormente eran medios físicos como, discos, casetes, discos compactos, han sido desplazados por la música digital, y en la misma línea se pueden nombrar:

- El video digital, como tecnología de grabación de imágenes
- El correo electrónico, como servicio de envío y recepción de mensajes y archivos digitales (documentos, imágenes, audios, videos, etc.)
- Los libros digitales (eBooks), como versión electrónica o digital de un libro
- La fotografía digital, como reemplazo a la fotografía química
- Los documentos digitales, que ganan terreno sobre los impresos
- Las herramientas de diseño asistido por ordenador (CAD, CAE, CAM)¹⁰, que permiten la simulación y pruebas virtuales, de productos modelados digitalmente.

Aunque en estos ejemplos, se ha cambiado el estado de los elementos de átomos a bits, para que haya una interfaz entre el usuario/consumidor y el elemento se necesita de un medio que lo permita, sea este: un ordenador, reproductor de música, teléfono móvil, tablet, televisor, etc.; también es importante resaltar,

¹⁰ Por sus siglas en Inglés, Computer Aided Design (CAD), Computer Aided Manufacturing (CAM), Computer Aided Engineering (CAE)

que puede haber oportunidades en donde estos elementos, se conviertan en material físico por acciones como una impresión, un revelado o una grabación.

2.4. Relación de las necesidades complementarias y las emociones con la sostenibilidad

Debido al enfoque del presente estudio, se reconocen otro tipo de necesidades complementarias de las personas como usuarios/ consumidores de productos y servicios, para indagar cómo diversas motivaciones y aspiraciones, que no son sólo necesidades básicas –como el beber alguna marca en especial de bebida en lugar de solamente agua-, son aspiraciones o motivaciones que se pueden dar en función de la sostenibilidad. Para analizarlo se recurre a los planteamientos de Maslow (1966), Max-Neef (1992) y Jackson & Marks (1999) sobre las necesidades, las formas de satisfacerlas y sus escalas o jerarquías.

Wigum (2004), basada en las nueve necesidades humanas fundamentales propuestas por Max-Neef (1992), afirma que estas se pueden dividir en *materiales* (subsistencia y protección) y *no materiales* (afecto, entendimiento, participación, ocio, creación, identidad y libertad), y que al menos en parte, pueden estar satisfechas por tanto satisfactores¹¹ materiales como no materiales.

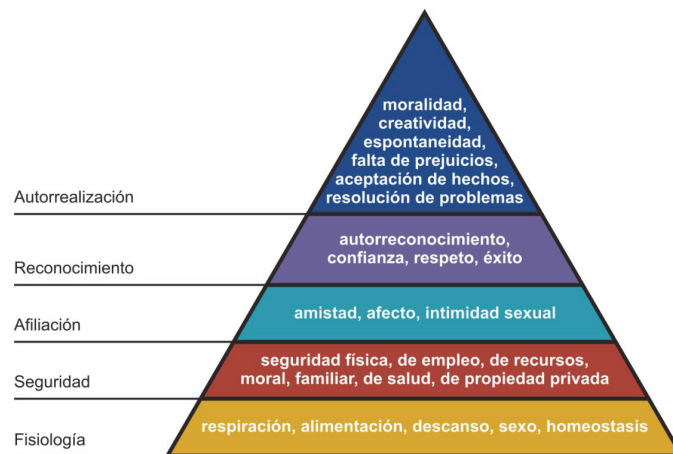


Fig. 3 Pirámide de Maslow – jerarquía de necesidades. Fuente: adaptado de Bartiaux et al (2011)

Por otro lado, se ha tomado como referencia la clasificación de necesidades de Maslow (1943), derivando que, gran parte de los componentes del *contexto inmaterial* que se relacionan con la sostenibilidad, se encontrarían en la parte superior de la jerarquía de necesidades. Estas necesidades de reconocimiento, pertenencia y autorrealización pueden estar relacionadas con aspectos emocionales, afectivos, espirituales y valores pertenecientes a la *dimensión inmaterial* en búsqueda de la sostenibilidad.

Para analizar la dimensión emocional, se toma el concepto de "*la experiencia del producto*" de Desmet & Hekkert (2007), el cual emplean para referirse a todas las posibles experiencias afectivas involucradas en la interacción producto-humano. Ellos afirman que la interacción producto-humano no sólo se refiere a la interacción instrumental, sino también a la no instrumental, e incluso la interacción no-física. En ese mismo sentido, Nagamachi (1995) afirma, que los consumidores son exigentes en la elección de los productos en términos de su demanda y preferencias. En la actualidad los consumidores son más sofisticados y desean que los productos se ajusten a sus propios sentimientos de diseño, funcionalidad y precio. Un ejemplo de ello ocurre en Japón, donde basados en el "*Valor KANSEI*" (2007), se pregunta a

¹¹ Los *satisfactores*, son formas de ser, tener, hacer y estar, de carácter individual y colectivo, conducentes a la actualización de necesidades.

usuarios/consumidores comunes, sobre sus necesidades y recomendaciones para desarrollar productos o servicios que despierten emociones, empatía o resonancia simpática. En este sentido, Vezzoli & Manzini (2008) afirman, que al tener en cuenta la demanda de satisfacción en nuevos sistemas producto-servicio, se ofrecen diferentes -y más sostenibles- formas de obtener resultados, que podrían convertirse en socialmente apreciados y al mismo tiempo radicalmente favorables para el medio ambiente.

Planteamientos como los anteriores, sobre la relación de algunas necesidades humanas y emociones con la sostenibilidad, apoyan el enfoque que se propone sobre aspectos pertenecientes a un *contexto inmaterial*, del *sistema exterior* del MDC, abordados desde una perspectiva sistémica.

3. Metodología – Planteamiento metodológico

El presente estudio es realizado de forma descriptiva para analizar, si dinámicas de *desmaterialización* y *digitalización* o *informacionalización* de productos y servicios están relacionadas con la satisfacción de las actuales motivaciones (necesidades, emociones y valores) en los usuarios/consumidores. Con base en un trabajo anterior de los autores, y desde una perspectiva sistémica en la que se establecieron un *contexto material* y un *contexto inmaterial*, como derivaciones del *sistema exterior* del MDC; se pretende establecer si hay una conexión de estas dinámicas y las actuales motivaciones de los usuarios/consumidores con la sostenibilidad.

La investigación es descriptiva correlacional, para lo cual, basándose en investigaciones y teorías sobre actuales dinámicas de *desmaterialización* y *digitalización* de productos y servicios, así como en estudios sobre las necesidades del ser humano (Maslow 1966, Max-Neef 1992, Jackson & Marks 1999), las emociones y la relación usuario-producto (Desmet & Hekkert 2007, Mugge et al, 2007, Vezzoli & Manzini 2008), por medio del análisis de un estudio de caso, se logre establecer si estos factores pueden estar relacionados con la sostenibilidad, desde un *contexto inmaterial*, en el cual se busque llegar a productos cada vez más desmaterializados y digitalizados que afecten menos el medio ambiente.

4. Estudio de caso

En la actualidad, algunos productos han desaparecido (VHS, Betamax, casetes de música, máquinas de escribir, etc.), mientras que otros han sido reemplazados por un solo dispositivo (teléfonos, videograbadoras, reproductores de música, calculadoras, GPS, grabadoras, etc.). Aunque actualmente se siguen fabricando muchos de estos productos, se debe resaltar que algo ha cambiado en algunos de ellos; han evolucionado de cómo eran anteriormente en términos de volumen y peso. Los libros se siguen fabricando, a pesar de los ebooks o la enciclopedia británica, después de haber sido reconocida como algo icónico durante más de dos siglos, desaparece como -hecho- *medio material* y evoluciona hacia un *medio virtual e inmaterial*, disponible en la red como una nueva vía de acceder al conocimiento.

Con base en las anteriores teorías y planteamientos, como estudio de caso, se establece que el *contexto inmaterial* puede estar presente en la cotidianidad, sin ser percibido. Para ello, como ejemplo práctico se plantea el siguiente supuesto en el que:

Una persona puede estar retirada de la ciudad, por decir algo, a 50 kilómetros de la zona urbana en un entorno rural, y desde ahí acceder a una serie de servicios que le brindan las funciones y aplicaciones de su Smartphone.

En tiempos pasados esto era muy difícil, por no decir imposible de lograr, debido a que en algunos dispositivos, su volumen, su peso o su conectividad eran un impedimento (teléfono, contestador,

ordenador, televisor, reproductor de música, radio, etc.), donde en el mejor de los casos, se debían elegir algunos de estos objetos/elementos para llevar consigo. Hoy en día, esta situación ha cambiado, ya que en algunas ocasiones con solamente un dispositivo es posible: hacer llamadas, tomar fotos, grabar videos, escuchar música, jugar, ver películas y programas de Tv, así como conocer las condiciones atmosféricas y la geolocalización del lugar en el que se está; todo esto sin contar, que con el desarrollo de nuevas aplicaciones se amplía el espectro de funciones de este tipo de dispositivos.

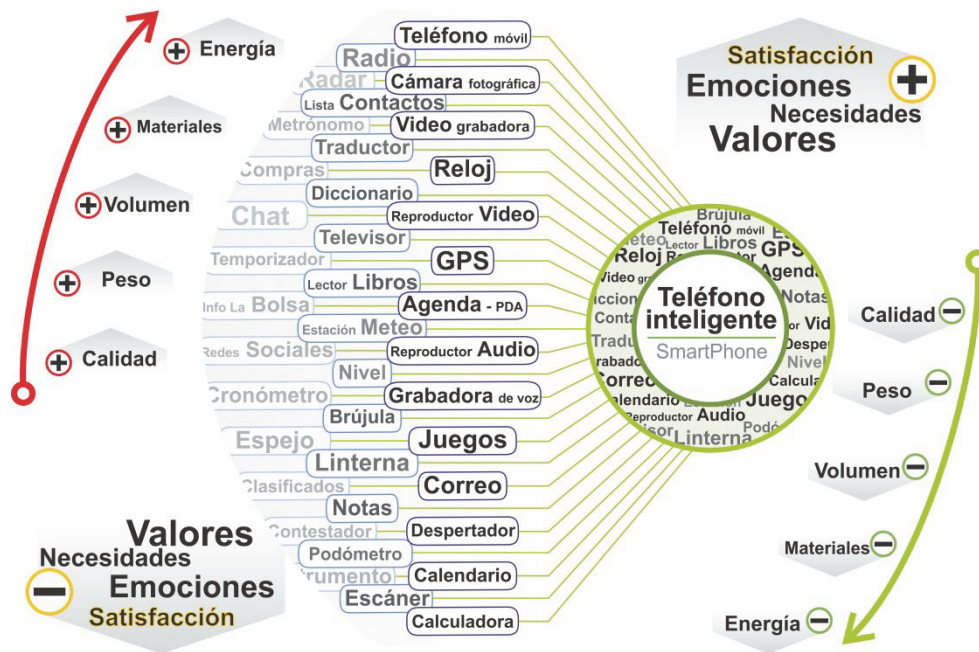


Fig. 4 Desmaterialización y digitalización de productos y servicios. Fuente: elaboración propia

Lo que se pretende con el anterior supuesto, es reafirmar que hay una *contexto inmaterial* que está presente y tiene una relación directa con la plenitud, las necesidades y las motivaciones reales de la gente, en donde la *desmaterialización* y la *digitalización o informacionalización* de productos y servicios contribuyen al desarrollo de todo este fenómeno. Esto se refuerza con el planteamiento de otro caso hipotético en el cual:

La misma persona, que se retira a 50 kilómetros del entorno urbano, pero suponiendo que disponga del dinero y los medios de desplazarse con esos equipos físicos e independientes entre sí (teléfono, contestador, televisor, reproductor de música, reproductor de video, radio, calendario, etc.), podría generar aspectos negativos en relación con la plenitud de la experiencia y sus motivaciones, además del impacto negativo que causaría en el medioambiente.

Es importante en este punto, hablar de experiencia, satisfacción y bienestar, pues si se evalúa objetivamente a la persona que se desplaza los 50 kilómetros de la ciudad, en estos términos, tendría que cargar con “X kilos de productos”, para suplir las mismas necesidades/funciones con algo que pesa alrededor de 140 gramos. En el primer supuesto, no tiene lugar el evaluar la calidad de algunas de las funciones que suple un sólo dispositivo, porque es evidente que la calidad de un Tv plasma, es mucho mejor, al igual que las fotografías que se pueden lograr con una cámara réflex; aquí se trata de lo básico,

de las funciones básicas y cómo ellas en su conjunto pueden generar una mayor experiencia, satisfacción y bienestar en el usuario con un menor peso y volumen.



Fig.5 Caso de diseño – teléfono inteligente (iPhone 4). Fuente: (iMore, 2016)

Al respecto, Wahl & Baxter (2008), citando a Buchanan (1992) destacan el que el poder creativo detrás del pensamiento de diseño se encuentra en *"pasar a la modalidad de imposibilidad"*, y reconocer que lo imposible "realmente sólo puede ser una limitación de la imaginación que puede ser superada por el mejor pensamiento del diseño". Además, también sugiere que el pensamiento de diseño en este contexto es "no pensar dirigido hacia una "solución tecnológica rápida" en hardware, sino hacia nuevas integraciones de signos, cosas, acciones y el ambiente que aborden las necesidades concretas y los valores de los seres humanos en diversas circunstancias". Para ello, es necesario analizar la relación entre los aspectos motivacionales de las personas y lo que caracteriza a la sostenibilidad "hoy en día", para encontrar las verdaderas motivaciones en el uso de productos y servicios y "no" lo que las empresas suponen o sugieren. En este sentido, se podría seguir adelante y cambiar la perspectiva, olvidando el producto o servicio en sí mismo y pensar acerca de las funciones que los usuarios/consumidores necesitan.

5. Discusión

La *dimensión inmaterial* en productos y servicios, es una realidad y está presente en la actualidad. No se puede dar por sentado, a priori, que la gente conoce el concepto "*inmaterial*", se cree que la gente puede comprender que hay un *contexto material* y un *contexto inmaterial*, no solamente porque esté de acuerdo o no, sino porque efectivamente está ocurriendo. Hay un proceso de desmaterialización y de cubrir más necesidades con menos productos, lo cual puede ser evidente en los sistemas producto-servicio. Como ejemplo de ello están, Ascensores Schindler que cambian a vender servicios de transporte vertical en lugar de ascensores; o la empresa Rank Xerox, quienes ofrecen servicios de reproducción a la medida del cliente en vez de vender solamente fotocopiadoras (Stahel, 1998). Este fenómeno se presenta en la actualidad desde empresas que cambian de ofrecer y vender productos a ofrecer servicios, hasta los actuales smartphones y tablets, que integran varios elementos y productos, mediante sus aplicaciones en

uno solo. Esta nueva forma de interpretar el actual desarrollo de productos y servicios, está basado en analizar “*lo que la gente quiere y aspira*”, así como “*el por qué lo necesita*”. Aquí cuando se habla de aspiraciones, necesidades, motivaciones, se refiere a lo que motiva a la gente a adquirir algo, lo cual va en línea con esa *dimensión inmaterial*.

Volviendo al caso de Xerox, la marca no desarrolla su estrategia desde la óptica de la sostenibilidad, sino desde una perspectiva de negocio mediante la cual pudieran mejorar sus servicios, y que al mismo tiempo esto se viera reflejado en el aumento de sus ingresos; al parecer sin darse cuenta, que ese modelo al mismo tiempo favorece la sostenibilidad.

... ahora, según el actual desarrollo de las cosas/objetos/dispositivos, la relación de los usuarios, con base en sus aspiraciones, necesidades y motivaciones, y reconociendo la existencia de ese *contexto inmaterial* y su posible relación con la sostenibilidad, es necesario preguntar:

¿La generación de menos objetos pero con más funciones, realmente estaría relacionado con la sostenibilidad?

¿Tienen los procesos actuales de desmaterialización y digitalización o informacionalización de productos y servicios, una relación con una mayor sensación de plenitud de esas funciones?

¿Cuál es la tendencia de la sostenibilidad, en relación con esa valoración de lo inmaterial?

Desde el punto de vista de tendencias, se cree que hay una tendencia hacia la disminución productos, pues anteriormente eran necesarios más productos que satisficieran -cubrieran- las necesidades de la gente, mientras que hoy en día, en algunos casos esta satisfacción se puede alcanzar con un solo producto (multifuncionales, smartphones, tablets, etc.). Lo anterior se puede traducir en que, hoy en día , “con menos productos, la experiencia individual aumenta, porque se pueden realizar muchas actividades, mediante las funciones y servicios integrados en un solo elemento”. Muchas cosas cambian de formato y dejan de ser tangibles, para convertirse en intangibles.

6. Conclusiones

A través del desarrollo de los contenidos tratados, se asume que el aporte del presente estudio, además de reconocer la existencia de un *contexto material* y un *contexto inmaterial* desde una perspectiva sistémica, es el de identificar desde la *intangibilidad*, algunos puntos clave generadores de sostenibilidad. Para este propósito, se ha analizado cómo ésta realidad del *contexto inmaterial*, que además es tendencia, puede apoyar la sostenibilidad, por el “sólo hecho” de ser características, aspectos, rasgos a los que la gente le da valor; a modo de alcanzar las expectativas y motivaciones más profundas de los usuarios, lo cual puede coadyuvar a que se demande mucho más la sostenibilidad.

Anteriormente los usuarios experimentaban una fragmentación de la relación uso-función con los productos/cosas, esto significa que un producto realizaba “una y sólo una función” por lo que eran necesarios más productos que realizaran funciones específicas; esto si se toma desde la perspectiva de la sostenibilidad significaría la utilización de más materiales y por consiguiente, más volumen y más peso; lo cual a su vez, hacía que la experiencia individual fuera menor porque estaba más fragmentada. En la actualidad se presenta un fenómeno opuesto, en donde, con menos productos se puede alcanzar una mayor experiencia individual; ya que en algunos casos sólo un dispositivo, puede abarcar un mayor número de los dispositivos, productos o elementos que en otros tiempos se utilizaban; lo cual está directamente relacionado con la sostenibilidad. Resultado de lo anterior se concluye lo siguiente:

“Hay una relación directa de la desmaterialización y digitalización o informacionalización de productos y servicios con las motivaciones (necesidades, emociones y valores) de los usuarios; en donde, por medio de una reducción de materiales - volumen y peso-, un menor consumo de materias primas y energía en producción y uso, además de la optimización funcional –entre otros–, se favorece la sostenibilidad, y al mismo tiempo componen ese contexto inmaterial que involucra aspectos emocionales de satisfacción y bienestar de los usuarios”.

Por último, aunque se reconoce una *dimensión inmaterial* que está relacionada con las necesidades, aspectos emocionales y/o valores de los usuarios/consumidores, en donde dinámicas de desmaterialización y *digitalización o informacionalización* han contribuido a la desaparición de algunos productos, mientras que otros, han evolucionado pasando de ser elementos materiales a ser elementos inmateriales o servicios, es probable que en algún momento de la interfaz PRODUCTO/SERVICIO-HUMANO, sea necesario tener en cuenta elementos materiales (p. ej. teléfono móvil, tablet, ordenador, televisor...) como medios que permitan la interacción entre el humano y el producto o servicio, así como otro tipo de conexiones (p. ej. energía, internet, datos, fibra...) que consoliden la plenitud de la experiencia y la satisfacción de las demandas, necesidades, emociones y valores de los usuarios/consumidores. Lo anterior refleja que desde un enfoque de *diseño inmaterial*, así como de dinámicas de *desmaterialización y digitalización o informacionalización* de productos y servicios, se contribuye a la reducción del impacto ambiental causado por el consumo intensivo de elementos materiales.

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Opportunities and challenges in teaching Systemic Design

The evolution of the Open Systems master courses at Politecnico di Torino

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Abstract

The contamination between design and theory of systems as a field of development of new design processes is nowadays consolidated. However, the issue concerning the methodology to apply in teaching systemic design remains an open question.

The approach adopted in the Master Degree in Systemic Design at Politecnico di Torino is based on the assumption that the teaching method must itself be systemic. Alongside designers, the degree course has involved from the very beginning experts from different disciplines (i.e. chemistry, physics, mechanics, history, economy and management) as teachers, in order to create a multidisciplinary environment for the development of projects. Born as master degree in academic year 2002-03 at Politecnico di Torino (Italy) from the close collaboration with Gunter Pauli, the course has changed name and form but not the content, until it reached the current title (a.y. 2015-16): master degree “Aurelio Peccei” in Systemic Design.

The Open Systems course has enabled students, in early years, to experiment the design of production processes. This was the case of the systemic project done with NN Europe, a company engaged in manufacturing ball bearings, in which the output management allows a positive economic impact. Over the years the course has shifted its focus from the production process of a single product to the wider company context. In 2010, the approach has been applied to the agricultural enterprise Ortofruit: starting from agricultural production, the students have defined the production system and the relationships with the market. Systemic Design, during this course, has experienced the transition from the design of industrial processes that are closely linked to the territory, and then enhance local resources, to the design of the whole territorial system.

The work done by the students of the course in recent years has led to the definition of scenarios about fields usually distant from the traditional design world. For example, the definition of the economic model, the corporate model that is built around relationships on cooperation with different disciplines.

This transition, from the product to the entire territorial system, allows the exploration of new contexts, but it also puts the designer in a complex and challenging position in according with complex theories.

Keywords: *systemic design, education, sustainability*

1. Background

Teaching, and learning, is a complex process that involve many variables with non linear accumulative effects (Dhindsa et al., 2010). The complexity doesn't decrease with the higher level of education, neither when the content of the lectures is related to the the Complexity Theories. That is exactly the case that we are going to discuss in this paper, because we analyze the educational model in teaching Systemic Design Theories and its relation with the other Complexity Theories at Master Degree level (Politecnico di Torino).

More studies bring the research-practice gap in education changing research methodologies that modify the teachers as collaborators (Krockover & Shepardson, 1995) or the teachers as researchers (Pekarek, Krockover, & Shepardson, 1996). Krockover & Shepardson, in their introduction of the *Journal of Research in Science Teaching* (1995) underlined the need of “a more holistic image of education in which researchers investigate the interplay among the learner, the teacher, and the nature of the curriculum, instruction, and assessment”. The new figure of teacher has a systemic view of schools and community, in order to develop a collaborative relationship with students.

From the classical meaning of the word education, it derived from the Latin *ex-ducere*, so “draw forth from within”. This concept emphasize the fact that the teacher should not put in information in students, but the learner build internal representations of new experiences in relation to past experiences (Anderson 1992). This kind of education was formally defined as Constructivist Learning Theory (Piaget, 1950), with its psychological applications, for axample with Bodner, 1986; Driver & Oldham, 1986; Novak & Gowin, 1984; Von-Glasersfeld, 1988. This theory is based on the active role of the learner in constructing interpretations of experience and in sharing with others common cultural experiences, in order to organize a set of informations. In that perspective, “the most important single factor influencing learning is ‘what the learner already knows’ ” (Ausubel et al. 1978). Building a knowledge in memory is strictly connected with the ability of reasoning, understand concepts, and connect them with prior conceptions. Those kind of activities are crucial for effective learning, because they require a process of setting many information at a time, which is facilitated by the organisation of prior knowledge (Mitchell & Lawson, 1988). Hence, the teaching techniques should help the students to organize their knowledge in memory and enhance learning of complex scientific ideas. The students should be actively involved in order to reconcile disparate prior conceptions with more scientifically accepted new information in order to resolve inconsistencies, represent scientific content in a conceptual way, and build the knowledge organisation (Ebenezer and Gaskell 1995; Linder 1993; Nieswandt 2001; Smith et al. 1993). Therefore, in this process in which new information are built, the previous knowledge may be subjected to transformations, such as conceptual growth or, even, change because the learner actively attempt ways to merge new insights within existing frameworks.

The Constructivist Learning Theory comes from the same theroetical basis of the more recent Systemic Design Approach, that is the content of the lectures we are going to analyse and discuss. The use of Constructivist Learning Theory in theaching Systemic Design is coherent and effective.

The complexity theories evolved on the basis of the General Systems Theory by Karl Ludwig von Bertalanffy (1968), so some of the next rationales applied this theory on different artificial systems, such as the Generative Science. This trans-, inter-, and multi-disciplinary theory explores the natural world and its complex behaviours as a generative process (McCulloch et al., 1948; Wiener, 1948). From General Systems Theory have grown ideas within diversified areas, exemplified by the ecosystem ecology by Eugene Odum (1975), the living systems by Fritjof Capra (1997), the organizational theory by Peter Senge (1990), the financial research related to human resource development by Richard A. Swanson (1988), and so on.

The Systemic Design theory considers productive industrial organization as complex adaptive systems with the same behaviour as the Nature has, where there is no waste because all the substances are used as resources by another natural reign. This approach comes from the Cluster Theory (Porter, 1990), the Industrial Ecology (Frosh & Gallopoulos, 1989) and the Industrial Symbiosis (Chertow, 2000).

The content of those theories are complex and need a large number of information already in the prior knowledge of the learner, so they were usually taught at Master of Science level of degree. At Politecnico di Torino, the academic curriculum in design has three levels, and in the first one (bachelor degree) just some theoretical basis on Systemic Design are taught, but in the second level (master degree) is totally focus on it, not by chance its name is “Systemic Design, titled to Aurelio Peccei”, and in the third level (PhD corse) the research and the learning in that topic is mixed. In that paper we are going to go in deep with the teaching and learning of Systemic Design in the Master degree because it is the most crucial moment for learners.

2. Aims and Objectives

This study aims to examine the educational model used to teach complexity theories at university training and its benefit in the professional carriers of the students in different working activities. In addition, the specific analysis on the master degree courses in Systemic Design at Politecnico di Torino is used to answer the following research questions:

- 1- the use of teaching/learning theory close to complexity approach, like Constructivist Learning Theory, is beneficial in teaching/learning the complexity theories, like Systemic Design topic?
- 2- What are the competences needed for teachers and students?
- 3- What are the tools and the techniques used by teachers in the process of new information acquisition by the learners?

2.1 Methodology

The subjects of this study were the students and professors of the Master Degree at Politecnico di Torino in Ecodesign, since academic year 2002-03, and then in Systemic Design, since academic year 2015-16. The students are about 100 per year (except for the first three years, where we can see an esponencial growing from 20 students to 80), and they are coming half from the other italian universities and half from the rest of the world with different academic and cultural background. Prior to being in the master classes, they had different academic curricula, not only in design but also in architecture and engineer. The lessons were in English despite it is the second or third language for both students and teachers. To have a complete documentation about the nature of the experimentation, we have collected data using observation instruments and students' visual mapping and reports.

The observation is made up of two components: the former is the historical evolution of the structure and content of the master courses in Open Systems at Master Degree in Ecodesign/Systemic Design (Politecnico di Torino), the latter is the actual learning model used in the lectures by different professors in the same course. The historical evolution analysis considers the wide changes in the organisation of the courses and the content of the project during the years (from academic year 2002-03 to 2015-16), in order to verify if there is an increasing of complexity also in the way to face the Systemic Design projects. The analysis on the actual learning model goes in deep on the taught methodology, in order to understand the convergence between the model and the content.

The limit related to these two observations is the absence of comparison with other courses in some other institution, but unfortunately any other university in the world has an entire master degree course lasting two years in that topic with the contribution of many disciplines. Many other universities have singular courses on Systemic Design and Complexity Theories that last one year, at maximum.

The final considerations of these two observations are enriched with the Alma Laurea's data about the rate of satisfaction of students and their rate of employment after the degree, in order to understand the real benefit in their career and what kind of information passes through the long term memory. The Alma Laurea is an Italian consortium that groups 72 universities in the Country, with the purposes of collecting the evaluation from graduates and of publishing their curricula to match with the job market. This data set is extremely interesting because it collects first hand information from the primary engaged actors and because it keeps track of time and its changes.

3. Results and discussion

The Master Degree in Ecodesign/Systemic Design at Politecnico di Torino has involved from the very beginning experts from different disciplines (i.e. chemistry, physics, mechanics, history, economy and management) as teachers, in order to create a multidisciplinary environment for the development of projects. Born as master degree in academic year 2002-03 at Politecnico di Torino (Italy) from the close collaboration with the economist Gunter Pauli, in the last year, the course has changed name and form in Systemic Design, titled to "Aurelio Peccei". This master degree was organized in 4 modules: Virtual Design, Innovation, Product Components, and Open Systems (in chronological order, once a semester). Those modules have an increased complexity in the taught contents, and especially the first one gives the basis also for the visual representation of multifunctional concepts. Each semester a single complex project should be designed by the students with the help of different disciplines, explained by different professors.

In the last years, one more module was added (Atelier inside/outside) in collaboration with the master degree in Architecture, so students can freely choose between this one and Innovation. The enlargement in the academic offer is a way for the students to define better their competences and curricula.

The Open Systems course is mandatory and it is the last course before the degree. It includes contributions in various disciplinary fields (see figure 1): Systemic Design (design), Environmental Sustainability Processes (engineering), History and theories of Systems (humanities), and Economical evaluation of projects (economics). The core teaching in this module is the configuration of a new development model (economic and social) in which the outputs of a system become input of another one (Bistagnino, 2009).

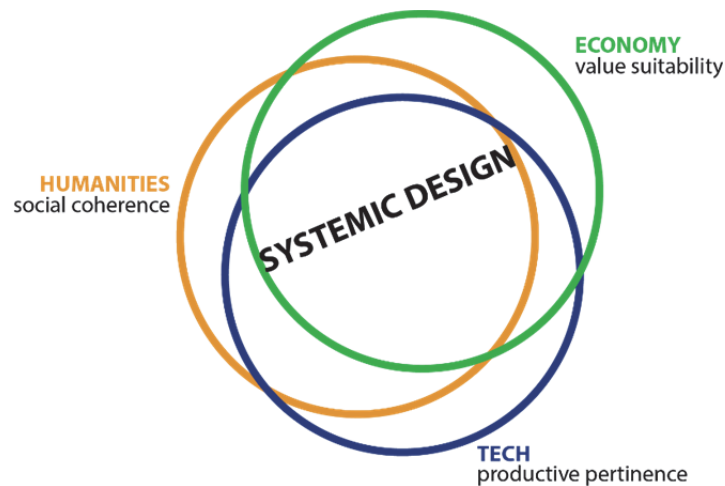


Fig. 1 Disciplines contribution to Systemic Design.

The projects developed in Open Systems module have seen an evolution in content: in early years, the students experimented the design of production processes related to single product, then of wider company context, and of industrial processes that are closely linked to the territory, and its local resources, and finally the design of the whole territorial system. The first step of this escalation was the case of the systemic project done with NN Europe, a company engaged in manufacturing ball bearings, in which the output management allows a positive economic impact. The second one, around year 2010, was the project with the agricultural enterprise Ortofruit, that has many different industrial processes and gives the chance to understand the relationships between local production and the market. The last step involves the students in the definition of scenarios about fields usually distant from the traditional design world; for example, the definition of economical model, the corporate model and other cultural paradigms (see figure 2). This transition, from the product to the entire territorial system, allows the exploration of new contexts, and puts the designers in a complex and challenging position in according with complex theories.

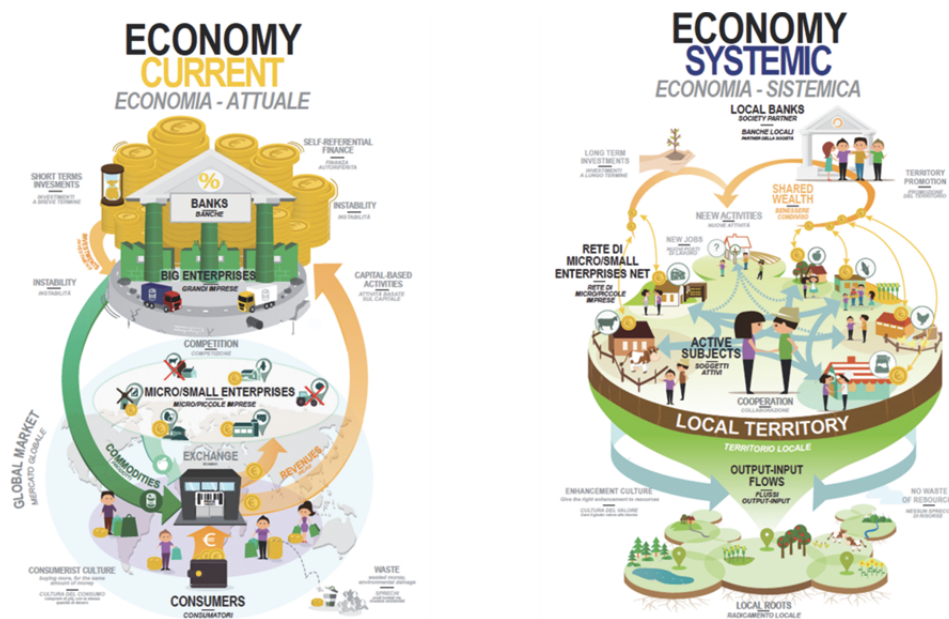


Fig. 2 Results of Open System module at academic year 2015-16 with different cultural paradigms.

The methodology taught and applied in Systemic Design project consists of a preliminary Holistic Diagnosis, the definition of design eco-guidelines, the systemic design project and its implementation. The Holistic Diagnosis considers natural, anthropic, social and economic aspects of a context and it is organised in three steps (see figure 3):

- 1- desk research on Existing information, with a mix of quantitative and qualitative data (from database, statistics, reports, case studies, scientific reviews, general readings, to social media);
- 2- field research to Integrate information, with a mix of quantitative and qualitative data (from data recording, mapping, case studies analysis, survey, perception, to empathy);
- 3- research synthesis with Information Design Visualization, in order to have the data correlation and its visualisation, the list of criticalities (needs, problems, etc.) and the lists of potentialities (resources, etc.)

The first two steps derives from the theories of Celaschi and Deserti (2007) about the combination of desk and field research in design processes; especially the reiteration of these two steps is marked by the gap analysis and the visual framing in order to fulfill all the information needed to complete the holistic diagnosis. The crucial function of visualisation will be deeper faced later on in this paper.

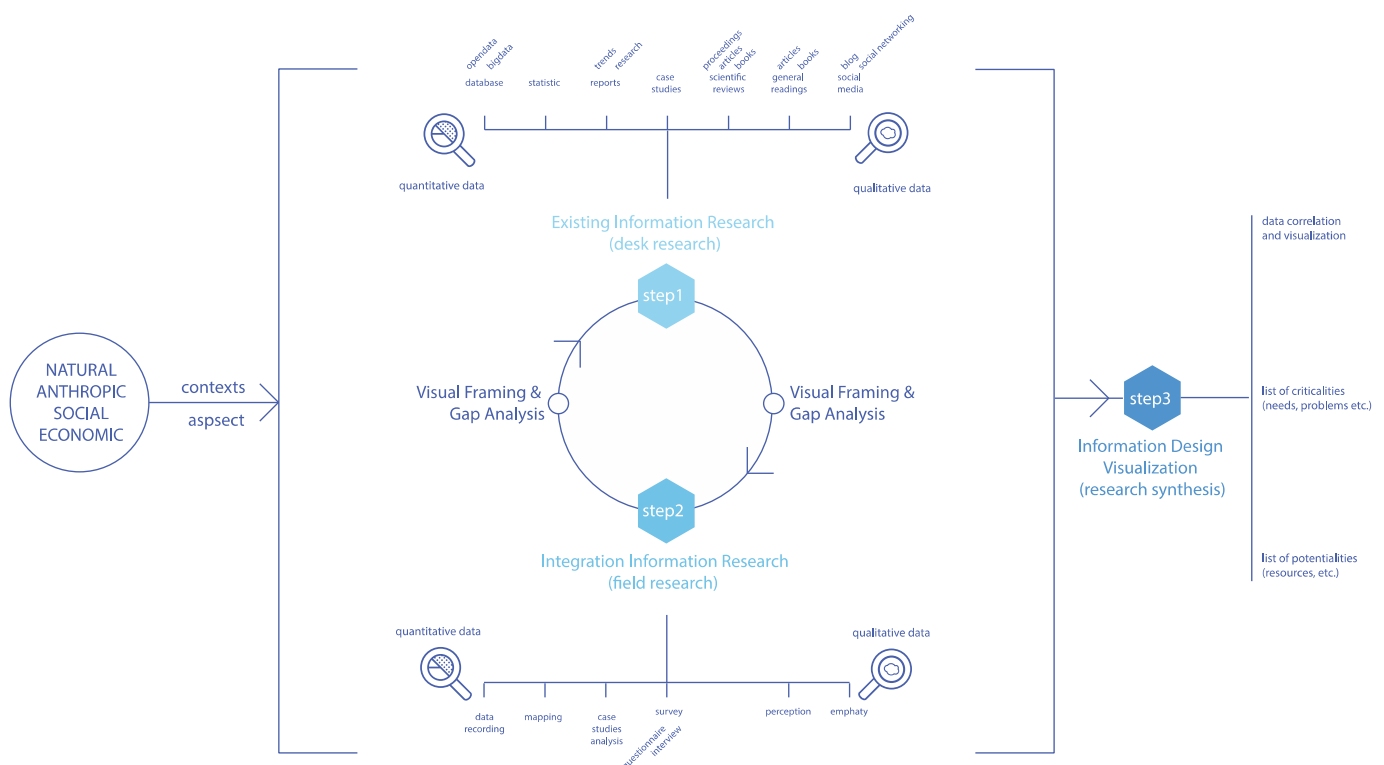


Fig. 3 Results of Open System module at academic year 2015-16 with different cultural paradigms.

With the complex data visualised in different maps and lists that underlines criticalities and potentialities, the designers can gather the design eco-guidelines in order to start the design of the entire system. The goal of the design phase is to optimize all the energy and material flows in the system and to valorize all the waste as resources, in order to obtain zero emissions. The last phase is the implementation of the system with the realization of the system in the specific context and the evaluation of the feasibility of

new business plan. The implementation of the project gives a lot of new input to improve the project and let it autopoietic (Maturana et al., 1972).

During the lectures, students are challenged by new experiences that require them to rethink their understanding based on scientific evidence from past experiences. The work is organised in small group in order to foster contrasting ideas, encourage reflection on experimental data, and motivate them to evaluate again and again prior ideas in relation to emerging evidence. In this way the students are forced in a conceptual change process where the brain actively interprets new experiences based on the mobilization of stored information in memory as a framework for the new knowledge construction (Anderson, 1992). One of the crucial aspect in the development of the lecture is the use of visual mind mapping by the students, every time new information and concepts come out. This is a technique of representing knowledge by organizing it as a network or other non-linear diagram incorporating verbal and symbolic elements. In general, this technique is consistent with modern constructivist approaches to learning, and emphasize the active involvement of the learners who utilizes existing knowledge structures to construct new knowledge by inter-relating new content with existing knowledge in memory. Longo, Anderson and Wicht (2002) demonstrated how this technique helps the students to organize their knowledge and make it more salient in long-term memory, compared to the more traditional lecture-centered format of teaching. Mind mapping teaching techniques, compared to some traditional methods that emphasize “knowledge transmission from expert teacher to novice students,” are more student-centered and involve students’ active participation in the learning process. During discussion, students were encouraged to share ideas and reach an agreed-upon structure for the organisation of their ideas, and to fix them in visual maps. In such a student-centered learning environment, the students have a crucial role in the organisation of learning activities, in order to build a more effective and efficient set of new knowledge. However, a limited number of organised lecture presentations are included, assuming that the teacher has taken care to determine the prior status of the students’ learning and to engage them in multi-modal learning activities. The quality of information organised in students’ cognitive structures help them to reconstruct correct information quickly and to accurately answer questions during discussions and examinations. Thus the constructivist-visual mind map teaching approach may enhance more broadly students not only in academic performance, but, better, in solving problems in daily life.

Recovering the data from Alma Laurea, we can say that this Master of Science is dense of contents, so generally students take a little more time than the conventional 2 year to reach their degree. However, the final score is high, on average: about 30% students gain the 110 with honors. Furthermore, the data shows a good interection between students-professors, with highest rates about the satisfaction of students in the availability of teachers (83%). A very positive rate is given to the general satisfaction of the degree course, with the 88% of positive answers and the 63% of the graduates that state their wish to sign up again in the same master degree. To confirm this data, we have done a cross-evaluation with the data collected in “Comitato Paritetico per la Didattica” (CPD) Questionnaires by Politecnico di Torino, supervised by the internal Joint Committee for Education. In those questionnaires the students reveals the high utility in attendance the educational activities for learning purposes (64%).

Reflection on learning outcomes and market demand is mirrored in the results of the consultation with the professional members of the Consulta, that confirmed the validity and effectiveness of the Master Degree as a whole. About the employment status, one year after the graduation, the 73% of graduates work in the systemic design field.

4. Conclusion

We would like to especially underline that the consistent use of visual maps in a constructivist teaching environment significantly improves information organisation in students' cognitive structures. The students of the master degree in Ecodesign/Systemic Design are exposed to a constructivist teaching and learning environment, because they are actively engaged cognitively and operatively in reflectively processing information that is presented in a way that encourages the learner to relate new knowledge to prior existing knowledge in memory. The theoretical advantages of using mind maps in learning is partially rooted in scientific evidence that early visual processing systems of the brain categorise visual input into constructs of colour, shape, location and motion (Ungerleider 1995). Prior published research has documented the validity of using flow-mapping as a representation of knowledge organisation and its effects on science learning outcomes (Anderson and Demetrius, 1993; Dhindsa and Anderson, 2004). This technique also has been successfully used in a number of studies involving constructivist teaching to obtain evidence of students' cognitive structures. The benefit of using visual maps is blown for that reason the first module of the Master degree is in Virtual design.

Evaluating the results explained in previous paragraphs, we can say that the Master Degree in Ecodesign/Systemic Design at Politecnico di Torino, really embodies the complexity theory also in teaching models with the adoption of Constructivist Learning Theory, and it achieves with the practices the real sense of project. The term project derives from the Latin words: pro-jacere, so throw forward. Looking at the projects done every year by the students, we can see how their contribution to the community is very broad and pitches the next twenty years.

In the end, we can conclude the graduates are open and willing to express critical opinions towards the subject, ready for negotiations. These results suggest that the cognitive structures of master students are extensive, robust, and interconnected.

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Fixed, liquid, fluid. Rethinking the digital design process through the ecosystem model.

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Abstract

According to the visions and conceptualizations from philosophers to design thinkers such as Habermas, Maturana & Varela or Levin, the design applied to digital artefacts, products and services —due to the convergence of media, deceives and technologies— is becoming even more a bio-sphere, or, with the words of Vernadskij, a Noosphere. The cultural shifting is represented both in the process side and in the approach to the whole design materials and outcomes. On one hand, the organizational structure is moving from an “industrial” approach characterized by a waterfall-process —organized in subsequent structured phases— to an iterative activity —that cycle among ideation, prototyping, testing assessing and redesign phases before to implement and release a project— to the agile and lean approach of the information-era in which the project itself persist constantly in a work-in-progress status —where updates have replaced new releases. On the other hand, the object of the project itself is deeply changing according to a vision of a digital ecosystem and consequently to the design approach that is moving from a fixed —a two-dimensional page borrowed-model— to a liquid, then fluid solutions beside the divergences of media and devices and the convergence of user context and experience. Paraphrasing Maldonado we’re moving from virtual to real, from intangible to tangible, from the web to intelligent environment, both digital and physical. In this hybrid space design plays its challenge to change process and purpose embracing both a traversal and a deep approach to single elements and the eco-system in its wide complexity. Nevertheless this transition implies design to face with the challenges of emerging and upcoming phenomena: the designer education —skills, competences, methods— in an hybrid context, the anthropological mutation brought up by the new generation of digital natives and finally the social impact and emotional implication of the confluence of virtual and real experience —mediated by technologies— that people live in their daily life.

Keywords: digital ecosystem design, fluid user interface design, user centered-design, mobile user experience design, agile design methods.

1. Converging phenomena and centrifugal forces

The traditional interactions, which people could experience with the different communication channels, were *naturally* linear until a couple of decades ago. The user has started doing and finalizing the tasks always in the same media channel, choosing from time to time which one was more suitable according to a multi-channel services offers. This *multi-channel* approach has been overtaken by a *cross-media* as clarified by Rosati (2011) in a post related to *pervasive architecture*.

The participative evolution of users' interactions enabled by the web 2.0, the wide diffusion of social networks, the digital mutation of communication mass-media, sets the scenario in which happens a cultural *migration* defined by Jenkins (2006) as *convergent culture* or *trans-mediality*. That means a *flow* of contents coming from different platforms, cooperation among many different sectors of the media industry and the migration of the audience looking for new entertaining experiences.

However, Jenkins perspective lacks on *media* according of the conceptualization of media as a *tool*: “*Medium* can be seen according to an ambivalent point of view. On one hand it could be a *tool* on the other a *way/manner*. Computers themselves are ‘*meta-medium* able to simulate others, but their essential is also the *universality* the ability of simulation’ (Polillo, 1993). According to this idea, the computer — extensively the digital support and languages— is a medium, but rather a tool that mean the designer operating field who designs the modalities of access and interaction between the user and information.” (Bollini, 2004: 60).

The debuts of the first Phone presented in 2007 *broke* the digital scenario, at that time *monolithic* —based on web predominance. The revolution of an integrated and mobile experience based on cloud-services introduces many variables impacting on the design process, framework and complexities. Communication becomes not only cross-channels but multi-devices too. People initiate a task using a specific device in a coherent context —for example in the subway during commuting time going from home to workplace— then they prosecute the started process using another device —when arrived in the office with a desktop computer. And finally —at the end of the day, lying relaxed on a sofa, watching TV —they finalize the order or control the status using a tablet: a totally different context compared to the one in which they began the process.

The experiential scenario could be so over-crowded of devices, interactions and activities acted at the same time, that we could talk about a systemic-environmental-multitasking to underline not only the simultaneity of the actions but also the social and structural contextually of the experience.

The user is no more asked to choose the most suitable device to complete a task, rather he/she access, disconnects, starts over the process from the last completed step, although in another context. The interaction moves therefor —also as a design focus—from the interface space to the different *access-points*, which —if transparent— allows the user to go in and out from different context and devices without perceiving any discontinuity.

The concept of *transparency* firstly introduced by Gui Bonsiepe (1993) to define one of the highest qualities of the Graphical User Interfaces, now is extended to the whole experiential system as a synonymous of the lack of *friction* cognitive.

Design, too, should be accountable for this activities and contents migration in a segmented and multifaceted scenario of interactive tools becoming the unifying factor for the user experience. The process itself should face, at its first beginning, the need to *integrate*, *consolidate* and *decline* the communication issues, the uses of information and services in the different users' case and scenarios, social, and media situation.

2. The digital ecosystem

Already in the crossroad from paper and traditional communication media —off-line— designers have been manage a radical, conceptual change of consolidated paradigms and praxis, layered and established in the secular history of writing, publishing and advertising, that means in the culture of the dimensional *mise-en-scene*.

The mutant format, compared to the fixed measures of physical supports, the weak control and the poor expressive possibilities given by screen-typography, the many different and *crazy* displays results — although the same design and front end development sources— limited by platforms' standards, browsers releases; the low quality of the images and the poor resolution of the displays and saving-formats —only bitmaps that means *lossy*— are just some of the critical transitions that designer have been facing the first transition *from paper to web* —according to Zelman work (2001)— now become standards them selves to plan and project a web interface and site.

The introduction of mobile devices, smartphone in 2007 and tablet in 2010, the family of tool to access the web, Internet services has become wider and differentiated increasing user scenarios, the social interactive flow along the everyday life time.

The design challenge is doubled: on one hand, design must face and solve the parcelling of interaction environments; on the other hand it should be able to unify the user experience.

According with the *state of the art*, the cultural debate too, is no more discussing of the project of a single communication artefact —the web site, the mobile app and so on— but rather of *digital eco-systems*. That means an interconnected system, in which single elements that are part of, interact among themselves and with the environmental context.

The *naturalist* metaphor applied to the phenomenological digital world seems to refer to the *Noosphere* conceptualization firstly introduced by Verdnaskij (1926) as the highest form of evolution of the biosphere and the human intelligent system in which some authors have already identified the *collective intelligence* then enabled by the Internet. The promising outcome of this comparison between technologies and the natural environment gives both a systemic vision of the phenomena coming also from the idea brought up by Maturana and Varela in their research work *Tree of Knowledge: Biological Roots of Human Understanding* (1984) and then adopted by Maldonano; and a *gestaltic* the approach whereby the whole is more than the sum of its single parts.

As underlined by Levin, the design issues is not to duplicate the same experience —often in a simpler manner— in all the devices enabling a “everything, everywhere, anytime” access, but rather to dynamically catch the user needs and context associated with the cross-migration from a device to another. The challenge is to focus on “*right thing* at the *right place* at the *right time*” in a context-driven perspective (Levine, 2014: 3) shifting to a new method which pillars are the “3Cs framework: *consistent*, *continuous*, and *complementary*”. The focus moves from technology, to people, the devices that they own, in *this* moment, in *this* context to execute a specific task.

3. From waterfall process to spiral model

The design process has been deeply influenced by this shifting from sectorial —industrial, product, graphic, multimedia, web and so on— approach to an eco-systemic perspective.

The referring point is no more a matter of scale —as stated by Rogers *from spoon to the town*— but rather a matter of focus, moving from the *object* both physical and virtual and its productive process to people and the experience that they would do of it in a *user scenario* to satisfy their explicitly and implicit needs.

The turning points are two and they referee to different level of design culture: the first pertains the subject of the design process and its out put —a unit, and artefact related to the whole ecosystemic world of the user and his/her needs in a specific context as previously described in tis paper— the second is a consequence of it. That means how the design process itself is redefined at its core to give answer to this new requirements in a progressively, accelerated and on-going changing of requirements and technological scenarios.

The project praxis was originally borrowed by the Tayloristic *assembly-line* model also due to the strong connection between design contribution and production process, just to mention the original label give to the discipline of *industrial design* according to the critical and historical evolution well synthetized by Maldonado in *Disegno industriale un riesame* in 1976. The design work was organized according to the so-called *waterfall process*. The whole project was structured along a linear sequence of phases, starting with analysis and requirements, going through concept, design, development and release. Each phase have a starting and ending date and specific documentation expecting to be transmitted to the next team. Often competences too are segmented in homogenous working group each one focalized on a limited part of the project itself and rarely able or involved from the beginning to contribute to the *big picture*.

Although this is a generalization of the waterfall process it is not so far from is more orthodox application.

This kind of approach implies a well-fixed goals; stable in time; expected out put and a very strong time management able to face with the unavoidable delay, change of course and *entropic* phenomena. Moreover it is only applied to project which outcomes have a significantly long-term life cycle due to the time-consuming effort of the whole process; otherwise it risks to deliver irrelevant *objects* by the time the project is finished.

But in the last two decades the world of design —both material and digital— has been deeply impacted by new phenomena: a wide acceleration of technologies evolution; a raising and fall of artefactual and production issues and praxis; the pollution of electronic and digital devices; virtual and augmented reality; Internet of Things where products and internet are converging; mobile revolution; *wearables*; smart-whatever and intelligent environment; auto-productions, *industrial* mini-series; *digital* art and crafts; makers movement; fab-labs; 3D-printing; robotics and automation; just to mention the most relevant emerging trends. Under the pressure of such disruptive impact the *fixed* and structured approach to design process have been radically modified moving from the sequential *flow* to a more iterative *loop*.

The introduction of the user-centered design approach in the '90s as an essential requirement in design field has forced to interrupt the linear step by step process to insert user testing and assessment activities and subsequent redesign and release circles. This kind of conceptual framework was firstly introduced by Lehman in IBM as *The Programming Process*: “The design process is [...] seeded by a formal definition of the system, which provides a first, executable, functional model. It is tested and further expanded through a sequence of models, that develop an increasing amount of function and an increasing amount of detail as to how that function is to be executed. Ultimately, the model becomes the system.” (Lehman 1969).

In more recent times —2001— in the field of coders and software the core principles of the *agile* approach were defined and declared in the *Agile Manifesto*. This working method is developed and carried out by small teams which “that deliver real, working software at all times, get meaningful

feedback from users as early as possible, and improve the product over time in iterative development cycles. Developing software in an agile way allows developers to rapidly respond to changing requirements. Agile developers believe that where uncertainty is high there is no such thing as a perfect plan, and the further ahead you plan, the more likely you are to be wrong.” (Beck 2001)

The agile approach seems to fit perfectly the *liquid* state of the art of the design discipline in the crossroad of material, digital and virtual instances. It guarantees shorter time phases (one to two weeks) and smaller deliverables in a more controlled and verified design-testing-development cycles. At the end of every single project iteration features released —called story— have already been tested and assessed with users: “This means requirements can change quite frequently through development. Along the way, refactoring takes place from time to time in order to ensure that features fit together into a single cohesive application. [...] At times, it will be necessary to jump out of the iterative flow and examine the whole system for congruency. Do components fit? If not, why? As you work through these potential problems, keep in mind the scope of your iteration and deliverables.” (Anderson 2011).

Although *Scrum* is specifically an *iterative and incremental agile software development framework* (Verheyen 2013) for managing product development, it suggests a further develop of design processes. It defines “a flexible, holistic product development strategy where a development team works as a unit to reach a common goal, challenges assumptions of the ‘traditional, sequential approach’ to product development, and enables teams to self-organize by encouraging physical co-location or close online collaboration of all team members, as well as daily face-to-face communication among all team members and disciplines in the project.” (Takeuchi & Nonaka 1986).

4. Releases vs. evolution

So, if the traditional approach to digital design evolution was a constant and accessible development for the *worst case scenario* in terms of infrastructure, OS and browser versioning and compliancy with recent W3C standards, monitors dimensions and resolutions, in 2003 at SXSW Steve Champeon and Nick Finck gave a speech titled *Inclusive Web Design For the Future* presenting the concept of *progressive enhancement* a reversed approach in front of the previous *graceful degradation*. A basic mark-up document is created, geared towards the lowest common denominator of browser software functionality, and then the designer adds in functionality or enhancements to the presentation and behaviour of the page, using the news technologies (Gustafson, 2008)

The remarkable voices and advocate of web standards such as Jeffrey Zeldman, Andy Clark or Molly Holzschlag slightly move from an orthodox and retrospective position to the new approach of *evolutionary* process become nowadays the standard in design and development work.

As well exemplified by the Facebook strategy, the progressive enhancement has become the standard *de facto* in upgrading main software platform and their interactions with the people. Facebook definitely went over successive releases when approaching the mobile development. If the first adopted strategy of disruptive turning point in its evolution were caused as well by marketing or re-branding radical changing —as happened in 2005 with the complete redesign of the user interface and experience realized by Aaron Sittig, the first graphic designer hired in FB or the to develop the *Facelift project* (Bret, 2011)— the last evolution were *smooth* and progressive after a couple of years FB were becoming a *platform* and facing the mobile revolution.

The last discontinuity has been the introduction of the *timeline* loudly disclaimed long before it becomes the new standard visualization of the post streaming. Initially people were invited to adopt the new

display model to familiarize with giving the opportunity to go back in the previous *wall* until the deadline announced. When FB *went mobile* —mobile access have widely overcome the other access models— the evolution of the interface and of the interactive patterns are frequent but always partial and progressive. Small innovations allow the users to slowly adopt changes almost without noticing them and reshaping and rearranging small parts of their mental models instead of the whole picture, once, with a strong and shocking effort.

5. From real to virtual and back

If in the late '90s the reflection about the impact of electronic and information technologies on artefacts was focused on the miniaturization and virtualization of objects, nowadays the tendencies are both convergent and divergent.

On one hand a large number of the specialized equipment —such as computers, phones, calculators, photo and video cameras, watches, TVs, walk-man, Hi-Fi etc.— are collapsing in few single, multi-function portable devices —the smartphone above all— on the other the world around us is becoming *smart* and intelligent, able to directly interact with us and our personal digital *appendices*.

Apparently miniaturization has a threshold limit —dimensions of components and physical ergonomic measures of our bodies— virtualization has not. Information technologies are still migrating from objects to the environment and moving from specialized tools to everyday objects: supermarket shelves, ephemeral exhibition and museums, cars, appliances and the domestic landscape, the bookshelves of libraries and the books —the reading machine become virtual both in its physical form and conceptual content.

Paraphrasing the Maldonado work about *Real and virtual* (Maldonado 1994) we can now moving back from virtual to real, but with the deep difference, that this dichotomy, on the contrary, is now recomposing. Digital is a layer covering and embedding itself inside the artefactual landscape making neutral object interactive and able to begin a dialog with us mediated by our personal devices in a transparent manner. An insight of this anthropological change is given by Sherry Turkle, who firstly investigated the perception, the psychological effects and the impact of real and virtual life. According to her research and critical work we can emphasize how digital technologies are “more than just a tool, but part of the everyday personal and psychological lives [...] Technology catalyzes changes not only in what we do but in how we think.” (Turkle 1995)

The ecological and systemic approach, therefor, is not only a matter of devices, media or channels among which the user migrate and switch from time to time according to his/her needs, but has also a cognitive and social meaning. Personal interactions bot in the physical world and in the digital sphere leave meaningful traces and *real* experiences in the intra-psychological life of people giving rise, in turn, to an *emotional* eco-system.

6. The cross-boundary flow of hybrid design

According to these new issues raised in the design practices the discipline itself needs a theoretical reshape and an open debate on its boundaries and challenges. The project culture is asked to open its competences to other field such as Information, Communication and Digital Technologies, Computer Science, Software Development, Coding, mark-up and scripting —digital tech side— Cognitive Psychology and Ergonomy, Sociology, Ethnography and User Research Methods —humanities and social

science side— Information Architecture, user-centered and co-design and so on. This new vocational openness means a structural, conceptual, methodological hybridation. Knowledge, theories, skills traditionally divided among specific fields must combine and melt together as stated in the *Manifesto ibridi* (Giacoma, Bocchi, Damiano & Casali 2012) when explaining the trans-disciplinary attitude: “Hybrids are those people, situated in the most various professional, cultural, and scientific pathways, who are able to connect traditionally separated fields of knowledge and action” according to the four pillars of the new design challenge: *complexity, acceleration, interaction and mind*.

On the other side, design disciplines must converge towards the focus of their own specific conceptual core, contaminating themselves across the several *souls* and languages.

Therefor design should face with the mutation of culture in itself as well described by Baricco in the essay *I barbari* —or a hybrid pamphlet published on a daily newspaper before to become a book in 2006— from a *vertical* culture —intended as a meaningful *diving* in the depths of knowledge— to an *horizontal* one —represented by *movement* and *shifting* among superficial experience to another. Despite the skeptical vision of the author, this two axis well describe the attitude that next generation must develop to be able to face the future challenges. A mutation that is atropological.

In less than ten years a new generation of students and then designers will begin to replace the *digital migrant* pros. Millenials or *digital natives* will bring in this world a different point of view. They will be the first generarian both of users and professionals to be born in the digital era. According to the definition given by Perkins (2001) they are identified as a *new group* born after 1985 grown up with digital technologies such as computers, Internet, mobile phones and MP3s already naturally familiar with digital technologies and devices. As reported by Schmidt and Hawkins (2008) in their recent paper *Children of the tech revolution* what is changing are the values, the way they interact with the world and how they connect socially to each other. Richard Watson in his *Future files: a brief history of the next 50 years* (2010) particularly stress the way how their digital attitudes embed and raise soft skills and social values based on multi-play computer gaming, collaboration, leadership, co-operation and problem solving skills.

They are also an information-intensive generation: always connected to internet, accustomed to free access to knowledge sources such as wikipedia, news, freeware software or on line SAAS (software as a service). Generation Z and Millennials have also a strong attitude to sharing culture and collaborative relation not only in terms of collectivization of emotion and competences thru the revolution of web 2.0 —just to mention the huge amount of tutorials, peer reviews, free lessons and resources available on Youtube or forums and Q&A groups produced and distributed both by pros and amateurs— social networks, MOOCs and peer-to-peer platforms.

This will be the cultural and social context in which it would be possible to reform and develop a new, open, hybrid and eco-systemic design culture firm and deeply rooted in its traditional basic principles and at the same time open to the material and technological evolution, not yet foreseeable but already certain.

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El Diseño adaptado al entorno de la Industria Cultural y Creativa

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Resumen

Los modelos de desarrollo tradicionales distan de la realidad de los tiempos modernos y se limitan ante nuevas posibilidades de cambio; por lo cual, las tecnologías y sus usos deben flexibilizar los procesos dando paso a un entorno proactivo que va de la mano de los integrantes del sector industrial y sus características. El desarrollo de las Industrias Culturales y Creativas [ICC] debe surgir en entornos fértiles donde las políticas, los profesionales especializados, el acceso a la tecnología, la innovación, las líneas de financiamiento y el mercado sean adecuados.

Las empresas conscientes de su entorno y de su evolución son capaces de adaptarse a nuevos escenarios, formas de producción y nuevas tecnologías para diversificar sus líneas de productos y hacer un control más eficiente en los procesos, desperdicio de recursos y la sustentabilidad. Por tanto, es necesario definir las características de una visión de mercado e industria que se proyecte a futuro, y donde el diseño desarrolle, coordine y gestione los proyectos de diseño aplicados a emprendimientos de carácter cultural y creativo.

El paso natural de la industria a modelos flexibles donde la interconexión a través de redes, la comunicación entre personas y los objetos que nos rodean a través de la nube, genera muchas posibilidades en cuanto a productividad e innovación que mejoren la calidad de los productos o servicios y reduzcan el gasto en recursos y tiempo; por otro lado, el acercamiento del consumidor al proceso creativo viabiliza un enfoque personalizado de soluciones a problemas puntuales y una mayor satisfacción. Las empresas de menor tamaño pueden beneficiarse con los nuevos modelos de negocio, donde la interacción con otros sectores manufactureros o de servicios puede generar una gran red de trabajo adaptado a segmentos y necesidades específicas, para luego reconfigurarse y direccionar su producción a otros segmentos y públicos si así lo amerita el cambio constante del mercado.

Palabras clave: *diseño, empresa, Industrias culturales y creativas, tecnología, transformación.*

Abstract

Traditional development models are far from the reality of modern times and are limited to new possibilities for change; therefore, technologies and their uses should be more flexible processes leading to a proactive environment that goes hand in hand with members of the industry and their characteristics. The development of cultural and creative industries [ICC] should arise in fertile environments where policies, specialized professionals, access to technology, innovation, financing lines and the market are adequate.

Conscious companies in their environment and their evolution are able to adapt to new scenarios, forms of production and new technologies to diversify their product lines and make more efficient process control, waste of resources and sustainability. It is therefore necessary to define the characteristics of a market vision and industry that is projected in the future, and where the design develop, coordinate and manage design projects applied to projects of cultural and creative character.

The natural step in the industry to flexible models where interconnection across networks, communication between people and objects around us through the cloud, creates many possibilities for productivity and innovation to improve the quality of products or services and reduce spending resources and time; on the other hand, the consumer approach to the creative process makes possible a personalized approach to solutions to specific problems and greater satisfaction. The smaller companies can benefit from new business models where interaction with other manufacturing or service sectors can generate a large network of work adapted to segments and specific needs, then reconfigured and direct their production to other segments and public if warranted the changing market.

Keywords: *design, business, Cultural and creative industries, technology, processing.*

1. Introducción

Las ICC como emprendimientos deben surgir de la mano de múltiples sectores, cuya estructura debe ser acorde a las posibilidades actuales y oportunidades futuras en un entorno cambiante. El diseño debe integrarse en cada empresa tomando en cuenta las características que configuran a cada sector de las ICC¹², pero también debe prever la evolución de esos entornos en aspectos como la tecnología, la comunicación, los procesos, y estructuras organizacionales. El camino a seguir debe ser labrado con las bases necesarias para su crecimiento; la innovación y calidad como base para la competitividad son herramientas que permiten la entrada a los mercados globales; por su parte, el diseño es partícipe de esta industria, aporta desde la creatividad y la gestión de proyectos de diseño al desarrollo de los sectores que componen las ICC.

¹² Los sectores de las ICC son: patrimonio cultural y natural; artes visuales y artesanía; presentaciones artísticas y celebraciones; libros y prensa; medios audiovisuales e interactivos; y, diseños y servicios creativos. Unesco (2011, p.19)

2. Entorno donde se desenvuelven las ICC

Son diversos los temas que aportan en la conformación de un entorno favorable para el desarrollo de las ICC; la relevancia de cada tema dependerá del aporte que éste brinde al desarrollo de emprendimientos culturales y creativos; en este sentido, cada Estado y su gobierno debe proponer políticas que marquen pautas y tracen el camino para el desarrollo productivo, el apoyo a la cultura y a la creatividad. Solo con un marco de acción claro y viable, el diseño puede actuar y poner en marcha acciones y proyectos en beneficio de una industria en crecimiento.

Según UNESCO (2011, p.14) son seis las acciones de apoyo a las ICC:

2.1. Competitividad e Innovación

La mejora en las líneas de productos, sus procesos de producción y la necesidad de las empresas de ser flexibles y adaptarse a las exigencias actuales, son factores que las obligan a ser más competitivas. Los procesos, materias primas, la imagen, la función del producto, el enfoque hacia el público y mercado, etc., son factores a considerar al momento de lograr la competitividad; y esto se puede alcanzar desde una nueva visión de la empresa apoyada en la innovación creativa. En este sentido la UNESCO (2011) indica que el valor atribuido al producto o servicio para su comercialización ha pasado a ser un factor emocional, con importancia en cómo se lo comunica y lo que expresa en un proceso de vínculo con el consumidor (p.104). En este entorno innovador y creativo toma mayor fuerza el consumidor como parte activa del proceso; por lo que, los esfuerzos en innovación de los productos y su comercialización deben sustentarse en estudios de necesidades, gustos, tendencias e incluso se puede llegar a procesos co-creativos de diseño que integren diferentes fuentes de aporte como especialistas en otras áreas de conocimiento y los mismos usuarios.

2.2. Recursos Humanos y Formación

Las ICC al estar compuestas de múltiples sectores con diverso enfoque y origen, necesitan cubrir las distintas actividades derivadas de esta industria apoyándose en profesionales especializados que brinden el soporte e ideas que pongan en valor la creatividad y la cultura. UNESCO (2011) prioriza la necesidad de formar a emprendedores, creativos, gestores públicos y privados; y para esto, se debe tener claro el panorama de oportunidades, potenciales y capacidades que pueden desarrollarse; así también, las necesidades del contexto cambiante deben enfocarse principalmente en las especificidades de los actores de esta industria y otros factores como lo social, el estado, estrategias y nuevas tecnologías (p.76). Ante este cúmulo de profesionales relacionados a las ICC, las universidades y centros de capacitación deben buscar construir el mejor perfil para formar individuos capaces de afrontar retos modernos, crear oportunidades y tener una visión global de futuro.

2.3. Infraestructuras e Inversiones

El medio donde se desarrollen las ICC debe ser adecuado para dicha actividad, ya sea enfocada en la creación, producción, promoción, comercialización; o cualquiera de las actividades propias de la industria, de las actividades complementarias y actividades relacionadas; que deben ser parte de una red de interacción y apoyo que permita su crecimiento. Para la UNESCO (2011) se requiere de instalaciones y equipos, talleres, espacios públicos, espacios de comercio y una logística e infraestructura administrativa que lo organice; es necesario un orden y planificación para lograr sinergias entre sectores productivos o clústeres y ser accesibles para todos los interesados (p.96). De esta necesidad han aparecido

distintas iniciativas como las denominadas ciudades creativas¹³, estos modelos de desarrollo urbano basado en las ICC se han convertido en centros de cultura y creatividad donde se desarrollan actividades conjuntas con otros sectores como el turismo o la gastronomía, esto permite acercar tanto a ciudadanos como a foráneos para lograr interés y apoyo hacia el sector cultural y creativo.

2.4. Financiación

El apoyo económico es vital para esta industria, al conformarse de sectores emergentes o históricamente poco apoyados, es fundamental realizar un cambio en la perspectiva de apoyo a los emprendimientos asociados a las ICC; para lo cual, se debe fomentar políticas que se encaminen a generar líneas de crédito flexibles y ajustadas a las características de esta industria. Esto lo evidencia la UNESCO (2011) al manifestar que las ICC carecen de acceso a crédito debido a su alto nivel de riesgo, ya que su principal capital, la creatividad es considerada un intangible; esto limita el crecimiento de empresas, el desarrollo de proyectos y la creación de suficientes propuestas que sean atractivas hacia los mercados (p.86). El estado es el llamado a controlar esta situación con estrategias que promuevan el incentivo y apoyo por parte del sector financiero, en especial a las medianas, pequeñas y micro empresas.

2.5. Marco Normativo

El ámbito normativo debe ser entendido a nivel local con el fin de establecer oportunidades e igualdad para todos; pero también se debe proyectar hacia afuera, y es en ese entorno global donde debe existir equilibrio con las normativas internacionales fomentadas por organismos a nivel global o regional y que tienen la adhesión de varios países. Al respecto la UNESCO (2011) plantea que la necesidad de un marco normativo adecuado y obligatorio para todos los actores involucrados es una condición para el desarrollo de políticas de fomento que sean eficaces; además se necesita una integración con otras normativas relativas a la producción, los mercados y la distribución que influyen también en el desarrollo de las ICC, debiendo adaptarse a esta industria donde su materia prima, la cultura y la creatividad son intangibles (p.68). Contar con reglas claras para las ICC constituye un respaldo al asegurar las condiciones que les permitan desarrollarse y lograr los objetivos trazados.

2.6. Desarrollo de Mercados

El objetivo de las ICC para posicionar sus productos y servicios es llegar a los públicos de los mercados internos y externos. UNESCO (2011) afirma que el éxito de la oferta de las ICC depende de su aceptación por parte de los consumidores, ya que su incipiente paso por el mercado sería un fracaso económico; pero la clave se presenta en el momento de generar una sociedad que valore lo propio con el fin de fomentar una identidad que debe ser asimilada desde adentro para que sea creíble externamente (p.112). El trabajo es conjunto; la sociedad, los creativos y el estado deben proyectar una idea o concepto de identidad creíble en torno a la amalgama de sectores que conformen la ICC; que sea apreciado y consumido internamente, para llegar posteriormente a potenciales mercados internacionales.

El entorno macro donde se desarrolle esta industria debe ser el resultado de una apuesta elocuente con la realidad del país, región o ciudad donde se desarrolle, no se la puede entender como una estructura que se puede copiar de otras experiencias; será necesario un mapeo de los emprendimientos culturales y creativos que permita entender que sectores existen, cuales son los potenciales sectores a futuro, cuales son las fortalezas y debilidades, así como las particularidades de los sectores y actores que formaran esa industria.

3. El entorno empresarial

¹³ Según Unctad (2010, p.40) Las ciudades creativas son “un conjunto urbano donde las actividades culturales de diferentes tipos son un componente de la economía de la ciudad y funcionamiento social”

Al diseño como función de la empresa se lo debe enfocar desde su posición estratégica para el desarrollo de proyectos e innovación; para esto, se debe entender primero como es que la empresa debe manejarse con su entorno. Tasma y Loeb (1998) hablan de un cambio surgido en 1997 que nos traslada de una civilización tecnológica e industrializada, una civilización de flujos y la inmediatez, donde el individuo tiene el poder del cambio; y, el panorama de la empresa se configura bajo un fuerte dominio capitalista junto a factores de carácter: religioso, moral, estético, científico y tecnológico (p.p.136, 74). Esta situación plantea un cambio constante, un avance rápido y mediatizado donde la empresa debe interactuar con su entorno al ritmo que marca el mercado y la sociedad.

Finizio (2002) habla de un entorno basado en el mercado, donde los cambios producidos por la oferta y demanda se generan mediante una concepción clara de la realidad y una proyección en base a predicciones; esta visión proviene de la comprensión y estudio del mercado, el consumidor, la tecnología, el medio ambiente, entre otros; estos elementos en conjunto son los que dan pautas para lograr la evolución y el desarrollo de la empresa. Se debe tener una predisposición hacia el cambio y la flexibilidad; una empresa que quiera lograr comprender su entorno y adelantarse al futuro debe ser consiente que debe fortalecer su estructura, las herramientas operativas y su potencial innovador en procesos y productos (p.19).

Una empresa consiente de sus necesidades debe buscar la forma de comprender su entorno. Las pequeñas, medianas y microempresas [MIPYME] pueden ser las más afectadas al momento de identificar y estudiar estos elementos debido a sus limitados recursos; por lo que, es necesario entender esa flexibilidad y cambio como una nueva filosofía institucional que le lleve a la búsqueda de nuevas formas de trabajo en conjunto y apoyo con otros sectores y profesionales externos a la empresa; con respecto a empresas relacionadas con áreas culturales, Finizio (2002) indica que pueden estar conformadas por muchas variables y a su vez, pueden estar en conflicto entre sí; por tanto, los escenarios no son iguales para todas las empresas, siendo necesario que cada una se enfoque en buscar las estrategias acordes a su realidad (p.19)

Detectar los nuevos escenarios que la empresa debe enfrentar requiere de una capacidad de predecir los indicios que permiten entender hacia donde se mueve el mundo; la relación con factores culturales, políticos, sociales y de desarrollo del conocimiento son parte de estos indicios que generarán situaciones emergentes con las cuales poder trabajar. Para Finizio (2002, p.30), en estos escenarios "las empresas se mueven, o deben moverse, a través de un enfoque personalizado entre la globalización y la segmentación", siendo necesario una conjugación del diseño con todos las unidades de negocio de la empresa que cumplen un papel en la configuración del producto y que a su vez deben centrarse en identificar las necesidades y deseos del usuario; solo así se pueden llegar a soluciones específicas bajo una misma línea de trabajo conjunta.

Con un escenario definido por la empresa, el diseño debe enfocarse en el desarrollo de propuestas; y según lo planteado por Finizio (2002, p.30), son tres los ejes de impacto para el o los escenarios:

- Aplicación / función
- Tecnología / producto
- Consumidor / mercado

En cada escenario los ejes pueden variar o evolucionar; es decir, se puede optimizar el uso o función del objeto diseñado, así como, añadir nuevas características que lo mejoren; la tecnología avanza a pasos gigantes, modificando los entornos digitales y la industria en ciclos continuos cortos o medios. Así

también, el consumidor evoluciona y se adapta a los cambios constantes, las necesidades y gustos se modifican al tiempo que se aprenden nuevas formas de uso y convivencia con los objetos y entornos.

Los ejes propuestos denotan una amplia visión global, donde se hace necesaria la presencia de especialistas en diversas áreas de conocimiento que apoyen el trabajo conjunto de la empresa. El acceso a los especialistas o fuentes de información especializada puede ser visto como un gasto importante por una empresa, por lo que se debe buscar facilidades que permitan un beneficio común a todos los sectores que conformen las ICC; en este punto se vuelve aún más significativo que los sectores culturales y creativos formen sinergias que los fortalezcan al momento de interactuar con otras áreas o sectores de apoyo.

Por otro lado, Tasma y Loeb (1998, p.p.136,74) describen este nuevo escenario en base a puntos de giro como:

- Constantes cambios cíclicos y mutaciones
- Una nueva distribución del poder y la aparición de nuevas tecnologías de red
- La ciencia superando a la ficción
- Las maquinas compitiendo y superando las capacidades humanas
- Maximizar los resultados empresariales en base a mantener la rentabilidad de sus dividendos
- El poder de los que controlan el flujo de dinero, los servicios, la información, los bienes, etc.
- Pérdida de la propiedad intelectual de las creaciones debido a la reproducción no controlada de ideas.
- Nuevos caminos y expresiones artísticas.

La vertiginosa dinámica presente en el escenario en que se mueve la empresa, hace que deban buscar nuevas opciones y oportunidades que les permita integrarse a los estados actuales de la sociedad y el mercado; por tanto, son las nuevas formas de producción y asociación productiva las que deben evolucionar y ser adaptadas por las empresas.

Esta estructura actual de los mercados y la sociedad presenta un cambio concordante hacia la masificación, el acceso a la información y el conocimiento gracias a la internet y las formas de comunicación de la era digital; los cambios a partir de 1997 (Tasma y Loeb, 1998), representan una búsqueda de armonía para todos, el nacimiento de las redes de información, la gestión del tiempo y la creación de tribus o simbioses en la sociedad (p.134). El modelo en que actualmente se desarrolla la sociedad describe una división entre ricos y pobres denominada cultura tribal (Fig. 1.); esta estructura marca una diferencia entre los que tienen y los que no, y determina la pauta para la segmentación de los mercados con los que se mueven los mercados actualmente, la especialización según gustos, preferencias y necesidades lleva a las empresas a generar productos y servicios cada vez más especializados y específicos para los públicos.

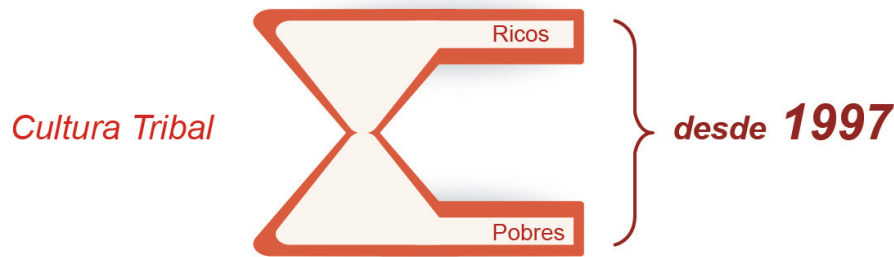


Fig. 1 Distribución de la sociedad desde 1997 (Cultura tribal). Tasma y Loeb (1998)

Esta visión propia de los modelos de negocio tradicionales como la gran industria o las MIPYME, pone en valor la necesidad de adaptarse a un estrato u otro al momento de generar propuestas de nuevos productos y servicios según el enfoque de la empresa; el diseño desde esta perspectiva, debe centrarse en buscar soluciones funcionales para cada nivel, generando una diversidad de opciones adaptadas a cada situación y posibilidades de los consumidores. Además de los segmentos en cuanto a nivel socioeconómico, también se presenta el entorno socio-cultural; Finizio (2002) destaca la importancia de marcar el mercado objetivo en base a las señales que se detectan en este entorno para poder definir el alcance del mercado, sea este local, regional o global; y determinar características y requerimientos que serán aplicados al diseño (p36). Cada uno de los segmentos o mercados determinan características específicas del producto, sin afectar otros factores comunes a todo proyecto de diseño: social, responsable con el medio ambiente, de calidad, ergonómico, funcional, intuitivo, etc.

4. Nuevas configuraciones de empresa

La industria a través de los años ha evolucionado sus formas de producción debido a los cambios sociales, culturales, avances en el conocimiento y las nuevas maneras de consumir; estos cambios del entorno externo también afectan al entorno interno de la empresa y su estructura. La empresa como una organización se estructura por unidades que trabajan en conjunto para lograr objetivos; Finizio (2002) destaca el concepto de red de empresa como alternativa a las estructuras tradicionales jerárquicas donde todas las funciones se ejecutan dentro de esta; el sistema de redes permite desarrollar funciones externamente pero con una guía y control desde la empresa, siendo esto un sistema flexible con resultados competitivos y eficaces (p.36). Las empresas deben buscar opciones para ser competitivas; limitantes de tamaño, geográficas, tecnológicas, políticas, etc., son factores que deben solventarse gracias a acciones estratégicas acordes a la situación de la empresa.

La visión actual de empresas nacidas de startups o emprendedores que se abren paso de forma independiente crea un panorama competitivo desde el momento mismo que nacen las ideas y que buscan salir adelante; inversores o alianzas son necesarias desde estados incipientes del negocio para su éxito, y debe ser una constante en el futuro crecimiento de la misma.

En la actualidad; la llegada de la industria 4.0 marca un nuevo hito en la visión de la industria, basada en el Internet de las cosas (IoT) por sus siglas en inglés, permiten una conectividad inteligente y la economía de recursos; siendo los factores la clave de esta industria (BMBF, 2014, p.16):

- Producción ampliamente personalizada dentro de entornos productivos de gran flexibilidad.

- Integración de clientes y socios en etapas tempranas de diseño y generación de valor.
- Vinculación entre la producción y servicios de alta calidad para generar "productos híbridos"

Este nuevo panorama permite el desarrollo de nuevos productos, servicios, procesos, comunicación y emprendimientos que requieren de profesionales especializados en diferentes áreas del diseño, además de servicios derivados de esta actividad creativa.

La industria 4.0 se integra acorde a los cambios sociales y culturales de pensamiento sobre nuestro entorno y el lugar que ocupamos en este mundo, la preocupación por los recursos y estar cada vez mejor comunicados son valores importantes de este modelo productivo; la convergencia del mundo real y el digital permite optimizar las experiencias y ampliarlas. Una definición derivada de la industria 4.0 es la referente a las industrias inteligentes:

Son industrias que tienen un alto grado de flexibilidad en la producción, en términos de las necesidades del producto (especificaciones, calidad, diseño), volumen (lo que se necesita), el momento (cuando sea necesario), eficiencia de los recursos y los costes (lo que se requiera), pudiendo sintonizar (de buena forma) las necesidades del cliente y hacer uso de toda la cadena de suministro para la creación de valor. Se activa por un enfoque de red-centralizada, haciendo uso del valor de la información, impulsada por las TIC y las últimas técnicas de fabricación disponibles. (Smart Industry Report, 2014)

Esta definición permite tener una idea clara de las posibilidades que se derivan del uso de la tecnología de punta y la productividad, sobre todo al momento de ser versátiles en un entorno de ciclos cortos y cambiantes.

5. El diseño como dinamizador de las ICC en un entorno de cambios constantes

De este entorno y configuración actual de la industria, se puede entender la necesidad de ver al diseño de una manera diferente a lo ya visto, los modelos tradicionales se vuelven obsoletos debido a su rigidez estructural que limita su migración a diferentes líneas de producción; otro factor es la cantidad de inversión que representaría en los modelos tradicionales implementar nueva infraestructura, que conjugada con la existente obliga a un crecimiento en cuanto a espacio y capital de producción que muchas MIPYMES no se lo pueden permitir.

Esto pone aún más en evidencia la necesidad de generar lazos entre distintas actividades productivas que se complementen y generen una simbiosis de proyectos con mutuos beneficios a las MIPYME o grandes empresas que intervengan. Una estructura funcional y adaptada para la tecnología, el cambio constante, el trabajo interactivo, la interconexión de redes y los actores o consumidores presentes, conforman los ejes que definirían una empresa de la industria 4.0; además, esto permitiría fomentar la producción local mediante unidades productivas que puedan solventar necesidades específicas sin tener que recurrir a producción en masa con su consecuente desperdicio y poca conciencia en el ámbito de la producción sustentable. El diseño por su parte, se integra en el proceso de la empresa desde la ideación de proyectos hasta el momento mismo de la experiencia entre usuario y producto; ya que en sí, el diseño configura esa experiencia y debe identificar las respuestas obtenidas.

Manzini (2015) plantea cómo se debe poner en práctica la capacidad de diseñar en función a dos ejes: el eje de actores y competencias; y el eje de motivaciones y expectativas, de donde surgen cuatro actividades:

- Organizaciones base, personas no expertas que impulsan proyectos de diseño desde la detección de necesidades o problemas

- Activistas culturales, personas interesadas en actividades, su desarrollo y promoción con un interés cultural
- Diseño y agencias de comunicación, expertos encargados en el desarrollo de productos, servicios y sistemas de comunicación
- Diseño y agencia tecnológica, expertos multidisciplinarios con un perfil técnico para la solución de diversos problemas; abierto a nuevas experiencias y procesos de diseño. (p.p.50-55)

Esta perspectiva ubica al diseño en diferentes niveles de interacción dentro de la sociedad, enfocado siempre en la propuesta de acciones; desde las organizaciones base y activistas culturales se puede obtener la información necesaria para el desarrollo de proyectos, retroalimentación de información o experiencias y la validación de los diseños; mientras que las agencias tecnológicas y de comunicación son las encargadas de poner en marcha las acciones y propuestas de diseño. Los factores existentes permiten identificar posibles configuraciones para el papel que el diseño debe cumplir en este tipo de empresas, siendo la propuesta del enfoque hacia las ICC el siguiente:

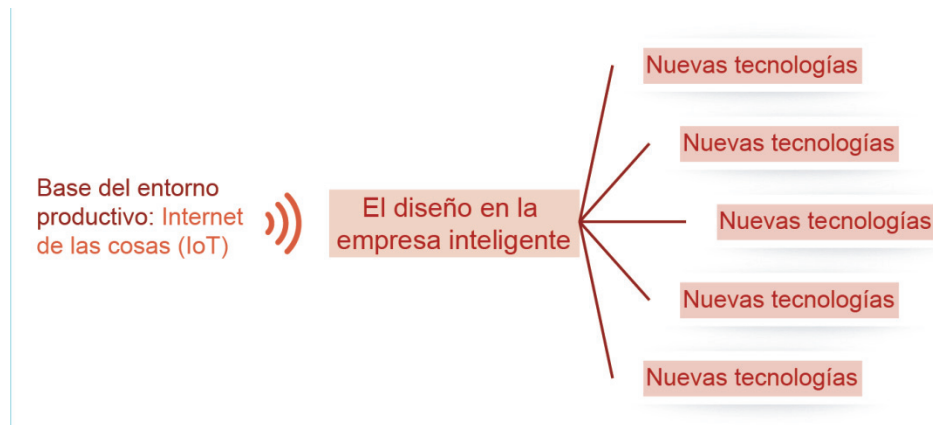


Fig. 2 Entorno productivo para las ICC.. Elaboración propia.

De este entorno se puede plantear acciones desde el diseño cómo:

- Integración de apps especializadas y dispositivos móviles para el desarrollo de ideas, bocetos, prototipos y el trabajo en equipo de la empresa.
- Trabajo en espacios amplios y configurables, que puedan ser desde un taller de experimentación hasta un salón de reuniones con el fin de generar acciones comunes de creación.
- Comunicación continua entre las unidades de negocio para la solución de problemas, control y gestión del diseño.
- Equipamiento para prototipado rápido y series cortas que permita flexibilizar la producción y abrir nuevas líneas de productos (dentro de la empresa o como servicio de diseño externo)
- El diseñador como gestor de experiencias aumentadas a los productos, mediante propuestas de servicios asociados (on-line)

- El diseñador como promotor del acercamiento y fidelización creativa de los usuarios a través de servicios complementarios (DiY)
- Gestión centralizada de procesos mediante la interconexión de equipos y dispositivos en la empresa.
- Coordinación y supervisión de proyectos mediante trabajo conjunto con otras empresas (on-line)
- Seguimiento de resultados mediante la retro alimentación de experiencias de usuarios que se contrasten con experiencias logradas en los procesos de desarrollo.
- Diversificación estratificada según el segmento o mercado, pudiendo identificar necesidades específicas de sectores de menos recursos o integrando la personalización del diseño como valor agregado a sectores más pudientes.

6. Conclusiones

En un entorno cambiante y flexible donde es necesario la respuesta y reacción inmediata, los modelos tradicionales jerárquicos presentan dificultades en la integración del diseño como eje de construcción de propuestas innovadoras, las acciones del diseño en la empresa deben tener una interacción constante con el resto de departamentos relacionados a la producción y generación de proyectos para lograr respuestas inmediatas y eficientes; esto hace necesario evitar perder el tiempo en una comunicación vertical sujeta a la toma de decisiones de los altos mandos, sino una comunicación abierta y trabajo en equipo.

El diseño debe tener su lugar en la empresa, sea como parte de esta o de forma externa; y su trabajo debe abarcar los procesos y actividades de la empresa valiéndose de todos los recursos posibles para dar apoyo y guiar los proyectos hasta su fin. Las múltiples actividades que el diseño debe cumplir en el actual panorama productivo, obliga a las medianas, pequeñas y microempresas a considerar una forma de integrarlo, siendo una posición viable el trabajo en red como una unidad externa de la empresa que gestione sus procesos creativos y productivos, esto generaría mayor competitividad y posibilidades de ampliar su producción; aún más si desde el diseño se proponen servicios complementarios para la empresa y se refuerza su capacidad productiva.

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La prospectiva como diseño de lo intangible. El caso de CENTRO

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Resumen

Se reseña la experiencia de investigación y confección de la especialidad en Diseño del mañana, programa de posgrado destinado a la formación de expertos en solución de problemas sociales con base en los métodos de la prospectiva, conjunto de herramientas y técnicas destinadas a sistematizar la imaginación para el diseño de futuros posibles, probables o preferibles.. Se concluye que en sí misma, la experiencia aspira a constituir una solución a un problema cultural significativo que permea todos los ámbitos de la vida: el de la visión a corto plazo. La presentación abarca los antecedentes del proyecto, la descripción del proceso de investigación, la exposición del programa y el estado actual del proyecto, que ocurre en el marco institucional de CENTRO, institución dedicada a la profesionalización de la Economía creativa.

Entre los resultados más relevantes de esta experiencia pueden señalarse, además del programa en sí, que ya se encuentra vigente y debidamente validado por la Secretaría de Educación Pública en México, la conformación de un claustro de profesores nacionales e internacionales altamente motivados y comprometidos por la experiencia; la integración de un consejo consultivo con representación de los más importantes think-tanks de futurología alrededor del mundo (la World Future Society, la World Future Studies Federation, Institute for the Future, entre otros) y la incorporación de CENTRO a la discusión internacional en materia de futuros, entendiendo los futuros como objetos de diseño complejos que pese a no existir, son integrados –conjurados– a la realidad material mediante narrativas, objetos, prototipos, escenarios y otras expresiones materiales que contribuyen a guiar la toma de decisiones en el presente.

El diseño de futuros supone un reto provocador dado que CENTRO cuenta con 13 años de experiencia en la formación de profesionales del diseño, la comunicación y la mercadotecnia; como parte de su proceso de maduración, la institución ha decidido comprometerse con el diseño en un sentido más abstracto y denso con el propósito de formar a especialistas capaces de utilizar su ingenio (y en esta medida, contribuir a la Economía creativa y a la sociedad del conocimiento) de forma sistemática para contribuir a la generación de realidades sociales más ad hoc a los futuros que consideramos deseables (futuribles).

Palabras clave: *prospectiva, diseño de futuros, pensamiento complejo, innovación social, retos del milenio*

Abstract

We present the experience of the researching and making of the Futures Design specialty, graduate program for the training of experts in solving social problems based on the methods of foresight, set of tools and techniques to systematize the imagination to design possible, probable or preferable futures. We concluded that in itself, the experience aims to provide a solution to a cultural problem that significantly permeates all walks of life: short-term vision. The presentation covers the background of the project, the description of the research process, program exposure and the current status of the project, which takes place in the institutional framework of CENTRO, an institution dedicated to the professionalization of the creative economy.

Among the most important results of this experience that can be identified, in addition to the program itself, which is already current and duly validated by the Ministry of Public Education in Mexico, the formation of a cloister of national and international teachers highly motivated and committed to the experience; the integration of an advisory board with representatives of the most important think-tanks on futurology around the world (the World Future Society, the World Future Studies Federation, Institute for the Future, among others) and incorporating CENTRO to the international discussion in the matter of futures, understanding the future as objects of complex design despite its non-existence, are integrated -conjured- to material reality through narrative, objects, prototypes, scenarios and other material expressions that help guide decision-making in the present .

The designing of futures poses a provocative challenge since CENTRO has 13 years of experience training professionals in design, communication and marketing; as part of their maturation process, the institution has decided to commit to design in a more abstract and dense sense in order to train specialists capable of using their wits (and to this extent, contribute to creative economy and society knowledge) systematically to contribute to the creation of ad hoc social realities for a future we consider desirable (futuribles).

Keywords: *prospective, futures design, complex thinking, social innovation, millennium challenges*

1. Antecedentes

Centro de Diseño, Cine y Televisión (CENTRO) es una institución educativa privada, fundada en el 2013 en la Ciudad de México con la misión de formar a profesionales de la Economía creativa, esto es, personas capaces de participar activamente en cadenas productivas que encuentran en el ingenio su principal materia prima (Howkings, 2016). En este vibrante ámbito se incluyen los diseños, la comunicación audiovisual, la industria editorial, la industria de los videojuegos, el desarrollo de software, entre otras actividades clave.

Dada su naturaleza, la Economía creativa encuentra en la propiedad intelectual e industrial uno de sus indicadores más importantes, de ahí que las universidades (más aun tratándose de instituciones con una

fuerte vocación hacedora, como es el caso de CENTRO) jueguen un papel fundamental como nichos de la clase super-creativa (Florida, 2014).

Actualmente, CENTRO cuenta con 7 programas de licenciatura y 11 de posgrado, todos relacionados con este sector, capaz de propiciar el desarrollo local y regional. De hecho, México se considera un país altamente competitivo (UNESCO, 2013) en esta materia, si bien aún no alcanza su máximo desarrollo en este ámbito.

En el 2013, el equipo de la coordinación de investigación de CENTRO recibió la encomienda de diseñar un posgrado de avanzada. Para cumplir con esta empresa, el equipo realizó una investigación de la cual se dará cuenta a continuación, cuyo propósito era crear el plan de estudios al cual se referirá más adelante, logrando que la propuesta fuera tan inspiradora como para que los propios profesores que la diseñaron quisieran cursar el posgrado.

2. La investigación

El equipo de investigación a cargo de la Especialidad en diseño del mañana de CENTRO estuvo conformado por 2 comunicólogas, 1 mercadólogo, 2 diseñadores, 1 animador y 1 administradora de empresas, todos comprometidos con la causa común de diseñar un programa inspirador, provocador, radical y altamente competitivo.

En principio, el equipo recopiló y revisó minuciosamente 46 programas de posgrado nacionales e internacionales, todos orientados al desarrollo de capacidades creativas aplicadas a los negocios, al diseño de políticas públicas y al diseño de soluciones a problemas complejos, entre otras salidas. De este primer universo se seleccionaron 10 programas especialmente interesantes que en aquel momento se impartían en 9 países (incluido México), ya sea en modalidad de maestría o especialidad. Dichos programas nos permitieron identificar una estructura común que sirvió como esquema inicial para bocetar el plan de estudios.

Por otra parte el equipo analizó la trayectoria profesional de 4 egresados de dichos programas para inspirar el perfil del egresado de CENTRO y realizó entrevistas a expertos acerca de cuál es el ámbito laboral y el potencial del mercado para los especialistas en diseño prospectivo.

La etapa de entrevistas resultó crucial para orientar la investigación, ya que CENTRO cuenta con una vasta experiencia en Economía creativa pero su trayectoria en prospectiva es muy incipiente aún. Por lo tanto nos acercamos a destacadas organizaciones en este ámbito de especialidad:

1. Club de Roma. Organización sin fines de lucro fundada en 1968 por científicos y expolíticos interesados en mejorar el futuro a largo plazo. En la década de los 70 encomendaron el informe *Los límites del crecimiento*. (Rome, n/d)
2. World Future Society. Organización sin fines de lucro fundada en 1966, anualmente publica una serie de informes relativos al futuro remoto y promueve la investigación en esta materia.
3. World Future Studies Federation. Organización sin fines de lucro fundada en 1973, con presencia en 60 países, promueve la generación de futuribles, el intercambio de ideas y la generación de recomendaciones para organismos internacionales en materia de prospectiva. (Federation, n/d)
4. Millenium Project. Think tank internacional fundado en 1996, conformado por 40 nodos de científicos y políticos alrededor del mundo, quienes año con año publican estudios en relación al

futuro remoto y desarrollan diversos métodos para el diseño de futuribles. Entre otras actividades, diseña, difunde y reflexiona en torno a los retos del Milenio. (Project, n/d)

5. Fundación Javier Barros Sierra. Asociación científica y tecnológica fundada en 1975 que agrupa a expertos dedicados a la prospectiva, específicamente en lo que hace al futuro a largo plazo de México. (Sierra, n/d)
6. Institute for the Future. Think tank sin fines de lucro dedicado a la investigación y la capacitación en materia de estudios del futuro. (Future, n/d)

En los primeros cinco casos, estas organizaciones cuentan con representación en México, de manera que CENTRO se acercó a sus representantes locales con excelente recepción. En el último caso, la fase de investigación coincidió con una gira de Institute for the Future a México, en la cual CENTRO fungió como sede y estableció contacto con el equipo de investigación del instituto.

Esta exploración arrojó resultados muy interesantes que a continuación se refieren.

Los estudios del futuro en México cuentan con una gran tradición que se remonta a la década de los sesenta, durante la cual destaca el trabajo de expertos como Tomás Miklos (Miklos, 1994), Guillermina Bahena (Bahena, 2012), Concepción Olavarrieta (Olavarrieta, 2014) y Antonio Alonso Concheiro (Millán, 2006) (quienes a la fecha se encuentran en activo), sin embargo en las últimas dos décadas el auge de la disciplina ha disminuido de forma significativa, identificándose pocos especialistas jóvenes en la materia. Entre los escasos nombres podemos mencionar el trabajo de Alethia Montero (World Future Society), Margarita Arroyo (Miklos, 2008) y Patricio Buenrostro (Embajadas del futuro), quienes han desarrollado su trabajo al alero de los expertos en principio mencionados y/o en colaboración con las organizaciones referidas.

¿Por qué hay tan pocos futurólogos en México? Nos preguntamos. ¿Dónde se forman los futurólogos existentes? La respuesta fue que en el extranjero o en el único programa de maestría vigente en México (en Monterrey, al norte del país). Sin lugar a dudas, la falta de oferta académica en la materia se hizo notar.

El equipo estaba en busca de inspiración y guía. Encontramos a expertos entusiastas y generosos, convencidos de la necesidad de lanzar un nuevo programa y dispuestos a colaborar su diseño; más tarde, estos expertos configuraron el actual consejo consultivo del posgrado. El análisis de las trayectorias de los propios consejeros sirvió para orientar el desarrollo del plan de estudios y crear el perfil del egresado, concebido como un experto capaz de idear escenarios futuros y asesorar a los sectores público, privado y civil en la implementación de decisiones presentes que hagan posible la consecución de los escenarios más deseables.

2.1. Acerca de los estudios del futuro

Por estudios del futuro entenderemos un "tipo de investigación especial mente creativa, orientada a la exploración del porvenir, con el objeto de proporcionar información relevante, en una perspectiva a muy largo plazo que permita apoyar la toma de decisiones" (Miklos, 1994).

El propósito de estos estudios es brindar información útil para los tomadores de decisiones, considerando los escenarios posibles, probables y preferibles como alternativa. Vale la pena destacar que este campo disciplinario parte de la premisa de que los futuros no existen y en esta medida pueden diseñarse como objetos complejos: ¿qué mejor reto para un profesional de la economía creativa que utilizar su ingenio para pensar en escenarios que no existen, pero podrían existir si trabajamos en su consecución? El

ejercicio supone el uso del ingenio, pero también de procedimientos formales para fundamentar ese acto creativo.

Con su incursión en el diseño de futuros, CENTRO se propone dar un paso más en su crecimiento en la formación de *problem solvers*. Por supuesto, esto implica un gran reto, el primer de ellos consiste en instar a los estudiantes para que se alejen un poco de su zona de confort y utilicen su imaginación y su capacidad analítica para pensar en soluciones hasta entonces fuera de su marco de referencia. Con este paso, la propia institución asume el reto de diseñar soluciones para un mundo en el que quizás el diseñador ya no se encontrará en el momento de la implementación: ¿qué tipo de consumo tendrán los nietos de la generación Z? ¿cómo debe ser la indumentaria que necesitan los habitantes de Marte? ¿qué políticas públicas deben implementarse ahora para lograr un manejo sustentable del agua dentro de 50 años? ¿cómo serán las aulas en las universidades dentro de dos generaciones? Son algunas preguntas que nuestros estudiantes deben plantearse para idear soluciones.

3. El programa

3.1. Objetivos

Los objetivos del programa se enuncian así: El alumno diseñará escenarios probables, posibles o deseables en torno a una problemática social relevante y concreta; en un marco organizacional determinado; el alumno conocerá, practicará y evaluará procedimientos de análisis efectivos para el diseño prospectivo y la innovación.

En lo que hace a los objetivos emocionales, nos propusimos que los alumnos se sintieran altamente motivados, desconcertados, ansiosos, estimulados y comprometidos con la experiencia, pensada para grupos de máximo 10 personas, lo cual permite hacer adaptaciones para garantizar su carácter personalizado.

3.2. Perfil de egreso

El egresado será capaz de construir escenarios novedosos, creativos, originales aplicando diversas herramientas e instrumentos del diseño prospectivo, la invención y la innovación para la solución de problemas sociales específicos, usando como base las tendencias y certezas estructurales existentes.

Podrán ser consultores privados, asesores de los tres niveles de gobierno, guionistas de televisión, radio y cine para la elaboración de escenarios en la incertidumbre y de eventos inesperados. Los egresados de esta especialidad deben ser capaces de pensar en un objeto que no existe: el futuro. O para ser más precisos, los futuros (posibles o deseables), considerando que es una entidad que no existe, pero que puede diseñarse para fundamentar la toma de decisiones en el presente.



Fig. 1. Pieza promocional

3.3. Currícula

El programa de la especialidad tiene dos centros: la formación metodológica y la práctica de los métodos. En ambos casos se diseñaron materias robustas alrededor de las cuales se concibieron asignaturas complementarias.

El primer boceto del programa fue diseñado por el equipo de investigación de CENTRO con base en los resultados del estado del arte, posteriormente fue comentado por el Institute for the Future, la World Future Society y la World Future Studies Federation. Dado que estas organizaciones no necesariamente coinciden en puntos de vista, los diferentes comentarios contribuyeron a lograr una propuesta diversa y balanceada en contenidos.

Segmento	Contenido
Propedéutico	Pensamiento de diseño
	Análisis de textos
	Aparato crítico
	Retos del milenio
	Introducción a la prospectiva
Segundo semestre	Historia de los estudios de futuros
	Antropología simbólica
	Pensamiento sistémico y teorías del cambio
	<u>Métodos prospectivos</u>
	Inteligencia prospectiva en la incertidumbre y la complejidad
	Construcción de escenarios

Primer semestre	Contexto geopolítico
	Pensamiento anticipatorio e innovación
	Procesos innovadores de planeación prospectiva estratégica
	<u>Laboratorio de innovación social</u>
	Escenarios de innovación disruptiva
	Narrativa y representación de escenarios a largo plazo

Fig.2. Estructura del plan de estudios. Fuente: Elaboración propia

El programa se imparte en 192 horas presenciales (sin considerar clases magistrales, conferencias, talleres y otras actividades complementarias) organizadas en dos sesiones semanales, durante dos semestres.

Cabe hacer notar que las personas que cursan este programa deben generar una carpeta de proyecto para graduarse y que dicho proyecto debe centrarse en una solución con alcance social. Dicha carpeta debe contener todos los entregables generados en cada uno de los cursos: futuribles narrados, futuribles representados visualmente, prototipos (dibujados, impresos en 3D u otros soportes según el caso), informes de investigación, estudios de caso, entre otros posibles entregables del diseño de futuros.

A lo largo del programa, también se insta a los alumnos para que incursionen en experiencias de diseño que de alguna manera los vinculen con la red de especialistas en prospectiva, tales como rondas Delphi, talleres para el diseño de futuribles, consultorias guiadas por sus profesores, entre otras experiencias de formación. Ello les permite familiarizarse con la visión de los expertos y sensibilizarse frente a las problemáticas que los futurólogos suelen atender.

3.4. Claustro de profesores y grupo de alumnos

El equipo de profesores a cargo del programa es diverso. Todos los docentes son posgraduados con nivel mínimo de Maestría y el 40% de la planta cuenta con formación específica en Prospectiva. Contamos con psicólogos, historiadores, filólogos, filósofos, diseñadores, antropólogos, internacionalistas y sociólogos en el equipo.

Vale la pena mencionar que además del equipo básico, todos los alumnos cuentan con un mentor nacional y uno internacional para el seguimiento de sus proyectos.

Por su parte, los alumnos de la primera generación son diseñadores, administradores y comunicadores.

3.5. Actividades realizadas hasta el momento

Al cierre de este texto, la primera generación de la especialidad concluye su primer semestre. Los alumnos están bocetando sus propuestas, mismas que serán discutidas con sus mentores en las próximas semanas.

Hasta el momento hemos realizado una conferencia magistral y tenemos programas dos más con expertos del sector. Adicionalmente los alumnos cursarán dos talleres para la práctica de técnicas prospectivas específicas y complementarán su formación con una clase magistral más.

En las próximas semanas también se llevará a cabo una mesa redonda con presentación de libros, uno de los cuales presenta el cruce perfecto entre la prospectiva y el diseño conceptual: se trata del Código de Eduardo Terrazas (Terrazas, 1975), obra gráfica inspirada en el clásico *Los límites del crecimiento* (Behrens, 1972).

En el segundo semestre, los alumnos entrarán al laboratorio de innovación, en el cual prototiparán y evaluarán sus escenarios. Asimismo tendrán dos conferencias magistrales y un taller más antes de estar en condiciones de presentar sus carpetas finales.

En paralelo, hemos iniciado el seminario de profesores de la especialidad, durante el cual intercambiamos contenidos de interés, profesionalizamos a la planta docente en técnicas prospectivas y en general, facilitamos el trabajo colaborativo de cada miembro del staff para integrar productos significativos y congruentes con el programa.

El camino ha sido arduo e intenso, sobre todo si pensamos que la generación está conformada por seis estudiantes. Sin embargo, ya tenemos lista de espera para la siguiente generación y esta primera experiencia nos ha permitido perfeccionar el modelo educativo y por ende los contenidos y las experiencias de formación.

Lo decisivo será, bien lo sabemos, los entregables que produzcan, cuya calidad será evaluada por el consejo consultivo de la especialidad.

4. Conclusión: tan difícil como diseñar lo intangible

Comenzaré por aclarar que la denominación “diseño del mañana” es imprecisa y se estableció con fines comerciales, lo correcto sería referir al diseño de futuros. El mañana es muy inmediato, la prospectiva promueve una idea más remota de los futuros; por otra parte, el mañana es uno y los futuros posibles, probables o preferibles son múltiples.

Hecha esa precisión, se concluye que un especialista en prospectiva crea objetos complejos (lo mismo una taza que una situación o un sistema) y para ello combina su imaginación con técnicas formales para fundamentar la propuesta. Es un diseñador en toda forma que genera información útil para otras personas, incluso para sí mismo, pero que enfrenta el reto de crear algo para lo que quizás no existen referencias (materiales o tecnologías que no han sido inventadas, por ejemplo).

Nuestra mayor área de oportunidad como coordinadores del programa es resistir a la indiferencia del mercado sobre la necesidad inminente de diseñar los futuros, proclive como es la cultura mexicana al pensamiento a corto plazo. Asimismo, la profesionalización del equipo de CENTRO para aplicar las técnicas prospectivas para el desarrollo de la propia institución es aún una tarea por completarse, si bien estamos trabajando en ella.

En mi opinión, el solo hecho de que CENTRO haya tomado el riesgo de emprender este proyecto, no inédito pero sí radical en relación a la inercia de la cultura mexicana, resulta esperanzador. ¿Cómo enfrentamos esta gran responsabilidad? Con mucha imaginación, visión de largo plazo y pensamiento sistemático, como los futurólogos.



Fig.3. Estudiantes con la futuróloga Concepción Olavarrieta. Fuente: CENTRO

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From the invisible, the everyday and the unmentionable towards narrative strategies to explain, understand, remember. New Perspectives on Cultural Preservation.

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Abstract

This proposal takes into consideration three categories of unusual narrative, connected to human life - the invisible, the everyday and the unmentionable - often placed in the outer fringe of our attention or completely ignored.

The invisible: that which inhabits our world and often influences our lives, even though escaping our awareness, because active in dimensions that we cannot see or do not know to guess. The everyday: what accompanies us in every moment of our lives and that produces in us a habit that makes it obvious (and then again, but otherwise, invisible). The unmentionable: what happened at some time and somewhere, and the memory of which, for convenience, hypocrisy or convenience, has been removed or put on the edge of our life (and therefore to the visible limits),

These categories have been chosen as paradigmatic of new experiences on Cultural Preservation. The comprehension of the fundamental value of intangible cultural heritage, which came less than ten years ago to be part of the official definition of "museum" written by International Council of Museums, indeed, has opened new perspectives in the field of curating and exhibition design, often destabilizing and unexpectedly coincident. Therefore we need updated languages, more interactive and interdisciplinary, towards the construction of a real design of the intangible cultures, able to reflect (and make reflect) on at first sight marginal phenomena, preserving their value of social and historical testimony and making it comprehensible to an audience as broad as possible. The new methods of staging these tales turn the apparent immateriality of knowledge of their socio-cultural values into occasion of development solutions, in form of exhibition design products and related services.

Keywords: *exhibition design, staging, museum, narrative*

1. Introduction

This proposal takes into consideration three categories of unusual narrative, connected to human life - the *invisible*, the *everyday* and the *unmentionable* - often placed in the outer fringe of our attention or completely ignored.

The *invisible*: that which inhabits our world and often influences our lives, even though escaping our awareness, because active in dimensions that we cannot see or do not know to guess.

The *everyday*: what accompanies us in every moment of our lives and that produces in us a habit that makes it obvious (and then again, but otherwise, invisible).

The *unmentionable*: what happened at some time and somewhere, and the memory of which, for convenience, hypocrisy or convenience, has been removed or put on the edge of our life (and therefore to the visible limits),

These categories have been chosen as paradigmatic of new experiences on Cultural Preservation. The comprehension of the fundamental value of intangible cultural heritage, which came less than ten years ago to be part of the official definition of "museum" written by ICOM (International Council of Museums), indeed, has opened new perspectives in the field of curating and exhibition design, often destabilizing and unexpectedly coincident.

«Cultural heritage does not only embrace the tangible expressions like monuments and objects throughout the years. It also includes the living expressions like the traditions that many groups and communities worldwide have been passed down by their ancestors and will continue to pass on to their descendants, mostly by word of mouth. Although it is the motor of cultural diversity, this heritage is fragile (...) Thus, ICOM commits itself to protecting the intangible heritage identifying and managing resources along with UNESCO who adopted in 2003, the Convention for the Safeguarding of the Intangible Cultural Heritage». (ICOM, 2016)

Therefore we need updated languages, more interactive and interdisciplinary, towards the construction of a real design of the intangible cultures, able to reflect (and make reflect) on at first sight marginal phenomena, preserving their value of social and historical testimony and making it comprehensible to an audience as broad as possible. The new methods of staging these tales turn the apparent immateriality of knowledge of their socio-cultural values into occasion of development solutions, in form of exhibition design products and related services.

2. The invisible. To show what is not visible

The sight is the predominant human sense, especially in Western culture. Everything we are used to deal with daily, every situation, event, relationship is bound to the world of the "visible". One can say that all of us we all living in a globalized society where what we see has become what "is", in the sense of what real exist. Is not by chance that the sight supremacy is strongly connected with the fulfillment of our contemporary consumer society, totally linked to the aesthetic effect (and therefore "attractive", in terms of commercialization) of the image. Most of communicative and expressive media we got it, so, are designed precisely in relation of the attractive and persuasive force of the images. Nevertheless there is a hidden world which often totally escapes from our view and that, therefore, we ignore, taking it for granted, or eliminating it entirely from the horizon of our awareness.

It is the level of the invisible: a place that we are hardly able to define in terms of boundaries, size and appearance, but that inhabits our world and often influences our life, even though escaping to our

conscience, because active in dimensions that we cannot see and could even guess. These parallel worlds, of which we are part, almost without realizing it, often are intangible places essential for our own physical survival. Bring them to the surface and make them accessible to all, is an innovative opportunity and a precious occasion to trigger new forms of storytelling, to accelerate processes of understanding whose effects go far beyond the cultural enrichment, involving issues such as the environment and its defense, the health, etc.

2.1 The Ketí Haliori *World Water Museum* project. A symbolic collection

The *World Water Museum* project, made by the Greek artist Ketí Haliori is an installation that «focuses to alert people on the challenges of clear, potable water on the planet. It approaches surrealistically the vast environmental problem, presenting water as museum item» as it is written in the *Idea* page of his website. (WWM, 2016)

It is important to note that although it is an art installation, its name includes the word “museum”. A choice that testifies the intention to position itself as a narrative event with its own specific physicality and temporality (the project foresees its location in a permanent exhibition at a traditional house in the Greek island of Hydra and an never-ending development, across continuous donations from around the world). Ketí Haliori chooses in fact, to deal with the water exactly as an evidence to be put on display into a museum, activating, in this way, its artistic and social value as a subject to be preserved and, above all, to be placed at the center of a different intellectual attention. The water, usually taken for granted and therefore underestimated or even ignored, becomes a complex narrative system that, through its own existence, is it told as a fundamental life element itself and, in perspective, an urgent and strategic global environmental problem. The development of the *World Water Museum* collection is based on the voluntary cooperation of anonymous people, who are asked to send samples of the waters of its rivers or lakes. A collective action that activates a partnership process and, therefore, a sense of belonging and that becomes immediately a metaphor of a global feeling to the problem that the availability of water resources presents to the whole planet, and to the risks of its forthcoming shortages. The water samples received in this way are submitted to chemical analysis, then classified and finally conserved in laboratory vessels, reporting the data of their origin and chemical composition.



Fig. 1 *World Water Museum*, an installation by Ketí Haliori. (Photo: Tassos Frangou; source: <http://worldwatermuseum.com/index.html#VzCxtzf3IU>)

Again, the meaning of the museum concept is well explained into the *Idea* website page: «The project does not carry out a factual scientific research of the condition of the world rivers or lakes water sources.

Its completion will constitute a symbolic collection of the samples of water which was conducted at an unspecified place and time, so that the present space-time picture of the river waters is presented – whatever that may be – without the application of scientific criteria and selective procedures». (WWM, 2016) The main principle of this installation is to make clear something that is well rooted in the very nature of the subject of the story – the indispensability of water – but, at the same time, almost totally ignored. For this reason a small portion of 100 ml of water for each sample received by the *World Water Museum* is mixed with portions of all the others, in a separate vessel called *Earth water*: a highly symbolic object, tangible icon idea of common belonging. The interaction of multiple communication levels and the presence of different degrees of conceptual and sensorial involvement require a redefinition of the real idea of content curatorship and of the expression modes implemented with its staging strategies, remodeled to make visible what really exists behind all obvious appearances of everyday. The *World Water Museum* is a potential structure of a “museum work in progress” through an art installation that, making the water something to collect, to classify and to exhibit, reveals, precisely with these actions, its social and cultural value.

Exactly the artistic point of view from which the project originates, a project which is not intended as a scientific research, but rather a symbolic collection, generates innovative points of view looking at water no longer as pure chemical element, but, rather, as an essential factor for understanding ethnographic, economic and political phenomena of the past, the present and the future. So the water becomes a material element that reveals multiple degrees of intuition about intangible factors linked to it: events which must be revealed with the development of innovative staging methodologies. The role of artistic intuition is essential, therefore, to activate new metaphors. Not by chance the work of Ketí Haliori active dialogue with the German artist Uwe Laysiepen (better known as Ulay), whose *magnum opus* is the *Earth Water Catalogue*, «a growing archive, database, library and platform, be it online or in print, available from the very outset to any user or reader; artist, scientist, engineer, civil servant, scholar, student, or simply any water consumer». (EARTH WATER CATALOGUE, 2016) *Synergies* by Ulay+Ketí Haliori, indeed, alongside *Catalogue* and *Museum*, amplifying the idea of water as a natural heritage of which we should fully perceive the substance and significance.

2.2 Micropia, Amsterdam. Discovering the invisible life

The willingness to make visible the invisible is the subject of the complex, innovative and surprising curatorial and staging project for the *Micropia* in Amsterdam, which lasted ten years. «This museum is about the invisible world, – says the museum's creator, Haig Balian – Two thirds of the natural world on this planet is invisible. One way of making it more visible is to imagine that every human being carries almost two kilograms of micro-organisms and bacteria. Half of the oxygen that we use is made of bacteria, and when you know that you have 10 times more micro-organisms in your body than body cells then you realize that you are a part of that invisible world». (EURONEWS, 2014) Realized nearby the Artis Royal Zoo, *Micropia* unveils the world of micro-nature, introducing a non-specialist audience, to the discovery of microbes: undetectable dimensions living creatures, yet present everywhere, since from our own body, in exponential amounts. An “other” living world surrounding us, of which we are part, but that we know little and that we usually remember only in relation to illness and disease, but which, however, is essential for our survival. In order to make real and understandable this narrative of the invisible, a broad team of scientists and specialists worked together with the exhibition design experts of the Dutch architects office Kossmann.dejong, in close collaboration with ART+COM Studios, a Berlin-based media design firm. The narrative and staging structure of the museum exhibition is made by a series of multimedia installations that allow visitors to confront the world of micro-organisms according to a broad spectrum of activities, which involve them constantly: in this way are activated a series of experiences that make us understand what ourselves are part of this invisible world.



Fig. 2 *Micropia, Amsterdam, The Netherlands. 2014. Source: <https://artcom.de/en/project/micropia/>*

«We have aimed for a balance between experience and knowledge». (KOSSMANN.DEJONG, 2016) The museum works as a large laboratory which reveals the presence of microbes in all aspects of our lives: the discovery of a parallel world. Entire colonies of real microbes that dwell in large petri dishes (enlarged reproduction of the typical containers for laboratory bacterial cultures) can be viewed through microscopes connected to large TV screens, revealing iridescent geometries of these collections of living organisms: true works of abstract art created by nature itself. (Something that reminds to the experiments of artists such as the Australian Peta Clancy or the Austrian Sonja Bäumel)

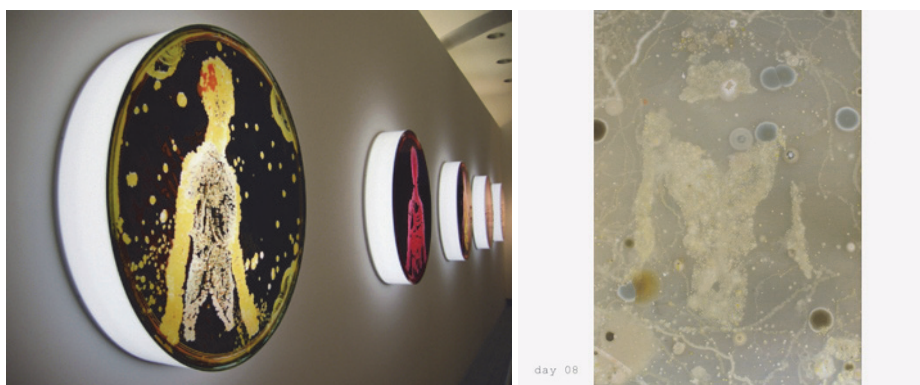


Fig. 3 Peta Clancy, “Visible Human Bodies”, Australian Centre for Photography, Sydney, 2007. (Photo: Xain Milke; source: <http://petaclancy.com/works/?pid=61>)

Fig. 4 Sonja Bäumel, Oversized Petri Dish “Self-initiate”, 2009. (source: <http://www.sonjabaeumel.at/work/bacteria/oversized-petri-dish>)

To tell the unsuspected symbiosis that characterizes the life of people and microbes is it possible to perform direct experiences by interacting, for example, with a full body scanner that lets you view where and how many microbes “are resident” on your body, or dealing with the “Kiss-o-Meter” to find out how many of them are exchanged during a kiss. The narrative space of the museum is therefore rewritten through the intertwining and mutual contribution of different disciplines, aimed at the script of actions, both in their uniqueness that in their sum, draw new boundaries of the exhibition design concept.

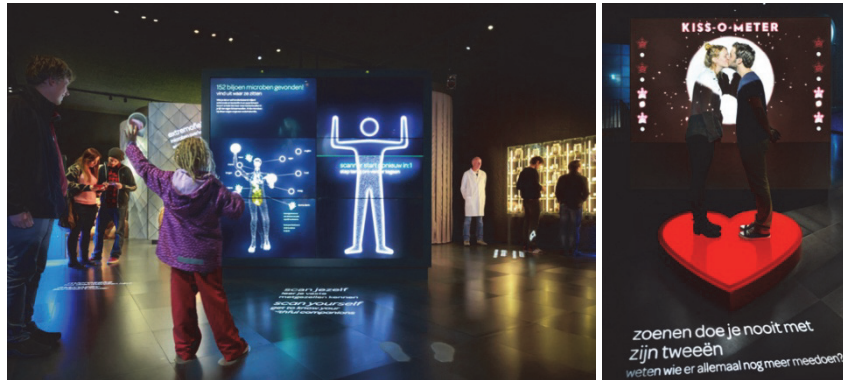


Fig. 5 *Micropia*, Amsterdam, The Netherlands. 2014

(source: <https://artcom.de/en/project/micropia/>)

«The mission of *Natura Artis Magistra* is to help a wide public discover and experience the interconnectivity of life and nature and to encourage the love of and concern for the natural world. This objective is of vital importance to our civilization: we cannot understand human identity without grasping how nature and human civilization are fundamentally bound up in and dependent on each other. It is impossible to fully understand the interconnectivity of the natural world without knowledge of the most powerful, most successful and, at the same time, the smallest life form: micro-organisms». (MICROPIA, 2016) *Micropia* is the “zoo of microbes”, where narrow cages and fake scenography are replaced by the interaction and the stimulation to explore, triggered by intelligent and innovative paths of exploration. The design project exceeds the boundaries of mere exposition and become the scope of application of a systemic design, including the development of alternative mode of interaction with science, by the design concept of a media-based exhibits as well as their interaction and hardware design, prototyping and programming.

3. The everyday: the usual is not obvious

How many things happen in everyday life of each of us? And how many of them really affect our personal history? Surely everyone can subjectively respond to both questions. But if these events certainly important, but so strictly personal, hides, embedded, histories whose evocative power was so strong to take a universal value: pictures of a global story that involves us all? Recurring events, common needs and requirements, moments of joy and drama: does exist a cross-syntax that brings us closer each other by sharing similar experiences?

The idea that there are social and cultural heritages that, despite the great differences that characterize contemporary society, got common matrix – an intuition that has his most interesting definitions in the principle of *collective memory* formulated in the early twentieth Century by Maurice Halbwachs (HALBWACHS, 1925) It is now also widespread in museum design, generating ecological principles of the alternative culture. These principles raise everyday life to a privileged place of exploration and understanding of social phenomena that we have gone through and that surround us today, defining an aesthetics of everyday where the usual is no longer synonym of obvious. The Halbwachs hypothesis, in brief, states that is the collective memory that allows the constitution of an individual memory (not the other way) and thus our memories are set up in accordance of its membership of a social group. As a

result the value we attribute to them individually is such as and is changeable in time, because its being closely tied to changes in the common social judgments. The combination of the traces of the past that a social group maintains, develops and transmits from one generation to the next, could be understood and represented through objects, images and habits of different historical periods and in relation to trends and traditions with which they took shape and became consolidated.

3.1 *Tidens Samling - The Museum of Everyday Life. Please touch the objects*

In this sense is paradigmatic the *Tidens Samling - Museum of Everyday Life in the 20th Century* of Odense (Denmark) that exist since 1992 defining itself the first “hands-on” museum of cultural history in Denmark. Indeed, the museum includes a large collection of objects (furniture, clothing, toys, magazines, records, etc.) that have been of common use in Denmark between 1900 and 1980. This heterogeneous collection is set within eight full-scale domestic environments, whose original interior shows its normal location in the daily life of typical Danish houses of the time. The most interesting feature of this museum, which otherwise would be very similar to a memorabilia store, is that visitors can and should interact with the environments and objects. «Our guests are welcome to make themselves at home in the living rooms where they may sit down, open the drawers, read the books, and put on music». (VISIT DENMARK, 2016) The narrative of the museum is no more static: the interaction exceeds the classic “do not touch” taboo and defines new rules of belonging between visitor and objects on display. The classic *period rooms* evolves themselves from scenic settings full of objects, into places of direct experience.



Fig. 6 *Tidens Samling - Museum of Everyday Life, Odense, Denmark. 1992*

(source: <http://www.visitdenmark.pl/pl/denmark/tidens-samling-museum-everyday-life-20th-century-gdk613063>)

At *Tidens Samling* you can sit down on furniture and you can try the clothes becoming part of the collection itself: all senses are involved in a time travel made in first person and without digital artifacts: the relationship is immediate, tangible, and tactile. «*Tidens Samling* is a place for all generations to meet and exchange memories and rediscover the history of your parents, grandparents and great-grandparent's childhood. The many details give recollection of early childhood for the elderly, whilst children and young people can learn about the lives of past generations». (TIDENS SAMLING, 2016)

3.2 *Gli oggetti ci parlano, Reggio Emilia, 2012. Let's listen*

The placement of everyday objects in museum facilities like the *Tidens Samling* always generates a destabilizing effect because these objects are not artworks "unique" as masterpieces and so they are not

included into a critical point of view which recognizes them an *aura* and, moreover, it doesn't matter their scientific-technological aspect (which is competence of the collections of scientific museums): their real nature is uncertain and hardly to define. Are they purely worthless consumer items (and therefore not worthy of museum location) or silent witnesses of different narrative structures: clues able to define different perspectives of exploration and knowledge of the multiple mix of stories that constitute the deepest sediment upon which the History (with capital first letter) can build itself?

The laboratory *Gli oggetti ci parlanno*, curated by by Italian architect Italo Rota in 2012 at the Chiotri di San Pietro in Reggio Emilia, as part of the exhibition *Lavori in corso* had launched a call for all citizens to bring to the *Musei Civici* of "Palazzo di San Francesco" objects common belonged to them and from them recognized as emblematic of some of the recent past living conditions. «Objects related to their memory but chosen with a critical act giving priority to those which in their time have meant a breakthrough, a turning point, a change» (FOTOGRAFIA EUROPEA, 2016) The initiative meant to experiment participatory cooperation methods to increase the second half Twentieth Century *period room* collections of the museum, through an act of shared reflection about the past and future of our community. Means brought to the museum by common people were photographed, cataloged and displayed with a temporary borrowing arrangements, just as real artworks. The idea of the exhibition, open to criticism for its aesthetic results and for a certain complacency in the accumulation excess, had its own clarity of purpose: to outline an insight into the social history of the Italian post-war period, through a visual proposition of daily life, urging a reflection on some open issues about the future.

The possibility of this principle to be applied to the original collections of the Reggio Emilia *Musei Civici*, hybridizing historic objects and documents to other more anonymous origin has raised great controversy at the time. An exhibition defined by multiple assembly and free association that, for many critics of the operation, if brought within the permanently collection would have subverted the philological conservation duty that is intrinsically linked to the role of the museum. An issue that certainly must be analytically dealt in the next years and which can be solve in the development of new types of professional designers of integrated system involving conservation, curation, communication and staging.



Fig. 7 *Gli oggetti ci parlanno*, Reggio Emilia, 2012. Source: courtesy of Studio Italo Rota & Partners

3.3 The *Museum of Broken Relationships* by Vištica and Grubišić

If the daily tracks are not included into a consolidated display structure and into a historical context and built, however, the unique and original core, as happens for the *Museum of Broken Relationships*, founded

by Croatian artists Olinka Vištica and Dražen Grubišić, a highly poetic and compelling vision invests banal and anonymous objects inventing a museum that, for its originality, was awarded in 2011 for its capacity to be innovative, challenging the common perception of the role of museums in contemporary society.

«The *Museum of Broken Relationships* encourages discussion and reflection not only on the fragility of human relationships but also on the political, social and cultural circumstances surrounding the stories being told. The museum respects the audience capacity for understanding wider historical, social issues inherent to different cultures and identities and provides a catharsis for donors on a more personal level». (MUSEUM OF BROKEN RELATIONSHIPS, 2016)

The *Museum of Broken Relationships* comes from the intuition that the drama of the end of a love is a traumatic moment in people's lives, and that this event is universal: everyone, sooner or later got to facing it, no matter the age, religion, culture or geographical origin. The devastating power that this event generates can radically change our lives and often leaves a residue of intense and mixed feelings: sadness, hopelessness, anger, revenge, apathy...

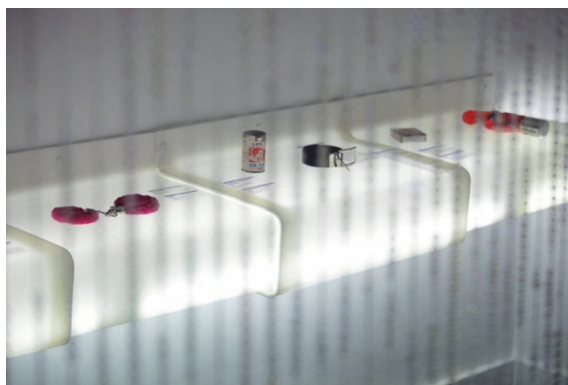


Fig. 8, *Museum of Broken Relationships*, Zagreb, Croazia, 2007. Source: <https://brokenships.com/en/about/download>

The visitor goes to Museum of Broken Relationships not only to view the collection on display, but to find himself and their common experiences, observing everyday objects of little value, sometimes surprisingly ugly, but that find sense, despite their apparent randomness, in their common emotional origin, creating a universal feelings portrait, unexpectedly logical and understandable.

3.4 The *Museum of Obsolete Objects* by Jung von Matt

Everything can be narrated. What really makes interesting a storytelling is its skills to be highly original in capturing an unexpected point of view, even when dealing with a topic seemingly trivial. There are many factors that contribute to the achievement of this result: intuition and practice to the originality, intelligence and earnestness in the construction of the narrative, clearly the motives and purposes of the narrative itself. As part of the cultural preservation idea this means above all to know how to identify events marginal at first sight, a hidden dimension, that makes them key witnesses of widespread social phenomena, affecting the reality of our lives, determining its logical structure, and changes. A sensibility that identifies the intangible culture, which nestles in the marginal phenomena and makes it understandable to everyone. Then that's also a project with an extremely simple structure becomes a valuable tool for understanding complex and broad phenomena. Imagine all the objects that lie abandoned in the bottom of our homes drawers, because displaced by new technologies that have made

them useless. Their destiny is most likely the dump; the lucky ones, perhaps, will end up in some modern antiques market, waiting for some nostalgic. They are the “obsolete objects”, in the moment of their maximum glory desired and everywhere widespread and now totally abandoned.



Fig. 9, The Museum of Obsolete Objects by Jung von Matt. Source: http://projects.jvm.com/mooo/?lang=en&hl=en_US

Nevertheless behind their aging you can outlining uses and customs of ages also right next door to us and, above all, one can become aware of how quickly, often secretly driven by the so-called “market laws” have changed the way we live. Above all, we can realize how contemporary society, so strongly influenced by technological advances, produces and consumes objects (and the related mass culture), that once lasted for generations and today, in a few years, appears to the youngest already unknown and incomprehensible. These are the multiple narrative structures that trigger with a visit to a virtual museum, which only exists in the web (although lately has generated many attempts to “real” copies): the *Museum of obsolete objects* designed by the German advertising agency Jung von Matt.

Made up of a *You Tube* channel (http://projects.jvm.com/mooo/?lang=en&hl=en_US) the museum displays, in fact, many objects that have accompanied our most recent history (rotary telephone, floppy disc, phonograph, compact audio cassette, etc.) organizing them, with elegance and irony, in short video clips that, like real *tutorial* of social archeology, identifying along an interactive *time line* the year of “birth” and that of obsolescence. Then it is explain how these objects works by a voice over, with metal intonation, which reinforces the impression to be time travelers who have discovered something very ancient, forgotten in who knows which computer archive. «Although a digital replacement has been found for all these analogue tasks the charms of the originals can never be replaced. Thus we have created the Museum of Obsolete Objects to house and exhibit those fading memories, not only, to jog our against brain, but to also show future generations the lost technological marvels of the 20th century» (JVM, 2016)

4. The unmentionable. Nothing should be forgotten

Since a few decades by now, on the international scene, does exist many museums devoted to events the memory and experiences of which many people, perhaps, would prefer to let disappear silently, in reason of an ambiguous sense of removal. They are places, in fact, that preserve the memory of tragic events because, aware of their ethical and social value, would transform the telling of those events into moments of deep reflection, awareness of conquest. Here on tries to make visible and above all understandable the trauma, the dramatic event, activating ways and narrative instruments to help the museum to be a vehicle

for memory and not memory itself. This is an highest importance critical point: the museum does not should identify itself with the memory the things, but needs to be the place that triggers the memory, helping the story of the past to get in tune with the contemporaneity, to evoke the experiences past and make them the object of reflection in the present. *The museum is not memory itself: it is opposition to memory loss*. Taking care of what is unmentionable, what has been removed (and then rejected) and placed at the edge of our lives, these museum act as places where the dramatic dimension is not simply repeated, but rather faced and understood. A complex mission that requires the ability to apply to contemporary society, made up of multiple and different memories and perceptions that must find space for the emergence of a renewed sensitivity.

4.1 *The Museo Memoria y Tolerancia, Mexico City.*

When someone think about something unmentionable, inevitably, the first thought goes to the large quantity episodes of insane collective violence who have gone through the human history without interruption, in every time, place, and culture. If the two great World War (especially the Second one, indelibly spotted by nazi war crimes) are the most documented moments of this story of the “unmentionable”, this should not obscure the many other slaughters perpetrated in the world in the name of false ideals and real racism or deviant ideologies. Paradigmatic in that sense, is the recent Memory y Tolerancia Museum of Mexico City, designed by Arditti + RDT Arquitectos. Here, in fact, the theme of memory moves from the Holocaust, and then introduce the principle of *Genocide and Crimes against Humanity* defined by the UN in 1948 and continue the journey into the abyss of the Armenian slaughters, ex Yugoslavia, the Rwanda, Cambodia, Guatemala, Darfur. Every genocide is there, with its macabre load of blood, with the images the executioners and the victims, with the symbols of propaganda and the weapons of mass destruction. With names, portraits, crosses. Every continent bears his sad contribution. no one can feel itself “excluded”.



Fig. 10, *The Museo Memoria y Tolerancia, Mexico City, Mexico, 2011* (Photo: Marco Borsotti)

« (...) every crime is different, while each genocide also refers us to an idea of unity, as if it too were part of a single immense night. It unfurls itself with a systematic, logical and inhuman nature, leaving behind it a sensation that takes us back to a single and selfsame monstrosity. Each genocide endorses the next; each mass-murder on this scale – replete with evidence and proof – justifies all the others of the same order. The Nazi executioner is complicit with the stalinist torturer, the Rwandan killer answers to the Serbian assassin, in full complicity». (OLLÉ-LAPRUNE, 2011)



Fig. 11, *The Museo Memoria y Tolerancia, Mexico City, Mexico, 2011* (Photo: Marco Borsotti)

The museum's curators have brought the theme of memory to the house of each of us, making it a common duty and to do that they asked to the exhibition project to support different narratives that combine faces, phrases and objects of the killers and the victims in a shocking continuity. The museum introduces, however, also the theme of tolerance, which closes the exhibit as a light at the end of the tunnel. The narrative structure here does not indulge, however, into a too easy optimism: it recalls, instead, issues such as gender equality and the freedom of expression, culture, religion. A narrative that does not hide affirms or imposes: shows reveals, and ask willingness to consciousness.

«A museum is by definition tied to the past, setting out themes that clarify our present in the light of recent or distant experiences. From far off, the participants in appalling tragedies call to us; paths are to be found for new reflection that tells us how to envisage this relationship between the practice of the word and the rejection of the silence that accompany genocides». (OLLÉ-LAPRUNE, 2011a)

4.2 *The Museo Laboratorio della Mente, Roma.*

There are many narratives that we usually put on the borders of our consciousness and over. Events, places, people that we addresses more or less consciously to oblivion and which we does not even allow the consolation of a minimum act of memory. This absence of memory, often unconscious, but collective, is not linked only to the issues of violence more evident, than that which builds the History (again with a capital letter): often involves although apparently minor events, related to marginal conditions, which the current logic of the so-called "right-minded society" does not accept because far from usual canons of understanding. They are the border places where marginalization, ignorance, non-knowledge is limited and tolerated in reason of a sort of social contract of not visibility.



Fig. 12, *The Museo Laboratorio della Mente, Roma, Italy, 2008* (Source: http://www.studioazzurro.com/index.php?com_works)

Unveil their presence therefore becomes a necessary and courageous civil act, but is often also an opportunity to discover a different humanity, rich of important values, engaging stories, and of real things that time changes, redesigns, makes comprehensible. In Rome, the project *Museo Laboratorio della Mente*, created by UOS Studies and Research Centre ASL Roma E and Studio Azzurro, revealed, through interactive video installations that wholly involve the visitor, the world of mental illness, just where this was placed and hidden from the world. It faces the hard historical truth, but also the scientific and social progress, culminating in Italy with a legislative reform that closed definitively the asylums (Law Basaglia, 1978) and especially reveals a large portrait of a forgotten humanity. The museum tries to define new communication contexts capable of give visibility to a lot of stories hidden behind the mental problems, starting from the limitations of physical freedom and the psychological constraints, up to clinical practices to contain first and then openness and understanding. But also the humanity of every day, the fears and the hopes, the unexpected and valuable poetic and artistic force of some "guests."

«The *Museo Laboratorio della Mente* was founded with the clear intention to build communicative contexts that favor the promotion/prevention of mental health through active and meaningful participation of the visitor. Within a narrative inspired by a multi-textuality and a continuous oscillation between real elements and laboratory experiments (...) the visitor is invited to reflect on social exclusion paths and to change/rethink its attitude towards diversity». (MARTELLI, 2010)

Visitors thus perform a profound learning experience, observing and listening to the witnesses of what was a parallel underwater world, dividing the attention to the narratives provided by the exhibitio project with the space itself, which is the original one, which gradually takes possession of them, bringing people in a total immersive situation. A condition created to arise interpretation processes that lead to a conscious inner public growth.

5. Conclusion

All these innovative scenarios of exhibition designs require training of new professional figures related to the design, management and development of new products cultural, communication and technology through innovative forms of knowledge management by the continuous development of models, tools and systemic modeling based applications. so complex narrative structures requiring simultaneous management of multiple design disciplines, combined with a strong sensitivity to get in tune with the cultural and scientific content defined for the museum. In this sense, the system design and is housed in its logical and complete fulfillment.

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Design of information systems as an aid to migrants

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Abstract

Starting from the official call for the 1st Contest “Let us help those who aid migrants”, by the International Committee of the Red Cross and the Universidad Iberoamericana’s Program on Migration, students of the degree course on Graphic Design and an interdisciplinary group of teacher developed a “Visual communication system to promote hygiene and health in hostels lodging migrants in transit.”

This teachers’ group, through the use of a dialectical – reflexive methodology (Diezt, 2011) was able to analyze the social processes endured by migrants and solve their problems by applying design, using as main tool the discussion and opinion confrontation among those involved in the job in order to develop a common language for the participants in the design process coming from different disciplines, taking into account the relationship between sign and images’ comprehension by users.

This paper objective is to share a teaching – learning experience by way of a case study and it shows the importance of using new tools and the feasibility of integrating different disciplines in projects with a social motivation.

The present document will develop along three main axes:

- 1. Situation diagnosis. The project starts questioning: Which factors must be considered in order to get satisfactory results from a design project with a social aim? Due to user’s complexity, it is required an interdisciplinary approach in order to know him, so that an adequate graphic solution can be provided.*
- 2. Systems and tools development. This section includes the description of the strategy to follow for the design carrying out, research, implementation, modification, installation and setting methods. Also, it answer to the question: Why is it important to utilize the new social tools in design processes?*
- 3. Results and evaluation. The document ends presenting answers to: Which ones and in which way were the etnometodological tools incorporated into the project?*

Keywords: *Systems, design, social, interdisciplinary, migrant*

1. Situation diagnosis

From the 90's on, the academic members of the Universidad Iberoamericana (UIA) were fully aware of the significance of forming social researchers committed and acquainted with the needs of the users for which they design. Even though the process of change and acceptance of the compromise implies grater rigorousness in the students preparation, the Design Department undertook the challenge and now its professors are totally accountable to the society. In this regard, a professional profile according new needs was generated which favor the preparation of designers more conscious of their environment and apt to overcome the work challenges imposed by users seeking a higher level of life quality and well-being.

It is for these reasons that, when we were invited to take part in the Red Cross Contest above mentioned, UIA's students and teachers as well wholeheartedly accepted the challenge of producing a proposal to get optimum results but, due to the case complexity, it was clear that new theoretical – methodological approaches were needed, taking into account the interdisciplinary and multicultural links to be established with the users.

The subject of study was migrants travelling through México toward United States of America (USA). They have a precarious economy and most of them are illiterate. Besides, they confront serious health risks like dehydration, gastrointestinal, respiratory, urinary or cutaneous infections, grievous bodily injuries or insect and viper bites, among others. And without concern for their genre, age or origin, they are constantly abused by delinquent groups and even by certain local authorities and have to undergo public policies that try to impede their passage and violate their human rights.

Along their transit through our national territory, they find 55 hostels, which are gray and lifeless spaces, lodging from 20 to 400 people, for 24 to 48 hours. This population is composed of 4% children, 11% women and 85% men. The majority of them (60%) proceed from Honduras, followed by individuals from Nicaragua, Costa Rica, Panama, Guatemala, Belice and Etiopía. This information was supplied by the institutions sponsoring the contest by the Universidad Iberoamericana's Program on Migration in the initial meeting of the project on September 11th, 2013.

These data were essential in establishing one of the main parameters for *hygiene promotion*, a concept defined as: “a planned and systematic strategy allowing people to carry the necessary actions on to prevent or limit risks of diseases related to water, sanitary conditions and hygiene” (Sphere Project, 2016).

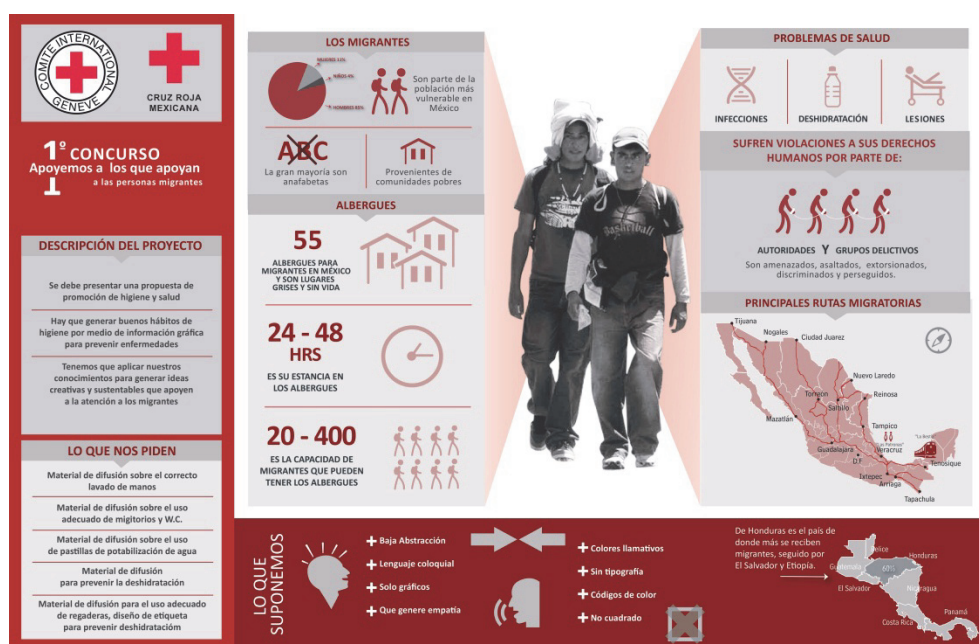


Fig. 1 "Infographic contest "Let us help those who aid migrants". Created by the pupil Paulette Ordoñez.

2. Systems and tools development

Creative processes of visual communication enable us to devise elements to favor the correct transmission of a problem's terms in a social environment and facilitate its solution by promoting a change in the behavior of those affected. As María Ledesma tell us: a design will generate any of three different types of attitude in the user: "To do – To read, To do – To know, To do – To perform" (Ledesma, 1997), where the designer function is to create elements for the easy transmission of a message, in this case, by informative cells synthesizing a long and may be complex message, in order to obtain a favorable response. So, the designer shall focalize on the people for whom he will create in such a manner that his graphic elements are capable of modify their behavior.

However, how can this goal be achieved in a project with a social approach, when it implies that the student must directly work on an extreme situation, by far alien to his own life style? It is here that interdisciplinarity comes up as a helpful approach to get a first approximation to users' universe, allowing the designer to grasp that alternative reality. The interdisciplinary group of teachers was integrated by: the Master Sciences in Social Anthropology Tatiana Elizabeth Lara San Luis, the Political and Social Sciences Doctor Javier Urbano Reyes, the Engineer Alejandro Vergara Frutos and the Master Sciences in Education and Industrial Designer Patricia Hernández Navarro.

Anthropology has mechanisms that enable him to focus his attention on the user's observable needs, through the analysis, detection and generation of findings that are useful in conceptualizing creative elements to connect with the user. And from Social Anthropology derives Visual Ethnography, a tool selected for this project because it allows to be near the subject under study without being in its immediate physical vicinity, which is a most convenient option due consideration given to distance and lack of time and safety. The last feature incorporated into the process was visual communication, because it makes possible to establish the relationships between emmisor, message meaning and receptor, taking into account this last one skills and characteristics.

Main project's objective was to develop a pictograms system permitting the transmission of information related to hygiene promotion (information supplied by the UIA and PRAMI), its convenience and the procedures to follow, trying to change certain inconvenient behaviors of the migrants in the refuges they are received. Regarding its specific targets, they shall, by an adequate design and iconicity and creating the necessary drawing reticules, production and *dummies* for each one, to originate a system of informative cells that make the users understand, in a clear and efficient way, what actions they are expected to perform, motivating them to comply.

2.1. Work method

Already defined the points previously dealt with, we proceeded to conform work teams in accordance with the official announcement, requiring from three to five participants, supervised by an academic adviser, and registered them by e-mail. The Master Sciences in Social Anthropology, Tatiana Elizabeth Lara San Luis, a UIA's teacher of the subject, joined the project from the beginning in order to present to the students and incorporate into the research process the new instruments for remote observation. The interdisciplinary method involving Social Anthropology and Graphic Design was thus promoted.

Once they had the research results, the students recognized a specific set of problems related to the needs of the final users of the design, in which graphic language is most important in communicating the message. Accordingly, they set three main features to be considered in the process of designing, corresponding to its analysis regarding semantical, syntactical and pragmatcal aspects, that is: with relation to the understanding of its meaning and representation, regarding its own structure and finally, concerning the relationship between meaning and interpretation.

The creative process brought out multiple options in shape, color and degree of abstraction, so a close filtration based on the research results was implemented. The graphic elements selected were those comprised in the figurative group of analogical motivation "representing the graphic denotation or depiction of a real subject, known within the environment in which it will be used, that could have the likeness of a human being, an object or an animal. This image is consequently of the iconic type and receives the name of pictogram." (Morris, 1982).



Fig. 2 Cells for promotion and hygiene. Morris (1982).

There were various difficulties in the graphic conceptualization process. For example, the skin color shade to be utilized, taking into account that the migrant population is multicultural and, were it too clear, the user would not identify himself with it. However, the selection of a blue background was a success, due that it gives idea of calm, and the hostels' guests are subject to a high level of stress at the time of their pass through them.

The same process was performed to select texts because, although the greater part of the migrants are illiterate, it was unavoidable to employ an universal language in which the words utilized had the same meaning for all the users notwithstanding their origin, it was necessary to change: "lavarse (wash)" by "restregarse (scrub)", "mingitorios" by "urinales", "w.c." by "sanitarios", among others. The regional representatives of the users supplied us with timely observations that were utilized to make modifications and apply to the design what Umberto Eco calls *pertinent aspects* (Eco, 1974) for the proper understanding and interpretation of the images' message, which could not convey to the receptor the idea of the person who created it. Through this concept, the students were confirmed in the need to know the users in order to develop clear, functional and empathetic pictograms capable of transmitting the desired idea.



Fig. 3 Cells for promotion and hygiene. Morris (1982)

Once selected the main pictogram representing the migrant, a set of parameters was specified in order to create an homogeneous system, designing a family of images, an standard format and size and the application of the adequate color palette, making always the proper use of the iconicity and clearly promoting the actions represented in the cells. With the design approved, we defined materials and manufacturing and fastening methods and made the mechanical originals for their production and, wishing to have a complete visualization of the project, we generated photos in situ, dummies and renders of each piece, to give a clear idea of their position and function in the hostels.

For the final evaluation of each work team project, the students presented the information obtained in the research phase and submitted a document and infography to the sponsor institutions representatives, who acted as qualifying judges. The documentation submitted included: a) Letter with the names of the students integrating the work team and their academic adviser. b) Research on the migrants and its results.

c) Design of informative cells for the diffusion of the correct way to wash one's hands and the use of antibacterial gel, use of pills to make water drinkable, prevention of dehydration, labels for water bottles and bags, correct use of urinals, toilets and showers (printed and in compact disk, with all the designs). d) Letter of rights' cession for use, diffusion, exhibition, communication, spreading and reproduction.

They made observations on each report, which were most valuable for the students because, being a real project, they could defend their work, interacting directly with their "customer" and having in advance an experience they will confront in their professional life. The highest authorities of the Committee of International the Red Cross and the Universidad Iberoamericana's Program on Migration, and the Design Department were present in the awards ceremony and the award's certificates were handled the UIA's Rector, Dr. José Morales Orozco, S. J. The winner of the informative cells was the team formed by the students: Paulette Ordóñez, Mariana Nava, Violeta Corona and Lorenza Moctezuma, while the prize corresponding to water labels and illustrative posters was accorded to the team integrated by: Ximena Torres, Ana Sofía Morales, Sofia Arana and Victoria Cojab.

3. Evaluation and results

Although there are many linked projects in the Design Department of the Universidad Iberoamericana, there are few cases like this one in which a punctual tracking of the results obtained in the final phase of the project has been done and in which, only six months after being applied extremely favorable outcome is reported. In words of the Ing. Alejandro Vergara Frutos, head of Water and Habitat Projects of the International Committee of the Red Cross, Regional Delegation for Mexico, Central America and Cuba: "In the middle of 2014 and beginning of 2015, they implemented a campaign to promote hygiene in nine hostels offering assistance to migrants in Mexico, five mobile clinics of the Mexican Red Cross and a number of shelters in Honduras. This campaign has two components: 1. A visual part allowing the migrant to follow instructions to improve his hygienic habits. Said posters have been affixed in showers, w.c., wash-hands basins and urinals in the sanitary areas of the hostels" (Vergara, 2015).



Fig. 4 Cells in hostels offering assistance to migrants in Mexico. Vergara (2015)

One of the benefits that were not expected on the initial objectives having a significant impact has been its use through visual communication systems to encourage healthy practices in meetings with people temporarily housing in refugees. The graphic presentation has been useful as an aid to facilitate each of the cleaning procedures. Using the same posters fixed in the sanitary areas, with the complement of the s – cycle diagram, it is possible to induce the migrants to change, improve or reinforce their hygienic

habits. These talks are given by previously formed volunteers from the hostels and by Mexican Red Cross personnel.

Campaign results are encouraging: gastrointestinal diseases product of poor cleaning usages have decreased by various percent points, still there are no official figures published and these are the only information references we have. Common areas are respected and are maintained in better conditions, as evidenced by the following phrases taken from a CICR responsible report: The campaign has been favorably accepted by the migrants and who themselves emphasizes the importance of hygiene to keep people healthy and living together in good terms.



Fig. 4 Talks are given by previously formed volunteers from the hostels and by Mexican Red Cross personnel.

The methodology used, consisting in maintaining a dialog and reflecting together both disciplines, as well as the incorporation of ethnomethodological tools generated three main features:

1. It opened the opportunity to create new didactics to teach user centered projects, in which everyone contributes specific elements of his or her area, to produce adequate solutions focused in the social environment. This project results show that the new interdisciplinary model have a positive impact to generate graphic solutions with impact.
2. Finding a work and communication dynamic was not easy. However, the involvement of designers in formation, specialists and academics proved that it is possible to establish integral-learning models, in which by means of rigorously established processes, inclusive solutions can be generated in order to modify erroneous behaviors, so as to improve life quality. As the student Paulette Ordoñez says: "In the research process, Anthropology gave me clarity and understanding about situations to which the migrants are exposed. An interesting aspect was to substitute the phases accompanying figures for ones more uneatable to them, what made me reflect that even though we speak the same language, we give the words a different meaning."
3. The student's rapprochement to social projects far away from their everyday experience results in a better learning and in compromise with those who have less. The experiences had by the work teams along the contest development generated a deep reflex ion about the importance that our discipline worked for the collective improvement. We, the academics, shall propitiate the creation of a social conscience in order that the students develop a critical thinking and have a bearing on changes favorable to our society. As Norberto Chavez says: *"The politicization processes should not be understood as marginal, capricious processes, alien to academic matters, but as processes consubstantial with the civic conscience of the university population"*.

Finally, we can conclude that, in generating solutions based on the “Design of information systems as an aid to migrants”, we were enabled to innovate with a graphic language capable of communicate and connect with the user. In enclosing interdisciplinary and the use of tools like Visual Ethnography, we propitiated observation and detection of the incentives for people to behave in their own benefit. From the results obtained till now, we can rename the project as: “Systems that save lives”.

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Regeneration through Design. Comparing old and new phases of urban renewal strategies.

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Abstract

In the last years, a new phase of economic crisis, which is concerning sectors of manufacturing industries, is affecting Europe. Focusing on Italy, sectors which have strongly characterized our country, such as textile and accessories, are facing with a fluctuating period of crisis. Also in this case, as it happened from late '80s, the urban structures and identities are seriously affected and need interventions of regeneration in order to gain new life both from social, productive and commercial point of views. Having in mind the Italian case, while the first phase identified had the characteristics of a disruptive macro-phenomenon, the second phase is more subtle and gradual.

In this paper we are going to focus on changes of design culture in light of these urban phenomena. While we can already make a first evaluation of regeneration projects developed after the crisis of heavy industry sectors, the most recent events of industrial recession and the consequent regeneration of the correspondent empty areas are still ongoing.

In order to analyze and, where it is possible, compare these two phases, we are going to look at two Italian case studies. The first is Bicocca, an area of Milan, which in the '90s was interested by a massive plan of regeneration and transformation after the closure of Breda and Pirelli industries. The second is Biella, a Piedmont Province city, which has been one of the most important centers for the textile and wool industry; the crisis of this sector strongly emerged in the first years on 2000 even if it had already begun between '80s and '90s when the biggest textile factories closed down. The differences between these two examples are not merely physical and dimensional but are clearly influenced by a different timing in the regeneration processes, which occurred in these areas (or, in the case of Biella, is still occurring). The analysis proposed in this paper will be focus on the work of research developed within two didactic experiences.

Notwithstanding the distinctions in terms of objectives and actors involved, in this paper we are going to delineate a systemic approach to study and design for the regeneration, improvement and innovation of places. We will try to understand if, through strategic design, it is possible to identify those soft levers and interventions able to rejoin the pieces of places, which lost their functionality and identity.

Keywords: Strategic Design, Design Thinking, Design for Territories, Urban Regeneration

1. Introduction

In this paper we are going to deal with the topic of brownfields regeneration looking at the role that design can have in these processes.

Starting from a review of the strategies put in place through different phases of industrial dismission, we will look at design approaches for (Parente, 2012):

- constructing new urban identities
- narrating and building local scenarios
- showing and communicating places

We are going to present a strategic design process developed in connection with the capabilities which design can exploit for the regeneration of urban areas. These approaches have been tested during several masters and higher education courses. In these pages we are going to present two specific case studies developed on real Italian contexts: Bicocca district in Milan and the city of Biella in the Piedmont Region.

Comparing the two cases both in terms of their positioning in the regeneration process timeline and of the strategies used, we are going to highlight the role of design for the “reconnection” of fragmented pieces, resulting from an already accomplished renovation (Bicocca), and for the start of a completely new phase of the regeneration process (Biella).

2. The phenomenon of urban brownfields from the ‘90s since today

In the last years, a new phase of economic crisis is affecting Europe. Focusing on Italy, sectors which have strongly characterized our country, such as textile and accessories, are facing with a fluctuating period of crisis. As it happened from late ‘80s, the urban structures and identities are seriously compromised and they need interventions of regeneration in order to gain new life both from social, productive and commercial point of views. Having in mind the Italian case, while the first phase identified had the characteristics of a disruptive macro-phenomenon, the second phase is more subtle and gradual.

The first phase of the industrial dismission was a huge and devastating phenomenon not only from a socio-economic point of view but also from a cultural one. Suddenly, certainties about the urban development which run the “creation” of contemporary cities, were no longer valid. In those days, cities had to face with internal “scars” and huge empty areas, abandoned by their functions, their economies and their meanings. In 1990 Bernardo Secchi wrote that the scenarios which are recalled by the “dismission”, the “decline”, the “emptiness” are, only in some cases, tragic and hopeless, but more often are melancholic; only recently these scenarios have been opened to hope and chance. Secchi also declared that only after a long and uneasy consideration, we can take a critical distance from the polyedric system of situations and experiences that these scenarios are referring to, in order to give a first interpretation, using a more clear perspective.

A positive and constructive vision about the dismissed industrial areas is needed, because they are potential places where to foresee new urban scenarios and a more complex reflection on the whole city. Secchi also wrote that it is probably the right time to go on with projects which were not “demonstrative” and exemplar which were able to show the paths and their goals; in addition to that it is important to

develop projects which did not match contrasting “fragments” to the existing city, but to elaborate more well defined projects which:

- really involve the city, its territories and its history;
- are able to collect the results of the past experimentations
- turn accomplishments into starting points for a new urban experience, for a new reflection on the living space.

This is what the majority of the reuse dismissed areas projects are not still able to express and desire.

At the same time, the discussion about the industrial heritage and about its tangible and intangible value is going on: “In the meanwhile we have to decide if these obsolete areas are today emptiness to be filled in with new contents or full spaces with contents to be, even only partially, conserved” (Rubino, 1996: p.119). This sentence clearly synthesizes an initial bifurcation in the approach toward the dismissed areas in relation with the value given to the “leftovers”, which we can sum up in two opposite visions (Parente, 2002):

- erase everything, rejecting the importance of the recent past:
 - to accomplish the return to a previous of (fake) not-artificial condition (for example the urban parks policy)
 - to start a reconstruction urban process, projection of new desires (as in the case of Paris urban transformations, such as the Parc Citroën of 1992, where only the name was saved, or the Zac of Bercy 1988-92)
- preserve everything as it was, stuck in time:
 - according to a poetic taste for an abandoned scenario
 - pursuing a “death” refuse, the “renew” to seem unaltered (as in the case of Ironbridge e and of English open-air museums)

Between these two extremes, “non-intervention” versus “absolute change”, it is possible to evaluate intermediate levels of conservative recovery, interpreting the conservation as a possible strategy for the memories transfer. The issue about the possible “ways” depends on the selection and the identification of what has to be transmitted. Then, it is difficult to identify, among the several memories of a post-industrial city, what can be the choosing criteria, as also Carlo Olmo stated:

“The problem is that each memory is relevant, because it shows a process, not a product: and the memory of a process is the hardest to be saved (...). Extrapolate a building and turning it into a museum of an industrial region or a productive sector can save consciences in distress, however it does not tackle nor solve the problem of the memories of quantities”. (Olmo, 1996: p. 20)

These are not only building, machinery, product quantities, but they also have to do with people, knowledge, culture and society.

Actually, during this first phase the huge amount of urban space freed by the dismissal of industries erased urgent questions: from one side there was the environmental issue and the great costs for the clearing operations and, from the other side, there was the need for recovering from these investments thanks to the increase of the land value. In Italy this period was characterized by the dismissal of several industries: Falck in Milan, Italsider in Bagnoli-Napoli, Fiat-Carapelli in Novoli-Firenze, Fiat-Lingotto in

Torino. Consequently, international calls were launched and huge estate interests emerged, which often stopped the renovation processes as in the case of Bagnoli, today still unfinished.

In the following years this phenomenon did not affect only big industries, but it became more and more diffused, widespread and pervasive. According to Istat data from 2015, in Italy the crisis has mainly interested textile, clothing, leather and accessory industries (-5,7%), factories producing metal products (-8,1%), rubber and plastic products (-2,1%); domestic electronic devices (-4,3%); machineries and tools (-5 %).

The comparison between the already accomplished national and international renewal successful and unsuccessful experiences, together with the changing economic scenario and the international financial crisis, favoured a change in the intervention practices, which required more consideration for the social costs of these interventions. Therefore, there was a passage from the urban renewal from the '90s to the urban regeneration of the new millennium, where the change of the word (regeneration instead of renewal) represents a different consideration for all the urban, social and environmental parameters. The introduction of new city "portions" is not only a need for functionalities and forms, but also for the sustainable creation of relationships, services, meanings. Because of the lack of public fundings able to completely sustain these operational costs, the role of private business, new forms of co-design and participation of the local communities become essential. Indeed, in Italy a decree law for the co-financing of projects in brownfields is on pending approval in the Senate. We are facing a paradigmatic change: the estate based city has to be substituted with the "social and creative city" (Carta, 2014), where it is highlighted the importance of the urban recycle for the creation of more open, sustainable and equal cities; where the communities participation, also through the temporary reuse of some public spaces (as it happens in the project *temporiuso.net* or in the experience of *BASE* in Milan at *ex-Ansaldo*) contributes to the renovation of the meanings of places, enabling virtuous processes and new systems of production of value.

3. The role of design in regeneration processes

The change of perspective where design was independent from the place, to the objectivization of place as the main core of the design project, allows to talk about design as a human capability, able to change and improve places. The human factor is very important in defining the capacity of design to interact and intervene on places. Indeed, the people centered approach is particularly relevant when a regeneration process has to be planned (Villari, 2012). The importance of communities (of inhabitants, users and designers) is crucial in strategic design processes which have as objective the study and, eventually, the improvement of places.

According to this view, Ezio Manzini (2015) talks about Design as place maker because through design practices, which involve both design experts and "common" people in order to give answer to a specific problem or even to give "sense" to a specific territory, is possible to create a new ecology of places. The typology of projects which have origin by these collaborations are different and have mainly to do with design service, social innovation, and experience design. In this view, the actions put in place by designers can fill in the gap highlighted by Lefebvre (1991) where there are:

- representations of places, which are how professionals and experts (architects, engineers, urban planners) conceive the space. Lefebvre talks about top-down practices put in place by people owning institutional and political decision power;

- representational places, which can be identified as the “artists’ spaces”, these are underground spaces seeking to change. Lefebvre refers to bottom-up provocative actions set up by powerless people in order to let see how places could and should be.

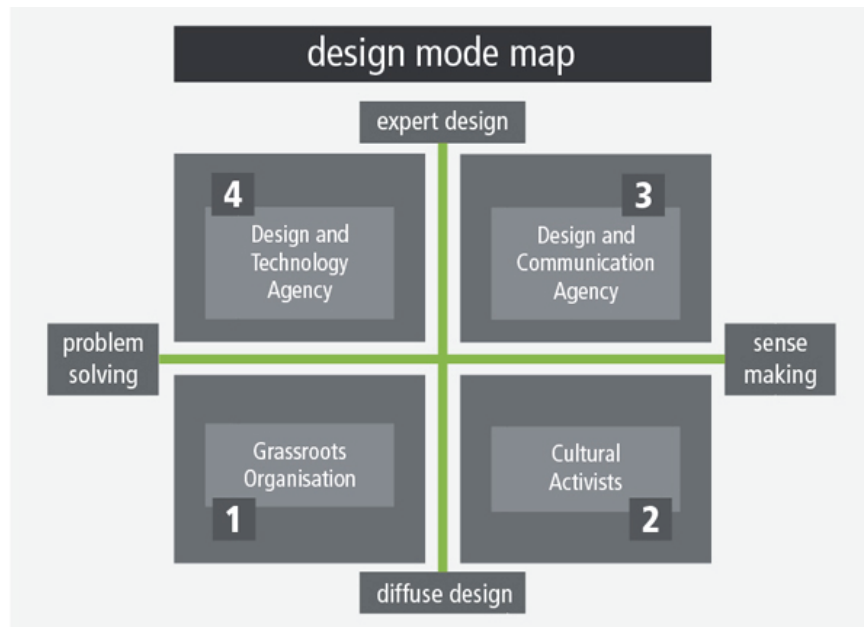


Fig. 1 The design Mode Map. Source: Ezio Manzini, (2015)

One of the purpose of this paper and also of the Research Center D4T - Design for Territories (Politecnico di Milano - Design Department) is that to systematize strategic design processes and approaches focused on places. We identified four steps of the design research process for the regeneration of places:

1. Discover and Envision: This step is focus on the identification of strategies and on methodologies to gain knowledge about a place (from the neighborhood to the national level) and then analyze this data in order to start envisioning the possibilities for involvement. This knowledge is comprised both of tangible and intangible resources, such as physical monuments or personal and collective stories and memories, all of which can be gathered both online or offline.
2. Empower: This is a pivotal moment for the Design’s research focused on places. Design’s goal is to uniformly connect all local activities carried out in order to empower institutions, citizens and enterprises to know, manage and take part in the culture of a specific place.
3. Communicate: Another important role that Design can play is establishing more efficient ways of communicating knowledge gathered about a place: both within the area of specific study and beyond, in meaningful way according to the given purpose of the research.
4. Re-invent and Re-produce: In this phase, specific activities take place, such as integrating service design for tourism, culture or welfare; strategic design for place and sense making, place branding or competitive position attainment; policy design for local and sustainable development; etc.

Design owns specific capabilities useful for the valorization of territories. To the model presented above, it is possible to integrate what Francesco Zurlo called “design capabilities”. In particular, the capabilities of seeing, foreseeing and let seeing (showing) can be functional to the design process for the study-research of the territorial system.

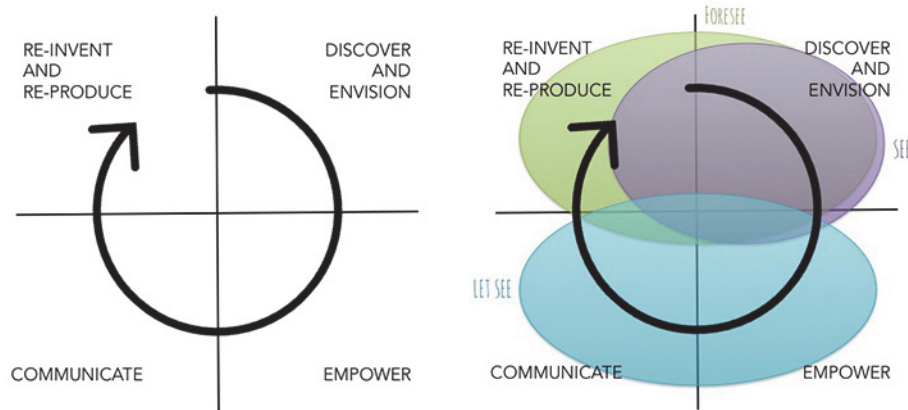


Fig.2 The strategic design process and the design capabilities

We can propose the following interpretation:

- **SEE.** The ability to see allows taking a critical look at the territories and sounding their physical, cultural, and social, knowledge resources, connected also to the governance system and to the contacts with the outside world. The design ability to see through its own set of methodologies, allow to read, feel and listen the territory. This capability specifically fit into the first step of the design strategic process (Discover and Envision) even if is partially present also in the Re-invention and Re-production phase.
- **FORESEE.** The ability to foresee go through the interpretation of the seeing action. The prevision can also be visualized and tell to discuss it with the actors from the territory, to activate co-design activities, to get closer the community to the decisional process and to create agreement. The capability to foresee, as the previous one, is present both in the first phase of the process (Discover and Envision) but it is particularly important and relevant for the fourth phase (Re-invent and Re-produce).
- **LET SEE.** The ability to let see (to show) allows to internally and externally communicate the territorial identity, not only through brand design and through the design of efficient communication artifacts, but also through activities which strengthen the territorial representative values. This capability is, instead, especially exploited during the “Empowerment and the Communication” phase.

In the following pages, in light of the above mentioned theories and approaches, we are going to present two different educational experiences carried out within the Master Progettare Cultura (Designing Culture) and the Higher Education Course BST-Branding the Territorial System.

4. Case studies

In the following sections we are going to talk about two different case studies, where the factories crisis and their consequential dismantlement caused for sure a crisis of the identity of the city, in the case of Biella, and of a specific area, in the case of Bicocca district in Milan.

Through 2015-2016 educational experiences, we tackled some specific issues. As Bicocca is concerned the focus is tighter on the specific relationship between an art institution (Pirelli HangarBicocca) which was recently installed in this area, where the regeneration process can be considered almost finished, in terms of structural interventions. However, as we will see, this process is not really finished nor accomplished in terms of social recognition and sense making. As Biella is concerned, the city is nowadays facing with the issue of empty spaces and loss of functionalities and meanings. The regeneration process is partially begun and it is following a different approach compared to what happened for Bicocca.

We are going to look at these two educational experiences in order to understand the design process put in place, where different places have to be taken into consideration, different timing in the regeneration process are occurring, different goals have to be accomplished.

4.1 Working on Bicocca: creating connections

The Bicocca area gained its identity at the beginning of XX century when heavy industries, such as Pirelli, Breda, Ansaldo, Magneti Marelli and Falck, were installed in it.



Fig. 3 Bicocca district location on the map of Milan. Source: Students work – S.Barozzi, C.Federici, V.M.Grattacaso, F.Regorda, M.Saccocci

In early '80s several plants were dismissed and the production ceased. The Pirelli Group was enough forward-looking to start thinking about the reconversion of this area. Therefore, in an agreement between Pirelli SpA, the City and Provincial Governments of Milan, the Lombardy Regional Government and the Labour Unions, several experts were invited to participate in a contest to re-think the destination of this area. The regeneration process of Bicocca area begun in the '80s and it was formally concluded in 2005. The Studio Gregotti & Associati was chosen for carrying out this process in 1988. The settlement model was initially based on the idea of Bicocca as a science park for innovation; then the main goal shifted to the polycentric development of the city, where Bicocca should had become an additional and new city centre for the suburb areas of Milan. In order to reach this goal, the "Gran Bicocca Project" included the settlement of the University (1991), the CNR, the Teatro degli Arcimboldi (2001), residential units, public spaces and green areas. As it is evident, the followed strategy was that of the knowledge oriented renovation. Another physical element for this renovation was the opening of centre for contemporary art HangarBicocca in 2004 (now called Pirelli HangarBicocca). However, more recently, in 2005, with the construction of the Bicocca Village big mall, the consumption and leisure direction was taken as well.

Bicocca renewal is probably closest to what Lefebvre defined a representation of place. Indeed, apart from few visual elements, such as the cooling tower which was transformed in the conference hall of Pirelli HQ, a connection between the multiple layers composing Bicocca wasn't put in place.

"The sensation that in the place of the factory as an element governing the area and its rhythms there has arisen a foreign body that does not integrate with the rest, but which does not remain deliberately aside either, thereby is generating a sense of fragmentation in the district." (Mugnano, Tornaghi, Vicari, 2005: 182)

As the scholars mentioned above declared, the disappearance of factories, which gave a real connective tissue to the whole area, left space a networking emptiness among the new realities installed on the territory. Nowadays, for sure, Bicocca is mainly identified with its university, even if we cannot talk about a university district, because there is mainly a functional use of the university as a place for studying and not really devoted to sociality. However, this transformation is (probably) still ongoing. At the same time, the relationship between these big institutions (the university, Pirelli HangarBicocca, the mall, Arcimboldi Theatre,...) are pretty missing. The disconnection among them goes together with the detachment between them and the old inhabitants. These new realities are "locked": it is hard to experience them from the outside and in some cases, as for Pirelli HangarBicocca, they are almost hidden and invisible from the outside.

Within the Master Designing Culture (Progettare Cultura) held by Politecnico di Milano and Università Cattolica del Sacro Cuore, during the academic year 2015-2016, the focus was on the Bicocca district and in particular on Pirelli HangarBicocca.

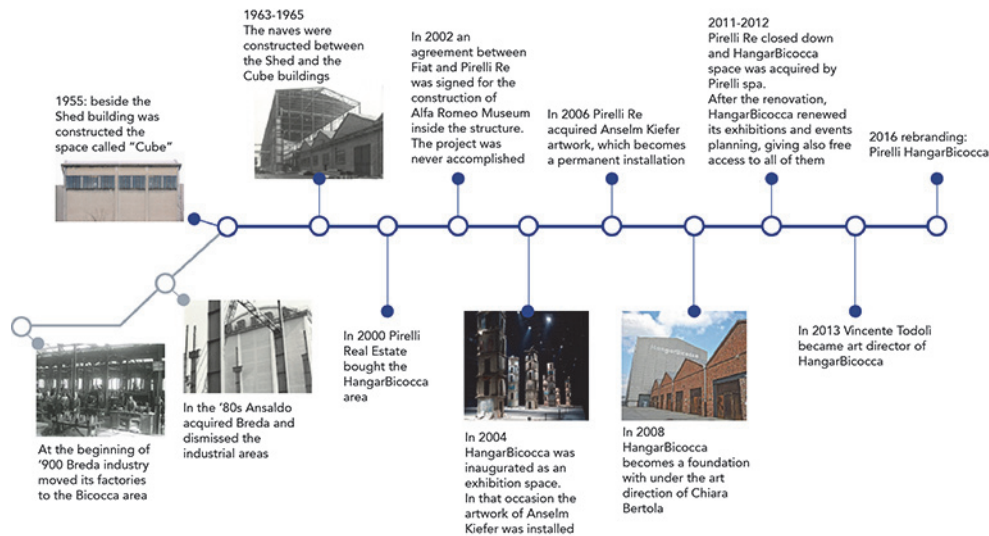


Fig. 4 Pirelli HangarBicocca born and development . Source: Students work - M.De Francesca, E.Domenichetti, V.A. Dovico, M. Fonseca

Indeed, Pirelli HangarBicocca is the customer for the project work phases of this year. The objective of the work, to be accomplished during the course, is that of reading this art institution in relationship with the neighborhood and with the young users (18-30). The final goal, indicated by Pirelli HangarBicocca, is to think and to propose design strategies in order to:

1. Improve the relationship of Pirelli HangarBicocca with the Bicocca district
2. Improve the attraction of young visitors in the cohort age 18-30

In order to do that, the students were introduced to the knowledge of both the area and the institution through frontal lessons and private meetings with the whole staff of Pirelli HangarBicocca.

The first stage of this work was mainly focused on the collection of information and data. The intermediate project work was organized splitting the class in five groups, each of which was focus on the analysis of a specific "attractor". Indeed, we identified five different territorial attractors concerning the specific target group 18-30:

- The University
- The mall Bicocca Village
- The MIL, polyfunctional space for creativity and design
- The Edificio Sedici, composed by 65 factory lofts for creative and knowledge studios and agencies
- Bars, pubs and self-managed social centers which animate Bicocca nightlife

After having developed a desk analysis about the area, the students were asked to carry out a field analysis based mainly on qualitative methods, such as observation and interviews (structured or semi-structured). Each group, after having done a general analysis of the area and the client (Pirelli

HangarBicocca) focused its attention on the young students, workers and users of the above listed attractors.

The analysis of the neighborhood returned a fragmented image of Bicocca, composed by old and new citizens, services, public spaces, etc.. In addition to that, all the groups stressed infrastructural problems which affect the district and its perception of safety, openness and welcome.

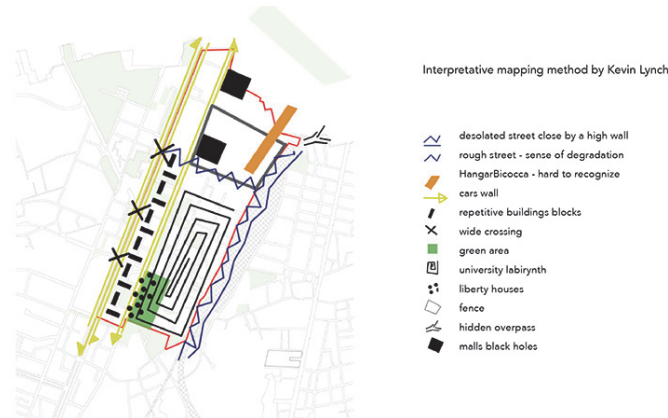


Fig. 5 Bicocca conceptual map . Source: Students work - M.De Francesca, E.Domenichetti, V.A. Dovico, M. Fonseca

From the collected interviews this spacial constraints are reflected in a small scale on Pirelli HangarBicocca.

The university students from Bicocca University (about 30), who answered to the incentive and associative question “If I tell you contemporary art what it comes into your mind?” in some cases mentioned the name of HangarBicocca. However, when asked about the institution, many of them didn’t have nor knowledge or experience of this space. Some of them even associated Pirelli HangarBicocca with the nearby mall Bicocca Village. It is evident a crucial lack of knowledge of what exactly this building is and what it is about.

Some young interviewees from the “nightlife” group, declared not to be aware about the existence of this art institution which seems to have more popularity outside of the district than in the local area where it is located.

“Hangar...I know that it exists, but I don’t know what it has to offer me. I didn’t know that it was an exhibition space nor that there is a restaurant in it.” Silvia - nightlife interview

Young people who know this art space declared that it is not particularly attractive for potential users of their same age.

“Hangar doesn’t exist in my peers minds. It seems that it doesn’t want to involve young people. It is not attractive from the outside. It seems always closed and dark. Its advertising doesn’t go on the channels which my colleagues and I use.” Sabrina - nightlife interview

Among the young users of the mall Bicocca Village, 43 respondents out of 55 (78%) had never been to Pirelli HangarBicocca; 18 of them (33%) do not even know about its existence.

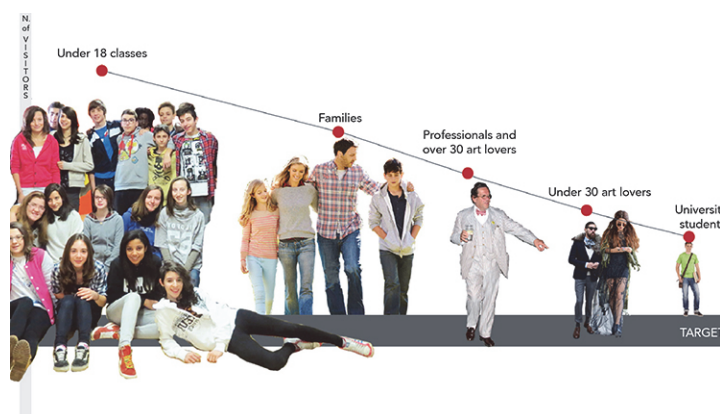


Fig. 6 Number of visitors according to the target . Source: Students work - M.De Francesca, E.Domenichetti, V.A. Dovico, M. Fonseca

In the month of June (2016) the students are going to accomplish the final project work. After a new confrontation with Pirelli HangarBicocca, also in light of the results from the intermediate pw, a need for a better communication emerged. Nowadays, Pirelli HangarBicocca is already developing some projects and actions oriented to be more open to the outside. Apart from launching a membership card to fidelize even more the already existing users, they have just run the first streetart intervention of the new program “Outside the Cube”, hosting the artists OSEGEMEOS (Gustavo and Otávio Pandolfo) with their work Efêmero. It is particularly interesting the fact that the mural was inspired both by the history of Pirelli HangarBicocca building, where train locomotives were built, and by the present structure of the area, characterized by the close proximity of railway lines. Another important appointment will take place on the 27th of May: a conference titled “Education through contemporary art. New participation forms. Schools, museums and universities for an educational alliance” will take place thanks to the collaboration with the Università degli Studi di Milano Bicocca.

Since some activities open to other institutions and to the relationship with the neighborhood have already been put in place, the students will be asked to work, as already said, on the communication topic. This issue will have to be tackled from several angles, not only from an advertising point of view. The students will have to work both on the tangible and intangible levels of communication and artifacts, in relationship with the physicality of the space and with the more ephemeral, but really important, narratives about the institution, its brand and its identity.

4.2 Working on Biella: a wider approach for a new identity

Biella, a state capital of the Piedmont region, known for its textile production (specialized in the wool industry), was affected by the industrial crisis, which had as results the production decrease, the reduction of the average industrial dimension, and the dismissal of some important textile factories (e.g. Lanifici Rivetti).

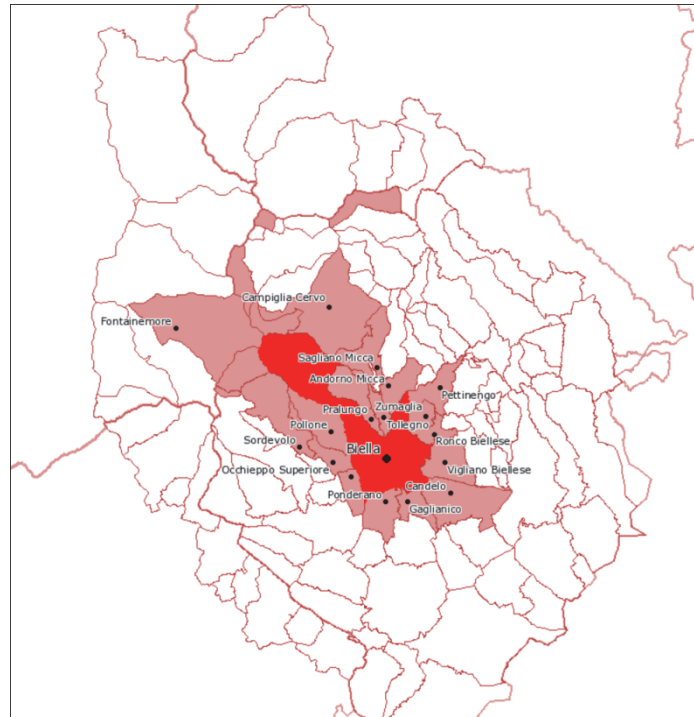


Fig. 7 Biella province . Source: *comuniverso.it*

However, it must be said that the textile district of Biella still exists, thanks to processes oriented towards the specialization in branches of excellence production for the high-end market sectors and the recognition of the importance of textile industries archives (Osservatorio Distretti Italiani, 2014). However, the installation of big malls at the outskirts and the displacement of the hospital, contribute to empty out the city centre.

In the past, the mono-industrial inclination, which characterized the economic development of Biella, and the closure of these places from the outside world, were strengths of this territory and really characterized its stance. Today, a deep changed scenario is forcing Biella to redefine its strategic goals also in terms of awareness and recognition from the outside, because the values of privacy and closeness are no longer useful and they are showing all their limits.

This territory has to face with big challenges because it lost its points of reference. The city has to deal with a system of empty spaces, not only physical and functional, but also of value and meaning. For this reason an evaluation of the available system of resources is needed in order to re-focus Biella objectives for growth and identity. This process, in order to be accomplished, has to be developed in light of the sense of belonging to a community, but also thanks to the collaboration and the competitive comparison with the outside world in order to renovate its own offer and value systems.

This topic was the object of interest for the activities of research and design in the VI edition (2015) of the Higher Education Course BST-Branding the Territorial System of Poli.design - Consorzio del Politecnico di Milano. The course was entirely held in Biella territory: a very interesting case study, where new initiatives in contemporary art, design and agroindustrial sectors go together with the inflection of the textile industry sector and to the empty of the production and commercial spaces. This abundance of resources was not really exploited in the past; but today these resources together with a wider openness to tourism and cultural market sectors would be the drivers for a re-thinking process.

The goal would be that of giving resonance to the specific qualities of the place, both to the historical heritage and to the most recent business initiatives, in order to build a sense making system able to:

- drive the urban regeneration processes;
- grant a strong territorial awareness;
- start new market orientations, which respected people and local stakeholders;
- valorize local knowledge.

The first section of the course, focus on theoretical and methodological modules, was immediately integrated with the acquisition of knowledge about Biella, take advantage of the opportunity of being physically on the place. In this way, the role of a “directed” design, which needs to see, ear and directly interact with local actors and places of study, was reinforced. The different modules were thematize according to four focus - Arts/Heritage/Landscape, Food, Design, Fashion/Textile - integrating theoretical lessons, focused visits and seminars, these last organized by the Associazione 015 Biella, partner of the project.



Fig. 8 The territorial analysis: Arts/Heritage/Landscape, Food, Design, Fashion/Textile. Photos by C.Sedini and C.Iemmolo

The week of the intensive project work treasured the methodological lessons and the fact-finding experiences of the previous modules to arrive to the synthesis of five project scenarios developed for different thematic fields: water, events, shopping, sustainability, make. These topics could had to be interpreted both as distinct hypothesis and as an interconnected system of actions to be developed in the mid-long term. Scenarios hinged on data and information gathered thanks to the analysis and the critical interpretation of the territory, thanks to the confrontation with the local actors, thanks to the identification of values and sleepy or forgotten potentialities. The students developed all site specific proposals which hopefully could start a dialogue among institutions, entrepreneurs and inhabitants in order to elaborate some share hypothesis of action. The next step is a new edition of the course in order to go on with the dialogue with local institutions and to deepen the concepts developed in the first year.



Fig. 9 Five concepts for Biella: place identity, storytelling and strategic plan of intervention. Source: Students projects logos

5. Conclusion

In 2003, Roditi wrote in its chapter *Milano-Bicocca: da area industriale a centro urbano “nuovo”* (Milano-Bicocca: from industrial area to “new” urban centre) that a walk by the streets of Bicocca, especially in the nighttime, is able to give a sense of disorientation and placeness, probably due to the difficulty of giving a specific meaning to the new urban shapes. The shapes mentioned by Roditi can be seen as the building which characterized that area: the University, the big mall, Arcimboldi Theatre and Pirelli HangarBicocca, as well. Some of these spaces conserved the old structures which were filled in with new contents, others are completely new. However all of them are closed systems, both in terms of their strongly fenced physicality and in terms of their knowable and permeable identity. Today the sense making of Bicocca has surely improved, even if it is mainly connected to the presence of university students and workers (Pettenati, 2012).

Biella case study is particularly interesting because the industrial crisis influenced first of all a redefinition of the textile sector. After the dismissal of several industries, private foundations, such as Fondazione Pistoletto and Fondazione Banca Sella, appointed themselves as promoters for the reconversion and the regeneration of several abandoned spaces, using culture and art as main drivers. Differently from Bicocca case, here still are several empty spaces to be reconverted, meanings to be defined and economies to be rethought. Another difference is the diffusion and the parcelization of areas where these interventions are needed; indeed these spaces are scattered in the whole city. Since this is an ongoing process, there is the possibility to follow an integrated process which acted both on hard and soft elements of places and with participatory models, with the multiple actors involved.

As we have seen in the previous pages, design can be place making (Manzini, 2015) thanks to the strategies and processes which involve both design experts and “common” people, as for example citizens, in order to give answer to a specific territorial issue or even to give “sense” to a place. Design can play different roles. In cases, such as the Bicocca district, where the renovation process is already accomplished in terms of infrastructures (hard factors) design is able to rejoin the fragmented pieces resulting from the renovation. This goal can be accomplished going from the “Discover and Envision” step of the strategic design process, where designers (experts or not) see the territory, its tangible and intangible resources, to the “Empower” and “Communication” steps. Indeed, it is in these phases of the process that designers let see to the actors involved their potentialities and those of the place. The results expected from this work, which is specifically focus on the artspace Pirelli HangarBicocca, are those of:

- make visible the richness of the offer that the various cultural actors generate in this area
- envision innovative connections among the different local actors
- co-produce and share the knowledge generated inside these cultural institutions.

In cases, such as the city of Biella, where the regeneration process is at its beginning, design can help in looking forward, identifying common purposes of the different communities of actors. The whole society has to be involved: citizens, entrepreneurs, private foundations and businesses, trade associations, cultural and governmental institutions. In order to avoid identity and sense making problems, due to parcelized and isolated (in the meaning of disconnected) interventions to the space, it is important to combine hard and infrastructural intervention with other soft levers, which are often used in design strategies. Also in this case the first important step is “Discover and Envision” and after going through “Empower” and “Communication” phases specifically oriented for the actors involved in the design process, the crucial step of this process is the Re-invention and Re-production phase. Indeed, it is here that designers start to really foresee the possible paths to follow.

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A gestão de design na perspectiva da produção de ativos intangíveis na agricultura familiar: um estudo multicase em Joinville e Blumenau no estado de Santa Catarina

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Resumo

A agricultura familiar é responsável por percentual significativo do valor de produção agropecuária. Enquanto a agricultura patronal gera R\$ 358,00 por hectare, a agricultura familiar gera R\$ 677,00 sendo, sendo 89% mais produtiva e respondendo por 10% do PIB (BRASIL, 2016). Santa Catarina contribui na dinâmica produtiva com 168.544 unidades em 2.645.088 ha. A gestão de design preocupa-se com o desenvolvimento e a gestão de processos, produtos, pessoas e serviços como elemento chave para o posicionamento e o incremento estratégico das organizações e neste contexto pode se transformar na força principal de mudança, aperfeiçoando a identidade a imagem e a comunicação, entendidos também como ativos intangíveis. O uso de bases taxonômicas neste contexto, pode contribuir a partir da organização das informações em um sistema de navegação que facilita a identificação em todos os níveis da produção agrícola familiar, para elaboração e verificação da produção de ativos intangíveis. O objetivo deste artigo é desenvolver uma base taxonômica com a finalidade de identificar os ativos intangíveis com base na gestão de design.

No que toca a metodologia este artigo caracteriza-se como exploratório e qualitativo envolvendo um estudo multicase em 26 empreendimentos rurais em Joinville e Blumenau em Santa Catarina. Para tanto construiu-se uma base taxonômica estruturada em classe, subclasse, gênero e renque como suporte para navegação, organização e reusabilidade da informação e os resultados mostram que a valorização da agricultura familiar, nos casos em tela, pela quantidade de práticas, processos, insumos e equipamentos necessários identificados e classificados transforma entradas em saídas de qualidade, e dentro desta diversidade, é possível a valorização, identificação e proteção por meio da gestão de design.

Palavras Chaves: Gestão de design; Ativos intangíveis; Valorização.

Abstract

Family farming is responsible for a significant percentage of the agricultural production value. While the employer agriculture generates R \$ 358.00 per hectare, family farming generates R \$ 677.00 being, 89% more productive and accounting for 10% of GDP (BRAZIL, 2016). Santa Catarina contributes to the productive dynamic with 168,544 units are in 2,645,088 ha. The design management is concerned with the development and management processes, products, people and services as a key element for positioning and strategic development of organizations and in this context may become the main force for change, perfecting identity image and communication also understood as intangible assets. The use of taxonomic bases in this context, can contribute from the organization of information into a navigation system that facilitates identification at all levels of family farming, for the preparation and verification of production of intangible assets. The purpose of this article is to develop a taxonomic base for the purpose of identifying intangible assets based on design management. As regards the methodology this article is characterized as exploratory qualitative study involving a multihull in 26 rural enterprises at Joinville and Blumenau in Santa Catarina. Therefore built a structured taxonomic basis of class, subclass, gender and hedgerow as support for navigation, organization and reusability of information and the results show that the value of family farming, where screen, the amount of practices, processes, supplies and necessary equipment identified and classified transforms inputs into outputs quality, and within this diversity, recovery is possible, identification and protection through design management.

Keywords: *Design management; intangible assets; Valuation.*

1. Introdução

A valorização, a proteção e a identificação de pequenos grupos produtivos figuram como ativos intangíveis e como resposta das articulações da gestão de design na agricultura familiar (Merino et al, 2012; Teixeira, 2011; Neto, 2012).

A necessidade da produção agrícola familiar em atuar com produtos que viabilizem ao empreendimento rural, a permanência do homem no campo com dignidade sob a perspectiva de melhorar sua qualidade de vida continuamente e estimular o negócio sob a expectativa empresarial, proporciona a gestão de design um ambiente apropriado para a produção de ativos intangíveis que estimulam as cadeias produtivas da agricultura familiar.

A gestão de design alinhada com esta necessidade contribui para que esses ativos intangíveis estimulem o negócio, criando valores a partir de suas intervenções, tais como por exemplo na construção e gestão da marca, a partir da difusão dos benefícios funcionais e emocionais, na personalidade traduzida através do símbolo e da logotipia, bem como nas hiperconexões estabelecidas, conforme se vê na Figura 1.

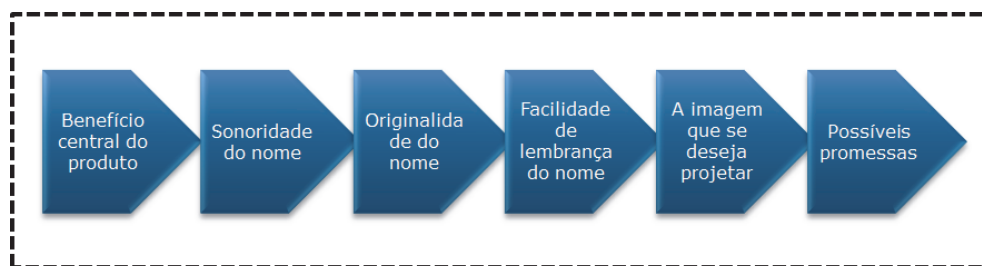


Fig. 1: Hiperconexões de valor. Fonte: NGD/LDU, (2016)

Em Santa Catarina as propriedades rurais demandam dessa assistência para interferir na capacidade produtiva para melhorar e proporcionar por meio desses ativos uma cadeia produtiva competitiva.

Os empreendimentos rurais devem administrar as incertezas proporcionadas por uma série de variantes, entre as quais destaca-se políticas públicas, transposição de fronteiras e gestão da informação, e que, ainda precisam ser eficazes no contexto do ambiente interno.

A gestão de design diminui essas incertezas, contribuindo para valorização de grupos produtivos por meio da identificação e proteção e da prática projetual, criando características que conferem unicidade aos produtos e serviços incrementando os ativos intangíveis.

Por isso o objetivo desse artigo é desenvolver uma base taxonômica com a finalidade de identificar os ativos intangíveis com base na gestão de design.

2. Metodologia

Com relação aos aspectos metodológicos este artigo se caracteriza como exploratório e qualitativo (Lakatos e Marconi, 2003). A pesquisa envolveu um estudo multicasco e para Gil (2002, p. 139), esta condição de múltiplos casos deixa a pesquisa mais robusta e “proporciona evidências inseridas em diferentes contextos, concorrendo para a elaboração de uma pesquisa de melhor qualidade”.

O recorte espacial contempla, no Estado de Santa Catarina, as regiões de Joinville e Blumenau (Figura 2), compreendendo um universo de 26 empreendimentos rurais e pesqueiros. O projeto já está em desenvolvimento há dois anos.

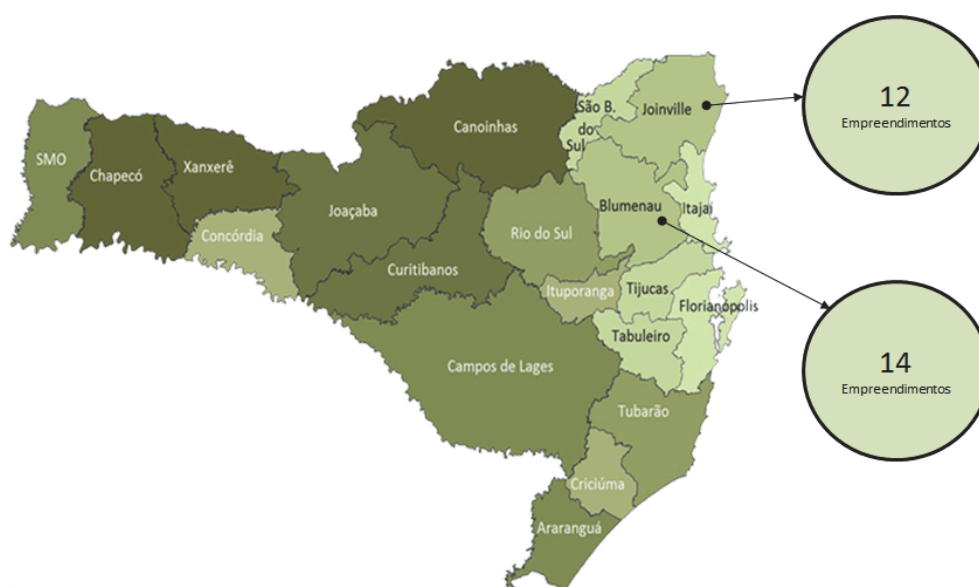


Fig. 2: Santa Catarina e as cidades de Blumenau e Joinville. Fonte: Epagri/Cepa (2016).

Quanto aos procedimentos metodológicos, após o delineamento da área espacial da pesquisa, definiu-se como problema a ser investigado, de que forma uma base taxonômica pode contribuir para a verificação da valorização, identificação e proteção em pequenos grupos produtivos?

Para responder esta pergunta, procedeu-se a uma revisão da literatura em fontes primárias e secundárias. Após o levantamento bibliográfico, planejou-se as visitas, utilizando-se *in locu*, outras ferramentas como formulários e periféricos eletrônicos para coleta e registro dos dados e informações, sendo visitadas cada um dos 26 empreendimentos nesses dois primeiros anos de ações do projeto.

De posse das informações, procedeu-se ao tratamento e organização do volume de dados levantados. A fim de sistematizar as informações sem o risco de perder fatos e acontecimentos importantes, decidiu-se montar uma base taxonômica.

Para a montagem da base, utilizou-se o princípio da sequência canônica (Campos e Gomes, 2007), pois há uma ordem natural do conjunto de assuntos. Cada classe deu origem a uma subclasse de sustentação modalizada, quaternária, alfa numérica e policromática, explícita e consistente, que oferece ao leitor a possibilidade, pelo pensamento associativo, identificar o grupo, a cultura, a atividade e a perspectiva turística. A Figura 3, apresenta sinteticamente a estrutura.

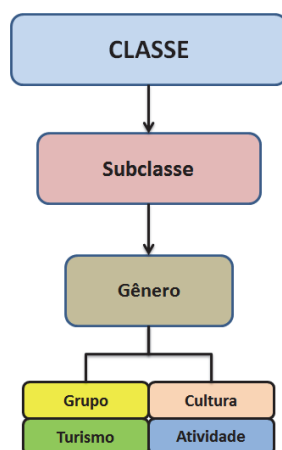


Fig. 3: Estrutura da base taxonômica. Fonte: NGD/LDU (2016).

A estrutura tipológica dos ambientes de domínio da presente base é constituída por três níveis e dois renques. O primeiro domínio chamado de classe reúne a temática de maior abrangência. É constituído pelos arranjos produtivos da fruticultura, olericultura, aquicultura e pesca, pecuária, gestão, floricultura e avicultura. A identificação dos conceitos ocorre no campo a partir do sistema produtivo da propriedade.

No segundo domínio da base, ou seja, a subclasse, 33 possibilidades de ocorrência se materializam, divididas em 15 variações na classe fruticultura, 4 na olericultura, 3 na aquicultura e pesca, 6 na pecuária, 1 na classe gestão, 2 na floricultura e finalmente 2 na classe avicultura. A modo de exemplo, as 2 possibilidades de ocorrência na classe avicultura, são nomeadamente: avicultura de corte e avicultura para produção de ovos.

O último domínio, cognominado de gênero, é estruturado em dois renques alinhados e dispostos na mesma fila e denominados de grupo e cultura; atividade e turismo (Figura 4).



Fig. 4: Dois renques. Fonte: NGD/LDU (2016).

Compõe o microambiente nomeado de grupo (quadrículo amarelo), 8 maneiras produtivas que variam da comercialização de produtos *in natura*, a prestação de serviços de hospedagem, registrados a partir de uma sequência numérica. O segundo microambiente do primeiro renque, chamado cultura (quadrículo alaranjado), indica se o tratamento econômico e climato-ambiental é permanente ou sazonal, apresentando duas perspectivas registradas com letras maiúsculas.

O terceiro microambiente qualificado de atividade (quadrículo azul), assinala qual o status que é dado a atividade econômica e agrícola. Pode ser enquadrada como uma atividade principal ou secundária. A atividade será principal quando ela for a responsável pela produção do maior número de riquezas para a propriedade. É secundária quando for encarada como uma ação adicional e que incrementa o volume de riquezas produzidas. É representada de forma numérica. Finalmente o microambiente do segundo renque

estabelecido como turismo (quadriculo verde), especifica se a propriedade tem intenção ou não de desenvolver a atividade turística no espaço rural, a partir de roteiros e circuitos turísticos organizados.

A base foi estrutura em uma planilha do Microsoft Excel (Figura 6) e sua leitura é horizontalizada e sempre partindo da esquerda para direita.

3. A agricultura familiar e a gestão de design

O processo de mudança socioeconômica e o aumento desordenado das cidades tem exigido cada vez mais a produção de alimentos em larga escala para suprir as necessidades humanas.

Neste panorama os agricultores familiares buscam maneiras de se adaptar a esta realidade, oferecendo a própria cidade sua produção rural. Este espaço de oportunidades por um lado proporciona formas de ampliar os negócios, mas por outro lado as carências que via de regra permeiam os pequenos produtores, transforma uma potencial oportunidade em uma fragilidade.

A reprodução das relações sociais no espaço rural, todavia, tem se mostrado até agora insuficientes para manter o agricultor familiar no campo, visto que as técnicas de produção, controle, embalagem e comercialização comprometem o negócio.

Portanto como atividade criativa e eminentemente integradora, a gestão de design pode conduzir os agentes envolvidos para o atingimento de seus objetivos auxiliando de forma racional o atingimento dos resultados pretendidos ampliando sua capacidade de inovação. Corroboram com este fundamento (Gorb, 1990) e (Goulart, Merino e Merino, 2013).

Muito embora a agricultura familiar seja importante para a produção alimentar, as políticas públicas e o desenvolvimento de tecnologias e processos produtivos privilegiam somente a agroindústria patronal, desconsiderando a relevância do meio rural na manutenção das sociedades.

Portanto o reconhecimento da agricultura familiar como força econômica fundamental (Brasil, 2010) desenvolve um conjunto de oportunidades em que a gestão de design acelera e melhora a qualidade de vida e as relações sociais dos envolvidos, aqueles que têm mais de 80% da sua renda advinda da atividade tradicional e cuja base de trabalho está nos membros da família (Bittencourt, Bianchini, 1996).

Por consequência a compreensão da gestão de design como mecanismo agregador de valor para a pequena propriedade enseja ações que levem esses pequenos negócios, a desenvolver uma série de mecanismos que oportunizem uma alavancagem, sobretudo aos processos produtivos, a fim de melhorarem seu desempenho global e valorizar seus ativos intangíveis.

4. Os ativos intangíveis e a valorização da agricultura familiar por meio da identificação e proteção de pequenos grupos produtivos.

A agricultura familiar antes chamada de subsistência sempre apresentou papel importante nas questões econômicas estando presente na rotina das atividades produtivas do Brasil (Mattei, 2014).

Como atividade representativa, apresenta 4,3 milhões de estabelecimentos agropecuários de natureza familiar. Representa 84% do total de módulos agrícolas do território. São mais de 12 milhões de pessoas ocupando 24% do território e respondendo por 38% da renda bruta.

Assim, enquanto a agricultura patronal gera R\$ 358,00 por hectare, a agricultura familiar gera R\$ 677,00 sendo, 89% mais produtiva respondendo por 10% do PIB (Brasil, 2016). Santa Catarina contribui na

dinâmica produtiva dessas cadeias de produção, com 168.544 unidades em 2.645.088 ha. O estado possui 90,5% desses estabelecimentos que ocupam 87% da área agrícola respondendo a 71,3% do valor bruto da produção, gerando mais de 240 mil empregos, 17% da força de trabalho.

A valorização da agricultura familiar por meio do design ocorre pela identificação e proteção desses pequenos negócios. A gestão de design se mostra catalizadora na criação de novos produtos, no incremento de produtos atuais e no desenvolvimento de identidade visual e proteção de marca através da propriedade e da indicação geográfica, e assim se transforma, para Castelão e Landim (2009), em uma ferramenta estratégica.

Diante do exposto cabe ressaltar que a identificação e proteção, proporciona aos pequenos grupos produtivos a perspectiva de se tornarem diferenciados e a competência para identificação e proteção de pequenos produtores é do Instituto Nacional de Propriedade Industrial.

A lei de propriedade industrial 9.279/96, regulamenta este dispositivo estratégico no âmbito do território brasileiro, que via de regra, atribui valor aos produtos através de sua vinculação territorial local, de acordo com o artigo 170 da supracitada lei.

O modelo avalia solo, condições climáticas, processo de produção, determinando territorialidades específicas, mas as principais questões para obtenção do título ainda são atribuídas ao conceito de coletividade, através dos fundamentos do associativismo e do território, o que implica na valorização bilateral dos dois fundamentos.

Essa mobilização associativa aliada às questões edafo-climáticas de dado território permitem a prospecção deste direito da propriedade industrial, e vem se tornando um dispositivo popular.

Niederle (2011. p. 18), defende que as indicações geográficas ensejam uma “revalorização de tradições, costumes, saberes, práticas e outros bens imateriais associados a uma identidade territorial e origem geográfica específica”.

Muito embora, não tenha se utilizado, no presente projeto, a indicação geográfica estabelece uma ligação entre o produto e a localidade geográfica de produção e ou de origem, o que para Neto (2011), cria um fator diferenciador dos produtos similares disponíveis no mercado e isso “possibilita a construção contínua de uma teoria mais ampla, mais competente e mais comprometida com as variáveis de interesse social” (Portuguez, 2001, p. 60).

A indicação geográfica divide-se em indicação de procedência e denominação de origem. Ambas concedem reputação ao produto pela origem geográfica ou que tenha se tornado conhecido como produtor de determinado produto e ou serviço. No entanto, destaca-se que até o presente momento, não se desenvolveu ações de indicação geográfica no projeto, relatado neste estudo.

A generosidade da terra e a ingratidão do homem, que sempre agiu no sentido de destruir, aniquilar, consumir e enfraquecer as produções e a substância da natureza (Pádua, 2002), tem exatamente na indicação geográfica, o seu oposto, pois requer a boa prática e uma excelente qualidade ambiental dos atributos geográficos.

A indicação geográfica possibilita ao consumidor, a certeza da origem geográfica do produto com suas características finais decorrentes dessa origem, e para o produtor a garantia de longevidade comercial. Essa diferenciação aumenta o valor agregado do produto e ou do serviço, preserva suas particularidades e estimula investimentos na área delimitada pela IG, valorizando a condição humana e as características do campo pela agricultura familiar.

Figurando finalmente como mecanismo legal de identificação e proteção, ainda existe a marca coletiva que identifica produtos e serviços de uma determinada organização e a marca de certificação que oferece a evidência de uma certificação a partir de normas e especificações técnicas, caso das International Organization for Standardization – ISOs.

Estes mecanismos legais garantem a autenticidade dos processos produtivos e da identidade visual dos produtos, processos e serviços, cria um fator diferenciador e agrega valor, transformando-se nos ativos mais importantes do negócio (Neto, Teixeira e Merino, 2010).

Por estas razões Preto, Merino e Figueiredo (2011) afirmam que a planta deve incorporar a gestão de design na concepção estratégica do negócio, no design do produto e na análise de seu ciclo de vida. Como resultante desse processo os ativos intangíveis são destacados como uma contra resposta da incorporação de valor do agroecossistema.

Assim, por meio da gestão de design, todos os componentes que não são perceptíveis ao toque, ou seja, que não são corpóreos entre os quais chama-se atenção para a valorização a identificação e a proteção, passam a incorporar um ativo de capital que incrementa benefícios ao negócio e aos sujeitos diretamente ligados ao sistema.

Uma vez que está em curso no mercado a transição da valorização dos ativos tangíveis para uma supervalorização dos ativos intangíveis, entendidos como “bens e direitos colocados à disposição da empresa, que não tem existência física, mas que são capazes de gerar benefícios futuros para a entidade” (Garcia, 2001, p. 6) fica claro que a natureza física não é mais uma variante absoluta. Pelo contrário, os ativos intangíveis estimulam a percepção de perenidade que o mercado alvo passa a construir do negócio, da marca, das estratégias, do modelo de gestão consignado através de uma eficiente governança corporativa, mediada pelo design.

Ora, portanto a principal questão da valorização dos ativos intangíveis reside não em valores absolutos, mas na construção de uma curva de valor que seja e possa ser monitorada sistematicamente, uma vez a dificuldade em valorar contabilmente em modo de balança os valores desses ativos incorpóreos. Portanto, o resultado financeiro efetivo e final daquilo que é palpável está ligado diretamente como a consequência potencializadora do aumento da curva de valor avaliada sistematicamente através de uma matriz de avaliação de valor definida por atributos que sejam consistentes e comparativamente mais fortes que os concorrentes, causada pelos ativos intangíveis.

Dessa forma, estes ativos intangíveis, entendidos como tudo que não é corpóreo, tais como a preocupação com a sustentabilidade, a boa engenharia e os benefícios do produto e ou serviço, entre outros, evidenciados por intermédio da gestão de design, oferecem melhores condições de competitividade.

5. Resultados e discussão

Os empreendimentos pesquisados apresentam em média, tempo de existência de aproximadamente 17 anos. A Figura 5 apresenta a série dispersiva do tempo de existência e da quantidade de empreendimentos.

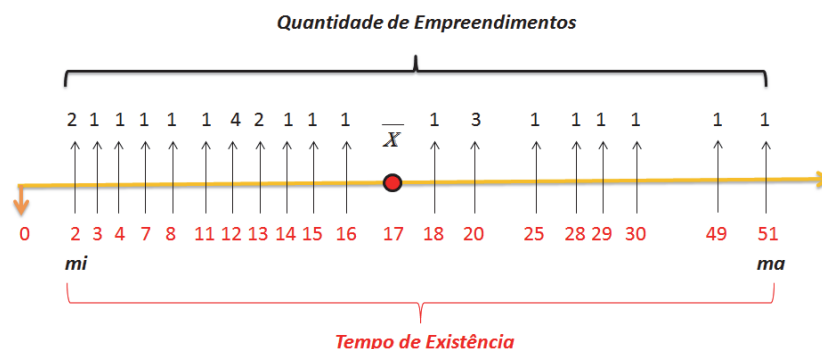


Fig. 5: Série dispersiva de tempo. Fonte: NGD/LDU (2016)

Dos 4 empreendimentos que apresentam 12 anos de existência, 3 são de Blumenau e 1 de Joinville. Dois empreendimentos estão no início do negócio, apresentando 2 anos de duração. Um é filiado a uma associação que conduz os interesses da categoria e o segundo nasceu de necessidades particulares de um dos membros, proprietários do negócio.

O empreendimento com mais tempo de vida localiza-se em Blumenau e atua na área de fruticultura e olericultura. Sua principal atividade é a plantação de cana e a transformação em melado, atividade econômica permanente, considerada a principal fonte de geração de riquezas e não querem o desenvolvimento da atividade turística. Também de forma secundária atuam igualmente na olericultura com raízes e tubérculos sendo a primeira uma atividade sazonal e a segunda permanente. A venda *in natura* de tubérculos e raízes apresenta uma atividade econômica secundária.

Um (1) empreendimento manifesta preocupação com a questão da sucessão do negócio, visto que os membros mais jovens da família agrícola não querem dar continuidade aos negócios dos pais, preferindo outras atividades não agrícolas e fora do meio rural.

Igualmente, algumas propriedades demandam assessoria na gestão em todos os níveis do empreendimento necessitando de auxílio na formação patrimonial da marca e do negócio, bem como da criação de alianças estratégicas que ampliem e reforcem o design, através de ações coletivas, inovadoras e associadas.

Os empreendimentos traduzem o potencial da produção manual através de um processo histórico e único, conferindo autenticidade ao sistema produtivo mesmo que haja certa reprodutibilidade técnica, posto que o conceito de autenticidade decorra justamente do saber que o produziu e não do bem em si (Sant'anna, 2003).

As práticas desenvolvidas são expressões culturais imateriais herdadas dos seus antepassados e são reproduzidas continuamente através das gerações que a detém, constituindo uma forma de compreensão e vivência da vida social, cultural, econômica, política e cultural dos grupos num misto de tecnologia e arte, sem perder a validade ética e estética (Benjamim, 1992).

Isso amplifica as possibilidades de utilização dessas características para empregar o design na atividade do turismo no espaço rural, já que a harmonia ambiental, a formação étnica de seus membros, o conceito campestre, o partido arquitetônico das construções aliado às atividades produtivas, lúdicas e artesanais, torna o meio rural um ambiente dinâmico o que amplifica consideravelmente a criação de postos de trabalho fomentando a multifuncionalidade do espaço rural, minimizando os efeitos deletérios das ocupações rurais não agrícolas, pela “desdiferenciação social atrelada a pluriatividade” (Laurenti e Del Grossi, 1999, p.17).

A partir das análises efetuadas, desenvolveu-se uma base taxonômica das atividades dos empreendimentos, como auxílio na organização da informação, estruturada em classe, subclasse, gênero e renque (Figuras 2 e 3) como suporte para navegação, organização e reusabilidade da informação, conforme pode-se observar na Figura 6.

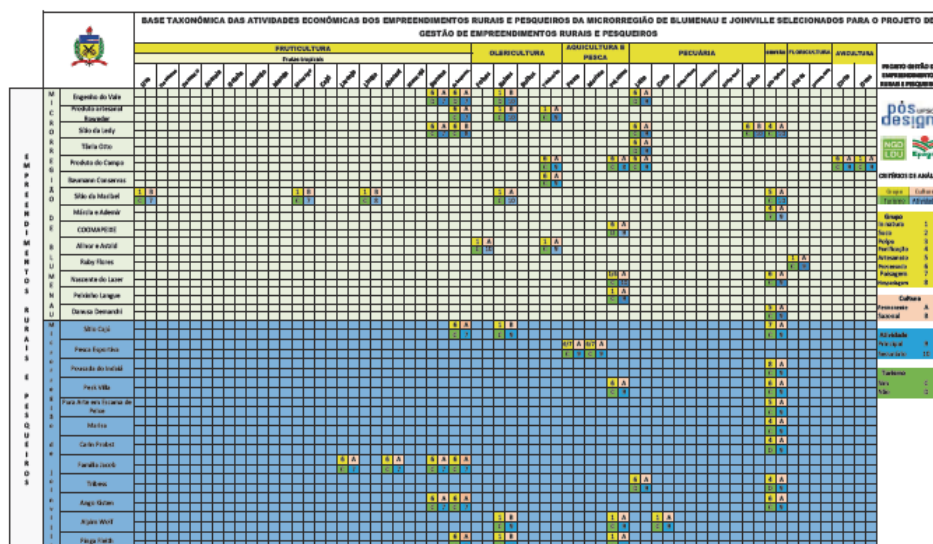


Fig. 6: Base taxonômica das atividades econômicas dos empreendimentos rurais e pesqueiros analisados. Fonte: NGD/LDU (2016).

Assim com base na composição e leitura das propriedades consignadas na subclasse da base taxonômica, apresenta-se o Gráfico 1, A e B.

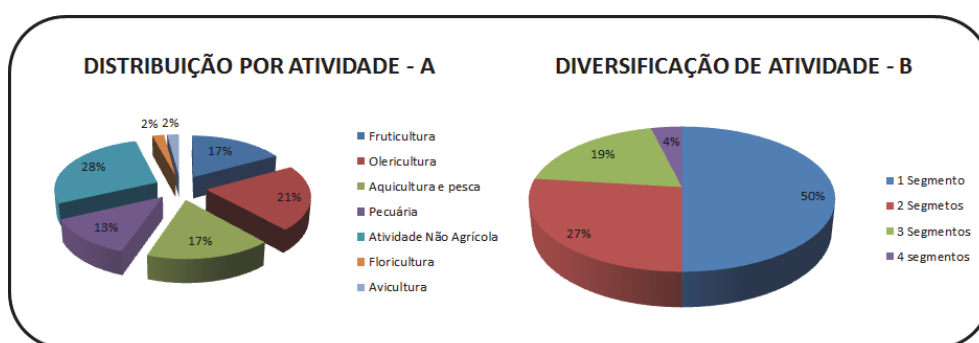


Gráfico 1: Distribuição por atividade e diversificação da oferta. Fonte: NGD/LDU (2016).

É possível inferir-se com a exposição dos dados do Gráfico A, que as atividades convergem para panificação, artesanato, hospedagem, contemplação de aves e paisagem, além de processamento de

produtos *in natura* oriundos da piscicultura, mas que também não se traduzem como atividade principal, vez que oferecem à produção processada de alimentos. Este estrato alcança 23% da amostra.

A segunda atividade mais executada nas propriedades é a olericultura, compreendendo um universo de 21%, seguido da fruticultura e aquicultura e pesca com 17% cada categoria. A quarta atividade mais praticada nos empreendimentos é a pecuária para produção leiteira e derivados (13%), identificada como atividade permanente. Floricultura e avicultura abarcam, cada categoria, 2%.

A sobreposição do Gráfico B, a partir do conhecimento gerado com o Gráfico A, permite deduzir que no que diz respeito ao conceito de diversificação (Ansoff, 1981), o tema apresenta-se de forma pouco explorada. Somente um (1) empreendimento atua em quatro (4) categorias, nomeadamente olericultura, piscicultura, pecuária para produção leiteira e avicultura para corte e produção de ovos, todas elas, segundo declaradas por seus agentes produtivos, como sendo, atividade permanente e assumindo a principal fonte de geração de riquezas do empreendimento.

Constata-se, por meio da navegação da base taxonômica que os empreendimentos rurais localizados na região de Blumenau atuam nas 7 classes da base. Na subclasse é possível verificar a produção de uvas, morango, limão, assim como também banana e cana de açúcar, classificada na subclasse como atividade sucroalcooleira. Exceto esses dois últimos, todos os outros são comercializados *in natura*, considerados culturas sazonais e que adicionalmente potencializam riquezas para a propriedade. Com relação aos dois últimos, no micro espaço grupo, tanto a banana quanto a cana de açúcar são processados para fabricação de geleias, doces e melado.

A preponderância nas outras classes é mantida no processamento da piscicultura (Filés e outros cortes), de lácteos para queijo, natas e iogurtes, panificados e artesanato. Com relação ao desenvolvimento do turismo organizado, duas propriedades não querem adicioná-las na propriedade.

Já as propriedades rurais localizadas em Joinville, concentram suas atividades em 6 classes excetuando avicultura. Na subclasse frutas tropicais atuam produzindo laranja, abacaxi, banana e cana de açúcar. Assumem a condição de produtores permanentes e tem na atividade a principal fonte de geração de riquezas da propriedade.

Na classe olericultura, subclasse raízes, duas propriedades produzem de forma sazonal, comercializando a colheita do aipim e considerada para um como a fonte de principal riqueza, e para o outro, como sendo uma atividade secundária.

Nas classes pecuária e gestão, há uma variação quanto as subclasses, com alinhamento mimético no gênero, com somente duas propriedades contrárias ao desenvolvimento do turismo. Ainda nessas duas classes, no microespaço grupo, integrante do primeiro renque, (1) propriedade explora a contemplação da paisagem e a observação de pássaros; (1) atua no ramo de hospedagem; (3) com panificação e (1) com artesanato.

Assim, de acordo com a base taxonômica é possível afirmar que é possível a valorização da agricultura familiar, nos casos em tela, pela quantidade de práticas, processos, insumos e equipamentos necessários para a sistemática reprodutibilidade de um sistema usado para transformar entradas em saídas de qualidade. Como um sistema que opera em um layout específico dentro de uma capacidade planejada, reportando a estrutura física aos relacionamentos humanos, a partir de um conjunto de elementos com suprimentos, máquinas e equipamentos, as evidências contribuem para a valorização da agricultura familiar.

Finalmente a convergência das ações desencadeou uma série de respostas aos agricultores e como resultado da prática projetual dessas ações por meio do design, valorizam a agricultura familiar por meio

da criação de identidades visuais, de embalagens e humanização dos pontos de venda, oferecendo aos consumidores, produtos diferenciados.

Os ativos intangíveis, a partir da evidência da constatação da localização, do material de comunicação, da interpretação dos símbolos através dos signos visuais e logotipos, deixam claro que a valorização a identificação e a proteção, se transformam em ativos intangíveis na agricultura familiar, e isso enriquece o apelo ao consumidor.

No entanto, considera-se como principal ativo resultante dessas ações o fornecimento sinérgico entre o ambiente interno e o externo, mas acima de tudo a evidência física e imaginária, que posiciona o negócio, a marca e o produto como agentes de qualidade.

Portanto foram realizadas melhorias no ponto de venda para exposição atrativa das mercadorias, com ações de branding/naming, criação de marca gráfica e linguagem visual padronizada, envolvendo questões legais como o registro de marca, nome fantasia e nome empresarial e serviços para melhorar a experiência de compra e a conscientização sobre hábitos saudáveis; criação de tags informativas para os produtos; plaquinhas com nome / preço dos produtos; cartaz institucional do produtor; quadro negro com produtos do dia e cestos de vime para expor os produtos. Já em Joinville, o efeito final foi à identidade visual, nas embalagens, uniformes, papelaria, aplicações de identidade visual nos meios de transporte da cooperativa e estudos ergonômicos para despencamento das pencas de banana.

6. Considerações finais

As relações estabelecidas entre a agricultura familiar e a gestão de desing por meio da base taxonômica apontam mesmo que preliminarmente, valorização da agricultura familiar por meio dos ativos intangíveis, uma vez que as 26 propriedades estudadas desenvolvem processos produtivos, com tecnologias apropriadas e conhecimento necessário para a produção rural familiar.

Deve-se registrar que os resultados positivos na perspectiva da produção de ativos intangíveis vistas e discutidas relaciona o conceito como elemento catalisador de benefícios econômicos futuros: para o produtor e para o consumidor. O produtor com a perspectiva da convergência desses ativos em valores absolutos e o consumidor com as diversas possibilidades de satisfação de suas necessidades e desejos, a partir da compreensão e interpretação desses ativos intangíveis.

Considere-se ainda que a produção dos ativos intangíveis tais como valorização, identificação e proteção, aumentam as chances do negócio obter saúde e longevidade, mantendo o agricultor familiar no campo e diminuindo as chances desse agente produtivo sofrer as consequências negativas do abandono da atividade primária.

Alie-se a esse fato que a manutenção de pequenos grupos produtivos no espaço rural diminui a probabilidade da presença e dominância da agroindústria patronal com seu modelo de produção agressivo, comoditizado, produzido em larga escala. Esse modelo de produção aumenta a pressão ambiental e por outro lado dilata ainda mais o remoto rural, não como uma relação geográfica medida em distância, mas sobretudo a possibilidade do espaço rural perder a presença do homem e suas relações tipicamente rurais.

No que concerne à diferenciação, o desenvolvimento de novos produtos mantém o destaque e constrói uma participação de mercado mais consistente. Contudo o principal papel determinante da diferenciação é o desenvolvimento de novos atributos na curva de valores do negócio. Também a organização e

humanização dos pontos de venda, incluindo aspectos de layout afeta a capacidade de diferenciação dos produtos.

Nesse viés a autenticidade do processo produtivo e dos insumos de produção resulta na habilidade dos empreendimentos em exercer suas atividades de forma exclusiva, e isso cria valor e influencia a percepção da diferenciação. Dessa forma o projeto gestão de empreendimentos rurais por meio da gestão do design na dimensão da diferenciação, estabelece esforços apresentando os benefícios do consumo da origem familiar da produção agrícola desenvolvendo a agrobiodiversidade.

A dimensão sustentabilidade proporciona que os empreendimentos alicercem seus sistemas de atividades a partir das interconexões mais relevantes do sistema produtivo. Isso elimina custos, diminui riscos e aumenta as dificuldades de imitação dos concorrentes atuais. Esses resultados oriundos de um modelo de planejamento e gestão contribuem para a sustentabilidade, uma vez que desenvolve capacidades e habilidades específicas que reforçam o DNA do negócio, aumentando sua longevidade, manutenção e permanência no negócio. A compreensão dessa nova economia, solidária, social e popular sustenta um estilo de vida, influenciando significativamente nos hábitos alimentares mais saudáveis e na produção alimentar mais sustentável.

Por fim a construção preliminar da base taxonômica teve como objetivo o estabelecimento de uma categorização do que até o momento foi pesquisado, permitindo uma visão e leitura mais clara sobre as semelhanças e diferenças presentes entre as propriedades estudadas.

Assim as verificações apontadas por meio da base taxinômica neste estudo multicaso, pode-se afirmar que o papel da gestão de design aqui discutido vai além do desenvolvimento de embalagens e rotulagem: o papel do design neste viés consiste sempre em oferecer a melhor resposta através de um posicionamento competitivo, com linguagem clara criando compromisso entre os agentes direta e indiretamente envolvidos e isso amplifica o valor dos ativos intangíveis na agricultura familiar.

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Reciclaje de plásticos de consumo masivo. Caso comunidad de reciclaje Nashira

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Resumen

Desde sus orígenes los plásticos han revolucionado el mundo debido a su versatilidad frente a otros materiales, sin embargo, el volumen de material ha crecido ostensiblemente como se registra en los datos de Plastics - the facts 2015. An analysis of European plastics production, demand and waste data (2015), donde se afirma que 311 millones de toneladas de plástico se han producido en el mundo en el año 2014.

De otra parte, según el informe del Banco Internacional de Desarrollo (2011), el negocio del reciclaje en Latinoamérica, es en su mayoría informal. En Colombia, los recicladores desempeñan una labor ambiental importante siendo ellos quienes recolectan el 60.9% de los residuos reciclables, y obtienen una remuneración muy baja (aun cuando manipulan materias primas con alto valor económico), siendo sus ingresos mensuales en promedio 22,14 USD es decir menos de un dólar diario, lo cual, enmarca esta población en índices de pobreza extrema, lo cual establece una situación necesario de intervención con el fin de dignificar el trabajo y erradicar la pobreza extrema entrando en consonancia con objetivos a nivel mundial (Programa de Naciones Unidas, 2015).

Con estos elementos preliminares del volumen de materiales plásticos y el trabajo subvalorado de los recicladores, este proyecto propone reciclar plásticos desarrollando una extrusora que produzca la transformación del material plástico de consumo masivo desechado, en filamento para impresión 3D, -teniendo en cuenta la emergente masificación de las impresoras 3D FDM (Fused Deposition Material).

Este trabajo es desarrollado en conjunto con una comunidad de “reciclaje Nashira” en el Bolo San Isidro, corregimiento del Valle del Cauca - Colombia y plantea su desarrollo a través de metodologías de co-diseño incluyendo a la comunidad activamente en el proyecto (Sanders & Stappers, 2014), a su vez es necesario abordar los elementos claves de este proceso mediante estrategias sistémicas (Hernandis, 2015), así a partir de este enfoque se define la configuración del objeto final con el diseño como medio transformador de aspectos intangibles como el conocimiento, asociado una dimensión sociocultural donde la interacción es dada siempre por la comunidad como actor principal.

Palabras clave: Diseño social, Co-diseño, Reciclaje de plástico, Modelado sistémico, Extrusora de filamento.

Abstract

Since its origins the plastics have revolutionized the world due to its versatility to other materials, however, the volume of material has grown ostensibly as recorded on data from Plastics - the facts 2015. An analysis of European plastics production, demand and waste data (2015), where it is stated that 311 million tons of plastic were produced worldwide in 2014.

Furthermore, according to the report of the International Development Bank (2011), the recycling business in Latin America, is mostly informal. In Colombia, recyclers play an important environmental work being they who collected 60.9% of recyclable waste, and earn very low wages (even when handling raw materials with high economic value), and its monthly income on average \$ 22.14 USD less than a dollar a day, which frame this population in extreme poverty rates, which establishes a necessary intervention situation in order to dignify the work and eradicate extreme poverty coming into line with global targets (United Nations Program, 2015).

With these preliminary elements of the volume of plastic materials and recyclers underrated work, this project proposes developing a recycle plastics extruder to produce plastics processing consumer material discarded in filament for 3D printing, taking into account the emerging massification 3D FDM (Fused Deposition Material) printers. This work is developed in conjunction with a community of "recycling Nashira" in Bolo San Isidro, municipality of Valle del Cauca - Colombia and raises its development through methodologies co-design including the community actively in the project (Sanders & Stappers, 2014), in turn is necessary to address the key elements of this process by systemic strategies (Hernandis, 2015) and from this approach, the configuration of the final object is defined by the design as a medium transformer of intangibles such as knowledge associated to sociocultural dimension where interaction is always given by the community as the main actor.

Keywords: *social design, Co-design, recycling plastic, systemic modeling, Extruder filament.*

1. Introducción

Este proyecto se desarrolla desde el diseño industrial planteado como una actividad sistémica que permite identificar las necesidades y controlar los procesos que consiguen desarrollar el producto (Hernandis & Valenzuela, 2014), se aborda el estudio de caso de la comunidad Nashira, (única formalmente constituida en la ciudad de Palmira) que lleva a cabo la actividad del reciclaje, siendo esta, una labor importante tanto para el medio ambiente como para la sociedad (Berenguer & Corraliza, 2000). Esta investigación es abordada desde dos enfoques; el primero, consiste en el trabajo conjunto comunidad – diseñadores y el segundo desde un abordaje sistémico. Desde el primer enfoque, la experiencia de la comunidad y el acompañamiento constante del equipo de diseño, permiten el acercamiento al contexto para determinar las condiciones geográficas, económicas y culturales, a partir de la metodología de co-diseño (Sanders & Stappers, 2014), que establece este reconocimiento para analizar la situación desde diferentes

perspectivas. El segundo enfoque, establece los aspectos técnicos a través del modelado sistémico de producto (Hernandis & Iribarren, 2000) y se identifican de manera clara cada uno de los requerimientos de los sistemas de la propuesta objetual, basada en los insumos obtenidos de la primera fase con el grupo de reciclaje. Los dos enfoques concretan una respuesta a la problemática, surge de las ideas de la comunidad quienes al estar involucrados en el desarrollo del proyecto y crean apropiación de los resultados; el modelado sistémico, faculta el diseño, la construcción e implementación de una extrusora de filamento para impresión 3D a partir de material plástico reciclable, que permite la transformación del plástico recolectado en una materia prima que puede ser comercializado a un mejor precio del que reciben actualmente por el plástico.

2. Justificación

2.1. Social

Actualmente en Colombia el reciclaje de plásticos es una labor realizada en su mayoría por recicladores informales, y según el BID (2011) son ellos quienes hacen el mayor aporte a la recolección del material reciclable con una cifra que alcanza el 60,9% del plástico recolectado a nivel nacional. Sin embargo, dicha labor establece una remuneración tan baja que apunta a los índices de pobreza extrema con ingresos de menos de dos dólares diarios¹⁴, aun cuando la industria del plástico reconoce el potencial económico del material plástico reciclable asegurando pérdidas de entre 80.000 y 120.000 millones de dólares cada año por envoltorios plásticos no reutilizados (Ellen Macarthur foundation, 2016).

La fabricación de filamento plástico (para impresión 3D) a partir del material reciclado por comunidades vulnerables por pobreza, crea espacios de trabajo que contribuyen al mejoramiento de la calidad de vida, a partir de mayor remuneración económica obtenida por su trabajo. Este trabajo se justifica desde lo social teniendo en cuenta las condiciones del contexto en el cual es desarrollada la labor.

2.2. Ambiental

Se resalta la importancia y la necesidad de reciclar, dado que la masificación del plástico en el mundo se ha convertido en una problemática cada vez más difícil de controlar, como lo advierten los estudios presentados en el foro económico mundial (The new plastics economy: rethinking the future of plastic, 2016), que indican que de seguir sin tomar acciones, para el año 2050 el peso de los residuos plásticos será superior al peso de todos los peces en el planeta, por tanto es imperiosamente necesario el proponer soluciones desde diferentes perspectivas para prestar atención a las alarmas y contribuir con la mejora de esta situación ambiental. Brindar una materia prima a partir del producto reciclado de desechos plásticos como PET o HDPE, que finalmente terminan en depósitos o rellenos sanitarios donde pueden tardar más de 150 años en descomponerse, justifica este trabajo desde lo ambiental.

3. Caso estudio comunidad de reciclaje Nashira

Ubicada en el corregimiento El Bolo, en la ciudad de Palmira, Departamento del Valle del Cauca, en Colombia, Nashira es una comunidad de reciclaje rural conformada por mujeres en su mayoría madres cabeza de hogar, quienes en la labor del reciclaje encuentran una alternativa para suplir sus necesidades económicas, y a su vez contribuyen al mejoramiento de las condiciones ambientales de la eco aldea a

¹⁴ Tasa de incidencia de la pobreza sobre las bases de \$1.90 dólares por día (PPA). Tomado del banco mundial y comisión económica para américa latina y el caribe - CEPAL

través de proyectos de formación y capacitación de separación en la fuente, recolección y manejo de residuos sólidos.

Su labor parte del aprendizaje empírico por lo cual está mujeres muestran un gran interés y dedican parte de a su tiempo a aprender cada día más sobre los materiales que recolectan, su debido tratamiento y cómo disponer adecuadamente de ellos, esta situación derivó en acercamientos y diálogos con profesionales, entre ellos los diseñadores.

Sin embargo, la ausencia de conocimiento e información en el negocio del reciclaje, se ha visto reflejada en las ganancias obtenidas; los ingresos recibidos por la comercialización del material recolectado son muy bajos, no cuentan con la experiencia, el recurso suficiente o el conocimiento técnico necesario para realizar procesos de transformación de los residuos que pudieran dar valor agregado al material.

Por ello este trabajo se encuentra oportuno para brindar herramientas que ayuden a la consolidación de los procesos de reciclaje, haciendo uso de herramientas metodológicas de diseño participativo (Sanders, 2013) para desarrollar capacitaciones específicas y plantear la implementación de transformación del material recolectado para aumentar las ganancias, es así como se plantea la construcción de una extrusora (para filamento de impresión 3D) en un proceso de construcción que involucra a la comunidad de forma activa, que contribuye al mejoramiento de su calidad de vida y que dignifica la labor tan importante que realizan en cada jornada de recolección siempre en búsqueda del bienestar humano (Ramirez, Cardozo , & Lecuona, 2012).

4. Metodología

Se trabaja en esencia con 2 metodologías de diseño para lograr el cumplimiento de los objetivos, en una primera instancia se trabaja bajo los parámetros definidos por Sanders (Sanders & Stappers, 2014), haciendo uso de metodologías de co-diseño, esta metodología sugiere el abordaje con la comunidad y el trabajo con la misma, permitiendo el desarrollo de talleres que ayudan al reconocimiento de las materias primas recolectadas y a la capacitación, comprensión desarrollo y apropiación de la máquina extrusora.

Posteriormente se aplican metodologías de una adaptación de los autores al modelo planteado por Hernandis (Hernandis & Iribarren, 2000) en cuanto se refiere a sus modelados de producto y empresa, junto con metodología de caja negra expuesta por (Cross, 2003). Este enfoque permite visualizar desde lo general -la comunidad-, el planteamiento de un modelo, que debe ser rentable y sostenible y desde lo particular el desarrollo de un producto para transformar el material plástico recolectado.

4.1. Workshops y trabajo con la comunidad

Bajo el planteamiento de workshops, se logró el acercamiento con la comunidad en dos oportunidades, la primera “workshop de materiales” (Fig. 1) fue la apertura de espacios de capacitación sobre características de materiales, usos convencionales y métodos de fácil reconocimiento y clasificación, del cual se obtuvieron paneles gráficos contruidos en conjunto, con los cuales pudieran interactuar y que albergaran la información requerida por el grupo en el momento de realizar las pruebas las cuales fueron aplicadas a probetas de tres materiales (PET.HDPE, y PP) y llevadas a cabo por primera vez en compañía de las cinco integrantes del grupo de reciclaje en una sesión de tres horas, donde las pruebas que se usaron para el reconocimiento de los materiales consistieron en exposición al fuego directo mediante el uso de un encendedor, siendo los resultados a tener en cuenta el color y la forma de la llama, el color del humo y el color del goteo del material; adicionalmente se realizó una prueba de densidad en agua, de la cual los resultados posibles consistían en si la probeta permanecía en la superficie del agua o por el contrario llegaba al fondo del recipiente.



Fig. 1 Workshop de materiales



Fig. 2 Formato y diagramación del panel

Para este desarrollo se estableció que la construcción de elemento gráfico daría pautas básicas sobre los materiales y las pruebas, por lo que el equipo de diseño preestableció el formato y la diagramación (Fig. 2) de los tres paneles diferenciados entre ellos por medio de colores, dejando los espacios pertinentes para que las integrantes de la comunidad fueran construyéndolos haciendo uso de adhesivos que contenían la información y los resultados de las pruebas en los materiales, a medida que estas se realizaban.

Posteriormente se llevó a cabo el segundo ejercicio con la comunidad “workshop de formas básicas”, con el objetivo de llegar a propuestas formales a partir de la construcción de volúmenes básicos que pudieran ser reinterpretados como componentes del sistema de extrusión, cuya finalidad fue incentivar la participación de las integrantes en el proceso de configuración morfológica de la máquina, promoviendo la apropiación por el proyecto con el planteamiento de ideas propias y aumentando las expectativas sobre el resultado formal con la reinterpretación de sus propuestas, por lo que para este taller se propuso llevar a cabo la actividad en 4 partes (Tabla 1) en una sesión de tres horas de trabajo.

ACTIVIDAD	CONTENIDO
Contextualización	Procesos de reciclaje actuales, uso de maquinarias y alternativas de uso del filamento plástico.
Explicación	Funcionamiento general de máquinas de extrusión, otros procesos de transformación y alternativas mecánicas para procesar materia prima.
Construcción	Elaboración de modelos con formas básicas como reinterpretación de las partes de la extrusora.
Socialización de resultados	Muestra de resultados en grupo y retroalimentación del proceso para aclarar posibles dudas.

Tabla 1. Contenidos de las actividades.

1. Contextualización: en esta primera etapa se realiza una explicación sobre los procesos actuales de reciclaje, posibles métodos y maquinaria usada a nivel industrial de los cuales el grupo no tuviese conocimiento y finalmente la posible disposición o uso que podría tener el filamento fabricado.
2. Explicación: para llevar a cabo el taller se realizó una explicación introductoria al proceso de extrusión del plástico, maquinarias usadas, y principios básicos de funcionamiento con el fin de brindar la información que fuera necesaria y pertinente para esta etapa del proceso.
3. Construcción: se construye con el grupo un modelo representativo de una máquina extrusora, donde se identificaron sus partes y el orden en que el sistema debía ser construido, teniendo en cuenta algunas propuesta que surgieron del grupo en cuanto a la disposición de elementos como la tolva, respecto al tornillo de extrusión y su forma.
4. Socialización de resultados: en un escenario de participación y discusión, algunas integrantes del grupo dieron sus aportes hacia el modelo construido, proponiendo cambios en la forma y brindando alternativas de solución a partes técnicas del sistema a medida que se socializaban los resultados de la actividad.

En este workshop se evidenció la motivación por el proceso de capacitación (Fig. 3) y la apropiación de la información brindada en las explicaciones y charlas realizadas desde los primeros encuentros; con esta información el grupo realizó un modelo representativo (Fig. 4) y expuso sus ideas con las demás integrantes sobre la interpretación del proceso de extrusión.



Fig.3 Capacitación sobre el proceso de extrusión.

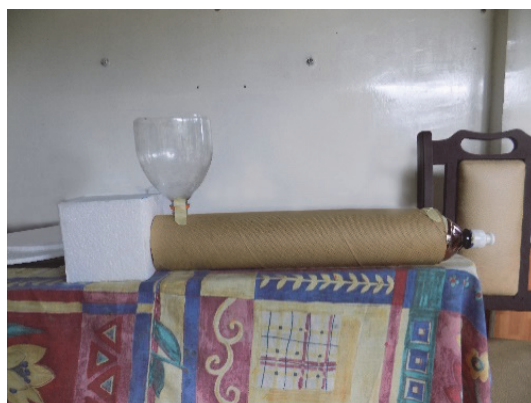


Fig.4 Construcción de modelo representativo.

4.2. Modelado del sistema

Paralelo a este proceso se inició el análisis de la máquina desde la perspectiva sistémica, estableciendo inicialmente los sistemas y subsistema existentes como flujos de información a través de una “caja negra” (Cross, 2003) que descompone la función principal en funciones secundarias y esenciales con sus respectivas variables de entrada y salida (Fig. 5 y Fig. 6).

Acto seguido, frente al abordaje del análisis preliminar del diseño de una extrusora se decidió escalar ampliamente y se optó por ampliar el estudio a procesos previos a la extrusión, teniendo en cuenta las variables que podían incidir en la toma de decisiones sobre la construcción o implementación de algunos procedimientos como lavado y peletizado, que pudiesen complementar la producción del filamento, entendiendo las posibilidades resultantes como modelos de negocio alternativos a la venta de la materia prima.

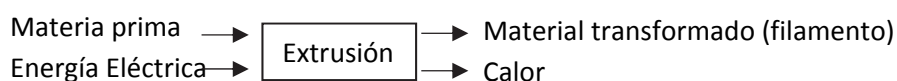


Fig.5 Modelo de sistemas de la “Caja negra” elaborada para el sistema de extrusión.

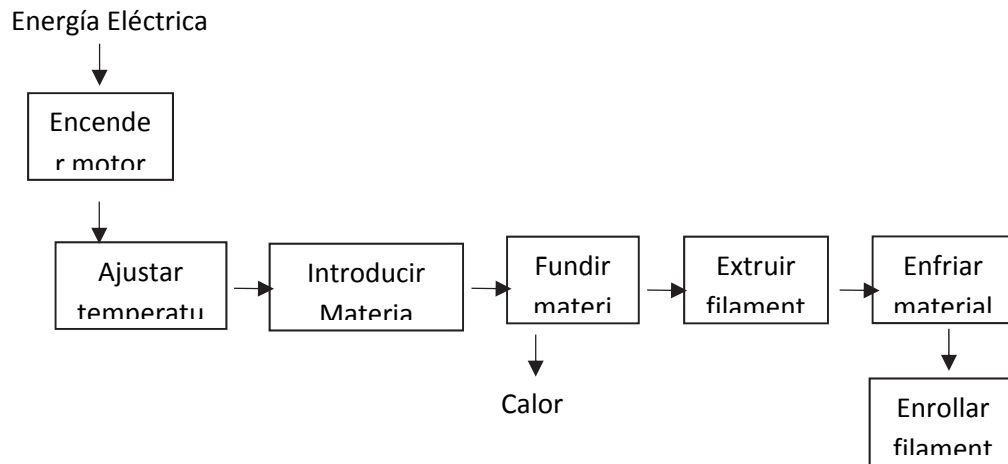


Fig.6 Descomposición de funciones para el sistema de extrusión.

Dado que el sistema de extrusión estaba comprendido por un número reducido de pasos generales, se aplicaron conceptos de escalabilidad que permitieron establecer la necesidad de procesos previos para el debido tratamiento de la materia prima, entendido desde la recolección del material reciclable, hasta el almacenamiento del producto final siendo la extrusión un subsistema del proceso de reciclaje del plástico, esto con el fin de identificar aquellos pasos que pudieran ser llevados a cabo por la misma comunidad sin necesitar otros recursos, especialmente aquellos que significaran una inversión o gasto elevado como energía eléctrica para el funcionamiento de máquinas adicionales o agua para el lavado y enfriado del material, de esta manera se propuso un sistema de producción en línea que tuviese en cuenta los procesos como son llevados a cabo actualmente (Fig. 8). Para esto se desarrolló un esquema sinóptico (Fig. 8) que tuviese en cuenta las posibilidades de comercializar el material en mejores condiciones, eliminando la dificultad de almacenamiento que representaba el no estar peletizado ni pesado y que tuviese en cuenta la propuesta de fabricación de filamento plástico tanto para venta, como para usos alternativos que la misma comunidad pudiese plantear.



Fig.7 proceso actual de reciclaje.

En este análisis, las variables tenidas en cuenta para la toma de decisiones sobre la disposición del material se basaron en dos aspectos, el primero que consiste en la forma de cómo se comercializa el material reciclable actualmente, donde el precio de venta se define según el peso sin los procesos de prensado ni lavado y por otro lado, la alternativa de producción de filamento con el material reciclable una vez que este que cumpla las características necesarias; en este caso en el proceso actual se identificaron actividades que podrían convertirse en cuellos de botella por la falta de espacio para el almacenamiento como es el caso del material que es lavado y almacenado sin ser peletizado, el cual ocupa grandes cantidades en volumen, pero NO en peso, lo que se traduce a poca ganancia. Por ello, se

replanteo el esquema de producción modificando el orden de las actividades actuales con sus correspondientes variables, adicional a esto, el proceso de secado que no es llevado a cabo por su complejidad y que sería solucionado realizando el peletizado previamente (Cuadro de modificaciones en la figura.8).

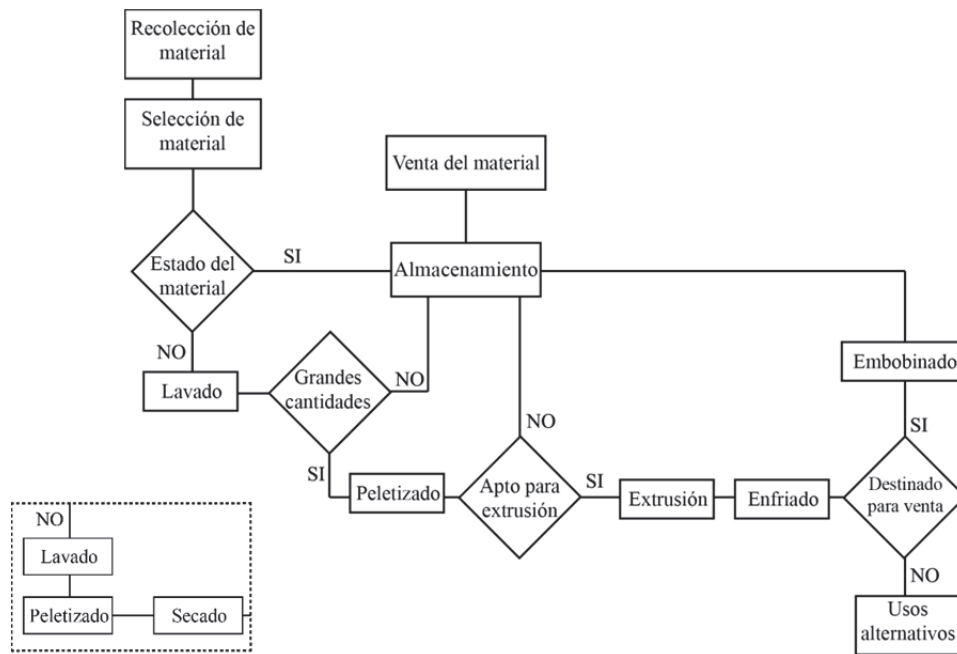


Fig.8 Esquema sinóptico para la fabricación de filamento-en línea discontinua las modificaciones posteriores.

A partir de este procedimiento se identificaron aspectos técnicos, que contribuyeron a la fijación de requerimientos, los cuales fueron relacionados directamente con un sistema funcional que permitiera solucionar una problemática específica organizadas bajo criterios de orden jerárquico de acuerdo al momento en el que son llevadas a cabo en el proceso de transformación, entendiendo que para comprender la estructura se deben examinar tanto su composición a nivel interno como las funciones que desempeña, su relación con el entorno y cada uno de los sistemas específicos con los que interactúa y que a su vez componen la función global.

4.3. Desarrollo de la propuesta

Una vez llevado a cabo el proceso de análisis de las condiciones de la comunidad se dio inicio a la construcción de la maquina extrusora, para esto se tuvieron en cuenta dos aspectos, el primero fueron las propuestas resultantes de los dos workshop realizados con la comunidad, con el fin de llegar a una configuración formal diferente a los existentes, y la segunda basada en los aspectos técnicos que constituyen el proceso de extrusión dividido en subsistemas funcionales y los elementos que corresponden a cada uno (fig. 10).

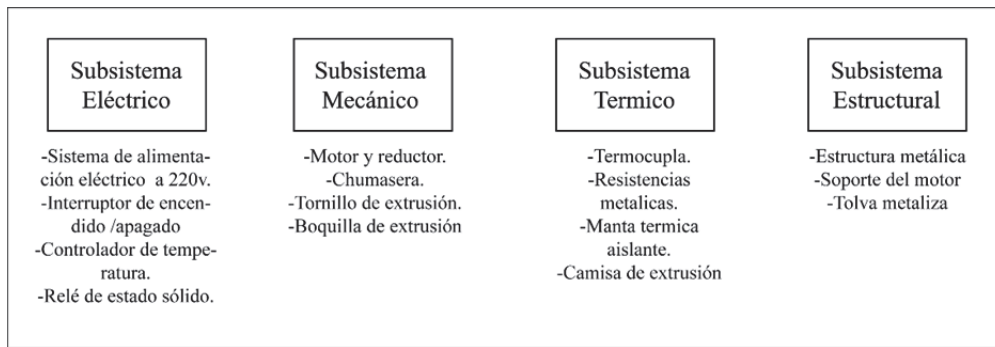


Fig.9 Subsistemas de la máquina de extrusión.

De esta manera se establecieron los requerimientos de la máquina y así mismo se adquirieron las partes según las especificaciones necesarias. Realizado dicho proceso se analizaron los elementos de la máquina en los cuales se podía intervenir de acuerdo a las apreciaciones hechas por la comunidad en espacios de participación anteriores, siendo las propuestas aplicadas a los subsistemas a través de colores que permitieran identificar de manera fácil cada uno de los elementos de la máquina (fig.10); haciendo uso de esta información, se determinó la posibilidad de usar múltiples colores para definir cada una de las partes de manera que comunicara el cuidado que se debía tener en las zonas de algunos sistemas, como lo es el subsistema térmico donde se manejan temperaturas elevadas, zonas de alimentación como la tolva en caso de atascamiento de material o mal funcionamiento del motor por posibles fallas en el sistema de alimentación eléctrica o conexiones en los componentes electrónicos.

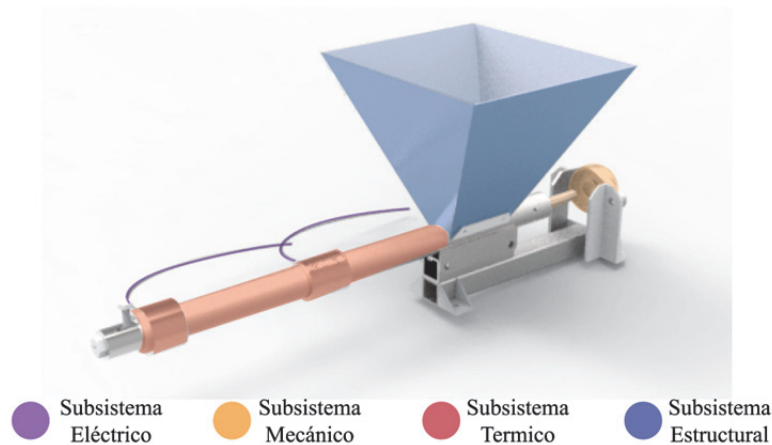


Fig.10 Identificación de los subsistemas de la máquina a partir de colores.

5. Conclusiones

Actualmente, en el mundo es necesario recapacitar sobre los problemas mayores que nos acogen, este trabajo aborda dos de ellos: la pobreza y la acumulación de residuos sólidos, en el caso particular el plástico. Ambos fenómenos desde una comunidad puntual en un país Latinoamericano, donde desde el diseño se aporta con soluciones centradas en tratamientos sistémicos y participativos, logrando soluciones impactantes en el contexto local con un alto nivel de apropiación.

El uso de metodologías participativas aumentan la receptividad y la apropiación de los proyectos realizados para las comunidades, hacer uso de ellas requiere de disposición, de trabajo en equipo y de coordinación entre la comunidad y los diseñadores. Crear sincronía en el desarrollo de estas dinámicas hace que se genere confianza en los procesos y para que los resultados puedan realmente implementarse es necesario hacer acompañamiento y seguimiento.

El uso de las metodologías sistémicas permiten un abordaje íntegro del problema, escalando la visualización del mismo y logrando impactar mucho más en las actividades de reciclaje llevadas a cabo por la comunidad.

El diseño es una profesión que permite mejorar las condiciones de vida de las personas vulnerables, este pensamiento emerge en los años 70s y hoy en día hace parte de una de las líneas de investigación y desarrollo de este siglo.

6. Agradecimientos

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Tangible interaction in museums and temporary exhibitions: embedding and embodying the intangible values of cultural heritage

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Abstract

Moving from a design perspective, the paper explores the potential of tangible interaction in giving shape to intangible contents in museums and temporary exhibitions.

Going beyond tangibility intended in the strict sense of touching assets we use here a wider interpretation of tangibility that considers touch in the sense of embodied experience. In this way we consider as tangible all those experiences that foster a strong involvement of the body when interacting with digital content. This includes objects-based and gestures-based interactions.

Tangible interaction is interpreted as a practice able to multiply the levels of the narrative, to make the visit experience memorable and to give materiality to intangible values. This approach uses tangible interaction as a way to let the audience experience practices and rituals linked to the contents and representative of the intangible values embedded in the assets.

The potential of tangible interaction to foster the intangible values of cultural heritage is discussed starting from a provisional classification of tangible interaction case studies. In particular four different categories are identified that are: smart replicas/originals, symbolic objects, codified gestures and performing gestures.

In conclusion, two possible design strategies that employ tangible interaction for enabling the experience of intangible values of cultural heritage are highlighted. These are:

Embedding meaning: it consists in creating sensorised objects that embed in themselves meanings related to intangible values of cultural heritage, and that communicate explicitly this meaning in their physicality;

Embodying meaning: it consists in integrating a meaning related to intangible values in gestures, so that intangible values are communicated implicitly in the action performed by the visitor.

Keywords: *tangible interaction, intangible values, design-driven approach, cultural heritage, exhibit design.*

1. Introduction

The application of interactive technologies to museums and temporary exhibitions has been for long time a topic of research in Interaction Design, Human-Computer Interaction (HCI) and related disciplines. One of the last trends in the field has regarded the research of technological solutions that allow for a fuller integration between the technology, the materiality of the objects and the physicality of the visit experience (Bannon et al., 2005; Petrelli et al., 2013). The importance of the physical engagement with heritage has been also highlighted by various works in museum studies (Chatterje, 2008; Pye, 2008; Dudley, 2011). This had led to the design of mixed reality installations that make use of technologies like augmented reality (e.g. Vlahakis et al., 2002), augmented virtuality (e.g. Hall et al., 2001) and tangible and embodied interaction (e.g. Rawat et al., 2005; Taylor et al., 2015) with the purpose of designing technologies that are better integrated with the real physical world and that require interactions similar to those people carry out in the real world.

This paper focuses on tangible and embodied interactive systems. Going beyond tangibility intended in the strict sense of touching assets, we use here the wider interpretation of tangibility as it has come to be considered today in the technological world (Hornecker et al., 2006). This interpretation considers as tangible all those experiences that require a strong involvement of the body when interacting with a digital system. Indeed, in tangible interaction systems the visitors interact by manipulating tangible objects or by making actions through gestures or the whole body.

In particular this paper aims to explore a peculiar aspect of tangible interaction, that is, its potential in giving physical shape to the intangible values of cultural heritage. First, the concepts of tangible and embodied interaction will be illustrated along with an overview of related works in the cultural heritage field. In order to lay the groundwork for the discussion of our research, the concept of intangible values and how it has been used in the exhibit design practice will be described. Then, a provisional categorization of different tangible interaction systems will be presented and used as a starting point to investigate and discuss the ability of tangible interaction to foster intangible values of cultural heritage. To conclude, different design strategies that make use of tangible interaction as a means to foster intangible values in cultural heritage will be highlighted and explained.

2. Tangible interaction, Embodied experience: definitions and related works in CH

Tangible interaction is a field of research inside HCI and Interaction design. Research in this field is part of a trend that became prominent in the mid 90s aiming to overcome the limits of desktop computers and virtual reality, particularly the fact that they estrange people from the real world (Shaer et al., 2010). A firm belief emerged at that time that instead of enclosing people in a virtual world, effective technical solutions should be developed to integrate digital functionalities directly in the real world (Wellner et al., 1993).

Technologies that integrate the digital and real world are globally referred to as mixed reality (Milgram et al., 1994; Coutrix et al., 2006). Augmented reality and augmented virtuality systems are examples of technologies that allow for an integration between the two dimensions – real and virtual - from a visual point of view. In the former, the real environment is augmented by overlapping digital information to it, while in the latter, direct representations of reality are inserted into virtual reality environments.

Tangible interaction emerged as a way to allow for an integration also at the level of the interaction (Ishii et al., 1997). Different disciplines have contributed to what is now known as tangible interaction, namely Computing and HCI, Product and Industrial Design and Arts. For this reason the expression *tangible*

interaction has come to be considered today as an umbrella term encompassing “a broad range of different systems and interfaces relying on embodied interaction, tangible manipulation and physical representation (of data), embeddedness in real space and digitally augmented physical spaces” (Hornecker et al. 2006, p. 437). In other words, tangible interaction systems propose a kind of interaction with digital systems that is similar to the way people interact in the physical world, that is, through specific physical objects or through gestures and full-body movements, and not using generic devices like the mouse, the keyboard or the joystick. It is important to point out that the expression embodied interaction is sometimes used by some authors in place of tangible interaction especially when referring to the whole-body or gesture interaction (Hornecker). This expression has become popular in Human Computer Interaction after the publication of the book *Where the action is* (Dourish, 2001). A recent overview on the application of the notion of embodiment to HCI is provided by Marshall et al. (2013).

Mixed reality technologies have become a topic of research also in the cultural heritage field (Bannon et al., 2005) because of their potential of overcoming one of the issues regarding the application of technologies to museums and exhibitions, that is, the distraction and disengagement of visitors from the real objects and their materiality (Ciolfi, 2003; Vom Lehm et al., 2003; Stevens, 2004). Therefore, augmented reality systems started to be employed in the cultural heritage field for their ability to overlap digital information directly on the objects on display (e.g. Vlahakis et al. 2002;). Similarly, augmented virtuality systems were developed to augment virtual environments with a representation of real objects (Hall et al., 2001). In parallel with an increasing interest in the materiality of the visit experience shown in museum studies (Chatterje, 2008; Pye, 2008; Dudley, 2011), also tangible and embodied interaction systems have been applied to museums and exhibitions in their different forms. These include technological systems like tangible tabletops (Hsieh et al., 2010), smart objects (Rawat et. al, 2005), and smart physical places (Ciolfi et al., 2005). Although different in forms, all these systems require similar interaction styles: through the manipulation of specific tangible objects (object-based interaction) or through free gestures (gestures-based interaction).

Pioneering research in the field of tangible interaction applied to cultural heritage started in the early 2000s with the European SHAPE (Situating Hybrid Assemblies in Public Environment) project (Bannon et al., 2005). SHAPE aimed to develop assemblies of hybrid, mixed reality artefacts in public spaces like museums and exploratoria and to examine the behaviours of visitors in relation to them. Two public exhibitions were developed and tested through visitor studies and some guidelines for the design of similar experiences were discussed (Fraser et al., 2003; Ferris et al., 2004; Ciolfi et al., 2005).

The still on-going European meSch projects (Material EncounterS with digital Cultural Heritage) is also dealing with tangible interaction (Petrelli et al., 2013). Started in 2013, its main goal is exploring new prototypes of tangible interaction (e.g. Petrelli et al., 2014) with the aim of bridging the gap between heritage and digital content, and also creating a platform that allows cultural heritage professionals to design, make and maintain interactive artefacts. Many reflections about the application of co-design methodologies in museums have also emerged as part of meSch (Ciolfi et al., 2016). Besides the two European projects, other tangible interaction systems have emerged both from research and museum practice, so that today the field is characterized by a strong variety.

What emerges from this overview is that so far the research in the field has been mainly practical and focused on the design and evaluation of new interactive systems, while not many theoretical works have been developed. With the aim of overcoming at least partially this gap one of the authors of this paper is currently developing a PhD research. As part of this on-going research, many projects that make use of tangible interaction in the cultural heritage field have been collected for analysis. The collection includes

both projects coming from research activities and design practice. The case studies that will be presented and discussed in this paper represent a subset of this collection.

3. Intangible values of Cultural Heritage in the exhibit design practice

The value of the cultural heritage is not only related to the connotative features of a specific cultural asset (such as the authenticity, the rarity, the preciousness, the manufacture, the prestige of the artist...) but also to its intangible significance (such as the circumstances of its realization, the stratification of its belonging to different owners, its symbolic and archetypal identity, its being object of traditions or oral narratives ...). This latest aspect – the intangible value – can be made evident by some of the strategies typical of the exhibit design practice. In this paper tangible interaction is interpreted as a practice able to multiply the levels of the narrative, to make the visit experience memorable and to give materiality to intangible values. This approach uses tangible interaction as a way to let the audience experience practices and rituals linked to the contents and representative of the intangible values embedded in the assets. Therefore we can identify “gesture-through” and “object-through” interactions able to enhance the visitor experience and the understanding of cultural heritage. In this context the word “mediation” represents a crucial point because it means the potential of the expository artefacts and the technological devices in multiplying the narrative of the cultural asset. Putnam - in his book *Museum as medium* (2009) - pinpoints some models of museums (such as Wunderkammer, Open Archive, Creator-Curator...) aimed at representing the tangible and intangible value of collections. The crucial concept that he suggests is: “replacing the value”. This approach takes into account the potential of the displacement in stressing the relationship between the tangible and the intangible value of the cultural asset exhibited. “All museums through their chosen mode of displaying, using the traditional devices of plinth, vitrine and label, have the potential to transform almost anything they exhibit into a work of art.” (Putnam, 2009, p. 36). On the one hand, this way of showing artefacts takes advantage of the traditional display (vitrine) in order to reinterpret the meaning, but on the other hand vitrines are the most “celebratory” expository elements that do not allow a tangible interaction with the object. Therefore this use of them is interesting because it opens to different interpretations of the perception of the cultural object and the potential to transmit its intangible value. “The vitrine reinforces the notion of the unique, untouchable and unattainable and, perhaps significantly, has its roots in the medieval church reliquary. It therefore enhances the inherent visual power of an object to catch a viewer’s attention and to stimulate contemplation. The effect of placing something in a vitrine is to “museumize” it: the glass scates not just a physical barrier but establishes an “official distance” between object and viewer.” (ivi). In this essay we are challenging this distance in support of a “dynamic” interface able to activate various narratives around the object exhibited.

In this perspective we can mention the installation *Object de Guerre 1-4* (2000-2006) by the young artist Joreige who focuses her works on testimonies about the war in Lebanon. She asked to each person involved to choose an object meaningful for his daily life or for its symbolic value in order to trigger the narrative about his experience. The result is a plural photograph that aims at portraying a plethora of points of view around a unique and intense topic: the memory of the war. The exhibit consists both of real objects exhibited in vitrines with label that mentions the owner’s name and his video-testimony; this last one becomes active when visitors get close to the vitrines. The combination of the multimedia language and the “traditional” expository element (vitrine) appears as a contrast: on the one hand the video-testimony gets close visitors to the witness because it stages his way of speaking and his way of narrating himself through the object like a “public intimacy”; on the other hand, the vitrine isolates the object in order to celebrate, decontextualize and offer it to the glance of visitors away from its physical and emotional habitat.

The mediation between object and visitors and between object and space is an important topic able to reflect the communicative and narrative vocation of the object exhibited. Designing the cultural experience means indeed designing the relationship between visitor and cultural asset.

The concept of the “object-through” mentioned before is perceptible and understandable thanks to new communication registers and new media-relational requirements of daily objects. The *Whispering Table installation* (TheGreenEyl for the Jewish Museum in Berlin, 2009) use the “chance” of the object - an object with a high gradient of ritual such as one present in a set decked table - in order to cope with the topic of the religion by means of food and objects around it. The space is almost dark equipped with black tables on which white, lighted kitchen objects stand out. Visitors can seat down around the table, take the objects and get them close to their ears: the objects reveal some sound narratives telling the symbolic meaning of food, rituals and religious belief. The objects communicate also among them: according to their disposition on the table, they tell stories about differences and similarities among cultures. The visitor arranges the things and listens to the stories like an actor of a renewed ritual. The memory of the bodily movements in the space allows to sediment knowledge in a permanent way.

In both the examples mentioned before, the tangible interaction moves the visitor’s attention from the objects exposed to their intangible value. The intangible dimension triggers three levels of cultural experience: the memory, the stratification of contents and the emotive engagement.

Tangible interaction can act as a vehicle in fostering the attention and incentive towards an emotional cultural experience. The use of multimedia and interactive technologies can generate a sort of “virtuous destabilization” that stages a new concept of diffuse performativity. As designers that give shape to the relationship between visitors and the cultural asset we have to consider a crucial issue: the risk of the excess of the semiotic saturation in the communicative interface. Therefore in designing this “mediation” we have to consider that new technologies foster the dematerialization of exhibit systems and objects (Balzola and Rosa 2011). Both interaction and interactivity are key points in designing cultural experiences: according to Balzola and Rosa (ibidem) on the one hand interaction is a direct relational form among two entities or more that communicate to each other and that transfer emotions, narratives and other information in a specific moment; on the other hand interactivity is an intercepted interaction because the process of the relation is recorded by a digital device.

In this perspective we are moving towards an aesthetics based on behaviours and not only on shapes. For this reason, the effect of the device interface through which we interact with the cultural asset is such important as the consistency of the interface itself. Sometimes if the interfaces are “natural”, the audience engagement is immediate. Actions, natural for humans, like blowing, shouting, clapping, touching can become means to trigger contents in a meaningful and, at the same time, simple way.

4. Investigating the ability of tangible interaction as a means to foster intangible values of CH: a provisional categorization

Manipulating, touching, moving, rising as well as other bodily gestures are becoming common means of activating and controlling digital interpretations of the artworks as well as actions aimed to elicit the intangible values the assets bear with them.

Analysing these novel ways of interacting with cultural assets, it emerges a clear distinction between those experiences that prompt visitors to touch objects and those that rely on bodily movements without physical contact. This distinction is commonly identified in the field of Interaction Design with the two terms embedded interaction and embodied interaction, referring the first to the incorporation of sensing

and computational capabilities within objects and the second to the ability of systems of reading and interpreting gestures and full-body movements.

Translating embedded interaction in CH field means enabling an object-through interaction, being the object a smart copy of the artwork in exhibit, an object imbued with symbolic meaning or a simple smart object with no reference to the assets. The manipulation is the major means of interaction with the objects that, according to what visitors do with it, activate digital interpretations.

On the other side, systems based on embodied interaction enable a gesture-through interaction, using the human body as controller of the digital world. By reading gestures or full-body movements the digital system can modify accordingly, being the gestures simple movements of a hand, codified gestures (e.g. recreating in the air those we usually do with fingers on a touch screen) or articulated movements involving all the body.

As already stated, the aim of this study is to analyse the potential of tangible interaction in eliciting the intangible values of cultural assets. That said, the simple distinction between embedded and embodied interaction seems weak in describing the relevance of the objects/gestures in relation to the values the interaction elicits. Therefore, we propose four categories for grouping experiences of tangible interaction, here listed and described in the following: (1) smart replicas/originals, (2) symbolic objects, (3) codified gestures and (4) performing gestures, being the first two mostly related to embedded interaction and the last to embodied interaction.

4.1. Smart replicas/originals

The category smart replicas/originals collects those experiences based upon technology-enhanced objects. These objects can be:

- *smart replicas*, that are copy of artworks on show, usually realized through digital manufacturing, that embed sensors;
- *smart originals*, that are original artworks and assets enhanced with digital technology and sensing capabilities.

What these categories share is a direct and easily understandable relation between the technology-enhanced objects and the artworks they are augmenting and interpreting and the possibility to touch and handle objects.

In the case of smart replicas, by manipulating real-size or scaled reproduction of artworks embedded with buttons and sensors visitors can (1) activate and control digital contents and eventually (2) experience sensorial aspects of the object such as the superficial finishing.

The copies of the untouchable original artworks are usually obtained acquiring digitally the shape of the original (typically through laser scanning or photogrammetry), modifying it in order to host sensors and controllers and then reproducing it in the most appropriate scale with 3D printers or milling machines.

An example in this sense is provided by the VIRTEX presentation method, by Daniel Pletinckx, firstly proposed at the Archaeological Museum Ename in Belgium in 2007 and then integrated in the *Keys to Rome* exhibition at the Allard Pierson Museum of Amsterdam in 2014. The first example consists of a bigger replica of a small ivory cross embedded with a gyroscope that allows users to move a 3D model by actually moving the replica, and buttons – recognisable as black dots – that trigger video contributions when activated. The same interaction model is proposed in the *Keys to Rome* exhibition that exposes two “sensorised” replicas of the Ara Pacis and of the Augusto of Prima Porta, whose originals are both in

Rome. The two monuments are proposed in a small scale in order to allow visitors to manipulate them, and set near to a plaster copy of a bass relief (Ara Pacis) and of the statue (Augusto of Prima Porta).

Smart originals, as the name suggests, propose the same interaction model but instead of using replicas, the real artworks and assets are embedded with sensors. A relevant example in the field is provided by the temporary exhibition *Fragments of memory* (Frammenti di memoria) by Gabriel Rapetti, that uses smart originals related to the farming. By touching the objects of the exhibition visitors can start light effects and activate stories of farmers told by the objects that evoke the atmosphere of past times in a whimsical way.

4.2. Symbolic objects

Interacting with the original artworks or with their copy is not the unique way of allowing visitors to handle smart objects and gain interpretation: smart objects can indeed be somehow related to the exhibit without having a strict formal relation with the assets on show.

We categorise these experiences as symbolic objects, since we include those projects that employ smart objects, icons or elements imbued with symbolic meaning as a vehicle to reach the intangible value of the cultural asset. In other words, the smart object itself, beyond its capability of activating contents on manipulation, becomes symbolic in itself by means of its shape and evocative power.

The exhibition *The Hague and the Atlantic Wall: War in the City of Peace* at the Museon in The Hague, realised in the context of *meSch project* (Marshall et al., 2016) provides a good example of *symbolic objects*. The exhibition focused on the impact of the construction of the Atlantic Wall on the city and its citizens and aimed to provide, starting from ten museum objects, three different points of view on the story: Dutch civilians, Dutch civil servants, and the German soldiers. Six objects have been chosen to tell the three stories in Dutch and English: a tea bag (Dutch) and a sugar packet (English) for the civilian, a travel pass (Dutch) and an armband (English) for the civil servant and finally a drinking mug (Dutch) and a dictionary (English) for the German soldier. The objects are selected by visitors at the beginning of the exhibition and, by placing them close to displays across the exhibit, video and audio contents are activated. Albeit the six smart objects are replicas of assets on display in the exhibition, they do not activate interpretive contents about themselves but become metaphor of a particular point of view. They are therefore employed for their evocative power and for their ability to represent and symbolise a character of a story.

The objects are, on the one hand, activators of stories able to contextualise the assets in the exhibit and to convey their intangible value, and on the other, are symbolic of that intangible value: by selecting one of the six objects at the beginning of the exhibition, the visitor acknowledges the meaning they embed.

4.3. Codified gestures

The category *codified gestures* collects those experiences that employ gesture-based interaction to control and activate interpretive contents about the objects on show. We include here projects that ask visitors to perform specific gestures (e.g. raising a hand, stepping, turning their head ...) to access digital contents. Gesture-based interaction is usually allowed by sensors (motion and proximity sensors) or by devices able to read the movement of the full body (e.g. Microsoft Kinect).

A relevant example in the field comes from the project *Etruscanning - Digital Encounters with the Regolini-Galassi Tomb* (Ray & Vos, 2013) that allows users to explore and navigate a 3D reconstruction of an Etruscan tomb by using gestures. Explicit and codified movements, captured by sensors, let visitors virtually move within the tomb and experience a digital encounter with a highly realistic VII century B.C.

construction. In this case, the human body becomes the input device and the gestures are the inputs given to the system.

In other projects the body becomes the means to sort artworks or to emulate them: the *Gallery One* exhibition at the Cleveland Art Museum by Local Project is an example (Alexander et al., 2013). In the *Sculpture Lens* installation, the facial expressions of visitor are caught and artworks with similar expressions are shown. On the contrary, the installation *Strike the pose* asks visitors to assume the same pose of sculptures and paintings of the collection with the aim of reaching the best accuracy of the pose.

The three projects described share an instrumental use of the visitors' body since it acts as activators of contents: in the first case it is just a controller of movements in a virtual environment while, in the two others, it acquires the role of sorter and imitator.

The performed gestures are meaningful in respect to a codified list of stored poses but not necessarily add to the comprehension of the artworks or help in conveying the intangible values connected to them.

4.4. Performing gestures

The *performing gestures* category shares with the previous one the use of the body to trigger digital interpretation of artwork but it adds meaning to the gesture itself.

The category collects indeed those experiences that ask visitors to perform meaningful – in respect to the asset on show – gestures to trigger specific effects able to stage the narrative of intangible contents. The gesture itself, beyond its ability to activate digital contents, is imbued with meaning since it becomes representative and symbolic of an intangible value connected to the object on show.

This grouping recalls the classification of technology-enhanced heritage (Lupo et al., 2014) proposed with the European research project Mela* that identified as *performing heritage* those experiences that call visitors to act and perform gestures able to recall cultural practices as well as to foster the intangible values of cultural assets.

An example that well suits within this category is the *Drinking symposium* installation at the Allard Pierson Museum of Amsterdam. Born within the European research project MeSch, it is made of a wall projection representing virtual characters taking part to a drinking symposium in the Ancient Greece, a 3D printed replica of a Greek drinking bowl (kylix) and a reproduction of a Greek daybed. Both the kylix and the daybed are embedded with sensors and modify the state of the virtual world when activated. By lifting the kylix, visitors animate a virtual character that lifts his kylix, toasts and drink wine. When the bowl is put down a woman in the virtual scene plays the flute and when a visitor sits on the daybed one of the animated figures shoots a drop of wine from his cup toward a stand in the middle of the room, a game which was popular in ancient Greece (*kottabos game*).

The gesture of raising and placing back the bowl as well as that of laying on the daybed are therefore inputs for modifying the state on the virtual world but are meaningful in themselves. They make visitors experience actions that have roots in an ancient past and help them to grasp not only the aesthetic quality of the assets on show in the museum but also their intangible value such as their use and relevance within a ritual.

5. Emerging tangible-interaction oriented design strategies enabling the experience of intangible values of CH

The four categories of tangible interaction described in the previous chapter highlight different ways of providing interpretive digital contents during cultural experiences. They share the will to involve actively visitors in bodily experiences, asking them to touch and manipulate objects and to perform actions with the hands or with the full body.

Despite this common ground, we can recognize differences in the strategies employed. The first two categories collect experiences that attach great importance to the physical manipulation or instrumental use of objects, being them original assets, replicas or symbolic objects. The paradigm of interaction they refer to is therefore that of *embedded interaction*. The last two groups of projects shift instead the focus on performed gestures as triggers of interpretive contents, referring therefore to *embodied interaction*.

Dissimilarities exist also within these two homogeneous groups. Analysing each category in detail we can recognise how the first and the third category – *smart replicas/originals* (i), *codified gestures* (iii) – employ tangible interaction as a simple trigger to activate interpretive contents. Beyond the added value of handling original objects (i) or to use the body instead of input devices (iii) the act of touching or performing gestures does not necessarily add to the communication and comprehension of the intangible values connected to the assets on show. The design action simply attaches to tangible interaction the role of trigger: the meaning is entrusted to the interpretive contents activated by the interaction, being it embedded or embodied interaction.

The strategy is different for the second and fourth categories – *symbolic objects* (ii), *performing gestures* (iv) – which attach meaning (related to the intangible values of the objects on show) to the object to be manipulated and to the gestures. The projects encompassed in these groupings employ tangible interaction not only to activate contents related to the intangible values, but also *embed* (ii) and *embody* (iv) *meaning* respectively in the sensorised object and in the gesture. The design action attaches meaning and includes the intangible values to be communicated directly into the object and in the gesture, and therefore acts as a translator of meaning.

We can therefore highlight two design strategies of employment of tangible interaction for enabling the experience the intangible values of Cultural Heritage: *embedding meaning* and *embodying meaning*.

The first strategy, *embedding meaning*, integrates explicitly the meaning into sensorised objects and focuses on their physicality. The object itself, for its significance in relation to the context in which it is employed, embeds directly and overtly meaning in respect to intangible values. Beyond its interactivity, it becomes a *representative object*, able to communicate in itself the intangible values it embeds.

The second strategy, *embodying meaning*, integrates implicitly the meaning in the gesture, focusing therefore on the act rather than on the object. The performed gesture, for its relevance to intangible values connected to the cultural assets, acquires meaning in itself. By performing a gesture, such as miming a ritual gesture in the *Drinking symposium*, visitors implicitly understand an intangible value of an asset, the value of use and its symbolism in this specific case.

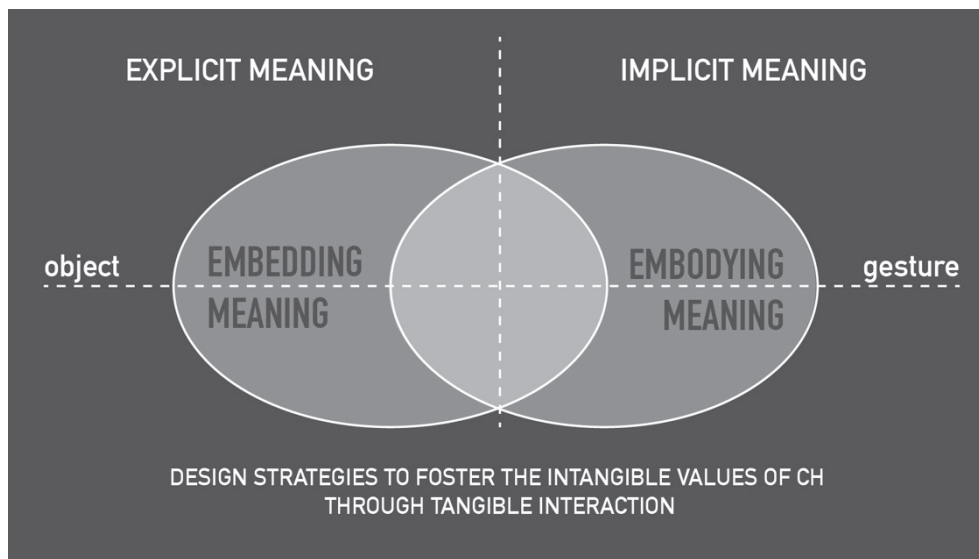


Fig. 1 Schema summarising the two design strategies to foster knowledge on the intangible values of CH through tangible interaction

The two strategies here highlighted are necessarily permeable and can coexist within the same experience: the *Drinking symposium* cited above is a clear example. The focus is indeed on the gesture of raising the bowl and sitting on the daybed but the two objects themselves embed meaning, being them replicas of assets exposed in the museum. A very different result would be obtained changing them with a contemporary glass and bench.

6. Conclusions

In this paper tangible interaction has been analysed from a peculiar perspective, that is, from the point of view of its ability to enable the experience of intangible values in cultural heritage. Starting from a collection of case studies, different categories of tangible interaction have been identified and then discussed in relation to their ability to foster intangible values. In addition, two design strategies that allow the achievement of this goal have been highlighted. These strategies, that can be referred to as *embedding meaning* and *embodying meaning*, differ for the way the meaning related to an intangible value is conveyed (i.e. emphasis on the object or on the gesture, explicit or implicit integration of meaning). Through this paper we have tried to provide a theoretical contribution to the understanding of the potentials of tangible interaction in enabling certain kinds of experience in cultural heritage. In doing so, we have tried to shift the focus from the interaction through the technology in itself to the results in terms of the experience enabled by certain design choices (Hassenzahl et al., 2013).

The theoretical contribution provided by this paper, beyond providing a conceptualization of a specific aspect of the use of tangible interaction, could be useful for designers and cultural heritage professionals. In particular, it can support them in the choice of certain design solutions according to the effects they want to obtain or the type of intangible value they want to communicate.

However, it has to be acknowledged that this work represents just a preliminary theoretical contribution to the field. Indeed, so far, the research in the field of tangible interaction in cultural heritage has been mainly characterized by the creation and evaluation of practical projects, while not many theoretical contributions have been provided. This makes the field very new, complex, and open to different kinds of

explorations. Therefore, this paper is presented as a starting point for a theoretical reflection that will possibly be developed further in future works.

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Design de produtos para homenagear pessoas *post mortem*

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Resumo

As unidades cemiteriais são locais de práticas sociais do quotidiano e de culto, sendo o túmulo o lugar onde a saudade pode ser exteriorizada e a memória da pessoa falecida reverenciada. Nas sociedades ocidentais podemos encontrar uma categoria de artefactos que pretendem evocar a memória ou homenagear pessoas falecidas. Neste paper tomam-se como referência três exemplos de produtos que possibilitaram uma reflexão sobre os conceitos que deram origem às suas formas, e que se arrisca a enquadrá-las numa nova “cultura material”, no sentido em que poderão ter criado uma rotura com o sistema tradicional de códigos e padrões partilhados pelas sociedades, e as suas manifestações, no que respeita às criações físicas desta categoria de produtos. Este trabalho oferece uma reflexão sobre o Design de Produtos. O que provavelmente o torna particular é o campo onde ele se situa: o design de produtos em memória de alguém post mortem. Geralmente feito de rocha granítica ou mármore, os produtos tradicionais possuem a forma de placa ou tabuleta, livro aberto ou folha enrolada. Sobre uma das faces possuem uma fotografia da pessoa que pretendem homenagear e inscrições. O pensamento de design inerente a este trabalho colocou de um lado o intrincado conjunto de emoções que este tipo de produto pode gerar, e do outro as componentes à partida mais acessíveis e que dizem respeito à forma, função e interações do objeto com os utilizadores e com os ambientes de uso. Na definição do problema considerou-se como requisitos obrigatórios: a diferenciação, o valor acrescentado e a durabilidade como principais objetivos. Os dois primeiros deveriam manifestar-se nas várias componentes/atributos do produto. A durabilidade estética e material/estrutural do produto implicava necessariamente a introdução de termos qualificativos e pesos quantitativos, que condicionam positivamente a geração e avaliação de conceitos tendo por base o conjunto de 10 Princípios para o Projeto que originaram uma Matriz Operativa enquanto instrumento de auxílio à conceção de produtos. A definição concreta de um público-alvo foi igualmente importante. Nesta fase, a perspetiva da psicologia e da sociologia como disciplinas com aptidão particular para compreender os indivíduos e os fenómenos sociais, respetivamente, foi crucial. Conclui-se que o projeto de um produto para homenagear uma pessoa post mortem, deve abandonar os hábitos e costumes mais tradicionais para se focar na identificação de novos públicos. Ainda que no presente momento se possam considerar residuais, acredita-se que no futuro poderão crescer, bem como o seu interesse por este tipo de produtos.

Palavras chave: *design, memória, homenagem, metodologia, durabilidade.*

Abstract

Cemeteries are places of daily social practices and worship, with the grave being the place where loss can be expressed externally and the deceased person commemorated. In Western society we find a series of artefacts that aim to evoke the memory or pay respect to the deceased. This paper takes three examples of products as references, which allowed reflection on the concepts originating their forms, and dares to set them in a new “material culture”. In this sense, they could have created a break with the traditional system of codes and standards shared by societies, and their demonstrations, regarding the physical creations of this product category. This work provides a reflection on the Design of Products in a deceased person’s memory. Generally made of granite or marble, traditional products take the form of a plaque or tablet, open book or scroll. On one side there is a photograph of the deceased person and inscriptions. The thinking inherent in the design of this work placed on one hand the confused set of emotions this type of product can create, and on the other the elements apparently more accessible at the outset concerning the form, function and interactions of the object with users and environments of use. Definition of the problem considered the requirements of: differentiation, added value and durability as the principal objectives. The first two should be visible in the product’s various components/attributes. The product’s aesthetic and material/structural durability necessarily implied introducing qualificative terms and quantitative weights, with a positive effect on the generation and evaluation of concepts based on the set of 10 Principles for the Project, which gave rise to an Operative Matrix as an instrument aiding product conception. Specific definition of a target public was also important. At this stage, the perspective of psychology and sociology as disciplines particularly suited to understanding respectively individuals and social phenomena was crucial. It is concluded that the project of a product to commemorate a deceased person should abandon the most traditional habits and customs to focus on identification of new publics. Although these may be considered insignificant at the present time, they may well grow in the future, as well as their interest in this type of product..

Keywords:: *design, memory, tribute, methodology, durability.*

1. Introdução

1.1. A consciência da finitude humana e o local de culto

A morte e o morrer levanta um conjunto de questões que geralmente se debatem no seio das áreas da psicologia e antropologia. O tema não é no entanto exclusivo de profissionais ligados às ciências sociais. Poetas, cineastas, pintores entre outros, sempre se sentiram inspirados pela morte e pelo que pode representar: perda, separação, sofrimento, rutura, desintegração, mas também fascínio, mistério ou alívio. Refletir sobre este tema poderá representar um estado no qual o sujeito se conhece enquanto tal, e se distingue das outras espécies. "O homem é um ser mortal, cuja principal característica é a consciência da

sua finitude (...)”(Kovács, 1992, p.2). Segundo vários autores, a morte faz parte do desenvolvimento humano desde a mais tenra idade. Na adolescência e na idade adulta, a interpretação que se faz, e o significado que adquire, vai se alterando, atingindo uma maior consciência da sua inevitabilidade em idades mais velhas. Segundo Kovács, (1992, p.9) pode-se preparar para morte, vivendo intensamente; obviamente não estamos a falar de negar a morte,...), mas de conviver com ela em busca do seu significado.

A dor causada pela morte ou pela perda de alguém dá origem a um processo de luto. Segundo Morin (1970, cit. in Kovács, 1992, p.29) é nas atitudes e crenças diante da morte que o homem exprime o que a vida tem de mais fundamental. (...) Para a espécie humana, a morte está presente durante toda a vida e faz-se acompanhar de rituais. Na idade média as igrejas eram o local de sepultura. Posteriormente, o enterro nas igrejas foi destinado unicamente a pessoas de estatuto social elevado, sendo que o lugar mais valorizado ficava próximo dos altares. No exterior e em áreas circundantes ao edifício eram colocadas as pessoas de classes sociais mais desfavorecidas. Com o crescimento das cidades e da população, e por razões de salubridade, estes locais de culto passaram a ser deslocados para fora das cidades. Atualmente encontram-se unidades cemiteriais construídas em parques, tornando-se além de locais de enterro, também lugares de passeio, descanso e oração. Os tumulos assinalam o lugar onde fica o corpo e podem exibir recordações sobre a imagem física da pessoa, que pode ser representada por uma escultura e, mais recentemente, por meio de fotos. Esses elementos físicos realçam a importância que as pessoas dão à morte e não deixam de ser formas de homenagem e exaltação da memória. Segundo Freire (2005, p.65) “a frequência das visitas dá-se primordialmente pela necessidade de cultuar o parente que ali está sepultado - fato proveniente da sensibilidade e da individualidade imbuídos no processo de luto no século XX.”

1.2 Definição do problema de design

Tipicamente este processo de design começou com a definição do problema (Boeijen et.al., 2014; Morris, 2009). O problema definiu-se como o design de novos produtos de homenagem ou em memória de alguém *post mortem*, em três vetores: diferenciação, valor acrescentado e durabilidade. O valor acrescentado deveria manifestar-se nas várias componentes/atributos do produto. A durabilidade estética e material/estrutural do produto implicou a introdução de 10 Princípios para o Projeto que originaram uma Matriz Operativa enquanto instrumento de auxílio à conceção de produtos e que remete para a geração e avaliação de conceitos.

A definição concreta de um público-alvo foi nesta fase igualmente importante. O projeto de um novo produto na categoria em que este se insere, deveria abandonar um setor da sociedade de hábitos e costumes mais tradicionais para se focar na identificação de novos públicos, nos seus desejos e nas suas expectativas, e como esses fatores podem manifestar-se nos seus comportamentos.

A problemática mais dominante no âmbito desta investigação, objetivou verificar a capacidade de se gerar produtos que se mantenham em pleno funcionamento pelo menos durante tanto tempo quanto a sua durabilidade material, contribuindo assim para a redução da necessidade de consumo por mudanças de gosto, por exemplo, e para sustentabilidade ambiental.

Para a análise do problema utilizou-se a checklist WWWWH: Who, What, Where, When, Why, and How (O quê, Quem, Quando, Onde, Como, e Porquê) adaptada de Boeijen, et al. (2014, p. 125).

2. Análise do problema

2.1 O que é o produto

O produto pertence à tipologia de objetos que pretendem lembrar uma pessoa *post mortem* e que contêm uma inscrição, ou epitáfio, em homenagem e em memória de alguém falecido, geralmente colocados sobre a sua campa ou tumulo. Este produto insere-se numa categoria de artefactos que se encontram em recintos exteriores designados de unidades cemiteriais. Geralmente feito de rocha granítica ou mármore, possuem a forma de placa ou tabuleta, livro aberto ou folha enrolada. Sobre uma das faces possuem uma fotografia da pessoa que pretendem homenagear e inscrições (nome, data de nascimento/falecimento) ou frases de familiares, amigos ou colegas, gravados ou em alto-relevo (**Error! No se encuentra el origen de la referencia.**).



Fig. 1 Exemplo de placa/tabuleta de mármore com inscrição gravada e fotografia (Propriedade e foto do autor).

Pelo que foi possível observar empiricamente em diferentes unidades cemiteriais nacionais, este tipo de produto preenche massivamente esses recintos. Este facto levou a que se procurasse identificar as razões para uma tão grande uniformização. Pelas visitas efetuadas a lojas da especialidade, concluiu-se que a oferta deste tipo de produtos em Portugal resume-se a variantes de forma, cor, textura ou dimensão que se podem considerar muito pouco diferenciadoras. A procura por produtos de valor acrescentado (estética, funcionalidade, versatilidade, etc.), segundo alguns comerciantes auscultados é muito residual, não havendo por isso interesse em novos modelos. Julga-se por este facto que quaisquer propostas de novos produtos, não se destinam a preencher imediatamente uma lacuna de mercado, mas poderão estar a antecipar futuras necessidades.

2.2 Quem é o público-alvo

Neste ponto, a experiência do autor serviu de base para esboçar a caracterização do público-alvo tradicional e de um novo que poderá estar a surgir e vir a constituir-se como um *nicho de mercado* na terminologia do Marketing (Lindon, et al., 2011). Ao longo de 24 meses foi possível observar empiricamente em unidades cemiteriais um conjunto de pessoas com características e comportamentos muito semelhantes. Maioritariamente adultos séniores, do sexo feminino, e aparentemente pertencentes a uma classe social média, esta massa de pessoas poderá representar a tradição de usos e costumes neste campo da vida social e cultural de um povo, cujos produtos participantes nestes rituais parecem cumprir sem questionamento a sua função. Prevê-se no entanto, que uma nova geração de frequentadores destes espaços com diferentes necessidades, exigências e perspetivas, possa exigir mais dos artefactos quanto, por exemplo, à sua eficiência ou representatividade da pessoa homenageada.

Tendo presente que o sucesso de um produto depende da sua aceitação por parte dos potenciais utilizadores, e que as alternativas geradas pelo designer dependem em grande parte da clara definição de um público-alvo (e das suas necessidades reais), utilizou-se neste passo a técnica “Personas” (Martin e Hanington, 2012; Rodgers e Milton, 2011). Para isso caracterizou-se um utilizador arquétipo (Fig. 2) e se descreve a seguir, no que respeita a critérios demográficos, geográficos, sociais, pessoais e comportamentais.



Fig. 2 – Representante fictícia do público-alvo (Foto Hill Street Studios/Gettyimages)

Isabel, de 48 anos, é licenciada em enfermagem mas exerce a sua atividade profissional como professora. A longa carreira no ensino trouxe-lhe um estatuto que lhe permite participar ativamente nas decisões da sua organização, o que abona em favor da sua pro-atividade e motivação. Casada, mãe de dois filhos, reside e trabalha numa cidade portuguesa de média dimensão no interior do país. Grande parte do seu tempo semanal é passado com os seus alunos quer em sala de aula quer em sessões de tutoria e orientação. Profissionalmente exigente, aposta na formação continua que considera ser indispensável para o sucesso profissional. O seu carácter extrovertido aliado a uma vontade grande em ajudar os outros fá-la passar algum do seu tempo livre em trabalho de voluntariado. Uma situação económica estável permite-lhe deter bens próprios que considera de qualidade e viajar em família duas vezes por ano. Os seus gostos passam pela leitura e jardinagem. As suas preocupações centram-se no sucesso escolar e no futuro dos seus filhos. Tem uma atenção especial e diária aos pais e sogro. Uma vez por semana, desloca-se à unidade cemiterial local para homenagear a sua sogra já falecida e com quem mantinha uma relação de mãe e filha.

2.3. Quando é usado o produto

Da observação e questionamento efetuado pode-se concluir que o uso ou contacto com este tipo de produtos acontece geralmente em períodos de tempo semanais e pontualmente em ocasiões especiais de aniversários ou outras como o Dia de Finados

2.4. Onde é usado o produto?

O produto destina-se a ser usado no exterior em unidades cemiteriais (UC) públicas ou privadas. Em muitos países Ocidentais, as UC, enquadradas na zona verde urbana, não são apenas locais para inumar os falecidos mas também locais de lembrança e lazer. Algumas UC tornaram-se pontos de interesse turístico, como é o caso do Cemitério Nacional de Arlington e Cemitério de Nova Orleães, nos EUA, o Cemitério de Woodland, em Estocolmo, e o Cemitério de Montparnasse, em Paris. (Huang cit. por Oliveira, 2009)

A importância histórica ou artística de determinadas UC de vários países europeus, levaram à criação da *Association of Significant Cemeteries of Europe* (ASCE) que tem por objectivo promover estes espaços,

públicos e privados. Um exemplo das actividades promovidas pela ASCE é a “Semana Europeia para Descobrir os Cemitérios” na qual se realizam eventos para atrair a população a estes recintos. Relativamente a Portugal, apenas o Cemitério do Prado do Repouso e o Cemitério de Agramonte, ambos no distrito do Porto, pertencem a esta associação.

Segundo Oliveira (2009) as UC podem ser de quatro tipos: unidade cimiterial *tradicional* (convencional, clássica ou horizontal), compostas por alamedas pavimentadas que contêm sepulturas, jazigos, crucifixos, imagens, monumentos fúnebres e pouca ou nenhuma arborização; unidade cimiterial tipo *parque* (ou jardim), formadas por gavetas no solo cobertas por relvado e árvores e isentos de construções tumulares; unidade cimiterial *vertical*, conjunto edificado de gavetas individuais e contíguas construídas acima do nível do solo, sem contacto com este; unidade cimiterial *natural*, que oferece um ambiente rural sem lápides, vedações nem portões. Em alguns países europeus estes recintos parecem apresentar-se com diferentes configurações e composições como é possível verificar por fotografias desses locais. Em cidades de países do norte (Alemanha, Finlândia, Suécia ou Polónia) são possíveis de observar as UC do tipo parque ou jardim (Fig. 3). Espaços relvados e arborizados são preenchidos de lápides aparentemente em granito ou outras rochas enterradas e envoltas por flores plantadas. Esta aproximação à natureza instituída pelos cemitérios-jardim, é segundo Freire (2005, p. 35) com o intuito de estimular as visitas.



Fig. 3 Unidade cimiterial de Hietaniemi em Helsínquia (Finlândia/Foto <http://www.traveladventures.org/>)

Em países do sul da Europa (Grécia, Itália, Espanha ou Portugal) as UC implantadas nas cidades capitais que se visualizaram, apresentam recintos mais tradicionais preenchidos de campas (Fig. 4).

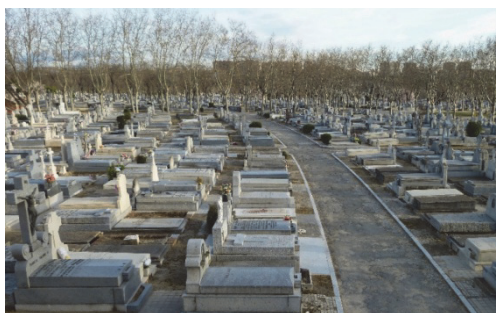


Fig. 4 Unidade cimiterial de la Almudena em Madrid, Espanha (Foto Luis García/ Wikimedia Commons)

Em Portugal, as UC, pelo menos as mais tradicionais, seguem esta última tipologia. Os recintos são ocupados por campas de pedra granítica ou mármore sobre as quais estão colocadas lápides ou placas de várias formas com inscrição e uma fotografia, jarras, floreiras lanternas, velas ou outros artefactos simbólicos (Fig. 5)



Fig. 5 Unidade cemiterial paroquial de Paranhos, Porto, Portugal (Foto autor)

De assinalar neste tipo de UC as diferenças sociais que se podem constatar de acordo com a imponência dos túmulos ou alterações arquitetónicas (Freire, 2005, p. 34).

2.5 Como é usado o produto?

Este ponto remete-nos para as funções do produto e para a relação que estabelece com os seus utilizadores. Na prática esta peça identifica e homenageia a pessoa falecida que representa. A forma como tradicionalmente o faz foi explicada na resposta à questão “O que é o produto?” O utilizador limita-se à sua visualização e inspeção cuja avaliação poderá originar ações de manutenção (limpeza ou restauro, p. ex.) e embelezamento (colocação de flores)

2.6 Porque é usado o produto?

A tradição, ou seja, a transmissão de práticas de geração em geração, poderá justificar plenamente a manutenção e a continuidade da existência de produtos deste tipo. Recordar e homenagear pessoas defuntas parece ser um conceito e uma prática transversal a vários estratos sociais ainda que com diferentes necessidades e expectativas. Para a avaliação da necessidade, valemo-nos da constatação da contínua procura/oferta deste tipo de produtos em lojas da especialidade e da sua manutenção nos locais de uso. Neste sentido, parece assim justificável que este tipo de artefacto seja ele próprio objeto de questionamento tendo em vista o surgimento de novos produtos mais adequados aos requisitos de um público-alvo mais exigente, no que respeita às funções estética, simbólica ou prática.

3. Pesquisa e Investigação

A pesquisa dirigiu-se para as componentes formais, funcionais e materiais que constituem um produto deste tipo. Ainda que se possa considerar insípida por falta de referências nesta vertente do design de produto, pretende-se neste ponto apresentar alguns trabalhos que influenciaram as propostas de conceção de novos produtos. Esta fase serviu para tentar encontrar justificações para a manutenção de formas tão semelhantes nos produtos existentes e conhecidos, bem como a refletir sobre a possibilidade de emprego de novos materiais e tecnologias na produção de novas soluções.

O facto de tradicionalmente a indústria nacional transformadora de rochas ornamentais como o granito, o mármore ou o calcário especializarem-se na produção maioritária de produtos (construção civil e outros) a partir de chapas destas matérias-primas, poderá justificar a forma de placa (quadrada ou retangular) que a maioria dos produtos observados apresenta. Esta limitação começa agora a poder ser ultrapassada com o recurso a tecnologias mais versáteis como a CNC (fresagem, torneamento ou corte) instalada em algumas indústrias do setor.

3.1 Material e forma

Na procura por um material que conferisse ao produto, o peso, a dureza e a resistência necessárias, quer no seu manuseamento quer a variações ambientais (temperatura, luz e humidade), o cimento apresentou-se como uma matéria-prima com as características desejáveis. O baixo custo/unidade ($\pm 1,00$ euro/Kg), a disponibilidade no mercado, a acessibilidade, a possibilidade de se trabalhar manualmente e por molde, a cor e os acabamentos superficiais, foram igualmente fatores decisivos para a seleção deste material como potencialmente alternativo à utilização de rochas ornamentais. O seu caráter versátil aliado à contemporaneidade da sua aparência final e flexibilidade de utilização, quer na sua forma mais simples quer em combinação com outros materiais, torna-o um material apetecível para o design de produtos. Com a mistura de aditivos, aglutinantes, adjuvantes ou pigmentos, o cimento adquire outras propriedades mecânicas ou estéticas que poderão ser exploradas.

3.1.1. As formas de(o) cimento

De um número considerável de produtos que foi possível conhecer, selecionou-se uma amostra que se julga ser representativa das potencialidades e versatilidade de aplicação deste material e algumas variantes. A Fig. 6 mostram um par de bancos feitos em cimento e ferro, e alguns dos materiais utilizados na sua produção, respetivamente. Os bancos são definidos por uma estrutura de suporte de três varões de ferro dobrados (pernas), combinados com uma base de cimento (assento) moldada a partir de um recipiente de plástico vazio reutilizado.



Fig. 6 Bancos HRS feitos de cimento e ferro reaproveitado de obras de construção civil. Moldes em plástico (Design e produção de Sebastián Hoepner, Javier Rojas e Federico Sartor, 2013/Foto HRS)

Esta aparente simplicidade da conformação do cimento permitiu antecipar alguma facilidade em trabalhar artesanalmente com este material.

A designer Mikaela Dörfel utilizou o cimento para a produção de um produto com dupla função: banco e mesa de apoio (Fig. 7). Neste exemplo, de aspeto relativamente mais leve e elegante, a conformação do material parece garantir a segurança e a resistência necessárias quando utilizados, enquanto a sua boa aparência e acabamento superficiais poderão levar ao seu uso também em espaços interiores, segundo opinião da autora.



Fig. 7 – Banco e mesa de apoio "U-STOOL" (Design de Mikaela Dörfel/IntoConcrete, 2014)

A Fig. 8 mostra um produto à escala da mão e por isso, acredita-se, facilmente manuseável no que respeita à sua dimensão e peso. É possível verificar pela forma e aparência deste produto a versatilidade do material cujo bom nível de acabamento formal e superficial é geralmente facilita o seu manuseamento.



Fig. 8 Contentor térmico para garrafas (Design de Fran Corvi, PPI3D Studio/IntoConcrete, 2013)

Outro exemplo onde se pode verificar o rigor dimensional e formal que se pode obter com o cimento é na Lapiseira "Contour" (Fig. 9). Neste objeto que combina cimento com aço inoxidável, a reduzida dimensão parece não ter impedido a aparente qualidade do produto final. O escurecimento e o desgaste (suavização da forma) do corpo da lapiseira provocados pelo uso frequente do objeto em contato com a mão, são fatores que os autores advogam fazerem parte do conceito do produto. Desta forma intencional cada lapiseira assume as características do estilo de vida do proprietário ao longo do tempo.



Fig. 9 Lapiseira "Contour" com invólucro de betão (Design de 22 Design Studio, 2012)

Como referido anteriormente, a cor pode ser um contributo importante na apreciação do produto de cimento como um artefacto contemporâneo. Para além das cores naturais (branco e cinza), a adição de

pigmentos permite um conjunto de outras cores que poderão ser consideradas no design e produção de produtos em cimento (*Fig. 10*).



Fig. 10 – Amostras de cimento nas cores naturais e com adição de pigmentos (22 Design Studio, 2014)

3.2 Memória e homenagem

Nas sociedades ocidentais podemos encontrar uma categoria de artefactos que pretendem evocar a memória ou homenagear pessoas falecidas. Não se pretende neste ponto apresentar a diversidade de produtos que se conhecem, mas antes servir para equacionar caminhos criativos para o processo de pensar e desenhar este tipo produtos. Para isso escolheram-se três exemplos de produtos que possibilitaram uma reflexão sobre os conceitos que deram origem às suas formas, e que se arrisca a enquadrá-las numa nova “cultura material”, no sentido em que poderão ter criado um rotura com o sistema tradicional de códigos e padrões partilhados pelas sociedades, e as suas manifestações, no que repeita às criações físicas desta categoria de produtos.

Em 2009, os designers Ákos Klimes e Peter Kucsera apresentaram uma pedra tumular feita de cimento repelente à água a que chamaram “SeeYou” (*Figura 12*). Sobre a face superior da base paralelepípedica, surge uma referência à forma humana e à cruz, símbolo universal da crença e culto religioso. Klimes e Kucsera definem-na como “...uma interpretação contemporânea de significados tradicionais e valores intemporais.”



Fig. 11 Pedra tumular “Seeyou” (Design de Ákos Klimes e Péter Kucsera/IVANKA, 2009, Foto Katalin Ivanka)

A revista de arquitetura e design “Ottagono” referiu-se à obra como aquela que “...representa uma forma criativa de interação entre aqueles que vão e aqueles deixados para trás, entre os seres humanos e as forças da natureza.” (Ottagono, 2009). A água é outro elemento que participa no conceito do produto. O espelho que se cria, reflete o mundo exterior ou as pessoas que se debruçam sobre a campa. Depreende-se

que este efeito possa originar várias interpretações à volta do tema da vida e da morte. Outros elementos como folhas, neve ou flores próprios das estações do ano, assinalam a passagem do tempo e ajudam a harmonizar a peça com o ambiente exterior. Sobre este aspetos em particular os autores do projeto afirmam: “Fenómenos e elementos da natureza são convidados a envolverem-se e criarem uma interação. A aparência do objeto muda com as estações do ano e o tempo.” (Seeyou project, 2013). A *Fig. 12* mostra a peça exposta em ambiente de inverno. A neve que preenche a concavidade realça a forma humana a cruz que pretende representar.



Fig. 12 Pedra tumular “Seeyou” (Design de Ákos Klimes e Péter Kucsera/IVANKA, 2009, Foto Katalin Ivanka)

Contrariamente à intenção de reconhecimento universal que o projeto anterior denuncia, o memorial ao designer gráfico norte-americano Paul Rand (1914 - 1996), conhecido pelo desenho de marcas que criou como a IBM, UPS e ABC, exprime na sua forma aspetos ligados à obra e à vida profissional do autor. Antes de morrer, Paul Rand pediu ao designer gráfico suíço Fred Troller para lhe desenhar uma lápide que superasse os clichés habituais. O monumento resultante deste pedido é composto por dois cubos sobrepostos (*Fig. 13*). No cubo superior em mármore, rodado sobre o seu eixo, foi gravado o nome do homenageado e as datas de nascimento e falecimento num tipo de letra sem serifa “evocativa da sensibilidade modernista” do designer homenageado. O cubo inferior apresenta uma inscrição em Hebraico lembrando a tradição judaica do designer. “O memorial destaca-se entre fileiras de lápides tradicionais no cemitério Connecticut pela sua económica beleza, subtil engenho e tipografia elegante.” (Heller, 2008, p. 92). O desenho deste memorial parece fazer justiça à ideia de Paul Rand proferiu publicamente no MIT Media Lab alguns dias antes de falecer de que o “Design is so simple, that’s why it is so complicated.”



Fig. 13 - Memorial a Paul Rand (Design de Fred Troller, 1996)

O terceiro caso faz uso de tecnologias de comunicação recentes e de comportamentos sociais que parecem cada vez mais comuns: gerar e guardar elementos da memória pessoal ou coletiva em formato digital. Hyuna Shin aproveita o facto de as pessoas possuírem cada vez mais dados digitais sobre a sua vida, como fotografias, vídeos ou blogs para criar um produto que não é mais que uma interface que liga o visitante à pessoa homenageada através de um código gráfico QR (Quick Response) gravado numa face de um cubo de rocha (*Fig. 14*).



Fig. 14 - Lapide de família "cloud" com código QR inscrito (Design Hyuna Shin/Designboom, 2013)

Este código de barras bidimensional, gerado a partir de um software próprio, é depois capturado pela camera fotográfica de um smartphone que através de uma aplicação o converte automaticamente num endereço URL dirigindo o utilizador para um sítio na Internet criado para o efeito. Este sítio permite assim o armazenamento selecionado de elementos de memória com o objetivo de constituir um acervo digital representativo da época em que a pessoa viveu. Segundo a autora, este sítio poderia conter os dados de outros membros da família que faleceram antes, para que as gerações futuras pudessem visualizar momentos das suas vidas, contribuindo para o conhecimento da história da família.

4. Geração de ideias e conceitos

O processo sistemático de geração de ideias resultou num número de três propostas. Nesta fase, esteve presente todo o conhecimento obtido nas fases imediatamente anteriores, e que ajudaram a caracterizar o sistema utilizador-produto-ambiente, e um conjunto de 10 princípios para o projeto (Matriz Operativa) que conduziram o processo de elaboração de conceitos de produto: Simples, Inovador, Ergonómico, Elegante, Funcional, Robusto, Acessível, Variável, Versátil, Combinado. Para além desta base operativa, foram ainda equacionadas 3 ideias chave que resultam de uma reflexão crítica sobre o conjunto maioritário de artefactos existentes:

1. *Desenvolvimento de uma peça multifuncional com a integração simultânea das funções de jarra, vaso ou floreira, suporte para a inscrição, e moldura para fotografia;*
2. *Redução da quantidade de elementos naturais (p. ex. flores) habitualmente usados no ritual de visitas periódicas;*
3. *Utilização de plantas espontâneas e sazonais em alternativa às flores de viveiro (redução de custos).*

4.1 Conceito de Produto 1

O primeiro conceito resultou da combinação material de 3 peças, sendo constituída por um corpo cilíndrico com um furo escalonado não passante onde é inserido um tronco de cilindro com aplicação de uma fotografia na base superior inclinada face ao plano de base. A moldura é fechada por uma tampa em vidro transparente embutida até à face superior do corpo. A peça prevê a colocação no seu interior de uma quantidade máxima de pétalas e folhas de uma rosa (por exemplo) e inscrições na sua face cilíndrica. A figura 15 mostra o modelo da peça em cartão e acetato com flores e fotografia.



Fig. 15 – Conceito 1

4.2 Conceito de Produto 2

Esta peça é composta por dois elementos: um prato circular e um corpo cônico que assenta pela sua base inferior no interior do prato. O corpo principal é trespassado por um furo conduzido por um eixo inclinado face à base de suporte. No interior da base superior do tronco cônico está embutida uma fotografia tapada por um vidro de diâmetro igual à base. A figura 16 mostra os modelos em poliestireno das peças deste segundo conceito.

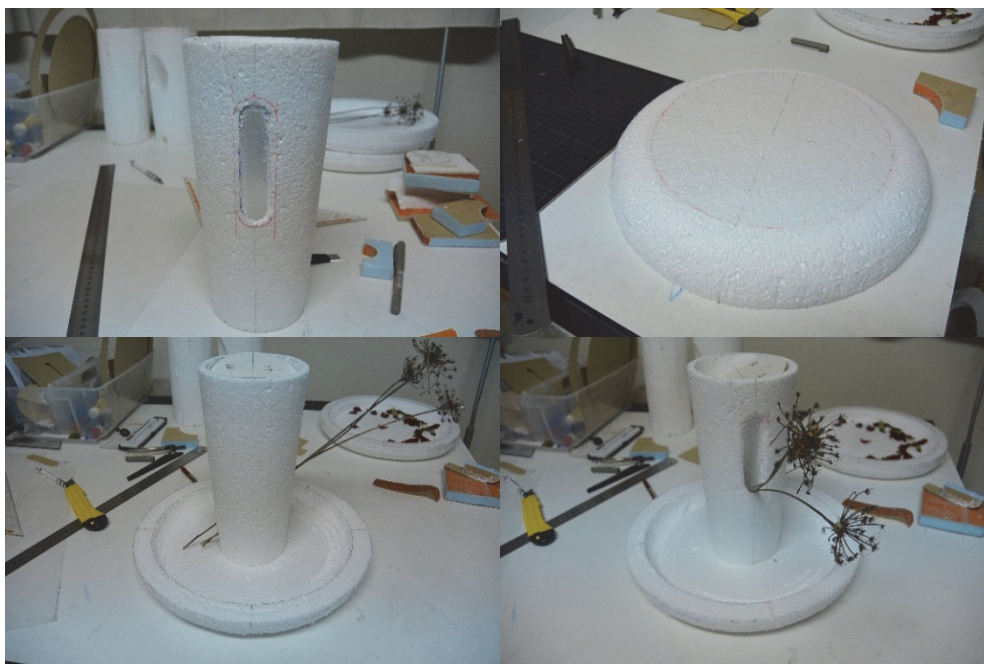


Fig. 16 – Conceito 2

4.3 Conceito de produto 3

Este conceito segue as ideias-chave equacionadas no início do projeto e propõe a multifuncionalidade. Duas peças cilíndricas “fundem-se” numa só com a sobreposição da de menor diâmetro (moldura) no interior da maior em posição concêntrica. Apesar de idêntica no seu conceito, esta proposta põe em evidência o efeito estético que se pode criar com diferentes cores e formas de plantas. Estas plantas cortadas a meia haste são colocadas no sulco inundado de água que circunda a peça e a moldura. A fotografia assenta num plano inclinado para que se apresente de frente para o utilizador, facilitando a sua visualização em ambiente de uso. A figura 17 mostra o modelo em poliestireno das peças que formam este terceiro conceito.

Avaliação dos conceitos (uso de Matriz Operativa)



Fig. 17 – Conceito 3

Para este momento utilizou-se a Matriz Operativa para a comparação dos conceitos gerados (C1; C2; C3) e sua avaliação, tendo servido como instrumento de apoio à decisão (Figura 18). A avaliação respeita os 10 princípios para o projeto e respectivos atributos que lhes foram associados. Cada item é avaliado de 1 a 3 atribuindo-se o seguinte significado: 0 - não se verifica; 1 – Não satisfaz; 2 – Satisfaz; 3 – Satisfaz totalmente. Os resultados quantitativos são mostrados. Mantendo-se a hierarquia determinada, o valor obtido por cada conceito resulta do somatório dos parciais obtidos em cada um desses princípios depois de aplicada a ponderação. Assim o adjetivo “Simples” vale 100% enquanto que o adjetivo “Combinado” pesa 10% para a pontuação final por ser o menos importante dos 10. O Conceito 1 foi o que obteve maior pontuação (73,3) e o Conceito 2 a menor (57,2). O resultado obtido pelo Conceito 3 (66,5) aproxima-o do primeiro. Depreende-se, por ter semelhanças formais e dimensionais. A figura 19 mostra o gráfico de barras horizontais desta comparação tendo a escala de valores (1 a 3) sido convertido em número de quadrados coloridos.

Matriz Operativa: avaliação de conceitos

		C1	C2	C3
Simples	Integro	3	1	3
	Organizado (Configuração)	3	2	3
	Não complicado	3	3	2
	Modesto	3	1	2
	Sem luxo	3	1	2
	Reduzido (suficiente)	3	1	2
	Desacompanhado	3	1	2
	Sem fingimento/disfarce	3	3	3
	Despojado/depurado	3	2	3
	Familiar	2	1	2
Inovador	Geométrica (Estético-Formal)	3	3	3
	Pontuação parcial (100%)	32	19	27
	Incremental	3	3	3
	Radical	0	0	0
	Disruptiva	0	0	0
	Pontuação parcial (+90%)	3	3	3
	Seguro	3	2	3
	Eficiente/Eficaz	3	3	3
	Tolerante	2	3	3
	Primeiro contacto	3	3	3
Ergonómico	Confortável	3	2	3
	Prazer	3	3	3
	Pontuação parcial (+80%)	17	16	18
	Proporcionado	3	2	2
	Harmonioso	3	2	2
	Delicado	3	3	3
	Pontuação parcial (+70%)	9	7	7
	Prático	3	3	3
	Utilitário	3	3	3
	Pronto	3	3	3
Elegante	Pontuação parcial (+60%)	9	9	9
	Resistente	3	3	3
	Estável	3	3	3
	Percepção	3	3	3
	Pontuação parcial (+50%)	9	9	9
	Material	3	2	2
	Produção	3	3	3
	Acessórios	3	3	3
	Transporte	1	1	1
	Comercialização	0	0	0
Funcional	Ciclo de vida	3	2	1
	Educação	3	3	3
	Pontuação parcial (+40%)	16	14	13
	Mutável	3	3	3
	Contexto	3	3	3
	Pontuação parcial (+30%)	6	6	6
	Adaptável	0	0	0
	Finalidade	0	0	0
	Pontuação parcial (+20%)	0	0	0
	Ordem	3	2	3
Robusto	Harmonia	3	3	3
	Pontuação parcial (+10%)	6	5	6
	Pontuação total	73,3	57,2	66,5

Fig. 18 - Tabela com os valores obtidos na comparação dos conceitos gerados (Matriz de Avaliação)

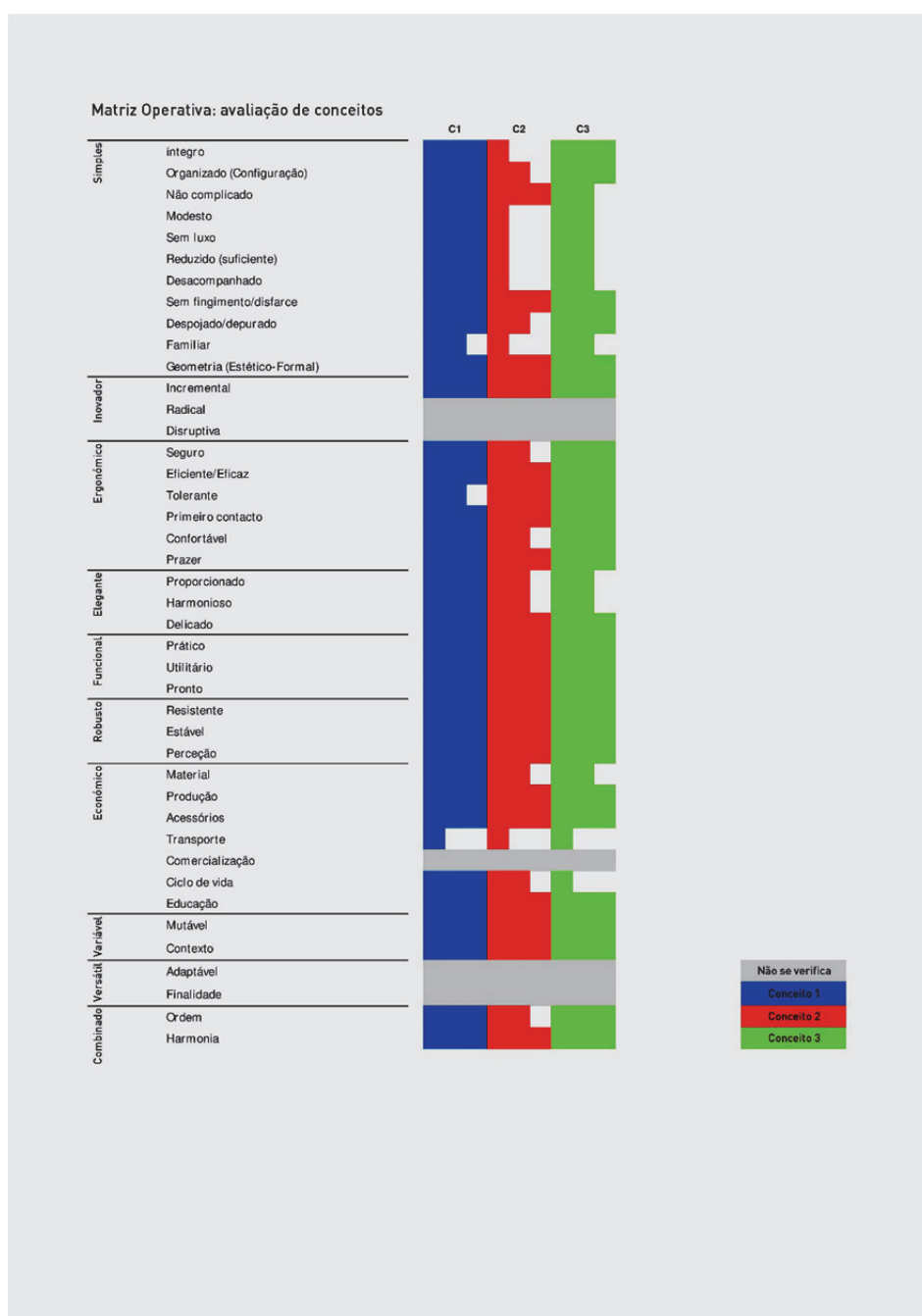
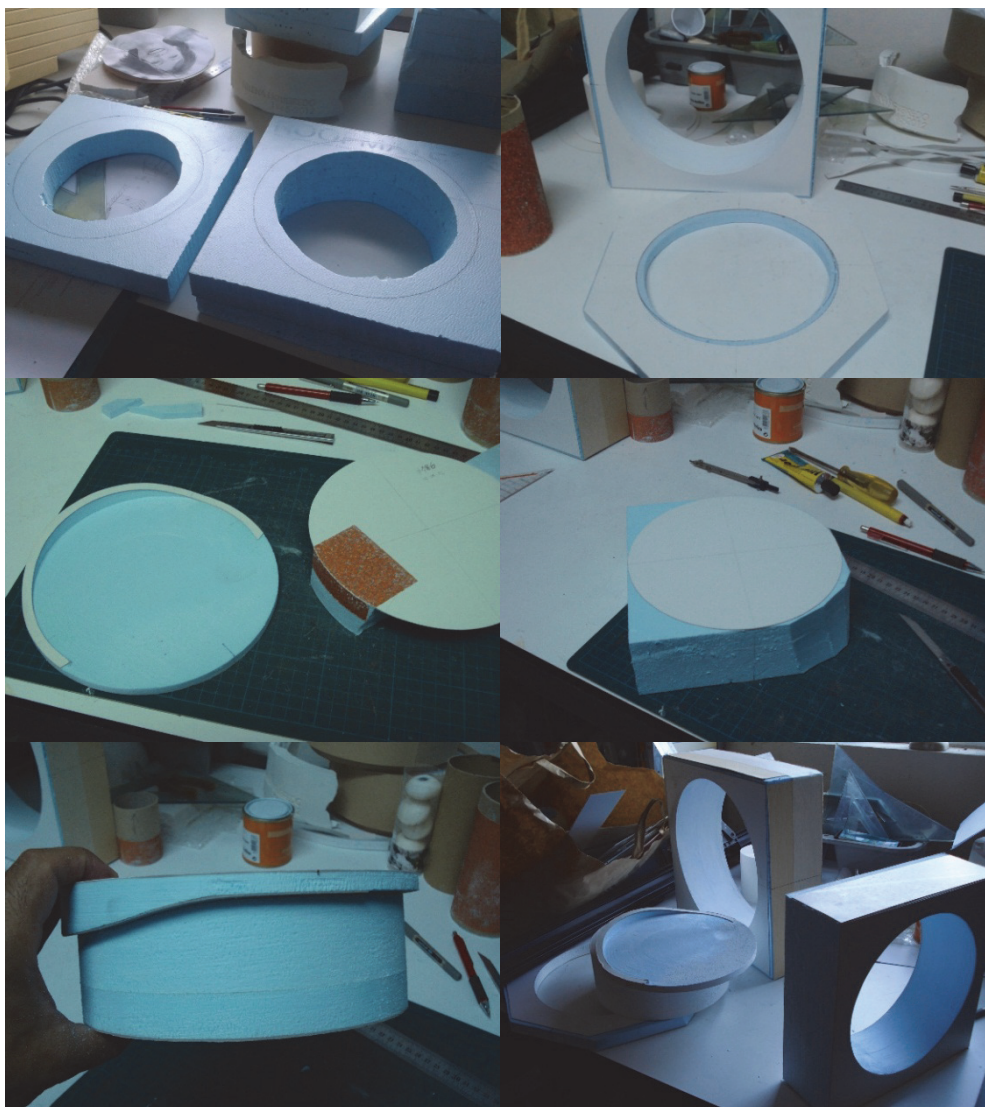


Fig. 19 – Gráfico de comparação dos conceitos gerados

Esta autoavaliação dos conceitos gerados possibilitou verificar a validade deste instrumento de auxílio à decisão da escolha de um para prosseguir o seu desenvolvimento.

5. Realização do protótipo

Nesta fase consolidou-se o conceito selecionado no que respeita ao seu dimensionamento, componentes e funcionamento, funções, testes com potenciais utilizadores, processos e equipamentos para o seu fabrico. A produção de um modelo próximo das características reais do produto foi essencial para a verificação e correção de algumas questões que não se puderam confirmar com a maquete de estudo. A construção física do protótipo dotado de todas as partes nos mesmos materiais do produto final afigurou-se assim como o passo seguinte para testar funcionalmente a interação com potenciais utilizadores finais, e a sua relação com outros equipamentos em ambiente de uso. A figura 20 mostra vários momentos da construção dos moldes em poliestireno extrudido para utilização com a argamassa de cimento.



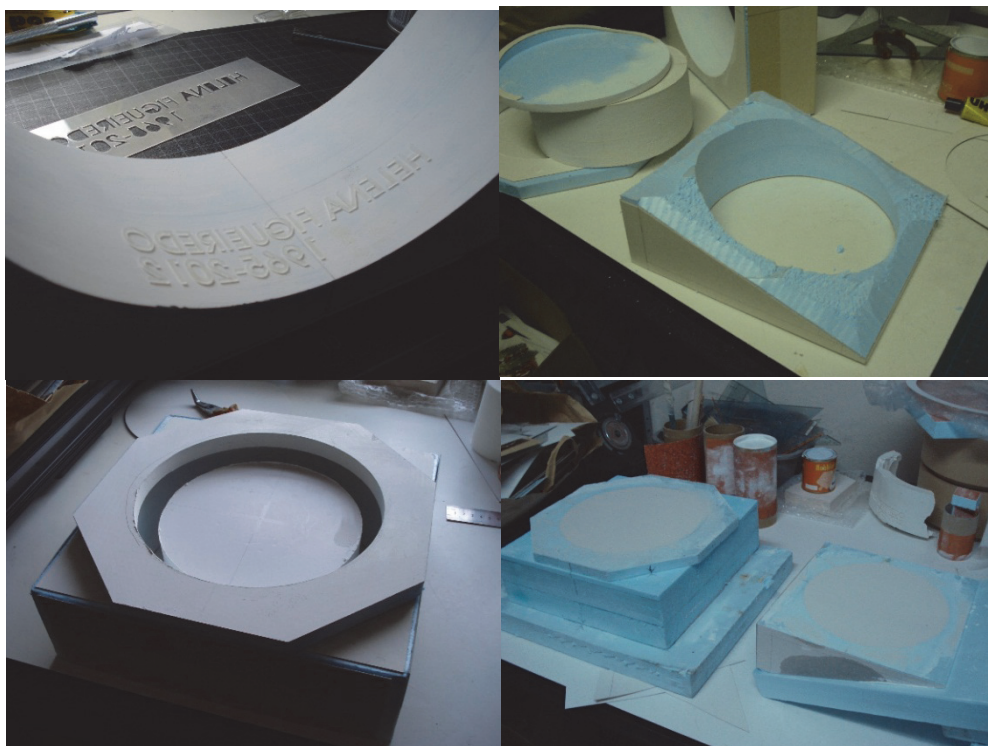


Fig. 20 – Produção do protótipo

5.1 Produto final

No final deste trabalho de prototipagem ficou-se a perceber a máxima sobre o desenvolvimento de protótipos de que Baxter (2008, p. 245) é defensor “Só faça se for necessário”. A construção artesanal do protótipo, mesmo com o mínimo grau de complexidade e sofisticação, consumiu uma grande quantidade de tempo (cerca de 150 horas em blocos diários médios de 5 horas) só justificada pelo grau de certeza que foi aumentando à medida que o projeto passava pelas várias fases e momentos descritos anteriormente. A figura 21 mostram o resultado final deste trabalho.



Fig. 21 - Protótipo

6. Conclusão

Com o protótipo físico e estrutural do conceito de produto selecionado, foi possível realizar testes específicos à forma, função e estética, que até aqui não tinham sido possíveis de realizar. Uma inspeção primária possibilitou verificar que a utilização dos mesmos materiais do produto final (cimento e vidro) e

a sua combinação apresentam uma boa convivência ainda que deva ser considerado a colocação de uma junta com propriedades elastómeras na zona de contacto entre a tampa de vidro e o corpo de cimento para evitar riscos e infiltrações de águas pluviais. Algumas falhas iniciais identificadas (dimensionais, superficiais) poderão ser evitadas com a correção ao desenho inicial e a utilização de processos de fabricação menos artesanais. A estética produzida pela cor da peça e o bom acabamento superficial poderá remeter o observador menos atento para outros tipos de materiais como a pedra moleanos. Novas cores naturais e outras poderão ser testadas com a adição de pigmentos à argamassa, na procura pela diferenciação ou até pelo aumento do contraste quando sobreposto em superfícies igualmente brancas como o mármore.

Ao fim do ano de utilização pode-se constatar que a durabilidade estética já ultrapassou a durabilidade estrutural. A *Fig. 22* mostra várias fissuras na parede da peça.



Fig. 22 - Fissuras na parede do protótipo

Durante o mesmo período foi possível de verificar a facilidade de uso e a economia no consumo de elementos florais quer pelo número reduzido que necessita para completar a zona própria e prevista no projeto, quer pela utilização de plantas espontâneas com flor que é possível encontrar (*Fig. 23*).



Fig. 23 - Utilização da flor de Mimosa (planta espontânea)

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Cuantificación y cualificación del diseño en la formación de ingenieros- Una nueva perspectiva.

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Resumen

El desempeño profesional en ingeniería está vinculado con el diseño, el producto y los procesos asociados, el cálculo y funcionamiento de máquinas, equipos, procesos, estructuras, entre otros, abordados desde una concepción lógica basada en la formación dada por las ciencias matemáticas y físicas. Si bien su formación de base en estas ciencias ha sido de características perennes y la evolución técnica ha puesto a su disposición herramientas para facilitar su aplicación en aspectos tecnológicos, su adecuada utilización frente a desafíos de nuevos conocimientos permitió asombrosos y vertiginosos avances mediante su aplicación ética y responsable asociada al diseño.

El diseño, más allá de la utilización de herramientas informáticas facilitadoras de este proceso, necesita una revisión en la formación en ingenierías que permitan trasponer estos límites, abordándolo desde la productividad y el medio ambiente asociado al ciclo de vida del producto que hoy el pos grado da accesibilidad.

El interés de este trabajo es profundizar el concepto de formación ingenieril vinculada al diseño, investigando la necesidad de este cambio, en un concepto que lleve implícito un nuevo abordaje de sus diseños curriculares que lo cuantifiquen y cualifiquen.

Palabras claves: ingeniería, diseño, ciclo de vida de producto, industria, diseño curricular

Abstract

Professional performance engineering is linked to the design, product and associated processes, calculation and operation of machines, equipment, processes, structures, among others, addressed from a logical concept based on the training given by the mathematical and physical sciences . While his training base in these sciences has been of perennial features and technological progress has made available tools to facilitate their application in technological aspects, its proper use face challenges of new knowledge allowed astonishing and rapid advances through its ethical application and responsible associated with the design.

Design, beyond the use of enabling tools of this process needs revision in training in engineering that allow transpose these limits, approaching it from the productivity and

the environment associated with the product life-cycle management that today the post-graduate It gives accessibility.

The interest of this work is to deepen the concept of training related to engineering design, investigating the need for this change, a concept that embeds a new approach to their curriculum that quantify and qualify.

Keywords: *engineering, design, product life-cycle management, industry, curriculum design.*

1. Introducción

Un factor importante a considerar en la valoración del diseño en el desempeño profesional de los ingenieros está vinculado no solo a sus sólidos conocimientos en las disciplinas específicas de su titulación sino también a aspectos que cortan transversalmente al proceso ingenieril asociado a la productividad y el desarrollo de productos (ya sean estos nuevos, sustitutos, de paridad o mejorados) que permiten concebir al producto asociado a la mercadotecnia, de la cual parte el concepto de su ciclo de vida.

Si bien esta mejora formativa, a partir de considerar aditivamente a su formación un mayor contenido en diseño vinculado a todas las etapas del ciclo de vida de un producto, es importante para la industria en general, lo es particularmente para los sectores industriales en el área de las Pequeñas y Medianas Empresas, que si bien cuentan con profesionales formados en áreas específicas, tienen demandas por necesidades emergentes que requieren de un desempeño profesional capaz de concebir un producto para todo su ciclo de vida, con una formación integral que evite su recurrencia a profesionales de otras disciplinas acarreándoles un aumento de mano de obra indirecta con impacto directo en los costes del producto.

Si bien este es el caso de los profesionales de la ingeniería vinculados con la producción eléctrica, mecánica, química, electrónica, industrial, entre otras, en relación de dependencia, es extrapolable para quienes realizan un desempeño profesional independiente en estas y otras áreas de la ingeniería asociadas con la construcción de obras civiles e informática, en servicios de consultoría o por cuenta propia, para quienes se genera una situación similar en cuanto a sus posibilidades de ejercicio profesional vinculado al diseño.

Desde el punto de vista de la mecánica formativa los componentes principales de diseños curriculares actuales determinan el funcionamiento en su conjunto basado en sistemas individuales de ejes temáticos troncales por disciplina, cuya configuración se asimila a un sistema en paralelo, con un grado de formación que será resultante de la sumatoria individual de los sistemas que lo integran, con materias anuales integradoras que realizan una integración sistémica de conocimientos, sin abordar el concepto producto y su ciclo de vida asociado a la mercadotecnia que sería de gran importancia implementar en los años finales de carrera permitiendo así una visión de conjunto de verdadera importancia.

2. Objetivos e Hipótesis

El interés de este trabajo está centrado en la profundización del concepto del diseño para el ciclo de vida del producto en la formación profesional de ingenieros, investigando la percepción de los sectores involucrados de la situación planteada desde las áreas académica y productiva.

Se plantea como objetivo determinar el grado de necesidad en ambos sectores en cuanto a contar con ingenieros dotados de conocimientos de diseño asociado al ciclo de vida del producto, a partir de la hipótesis que esta formación es de significativa importancia por ambos en cuanto a una mejor cualificación y cuantificación del desempeño profesional del ingeniero asociado al diseño.

3. Descripción del área de estudio

La estructura organizativa del sector académico tiene un sistema basado en cuerpos colegiados de gobierno que legislan las actividades de planeamiento universitario y aspectos académicos entre otros, siendo estos los más importantes a considerar para esta propuesta investigativa. Los sectores productivos están agrupados por cámaras empresariales asociadas a tipologías industriales, con características particulares dadas las improntas particulares de cada región del país. Este estudio se centra en la ciudad de San Francisco de la provincia de Córdoba de la República Argentina que cuenta con uno de los Parques Industriales más importantes del mencionado país, caracterizado por su industria metalmecánica PyMe, y en la Universidad Tecnológica Nacional Facultad Regional San Francisco caracterizada por sus carreras de ingeniería y principal proveedora de profesionales de la ingeniería a ese sector productivo.

Ambas tienen un elemento en común, los profesionales en ingeniería graduados en la Facultad Regional San Francisco y un fuerte compromiso regional asociado a la productividad y el desarrollo regional.

Las ingenierías dictadas en la Facultad Regional San Francisco tienen una relación directa con el sector industrial con la siguiente distribución de graduados por especialidad.

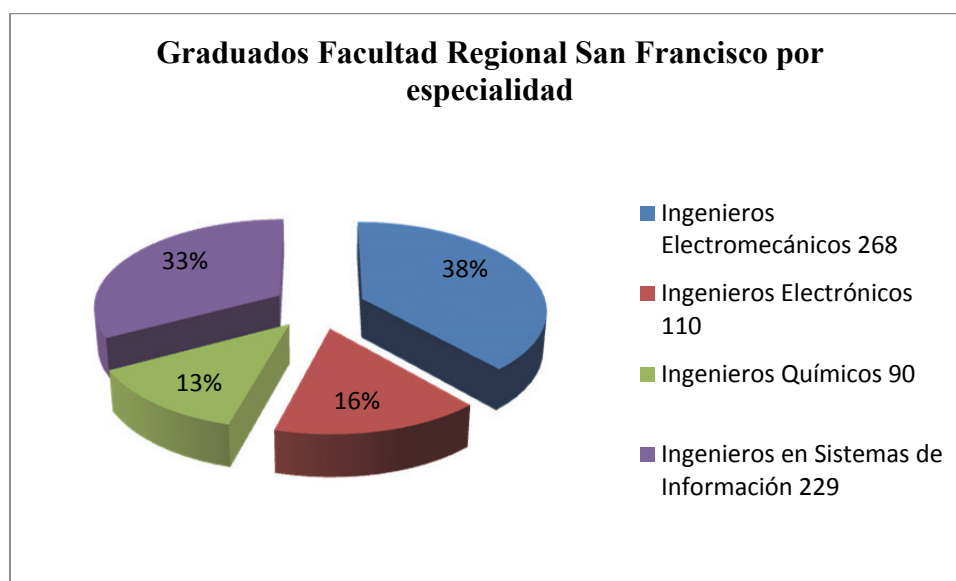


Fig. 1: Distribución de graduados de la Facultad Regional San Francisco por especialidad. Elaboración propia (2016)

Si bien todas las ingenierías dictadas en la Facultad Regional San Francisco tienen relación directa o indirecta con la industria metalmecánica, la figura 1 deja de manifiesto que la carrera con mayor número de graduados es ingeniería electromecánica, la que a su vez es la de relación directa con ese sector y la que mayor involucramiento posee con el análisis efectuado en este trabajo.

4. Metodología

Para efectuar el análisis de necesidad e interés en el sector productivo se efectuó una encuesta con variables de evaluación que determinan la importancia asignada al diseño en pequeñas y medianas empresas y la necesidad de contar con ingenieros formados en diseño para el Ciclo de Vida del Producto.

El interés y factibilidad de dar respuesta por parte del sector académico universitario se determinó mediante la realización de una encuesta con variables de evaluación que determinan, la formación actual en diseño en la Facultad Regional San Francisco en cuanto a diseño que contemple el Ciclo de Vida del Producto, si el diseño debe ser concebido para todo el Ciclo de Vida del producto y la necesidad de inclusión del diseño para el Ciclo de Vida del Producto en los actuales diseños curriculares.

Las encuestas tuvieron como objetivo definir la significación e importancia, por parte de los sectores productivo y académico, del desempeño profesional del ingeniero asociado a una formación que contemple al diseño concebido para el ciclo de vida del producto para su mejor cualificación y cuantificación.

4.1 Muestra

La muestra se centró en la industria metalmecánica y en los miembros de órganos de gobierno universitario de la Facultad Regional San Francisco con un tamaño que contempló una población de 92 posibles encuestados con un grado de confianza del 95%.

5. Resultados

Los resultados obtenidos responden al análisis de variables asociadas al diseño en los ámbitos académico de la Facultad Regional San Francisco e industrial metalmecánico de la Pequeña y Mediana Empresa de la ciudad de San Francisco. Se considera importante determinar la importancia asignada al diseño y la necesidad de disponer de ingenieros formados en diseño para todo el ciclo de vida del producto en el sector industrial y vincular las mismas a la formación actual del ingeniero en cuanto a diseño en la Facultad Regional San Francisco, la opinión académica en cuanto a la concepción del diseño vinculado al ciclo de vida del producto y la importancia conferida a la formación de ingenieros dotados de herramientas que contemplen al producto para todo su ciclo de vida como vía de posibles cambios curriculares para satisfacer las necesidades detectadas.

5.1. Resultados que determinan la importancia asignada al diseño en las Pequeñas y Medianas Empresas de producción metalmecánica de San Francisco

En primer lugar se considera importante evaluar la consideración del diseño por parte del sector productivo de la pequeña y mediana empresa metalmecánica en cuanto a su significación e importancia, constituyendo este el punto de partida para avanzar en aspectos específicos vinculados al mismo en función de los resultados obtenidos. Sólo se podrá avanzar en el análisis del objeto de estudio si existe, como punto de partida, una significativa mayoría con una alta valoración del diseño.

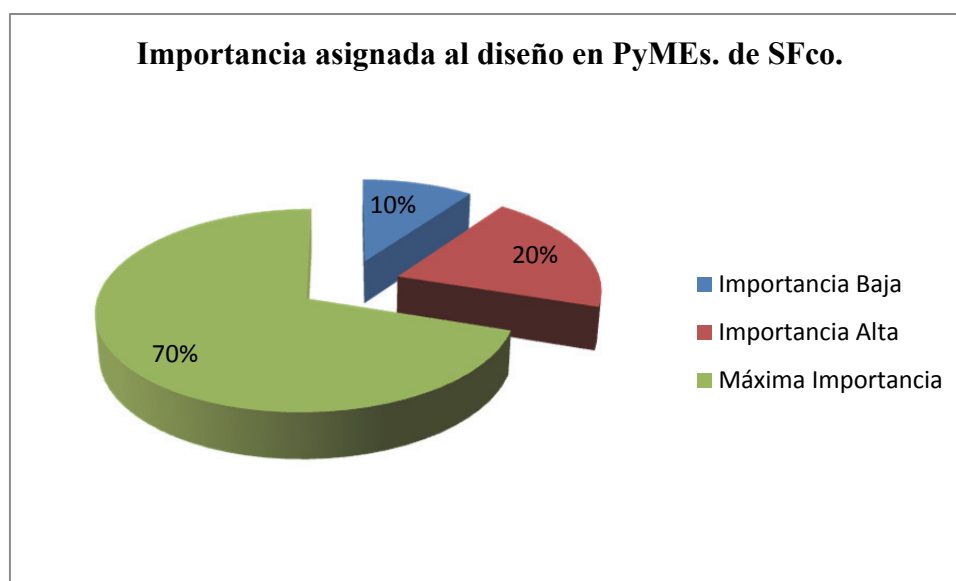


Fig. 2: Distribución importancia asignada al diseño en Pymes SFco. Elaboración propia, (2016)

De acuerdo a los resultados obtenidos que se plasman en la figura 2 se determina que el 90% de los encuestado considera con los valores más altos la importancia asignada a la variable diseño. Este resultado deja sentadas las bases que permiten avanzar específicamente en la evaluación de su necesidad vinculada al diseño para el ciclo de vida del producto y su demanda de profesionales de la ingeniería formados en esta concepción del diseño.

5.2 Resultados que determinan la necesidad de contar con ingenieros formados en diseño para el ciclo de vida del producto.

A partir de la significación conferida al diseño en el sector productivo metalmecánico de la pequeña y mediana empresa de San Francisco y habiéndose asignado una importancia significativa a esta variable, es importante evaluar la necesidad del sector de contar con ingenieros dotados de herramientas que contemplen el diseño para todo el ciclo de vida del producto. Su evaluación indicará si se debe avanzar en la factibilidad concreta de dar respuesta a la misma desde el sector académico de la Facultad Regional San Francisco.

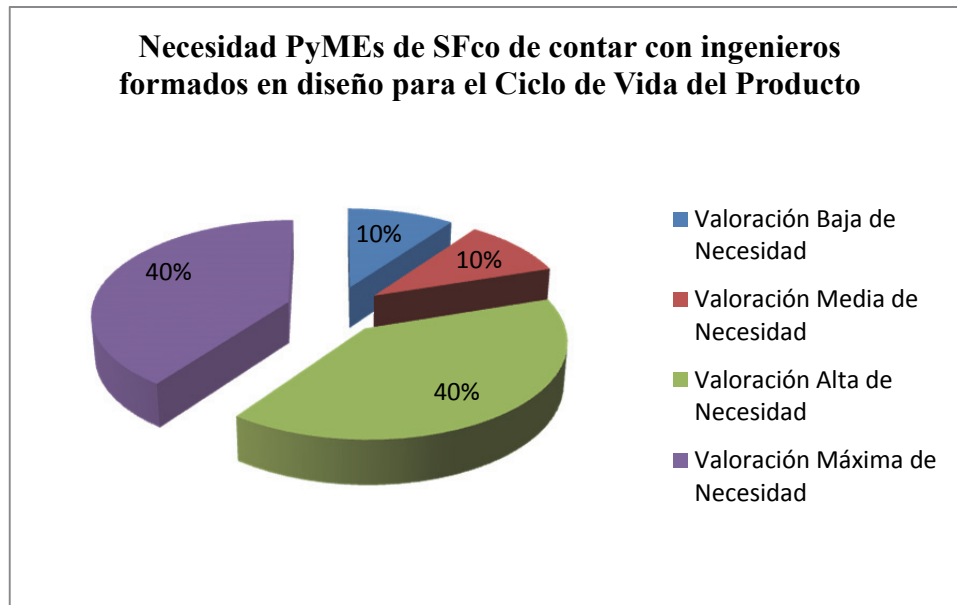


Fig. 3: Distribución necesidades en PyMEs SFco. en contar con Ingenieros formados en diseño para el Ciclo de Vida del Producto. Elaboración propia (2016)

La figura 3 pone en evidencia que la variable diseño de productos que contemplen su ciclo de vida es una necesidad de las Pequeñas y Medianas empresas puesta en evidencia en el 90 % de los encuestados, que consideran con los valores más altos de ponderación su necesidad de contar con ingenieros con esta formación. Esto indica que se debe dar respuesta por parte del sector académico a esta necesidad latente

5.3 Resultados que determinan la formación actual de ingenieros en la Facultad Regional San Francisco en cuanto a diseño que contemple el ciclo de vida del producto

Para avanzar en posibilidad de satisfacción de necesidades detectadas en el sector productivo involucrado en este análisis, es prioritario considerar la formación actual en diseño vinculado al ciclo de vida del producto en las carreras de ingeniería de la Facultad Regional San Francisco relacionadas al sector productivo metalmeccánico. Su evaluación permite determinar la formación específica en este campo y en función de los resultados obtenidos analizar la factibilidad de implementación de cambios curriculares a partir de la concepción del diseño en el ámbito académico.

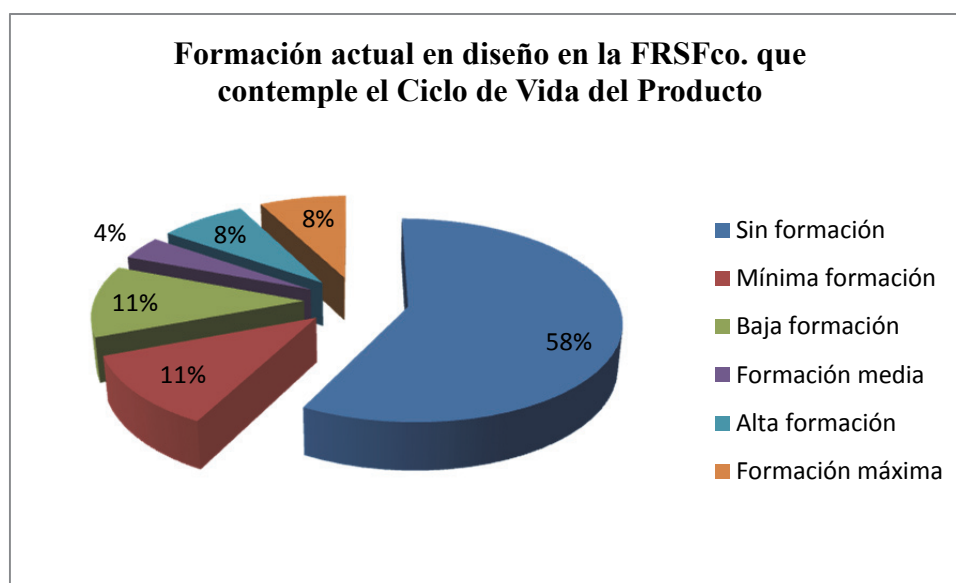


Fig. 4: Distribución formación de ingenieros en la FRSFco. en diseño que contemple el Ciclo de Vida del Producto. Elaboración propia (2016)

En la figura 4 se pone en evidencia que la formación en diseño en la actual currícula de ingenierías de la Facultad Regional San Francisco vinculadas a la industria metalmecánica no considera al diseño para todo el ciclo de vida del producto, dado que el 80% de los encuestados le asigna a esta variable los valores más bajos, de los cuales el 58% le asigna valor cero.

Este análisis deja en claro que para satisfacer las necesidades detectadas se debe partir de un cambio en la formación académica, la cual será viable sólo si en el campo académico se concibe al diseño desde la perspectiva del ciclo de vida del producto.

5.4. Resultados que determinan en la Facultad Regional San Francisco si la formación de ingenieros en cuanto diseño debe concebir al mismo para todo el ciclo de vida del producto.

Analizada la formación actual en diseño y antes de determinar la viabilidad de un cambio curricular, es prioritario considerar la opinión del ámbito académico relacionada a si el diseño debe ser considerado para todo el ciclo de vida de un producto, toda vez que sólo se podrá avanzar en la posibilidad de dar la respuesta académica correspondiente para satisfacer las necesidades detectadas, si la opinión es mayoritaria en cuanto a esta concepción del diseño.

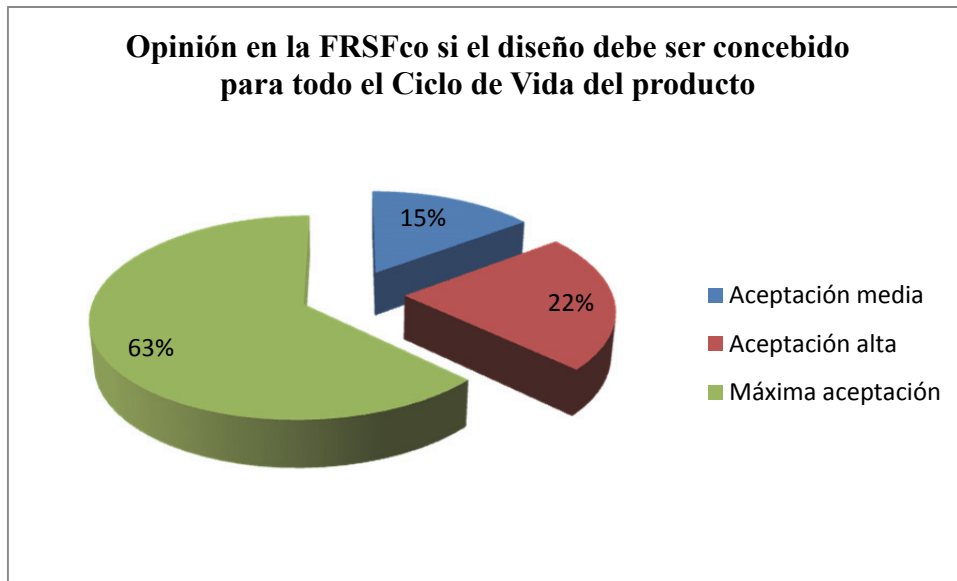


Fig. 5: Distribución concepción del diseño asociado al ciclo de vida del producto. Elaboración propia (2016)

Esta variable arroja aspectos sumamente significativos evidenciados en la figura 5, en la cual se percibe claramente que el 100% de los encuestados considera que el diseño de un producto debe concebirse para todo su ciclo de vida. El 15% le otorga una ponderación media mientras que el 85% lo considera en sus valores más altos.

El análisis de esta variable permite determinar que existe una total aceptación en el ámbito académico que el diseño debe ser concebido para el ciclo de vida del producto, permitiendo entonces avanzar en la posibilidad de adecuaciones curriculares que surgirán de la determinación de la importancia conferida por el sector académico a su inclusión en las carreras de ingeniería vinculadas al sector productivo metalmecánico.

Resultados que determinan la importancia asignada en la Facultad Regional San Francisco a la inclusión de formación de ingenieros en cuanto a diseño que contemple el ciclo de vida del producto

Habiéndose determinado que la concepción académica del diseño en la Facultad Regional San Francisco establece que el mismo debe contemplar al producto para todo su ciclo de vida, es fundamental evaluar la importancia asignada a incluir este concepto en la formación profesional. El análisis de esta variable determinará en forma concreta la posibilidad de satisfacer desde la Facultad Regional San Francisco la necesidad detectada en el sector productivo metalmecánico de las pequeñas y medianas empresas de San Francisco.

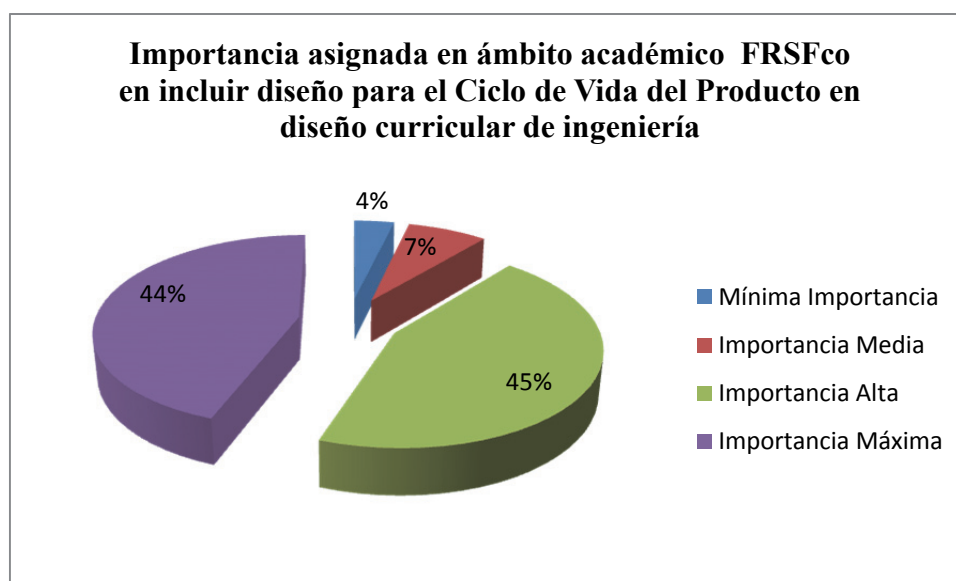


Fig. 6: Distribución importancia asignada al diseño para todo el Ciclo de Vida del Producto en el ámbito académico. Elaboración propia (2016)

Los valores detectados mediante la variable importancia que se asigna en incluir concepto de diseño de productos para todo su ciclo de vida en el ámbito académico es altamente significativa, solo el 4% lo valora con baja ponderación, mientras que el 7% le da un valor medio y el 89% le otorga los más altos valores de importancia, evidenciando la necesidad y factibilidad de implementación de esta concepción de diseño en los actuales diseños curriculares.

6. Discusión

En función de los resultados obtenidos se puede inferir la importancia asignada al diseño vinculado al ciclo de vida del producto en la formación de ingenieros, la que surge del análisis de variables en el sector productivo de la pequeña y mediana empresa y en el sector académico. La vinculación de estas variables permite determinar un aditivo impacto cualitativo y cuantitativo de formación profesional vinculado con la importancia asignada al diseño en las Pequeñas y Medianas Empresas y su necesidad de contar con ingenieros formados en diseño para el ciclo de vida del producto, atendiendo la formación actual de ingenieros y la visión académica en cuanto a la formación en diseño de ingenieros concibiendo al mismo para todo el ciclo de vida, lo que permite evaluar positivamente, con la variable importancia asignada en la Facultad Regional San Francisco, la necesaria inclusión de formación de ingenieros que contemple el ciclo de vida del producto.

7. Conclusiones

El análisis de las variables indica que el sector industrial metalmecánico le asigna importancia significativa al diseño, con necesidad específica que el mismo contemple aspectos mercadotécnicos asociados al ciclo de vida del producto, como así también en el orden académico se evidencia la

necesidad de realizar adecuaciones curriculares en este sentido en función de la importancia conferida al diseño en general y en particular en su relación con el ciclo de vida del producto.

En función de los resultados obtenidos podemos inferir que la cualificación y cuantificación del diseño desde una nueva perspectiva que considere al mismo para todo su ciclo de vida en la formación profesional de las ingenierías es una necesidad latente en los sectores productivos de las pequeñas y medianas empresas, quienes le asignan un valor superlativo al diseño y están en estado de formulación de la demanda para satisfacerla.

Asimismo en el sector vinculado a la formación académica se pone de manifiesto el mismo tipo de necesidad incluyendo la implementación de cambios curriculares que contemplen esta nueva dimensión del diseño, que se constituye en una nueva perspectiva que cualificará y cuantificará la formación de los graduados en ingeniería en función de la importancia asignada al diseño concebido para todo el ciclo de vida del producto.

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Percepción de la confiabilidad de un producto agroindustrial

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Resumen

Las máquinas que trabajan en la agricultura y sus partes componentes están predestinadas a cumplir las funciones asignadas en determinadas condiciones de producción y explotación técnica. El estado técnico de las máquinas durante el proceso de explotación cambia, así como cambian de nominal al límite los valores de los parámetros que lo caracterizan.

Una forma de caracterizar la maquinaria agrícola que se produce, es aplicando el concepto de sistemas, el cual según la cantidad de sistemas que la conforman y el grado de nivel tecnológico de los mismos podemos definir: Productos de alta tecnología: Tractores, Cosechadoras; Productos de media Tecnología: Sembradoras, embutidora de granos, extractora de granos; Productos de baja tecnología: Implementos observándose una estrecha relación entre la confiabilidad y la caracterización tecnológica. Productos de alta tecnología son más confiables que productos media y baja por razones múltiples entre ellas gestión del diseño, procesos de fabricación, acceso a tecnología del conocimiento, nivel de facturación de la empresa origen, organización empresarial, valor del producto, competencia.

El interés de este trabajo es profundizar el concepto mecánico de confiabilidad, investigando como tal la percepción de la misma en el usuario, como concepto globalizador donde estará implícito el concepto mecánico; abordándose la problemática desde dos puntos de vista: la confiabilidad como factor de compra y la confiabilidad en función de la operatividad de la máquina.

Palabras clave: *confiabilidad, caracterización, productos agroindustriales, usuario, gestión de diseño.*

Abstract

Machines working in agriculture and its component parts are predestined to fulfill the functions assigned under certain conditions of production and technical operation. The technical condition of the machine during operation changes, and change the limit nominal values of the parameters that characterize it.

One way to characterize agricultural machinery produced, is applying the concept of systems, which according to the number of systems that conform and the degree of technological level of the same can define: High-tech products: tractors, harvesters;

Medium-technology products: Drills, stocking stuffer grains, grain extractor; Low-tech products: simple machines observed a close relationship between reliability and technological characterization. High-tech products are more reliable than medium and low products for multiple reasons including design management, manufacturing processes, access to knowledge technology, level of turnover of the company source, business organization, product value, competition.

The interest of this work is to deepen the mechanical concept of reliability, investigating how such perception of it in the user, as globalization concept where the mechanical concept is implicit; the problem from two perspectives: reliability as purchasing factor and reliability depending on the operation of the machine.

Keywords: *reliability, characterization, agro-industrial products, user, design management*

1. Introducción

Uno de los factores determinantes en el éxito de un producto agrícola es el grado de confiabilidad del mismo, otros tienen que ver con la performance, precio de adquisición y reventa. En su conjunto estos factores forman el intangible de la Calidad del producto. (Bragachini, 2010).

En términos estadísticos la confiabilidad se define como la probabilidad de que un producto, parte de un equipo o sistema, lleve a cabo su función esperada en un período establecido de tiempo bajo condiciones especificadas de funcionamiento es decir que la confiabilidad de un producto es una noción dinámica a través del tiempo. Desde el punto de vista puramente económico es deseable una alta fiabilidad para reducir los costos totales, ya que es inquietante el hecho de que el costo anual para mantener ciertos equipos y sistemas de funcionamiento ha llegado a ser varias veces mayor al costo original del equipo. (Shkiliova et al., 2007).

Las máquinas que trabajan en la agricultura y sus partes componentes están predestinadas a cumplir las funciones asignadas en determinadas condiciones de producción y explotación técnica. El estado técnico de las máquinas durante el proceso de explotación cambia, así como cambian de nominal al límite los valores de los parámetros que lo caracterizan (Shkiliova et al., 2011). Cuando al menos un parámetro estructural sobrepasa su valor límite, esto puede provocar un deterioro o la pérdida de la capacidad del trabajo de la máquina o sus partes componentes. Las partes componentes de las máquinas se regulan, recuperan y sustituyen para lograr que sus parámetros técnicos no sobrepasaran durante el proceso de explotación el valor límite y los agregados no alcancen su estado límite. Precisamente es por esto que se utilizan en la documentación técnica normativa el sistema de los valores permisibles de los parámetros, que permitan prevenir las fallas y/o las consecuencias de las fallas de las piezas en el proceso de explotación hasta llegar a la próxima reparación o control de su estado técnico. Las máquinas modernas agrícolas (tractores, combinadas y otras) están constituidas por decenas de miles de piezas, cada cual potencialmente puede fallar por uno o varios parámetros de su estado técnico. Sin embargo, es conocido en la práctica de explotación que solamente hasta un 5% de las piezas representan la fuente principal de las fallas. Debido a esto es que en la práctica durante el proceso de dirección del estado técnico y de confiabilidad de las máquinas, generalmente, se trabaja con 100-200 piezas, que condicionan el nivel de trabajo sin falla, durabilidad y con un nivel bajo de mantenimiento de las máquinas agrícolas (Shkiliova et al., 2011).

Es decir que desde un punto de vista mecánico los componentes principales de una máquina agrícola son aquellos que determinan el funcionamiento en su conjunto, estos componentes forman parte de sistemas individuales no redundantes cuya configuración se asimila a un sistema en paralelo (J Shigley, 2004) por lo que la confiabilidad será igual al producto de las confiabilidades individuales de los sistemas que lo integran.

Una forma de caracterizar la maquinaria agrícola que se produce, es aplicando el concepto de sistemas, el cual según la cantidad de sistemas que la conforman y el grado de nivel tecnológico de los mismos podemos establecer del siguiente modo: Productos de alta tecnología: Tractores, Cosechadoras; Productos de media Tecnología: Sembradoras, embutidora de granos, extractora de granos; Productos de baja tecnología: Implementos, observándose una estrecha relación entre la confiabilidad y la caracterización tecnológica. Productos de alta tecnología son más confiables que productos media y baja por razones múltiples entre ellas gestión del diseño, procesos de fabricación, acceso a tecnología del conocimiento, nivel de facturación de la empresa origen, organización empresarial, valor del producto, competencia.

2. Objetivos e Hipótesis

El interés de este trabajo es profundizar el concepto mecánico de confiabilidad, investigando como tal la percepción de la misma en el usuario, como concepto globalizador donde estará implícito el concepto mecánico; abordándose la problemática desde dos puntos de vista: la confiabilidad como factor de compra y la confiabilidad en función de la operatividad de la máquina.

Como objetivo se planteó determinar cuáles son las variables principales que influyen en cada caso, considerando como hipótesis que el servicio técnico prestado por la empresa fabricante funciona como una variable de equilibrio, lo que explicaría el fuerte arraigo territorial de las empresas agroindustriales.

3. Descripción del área de estudio.

La organización empresarial de las mayoría de las industrias agroindustriales de la Región Centro de la República Argentina tienen una base familiar concentrada en “manchones territoriales” influenciadas directamente por el peso de la agricultura y de la ganadería, tratándose de un mercado complejo y heterogéneo según la particularidad de la zona. Este conjunto de empresas tiene un denominador común: una extensa localización territorial acorde con las demandas productivas regionales. Sobre este total, la gran mayoría son básicamente pymes, con un promedio de 30 años de antigüedad, cuyo tamaño va desde 10 hasta 300 empleados por empresa (hay algunas pocas excepciones que superan ese límite). El resto del mercado se distribuye en los segmentos de mayor valor económico y complejidad tecnológica.

3.1. Distribución porcentual de máquinas de media y baja tecnología fabricadas en la Región Centro

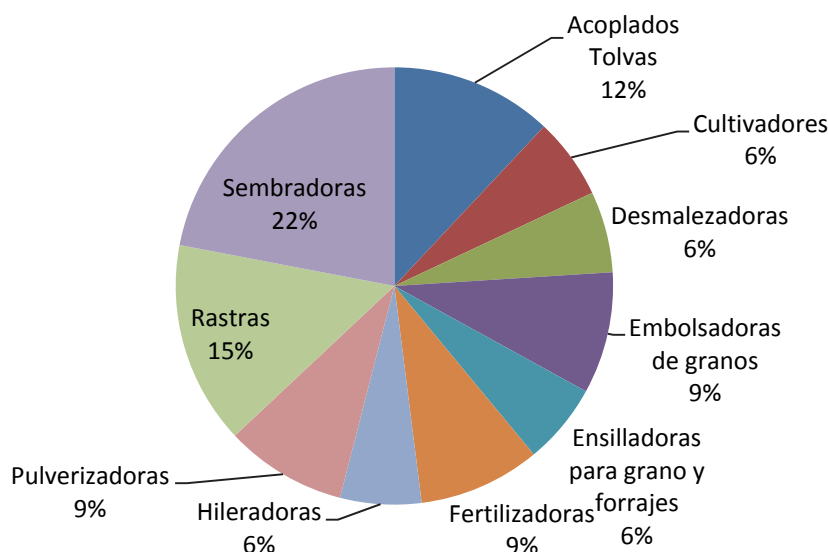


Fig.1 Distribución porcentual de máquinas de media y baja tecnología fabricadas en la Región Centro. (fuente propia)

4. Metodología

Para analizar la confiabilidad como factor de compra, se realizó una encuesta en la cual se propusieron como variables de evaluación: Referencia por otro usuario, marca conocida en la zona, conocimiento del vendedor (relación personal), conocimiento de la fábrica (establecimiento donde se produce el producto agroindustrial), económico. En el análisis de la confiabilidad según la operación de la máquina, se realizó una encuesta en la cual se propusieron como variables de evaluación: Referencia por otro usuario, marca conocida en la zona, conocimiento del vendedor (relación personal), conocimiento de la fábrica (establecimiento donde se produce el producto agroindustrial), valor económico. La variable servicio técnico se analizó estratificando las encuestas desagregando las explotaciones agropecuarias según el siguiente criterio: productores de menos 200 ha, entre 200 y 600 ha, de entre 600 y 1500 ha y de más de 1500 ha. La encuesta constó de un cuestionario de 15 preguntas de las cuales 10 fueron cerradas cuantificables y el resto abiertas, se llevaron a cabo durante la exposición agroindustrial “Agroactiva”, en Mayo del 2014 en la ciudad de Oncativo provincia de Córdoba República Argentina. Los objetivos de la encuesta fueron: Definir y cuantificar las variables que involucran la percepción de confiabilidad en el cliente y establecer el rol del servicio técnico en la percepción de la confiabilidad.

5. Muestreo

El total de productores y contratistas entrevistados asciende a 600 con un nivel de confianza del 95,5%, el universo por lo tanto lo constituye todos los productores y/o contratistas propietarios de por lo menos un producto agroindustrial de media o baja tecnología.

6. Resultados

6.1. Percepción de la confiabilidad del producto según el entorno

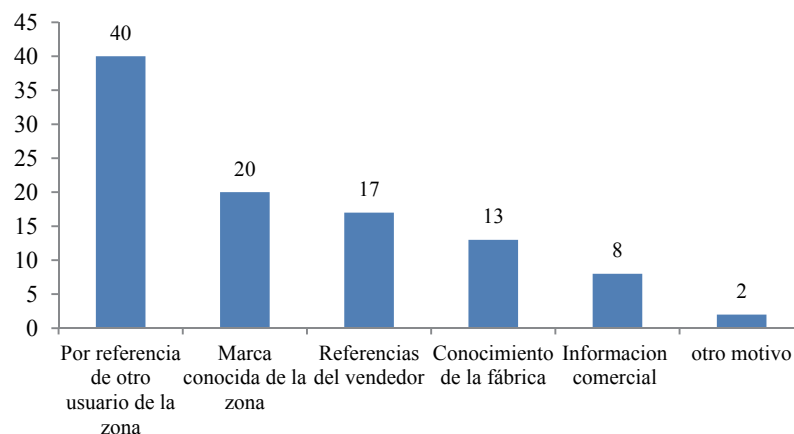


Fig. 2: Porcentaje de opiniones afirmativas respecto a las variables de confiabilidad del producto de acuerdo al entorno.

Según los resultados (Fig. 2) y considerando que la confiabilidad es un factor importante a la hora de adquirir un producto agroindustrial las variables “referencia de otro usuario” y “marca conocida” son las que más influirán más en el momento de la decisión de compra. Ambas suman el 60 % del total. En tercer lugar se ubica la variable “referencias del vendedor” con el 17 %, indicando que la reputación técnica comercial es importante en la percepción.

6.2. Valoración del servicio técnico como variable influyente en la percepción de la confiabilidad

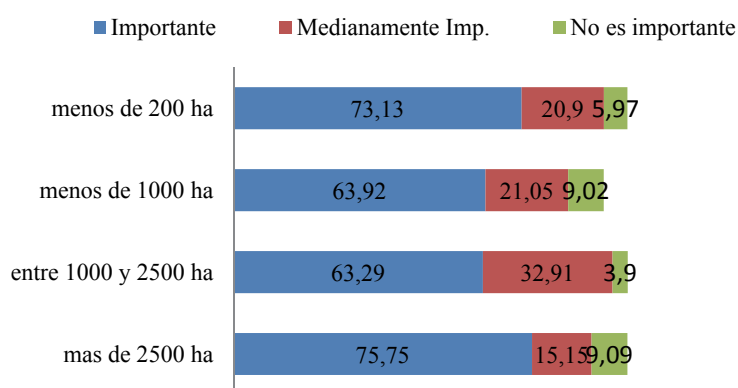


Fig. 4: porcentaje de opiniones afirmativas respecto a las variables de confiabilidad del producto de acuerdo a la importancia de la prestación del servicio técnico.

6.3. Variables sensibles de la percepción de la confiabilidad

Las Variables Sensibles de la percepción de la confiabilidad de un producto agroindustrial según el orden de importancia son: “bajo índice de roturas imprevistas y desgastes prematuro” (variables agrupadas por su origen mecánico), “referencia de uso”, “disponibilidad en tiempo”y “forma del servicio técnico por parte de fabricante”. (Fig. 5).

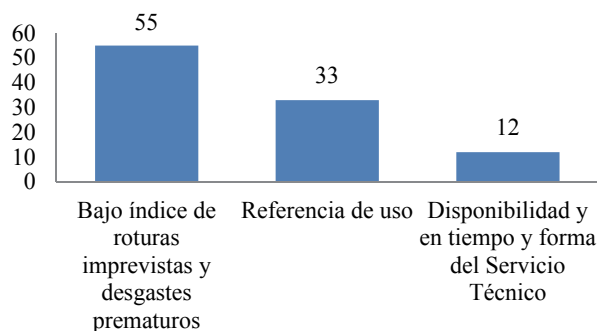


Fig. 5: Porcentaje de opiniones afirmativas respecto a las variables de confiabilidad del producto de acuerdo a la importancia de la prestación del servicio técnico.

De acuerdo a los resultados un producto se percibe como confiable (figura 5) cuando éste tiene en primer lugar bajo índice de “roturas imprevistas” y “desgastes prematuros” con un 55%, en segundo lugar si existe “referencias de uso” en la zona más allá de conocer su performance operativa real. Es decir que el usuario conoce la existencia de máquinas similares en su zona pero no las prestaciones reales de la máquina por propio uso, variable importante como factor de decisión de compra.

El tercer factor: “disponibilidad en tiempo y forma del servicio tecnico” con 12 %, actuando ésta última como variable de equilibrio entre las dos primeras, esto se pone de manifiesto cuando los productores expresan *“La máquina tiene algunos problemas de roturas y desgastes pero el servicio técnico es bueno por ese motivo la compré”*.

7. Discusión

A vista de los resultados podemos decir que la percepción de confiabilidad de un producto agroindustrial como factor de compra está influenciada en primer lugar por la referencia del producto aceptando que mucha veces hay una distorsión en el mensaje. El productor no es un comprador que compra sin referencia, para el caso de las empresas que necesitan introducir su producto en una región territorial usualmente consignan una máquina a un productor radicado en el lugar para que la pruebe y la valore, en caso que esta cumpla con los objetivos de venta será la referencia para iniciar la actividad comercial. El conocimiento de la marca se ubica en el segundo lugar como factor de peso. Una marca puede ser conocida a través de una campaña publicitaria pero a la luz de la percepción de la confiabilidad como factor de compra, una es consecuencia de la otra. Las referencias positivas técnicas comerciales del vendedor/distribuidor en cierta medida se trasladan al producto que se comercializa esta asociación también se hace con el establecimiento fabril en el plano comercial, se evidencia en la variable información comercial, también sujeta desvíos respecto a la realidad.

El conocimiento de la fábrica puntualmente en el aspecto técnico, o sea como se fabrica el producto también es una variable que aporta a la percepción, pero muchas veces el productor desconoce los

procesos de fabricación en detalle por lo que no relaciona la estabilidad de los mismo con la calidad final del producto, solamente aprecia la dimensión o la estética del mismo, de todas formas muchas pymes mediadas muestran sus procesos productivos ya sea a través de visitas guiadas o mediante campañas publicitarias.

La percepción de la confiabilidad según el uso de la máquina va más allá de un concepto mecánico y económico, esta se construye y complementa primeramente cuando el producto no presenta “roturas imprevistas” ni “desgastes prematuros”. Esta variable se asocia al concepto mecánico de confiabilidad y a la noción dinámica, habiendo una relación entre los esfuerzos límites y a la duración de las piezas, teniendo como parámetro el tiempo otorgado como garantía por parte del fabricante.

La variable “servicio técnico” se puede considerar como una variable de equilibrio, explicando por qué máquinas de mayor calidad técnica pero con un servicio técnico que no satisface al cliente no tienen éxito en una determinada región. La variable facilidad de reparación también se puede considerar de equilibrio, cuando el servicio técnico no es consecuente a la demanda.

Productores de menos del 200 ha en un 70 % opinan que la variable servicio técnico es importante debido principalmente a las restricciones tecnológicas, no de tiempo. Por su parte, los productores de más de 2500, también opinan que la variable servicio técnico es importante (70%), en este caso debido principalmente a las restricciones de tiempo (datos no publicados).

Es evidente que las variables “roturas imprevistas” y “ desgastes prematuros” se relacionan directamente con la gestión del diseño (Ortuño et al., 2000). También lo es la “facilidad de reparación” jugando un rol importante de equilibrio para aquellas empresas cuyo servicio técnico no satisface al potencial cliente por cuestiones logísticas y debe ser atendida como factor clave para la expansión empresarial.

8. Conclusiones

La percepción de confiabilidad de un producto agroindustrial como factor de compra está influenciada en primer lugar por la referencia del producto y por el conocimiento de la marca, existen otros que contribuyen en menor grado: referencia del vendedor/distribuidor, conocimiento de los procesos industriales del fabricante, información comercial. La percepción no se construye con una sola variable aislada.

La percepción de la confiabilidad según el uso de la máquina va más allá de un concepto mecánico y económico, esta se construye y complementa primeramente cuando el producto no presenta “roturas imprevistas” y “ desgastes prematuros”.

La variable “servicio técnico” se puede considerar como una variable de equilibrio.

Las variables “roturas imprevistas” y “ desgastes prematuros”, “facilidad de reparación” tienen una relación directa con la gestión del diseño.

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Design education learning: developing skills of observing and managing intangible systems in young generations

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Abstract

There is consensus among researchers regarding how managing and designing in complexity multidimensionality represents one of the main challenges and constants of contemporaries' processes of innovation (Manzini, Baule, Bertola, 2004). This systemic distinguishing peculiarity makes impossible to standardize the design innovation processes because every problem needs to be solved by adopting different strategies (Celaschi, Deserti, 2007). Nevertheless, those innovative processes can be developed and managed by referring us to tools and practices of design into the paradigms of multidisciplinary and multidimensional.

However, what happens when professors have to transmit those concepts to young students of design faculties? We have to consider that normally those students are coming from second-degree schools, which programs usually still insist on content rigidly divided in disciplines and don't consider how the contemporary relation between space and time has overturned for them (Morin, 2001). Young students generally disclaim their past in the meaning of heritage, values and techniques knowledge; they live in the present, a time that does not exist; a time that today results enormously expanded by globalization processes. They still living in a reality of which territorial capital subsystems are characterized by an entropic strong dichotomy of entities in opposition but, on the other hand, in balance within themselves, as for example topics as material/immaterial, collective/identity, culture/industry, etc. So, which are the design didactic challenges to provide horizontal skills for allowing young students to understand complexity and manage knowledge of the reality?

This article will discuss the case study of the perception among design of a newly generation admitted at the Innovation and Design Engineering Degree of the Universidad Panamericana – Guadalajara Campus. As expected, in this new generation we can especially observe a resistance to consider the sociocultural, business, technological and territorial dimensions as systems that strategically characterized and affected plural aspects of the design innovation processes. The contribute then proceed in analyzing case studies of didactic activities for creating skills and sensibility able to develop this capability to observe, select and manage the intangible in order to optimize the design of the tangible in the young generations.

The investigation, through the experimentation and comparison of informal didactic model, bring to the identification and promotion of special extra-ordinary didactics experiences oriented to the complex project and able to resalt the designer mediation role among the innate and dualistic tension between polarities able to resalt the intangible aspects which characterized contemporary design processes.

Keywords: *design education, management of intangible, young generations, learning process, Universidad Panamericana.*

1. Introduction

«Se dice cada vez más a menudo "eso es complejo" para evitar de explicar. Es necesario proponer una verdadera ruptura y poner de manifiesto que la complejidad es un reto que el espíritu debe y puede conquistar» (Morin, Ciurana, Motta, 2003).

There is multidisciplinary consensus among the need to rethink the profile of futures designer professionals by growing their capabilities of managing and solving complex problems. This need arises from the (pos)posmodern demand of heighten the number of factors, indicators and variables to take into account in advanced design process focused to anticipate futures and to bring man at the center of the project by contemplating primary factors that modern societies didn't considere as environmental, cultural and social issues, etc. (Celaschi, 2000). The analysis of best practices of professional advance design works, underlines several common factors: «the barriers between various fields (research, academia, business, environment, public administration, population) were cancelled thus opening new transfer and sharing channels, enable the knowledge exchange. The design of various relationship took a determinant role [...]» (Fanzini et al., 2014).

One of the most prominent voices who have faced this issue from the educational point of view is the anthropologist, became philosopher, Edgar Morin. As father of complex thinking paradigm, Morin suggests a dualistic approach to integrate the «analytic vocation of positivist sciences with the transdisciplinary and problematizing vocation of substantive philosophy» (Romero-Pérez, 2003, p.2). In his "Seven complex lessons in education for the future" (Morin, 2001), the author explains crucial problems which are needed to teach in the schools of every country. Among these, we should highlight the "Principles of pertinent knowledge" which statement is to encourage, through innovative education methods, the innate human propension to insert partial and circumscribed knowledges of different disciplinar areas in relation within thems and with the whole. Morin suggests to move on from old traditional education models for enabling in students the ability to restore relations and reciprocal influences between parts and total, where total is referring to the context, the global, the multidimensional and the complex; as well as strengthen the aptitude to set and solve essencial problems (i.e. general intelligence). Rebuild relationships between the parts and the whole means to overcame reduction and disjunction between humanistic and hiper-specialized science discipline and to finally take into account intangible and no measurable elements which were tradicionally eliminated during the phase of simplification of a problem (reductionism).

The urgency to form in young generations the ability of managing and solving complex problems is also expressed by the World Economic Forum as the most important of the ten skills professional need to thrive in the Fourth Industrial Revolution (Gray, 2016) .

The statement we are discussing is also well explored and expressed by Pier Giuseppe Rossi in his book “Tecnologia e costruzione di mondi: post-costruttivismo, linguaggi e ambienti” (Rossi, 2010). Rossi underlines how the paradigm change from linear to complex scientific approach requires to transcend the disciplinar division of Western cultures and to design finally new pervasive technologies for education process. The author stresses the need to leave linear and reductionist approaches in favor of complex, eco-systemic and enactive ones. Rossi recognize that contemporary cognitive processes are oriented to words construction and knowledge production rather than acquisition of informations. The changing paradigm also impact into researches, which move on from a model hipotesys – experiment – test, to a model design – action – thought.

This premise leads us to interrogate among various statements. If young generations are coming from second-degree schools, which programs usually still insist on content rigidly divided in disciplines and don't consider how the contemporary relation between space and time has overturned for them, how professors of design faculties can manage the learning process for fostering and developing in them the skill of observing, synthetizing and managing complex systems? Is it possible to identificate best practice which helps professor to fostering student's skills of detecting and working on the intangible factors which affect a complex system?

2. Methodology

The article is conceived by referring to metadesign methodology in the disciplinar frame of Advanced Design Cultures, which process refers to differentes phases.

First, we observed reality by inquiring three group of the newly generation admitted at the Innovation and Design Engineering Degree of the Universidad Panamericana – Campus Guadalajara (Mx) about their percepcion among design definition to identify cultural constants in their thoughts.

Second, we conduced a multidisciplinary literature analysis which led us to isolate some fundamental principles. This activity allowed defining the complex project approach as centre of the (design) education debate. On the basis of this investigacion a learning experience was designedand experimented within the students of the Politecnico di Milano (Italy) and the Universidad Panamericana – campus Guadalajara (Mexico).

Third, we recollected and analyzed several high significative education activities realized in a selection of Latin American Design Faculties or countries which permit to experience managing solving complex problem skills.

2.1 The perception of design in newly generation admitted at the Innovation and Design Engineering Degree of the Universidad Panamericana – Campus Guadalajara (Mx)

In August 2015 we conduced a capillary enquest which aim was to investigate the percepcion about design in newly generation admitted at the Innovation and Design Engineering Degree of the Universidad Panamericana – Campus Guadalajara (Mx). Before starting the didactic activity of “Design”Principle” course, it was asking to the sixty young students crossing that discipline, to define the therme “Design” in a short text. Moreover, those definition were elaborated to extrapolate keywords with the aim to facilitate a comparison between the concepts expressed.



Fig. 1 Word cloud that synthetize the definition of design provided by the students of the course “design Principle” of the Innovation and Design Engineering Degree of the Universidad Panamericana – Campus Guadalajara (Mx) in August 2015.

Has we can observe in the Figure 1 - where the dimension of every word depends on the number of repetitions of each relative to the total of the definitions - the perception of this statistic sample about the meaning of design lacks of numerous important concepts comparing to the design definition purposed by Flaviano Celaschi (Germak et al., 2008): «[design is] the way in which, in the contemporary system of trade, results are achieved in the form of products, services and experience, in which the significance, value, form and function are integrated and bring about universally recognised effects that lead to the exchange of these commodities on the market». The focus of the meaning of design expressed by young students, despite their digital nativity, is clearly oriented to a culture of tangible product rather than a culture of proyect (also oriented to achieve services and experiences results), where function and form are the main statement to balance with creativity for resolving a problem and where there is no perception about context or operational assessment (market, industry, technology,...) and contemporary intangible aspects as meanings, values, processes, time, culture, multidisciplinary, and so on.

The collective definition of design suggested by students obviously find a connection with the design perception of non-experts, as they are when entering to a design school. Nonetheless we should identifying at least two factors, local and global, that should had an impact in their definitions. First, they are living in a country that, as the majority of Latin American nations, has a strong original arts and crafts tradition, rather than industrial one, as USA or Germany for example, have. This consideration, joined with the analysis of literature about Mexican design school evolution, shows how Design «has experienced slower development by local circumstances where, for historical reasons, innovation for the creation of goods and production has been marginalized for political reasons, and the national market subject to a culture based on the copy or inspiration in ways of life foreign to ours» (Flores, 2010). Second, exactly as it happens to students of all other the world, young designers are coming from second-degree schools, which programs usually still insist on content rigidly divided in disciplines which are not

considering how the contemporary relation between space and time has overturned for them (Morin, 2001).

So, which are the design didactic challenges to provide horizontal skills for allowing young students to understand complexity and manage knowledge of the reality?

2.2 Highlits from the current debate on design education innovation

Due to the evolution from industrialized to knowledge based society, advanced industrialized companies have developed counciousness nearby informations and operative judgment are becoming necessary to produce innovation. Univeristies are stilling evolving in this contexts, trying to anticipate future needs of our societies by investing intellectual and economic resources for growing knowledge and disseminating it by training.

The focus that this article would to attempt, lead us concentrating on this second statement, i.e. on the dissemination of knowledge in the practice of design education as a priority. As the chapter “Research for design education: some topics” of the book “Innovation in design education” (Formia, 2012) well highlighted, we can identify from literature and case studies, some strategic and correlated themes at the centre of design education research debate. According to the author Antonella Penati, the theory/practice relationship should be identified as the core of design reflections and has generated several studies and approaches with the aim of integrating boths aspects for developing what Jane Abercrombie (Abercrombie, Patella, Giordano, 2003) has defined as “operational judgment”. Penati’s contribution facilitates the individuation of dydatic approaches that we identified in the diagram shows below.

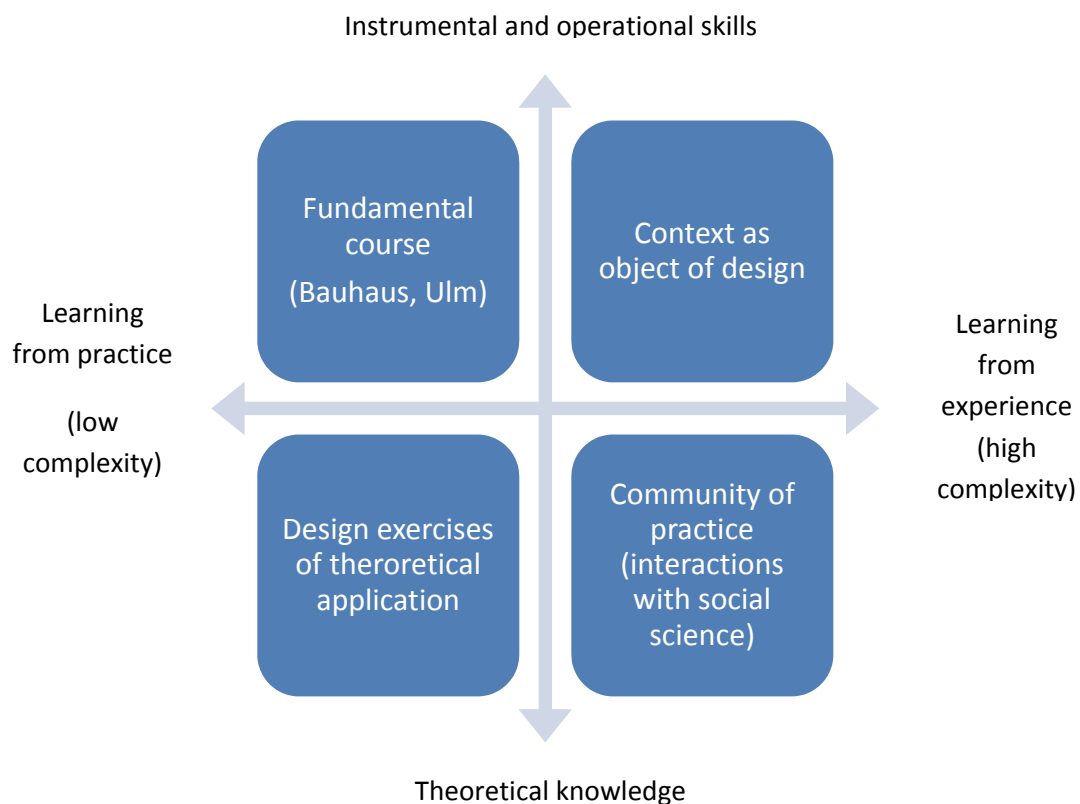


Fig. 2 Dydactic approaches of design education

The scheme objective, despite its simplicity, is to emphasize how recent debate among didactics education seems move from the learning with practice approach to the learning with experience approach, answering to the contemporary need of increasing complex problem solving student's capabilities by introducing activities able to develop skills as analysis of context and by transforming it in object of design. The main challenges in design education that literature is purposing refers therefore to two primary issues answering to the statement of knowledge as basis of good design recognized by Flaviano Celaschi (Germak et al., 2008, pp. 29-30) which are: «have very good knowledge of the phenomenon on which one is working in order to find the innermost essence of the problem that is to be solved; use a language of synthesis of the phenomenon that is capable of preserving the essence of the problem».

The postulation of metadesign process as apparatus of design practice innovation, provides us a frame of tools and methods which enormously improve the phase of a design process: the knowledge of the phenomenon by stimulating the literary sources and context investigation, also in disciplinary field and areas which are not strictly related to the problem analyzed (Celaschi, Deserti, 2007).

Referring to the visual thought, as underlined by Antonella Penati, the italian design research literature identified two main areas of interest: on the one hand, the research line concerning the product identity communication which is going further the visualization of tangible qualities for including in the construction of scenarios all intangible qualities related to communication, emotions and senses; on the other hand, the research line concerning the design of scenarios of possible futures (intangible) which is explored by innovative design processes which requiring the designer talent of implementing «new values, behaviours, methods of use, functional solution and possibilities of services» (Formia, 2012, pp.64-65).

2.2.1 Pedagogic issues in the complex paradigm

The pedagogist literature is plenty of authors who analyze the epistemological principles that sustain the paradigm of complexity for detecting new theoretic and methodologic models which should aid the scientific community to elaborate theories more fitted to the reality. Due to the nature of complexity, it seems quite impracticable, from the scientific point of view, to define exact methodological recipes that precisely defines the path to take for teaching in the systemic paradigm. Robinson Roa Acosta, in his dissertation on “Formación de profesores en el paradigma de la complejidad” (Roa Acosta, 2006), rather than remember that professors should be themselves educated in the complex paradigm for well developing their educative missions, indirectly suggests guideline helpful to understand primary elements to take into account for correctly design systemic educational methodologies. Between them we highlight:

- develop a vision and a shared mission with students;
- propender for the development of academic activities, establishing the largest possible number of relationships with other fields of knowledge;
- select, organize and structure resilient academic curricula that promote learning related to reality;
- develop laboratory practices through problem solving that allow, in unison with the theory, the appropriation of contextualized conceptual elements;
- students do face real problems of disciplinary and interdisciplinary work;
- seek the participation of students in the formulation, development and management of research and knowledge from and between different fields of knowledge;

- allow colleagues and students to make decisions regarding the educational activities of a class (participacion logic);
- plan an evaluation system of activities to assess the impact of the class and help improve them.

2.2.2 *What do we expect from a design training model?*

The design literature is rich of recent dissertations regarding design training models and pedagogical aspect. So the objective of this part of contribution, more than wanting to be exhaustive, it's to resume the main aspects to take into account for understanding the complexity of design a Design career.

First, it is strategic to define the profile of the designer that we want to educate for the future. According with the concepts previously expressed, Claudio Germak (Germak, Bozzola, 2010; Germak et al., 2008) traces an anatomy of the professional profiles of designers, which he calls "exploring designers", in relation to the exploration activities that a project requires. Based on twenty years of experience of the Politecnico di Torino (Italy), the author identifies three alternative/evolutionary/complementary professional profiles:

1. The conscious designer. His/her products have cultural value and are based on the purpose and accuracy of the performance provided.
2. The scenario designer. He/She works in collective research connected with other areas of specialization to produce scenarios in which «contextual values are accumulated to form critical mass: social, cultural, ethical, biological and technological values»
3. The navigating designer. Proactive figure with inexhaustible curiosity in search of new territories of project. He/She is an innovator because is able to go further the common sense and has developed a wide range of multi/interdisciplinary, sociocultural and material references.

According with various scholars (Penati, 2015; Maldonado, 1974), design process of learning consists of a broad variety of methods which are on complementarities but at the same time in opposition each other, as shown in the image below.

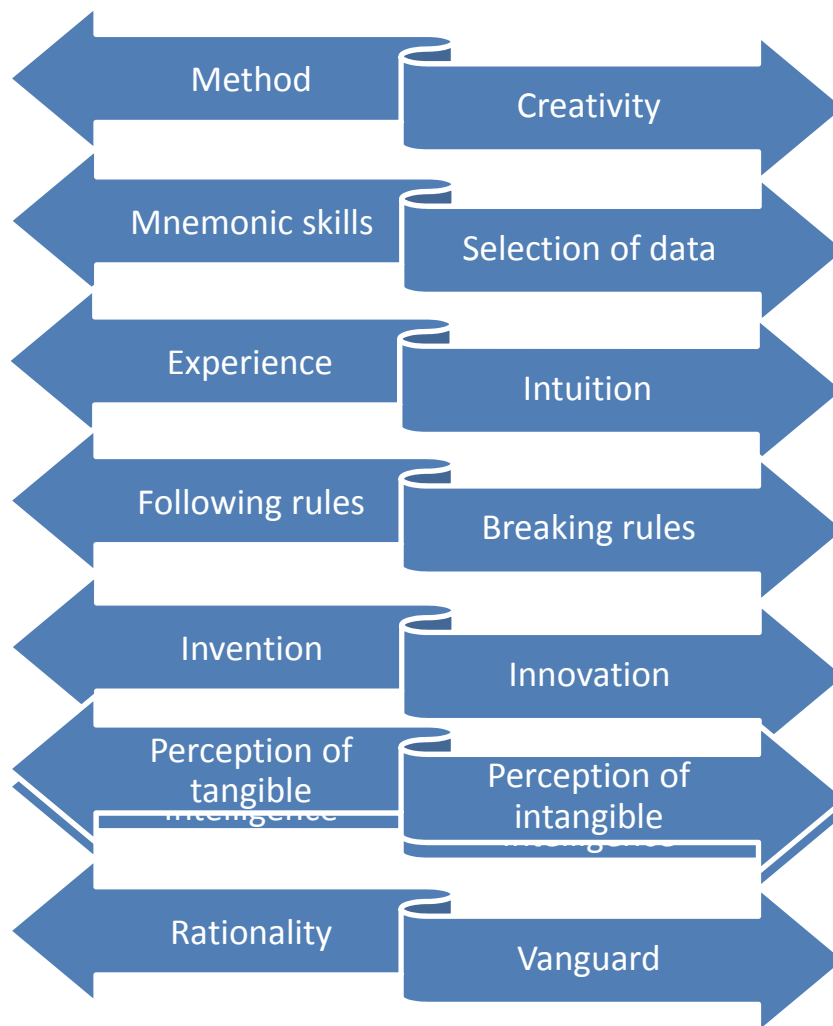


Fig. 3 Antithetic/Dialectic relationship between strategic designer skills

The tension between dualistic forces in balance is the core of design process. The antinomy and complementarity between concepts, rules and methods should be identified as extreme consequence of complex thinking paradigm (Morin, Ciurana, Motta, 2003). Depending on how much the educators/designers stress those forces and are able to make more strong the curiosity of student, they should get different professional profiles. With how much educators want to achieve an innovator designer profile, how much the strategic designer skills showed above have to coexist in the same individual.

Also due to the progressive dematerialization of products, the need to form in young student the capabilities of analyzing and managing intangible factors of a system, as one of strategic designer skills to achieve innovation, is growing. According with several authors (Germak et al., 2008; Penati, 2015; García-Garrido, 2015; Papanek, 1977), it remains primary to include a set of humanistic discipline into design school curricula.

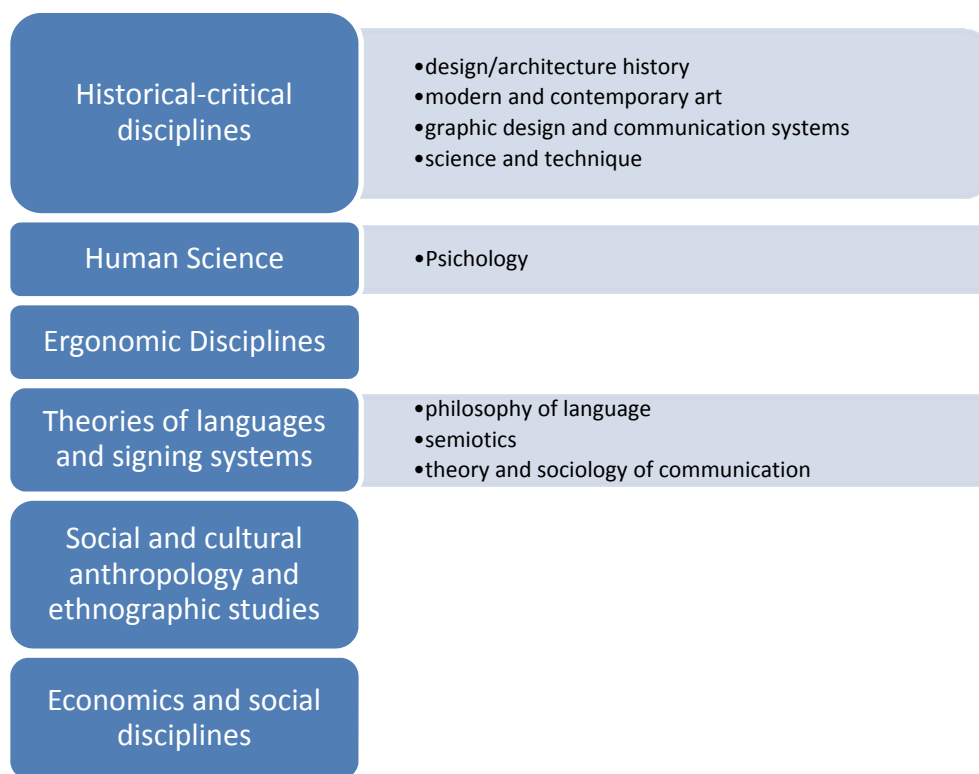


Fig. 4 Humanistic Discipline contributing to a Pedagogy of design. Fuente: (Penati 2015, pp.77-79)

2.3 Intangible context factors

Scholars are recently starting to explore the strategic potential of Design to imagine and communicate tactic and scenarios for the change, by operating with agent activators that work on a territory (Celaschi, Germak, 2009). Approaching the context from the point of view of a design project means to understand the evolving tangible and intangible parts of which it is composed as well as the relationships between themselves.

One of the most interesting contemporary approach analyzing the local context is recognized in the researches on the territorial capital lead by Roberto Camagni (Camagni, 1999). Camagni's assessment were been officially included in the regional development EU politics of the Organisation for Economic Co-operation and Development (OECD), with the report Territorial Outlook 2001. The report demonstrates that every region have its own specific territorial capital which is able to make certain types of investments more effective compared to others. The factors that play a key role in the territorial capital definition are geographic location, size of the region, climate, natural resources, quality of life and economies of scale. To these other factors affecting the traditions or local and regional costumes are added, as well as, the quality of governance, which includes issues such as mutual trust and informal rules that enable different actors to work together under conditions of uncertainty according to principles of solidarity and mutual assistance (social capital). Lastly, into the territorial capital are coming into play immaterial factors defined by the OECD report as "something in the air or environment", arising from the interaction of institutions, rules, practices, producers, researchers and policy makers that facilitate the conditions for the development of creativity and innovation, namely what is defined as "quality of the milieu" (Zonneveld, Waterhout, 2005).

According to the definition proposed by the OECD, Francesco Zurlo summarizes the territorial capital as «the combination of physical and intangible elements available to the area that can be strengths or real

constraints, depending on the aspects taken into account» (Zurlo, 2003). The Zurlo's concept of territorial capital implicates all the integrated elements that form regional prosperity:

- Know-how, which is the set of knowledge and skills necessary to perform certain work, research and development activities;
- Human resources;
- Physical resources, which is the set of natural objects, cultural and infrastructure;
- Forms of governance;
- Markets and relations with the exterior.

A more detailed taxonomy of the assets that characterized the innovation processes of territorial capital has been more recently published by Roberto Camagni (Camagni, 2008)

RIVALRIES High rivalries (private goods) Club goods Public goods Low rivalries (public goods)	<u>Fixed Capital</u> <u>Private</u> <u>Pecuniary externalities (hard)</u> <u>Tariffed public goods (excludable)</u>	<u>Relational private services:</u> - External relations firms - Transfer of R&D results - <u>Universities Spin-Off</u>	<u>Human capital:</u> - Entrepreneurship - Creativity - Private expertise <u>Pecuniary externalities (soft)</u>
	<u>Proprietary networks</u> <u>Collective goods:</u> - Landscape - Cultural heritage - Cultural resources "of system"	<u>Cooperation networks</u> - Strategic alliances (R&D and knowledge) - Services in p/p Partnership <u>Governance of land and cultural resources</u>	<u>Relational capital (micro: Associations)</u> - Ability to cooperate - Collective action ability, reputation - Collaborative Skills
	<u>Resources:</u> - natural - Specific cultural <u>Fixed social capital</u> - infrastructures	<u>Transcoding Agencies R&D</u> <u>Solicitors of receptivity</u> <u>Agglomeration Economies</u>	<u>Social capital (macro: civiness):</u> - institutions - models of behavior - Values, representations
	Tangible goods	Mixed goods	Intangible goods
	(hard)	(hard + soft)	(soft)
	MATERIALITY		

Fig. 5 Classification of territorial capital as a function of materiality issues and rivalries Source: Camagni (2008)

The elements that Camagni considers are divided according to their materiality. At the corners of the matrix (resources, social capital, human capital, private capital) there are the simplest elements to be determined, i.e. those which normally come in themselves working for a traditional land transformation process. The elements placed in the gray fields are otherwise characterized by more diaphramatic limits and more complex definitions. They are formed by intermediate classes of goods that require strong

elements of relationship with the other elements of the territorial context and that can assume strategic roles in the governance of local development processes. They usually result from complex cognitive processes that have taken place over time on a territory, generating in the local community the ability to learn from the experiences conducted. In the center of "innovative cross" the author recognizes the strategic importance of alliances for Research & Development (R&D) and for the creation of knowledge, supported by transcoding agencies, those that designers define mediators. Camagni's definition of territorial capital offer a wide and exhaustive panorama about the systemic nature of a local context.

The contents of the intangible column: human, relational and social capital bring us back to those humanistic statements which were mentioning above, while in relations with other paradigmatic elements of a place. A human centered focus of design practice, as cultural act, should not separate the man from the context during the phases of a design process.

Referring the territorial capital concept to the Design concepts expressed by Flaviano Celaschi we could therefore affirm that context is a strategic and irreplaceable factor that contain elements which guide designer in shaping products, experiences and services (Celaschi, Germak, 2009).

2.3. Learning from a real context

In the practice of design educations, students are called to develop a wide selection of activities. In this part of the contribution we want to identify tipologies of design education activities which are experimenting the growth of complex thought abilities in student which are coursing project centered academic career. This analysis does not pretend to be exhaustive, but suggests the possibility of enhancing the international relations created starting from the Latin American of Design network to share information on teaching practices that provide the development of skills within the complex thought, as well as on extraordinary activities that allow students to go beyond the "limits" of the Academia for coming into direct contact with the real context and/or professionals of different disciplines and experiences.

A first category of this kind of activities it's usually realized from professor trained to the complex thought who use building and/or cultural/social context as design' object. It's the case of the majority of doctoral workshop held by the ABC Department of Politécnico di Milano (ITA)¹⁵, or as, for example the design courses led at the Faculties of Innovation and Design Engineering of the Universidad Panamericana campus Guadalajara (MX)¹⁶. The list were be very large.

A second category of experiences could be related to the fact that in the contemporary university contexts all over the world is quite common to find a system of validation of student performances by recognizing formative credits. This means that exist facilities that allow students to undertake, with greater simplicity, national and international interchange programs in other Universities or participate in extra-curricular educational activities of various kinds. This opening led us to detect other kind of extracurricular experiences which undoubtedly could have a stronger impact in the professional growth of design students. We are referring to a wide variety of temporary events as workshops, summer schools, design driven incubators that are managing with multi and infradisciplinarity, multiculturalism as well as, the dualistic soul of our contemporaneity, i.e. local and global. Those kind of activities also help students

¹⁵ Cultural Heritage conservation and Valorization Workshop: students were called to design projects for the relaunch of cultural district of Oltrepo Mantovano Region (Italy) as concluding act of a participated project process which involved local institutions and culturale stakeholders. The output of the process were adopted by the cultural district governance for the search of new public and private funding.

¹⁶ Taller de innovación y diseño estético: metadesign practice for the regeneration of the Zapopan Centre, Historique Centre department of Zapopan government involved; Taller de innovación y diseño ergonomico,– Development of products for improving the life quality of children with disabilities, Hospital CRIT Teleton Guadalajara involved.

on one hand to understand the uncertainty of reference context and social/cultural/economic players and on the other hand to detect the main global innovation corridors. In the table below we are schematically illustrating few impacting best practice to which we are referring.

Tabla 1. Extracurricular activities case studies

Experience typologies	Reference	Reality investigated	Subjects	Characteristics
Extracurricular activities promoted by University	Design now summer school	Milan future fab city	Bachelor and master students of various faculties	Context as design object, Anticipation, infradisciplinarity
Extracurricular activities promoted by University	ROMA 20-25 Nuovi cicli di vita della metropoli, workshop and exposition	Envisioning the future of Rome	National and International Universities	Context as design object, Anticipation, infradisciplinarity multiculturality
Extracurricular activities promoted by firms	Innovation Workshop de Continental	Future vehicles	Students of various faculties	Anticipation, infradisciplinarity
Extracurricular activities promoted by universities and Association	Future ways of living Charrette -	How technologies will impact future ways of living	Institute without Boundaries (CA), Meet the Media Guru (ITA), students professional, scholars	Anticipation, infradisciplinarity, multiculturality
Extracurricular activities promoted by informal networks	Global Service JAM – internacional streaming workshop	Design services	Universities, scholar, students, professionals, citizen...	Multiculturality, infradisciplinarity

3. Conclusion

Sociological, pedagogist and design scientific scholars recognize the strategic urgent need to find ways for cultivating and enhancing in young generations the skill of managing and solving complex problem with the hope of forming professionals able to find more economic/social/ambiental sustainable and ethic solutions to problems. Despite the investigations, the same nature of complex thinking inhibits investigators to achieve exact recipes for resolving the pedagogical need of developing educacional methods able to strengthen in young generations the systemic thought.

From the point of view of design education, the model of metadesign process should answer, from the didactic and professional point of view, to the exigence of guiding designer into the project complexity by stressing and dilating the phase of investigation which anticipates the same design phase. Design discipline also is moving from the learning with practice approach to a learning with experience approach. This means that the activities that more develop into students the capacity of dealing with high complexity are recognizable in two main achieve: working with the context as object of design and working immersed into communities of practice. Undoubtely both events should accelerate the process of

student immersion into reality, the experimentation of what means intangible and develop the innate curiosity to understand the parts in relation with the whole.

Despite the lack of tools for verifying the rise of complex thinking into young design generations, which suggest new routes for multidisciplinary investigation, it seems obvious to recognize, especially in the extracurricular activities led by universities, with the partnership of firms and/or formal/informal external organizations (or viceversa), an excellent start point to mature multidisciplinary, multicultural, advanced and intangible factors sensibility.

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A Research on Designer Roles in Industries

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Abstract

In this study, possible differences for roles of designers in different industry systems were explored. It was studied if expectancies from designers change according to industries they work. This study is linked with a prior study which has investigated general expectancies from designers to get a hint about their work environment.

In a prior study done by the authors, it was investigated if concepts such as design thinking had any effect on requirements from designers. Since design thinking advocates designers to take active roles in managerial issues, and also require them to work with consumers as a team, it was hypothesized that recent job announcements may require capabilities related with these concepts. Also, when recent studies are evaluated, it can be seen that designers may take several different roles in companies. Therefore, it was investigated if capabilities referred in job announcements hinted any of the designer roles. It was found that companies asked for skills that addressed capabilities for designer roles such as team manager and process managers. However, the effects of industries' differing environments on requirements were not explored.

In the scope of this study, it was aimed to interview representatives from different industries to understand how different business systems affect design, and how designers transform themselves for different roles. Therefore, how business dimension along with type of products and services a company provides affect and change roles and requirements from designers was studied. A total of 50 companies were studied; 10 companies from 5 different industries with diverse characters were briefly interviewed to understand industry effect on requirements from designers. Interviews were thematically coded to define capabilities each company required. Industries included were shoes & bags, furniture accessories, jewellery, packaging and advertising & exhibition. It was found that requirements from designers differed according to the industry a company operates. Companies seem to emphasize different skills in relation with their business systems.

Keywords: Design management, design thinking, designer roles

1. Introduction

Recent studies suggest that designers get more involved with managerial issues and designers' capabilities are adapted to decision making processes, therefore organizations encourage their managerial staff to develop designers' skills. (Cooper et. al., 2009). This trend can be evaluated together with design thinking, which also hints that both managerial problem solving and design problem solving processes are "wicked" by nature, and the capabilities needed to manage them are alike (Dorst, 2011).

In this study, design thinking concept and its' relevance to demanded designer skills according to industries will be explored through interviews. Former data gathered from job announcements will also be shared. The role of the designers in the organizations will be analyzed through required characteristics that are not strictly linked with design action.

2. Design Thinking Concept and Roles of Designers in Organizations

Design thinking suggests that designers' problem solving abilities has a function in business environment. Design thinking concept also supports the idea of designerly problem solving being used along with user oriented competition strategies (Brown, 2008). Hobday et. al. (2011) also state in their studies that "...the treatment of design as a human-centered, core creative activity in business challenges the overly scientific, rational view of the firm and, with it, many of the standard intervention tools of innovation management.". They hint that design's solution oriented approach does not resemble other human-centered approaches; business, society and economy can benefit from design thinking (Hobday et. al, 2012).

Researches on designers' abilities also provide insights about designers' capability to carry out various problem solving techniques. Dorst (2003) suggests that designers work with three types of problems; defined, underdefined and undefined. Defined problems mostly deal with objective issues, while undefined problems are generally subjectively solved by designers' own taste and talent; however underdetermined problems, which forms the majority of the problems in a design process, are mostly formed during design process and designer deals with these problems by considering possible problems and solutions (Dorst, 2003). The concept on underdefined and undefined problems seems to suit with Cross (1990, 2001), who supports the idea that dealing with uncertain situations is involved in design problems. Cross (1990) also declared that designers can (1) create unique and unusual solutions, (2) work with incomplete data (3) work with uncertainty, (4) solve practical problems by using their imagination (5) solve problems by using drawings and other visualization equipments. This statement is also compatible with the others suggesting that design mainly deals with "wicked problems" that are difficult to define (Rittel & Weber, 1973; Buchanan, 1992).

Studies on different designer roles may indicate that designers' abilities on problem solving can lead them to have more involvement with other functions in the organizations' environment. Valtonen (2005) argues that while designers have always worked in product development process, they increased their role in the area and business in general. In her study on how designers' role evolved in Finland, one of the design-solution providers she quoted declares that the corporate directors say they need to change companies' strategies; but they don't know why and how, and design-service providers deals with these situations (Valtonen, 2005). This statement briefly expresses the way design is implemented to companies' strategies to create value. It may also suggest that the designers' capabilities about dealing with unclear problems can help executives to clarify strategies.

Another study on designers' roles in organizations defines three different roles a designer may take in a company (Perks et. al., 2005). Referred study mainly categorizes these three roles as shown below.

Table 1. Design roles and their descriptions, derived from Perks et. al. (2005) study.

Design Role	Main Actions	Required Skills in General
Design as Functional Specialism	They concentrate purely on design and are evaluated as resource	Traditional skills (aesthetics, visualization, technical skills, etc)
Design as Part of Multifunctional Team	Generate interaction between team-members, being a key member in a team	Skills to enable interaction and communication, flexibility and team building
Designer as NPD Process Leader	Getting more involved with marketing studies to set the direction, managing new product development process and informing other functions.	Non-functional skills such as business analysis, research, project management, motivating others, communication skills.

“Design as a part of multifunctional team” and “design as a NPD process leader”, may express the design thinking effect on designers' roles. Team-building skills and overall process management skills are compatible with the suggestions that design supports product development process through designerly thinking and designers' familiarity with wicked problem concept may help them when they deal with process related issues.

In this study, the qualities that are not directly linked with core design abilities will be coded. Therefore, the roles and requirements other than main design function practice were tried to be identified.

3. The Research

In a prior study job opportunities announced in Coroflot website job board was read and coded and evaluated. The results for the codes in the prior study are explained below. Afterwards, the probable differences for different industries will be evaluated by the current study.

3.1. Results of the Prior Study

During the prior research, behavioral qualities and expectations were coded into groups listed and described as below (Authors, 2015).

- *Working in teams/cross-functional teams* stands for employer expecting designers to work with teams. “Cross-functional teams” and “teams” were not coded separately as it is not clear in most of the jobs if the word “team” refers to a cross-functional team or a monofunctional team. So, the base for the code was being able to function as a team in a design environment.

- *Working independently/self-manage/self-motivated* refers to the ability of managing own work, without constant instruction and direction from a manager.
- *Working closely with executives* hints being able to work directly with executive staff.
- *Mentoring/leadership* implies to the ability of mentoring colleagues.
- *Marketing research* means doing marketing research activities.
- *Brand management skills* indicates the ability to build and/or manage a brand. Brand identity application abilities (to the product and services) are not included in this category.
- *Business management skills* refers to being able to handle managerial issues; dealing with subcontractors, accounting issues, etc.
- *Multi-tasking/flexibility* hints the qualifications required for handling multiple projects at the same time and switching projects when needed.
- *Working in a fast paced environment* implies ability to work with tight deadlines.
- *Project management and organizational skills* means being able to keep up with and direct a project within defined timetables and budgets.
- *Working under pressure* refers to being able to handle stress in daily work environment.
- *Self starter/proactive* indicates abilities for acting entrepreneurial and innovative without being told; being able to take initiative.
- *Problem solving* points out ability to deal with process oriented problems at work. Design related problem solving skills were not included in this code.
- *Client interaction/ management* means being able to handle client accounts, presenting to and meeting with customers directly.
- *Communication skills* indicates having positive interpersonal skills and handling process related communication issues in a constructive way. Design related communication skills such as visual and verbal presentation skills are not included in this category.

When the job announcements in Coroflot website was coded; the frequencies for the codes given were derived as follows.

Table 2 Derived from the prior study by writers. (Authors, 2015)

Category	Managerial (out of 228)	Senior (out of 243)	Regular (out of 912)	Intern (out of 43)	Total (out of 1430)
Working in teams/cross-functional teams	172 (75%)	190 (78%)	610 (62%)	22 (51%)	994 (69%)
Working independently/self-manage/self-motivated	41 (17%)	52 (21%)	242 (27%)	16 (37%)	351 (25%)
Working closely with executives	13 (5,6%)	10 (4,1%)	31 (3,3%)	2 (4,6%)	56 (3,9%)
Mentoring/ leadership	111 (48%)	70 (29%)	65 (7,1%)	0 (0%)	246 (17%)
Marketing research	22 (9,6%)	22 (9%)	62 (6,7%)	3 (6,9%)	109 (7,6%)
Brand management skills	33 (14%)	23 (9,4%)	46 (5%)	1 (2,3%)	103 (7,1%)
Business management skills	45 (20%)	22 (9%)	46 (5%)	0 (0%)	113 (7,8%)
Multi-tasking/flexibility	52 (23%)	57 (24%)	208 (23%)	8 (19%)	325 (23%)
Working in a fast paced environment	56 (24%)	67 (28%)	265 (29%)	13 (30%)	401 (28%)
Project management and organizational skills	169 (73%)	133 (55%)	450 (49%)	12 (28%)	764 (53%)
Working under pressure	13 (5,6%)	19 (7,8%)	48 (5,2%)	1 (2,3%)	81 (5,6%)
Self starter/proactive	35 (15%)	40 (16%)	131 (14%)	8 (19%)	214 (15%)
Problem solving	47 (20%)	53 (22%)	151 (17%)	5 (12%)	256 (18%)
Client interaction/ management	77 (33%)	77 (32%)	152 (17%)	4 (9,3%)	310 (22%)
Communication skills	135 (59%)	151 (62%)	448 (49%)	16 (37%)	750 (52%)

When the results are evaluated together with Perks et. al.'s (2006) model, it can be seen that the most required qualifications fit for team leader and process manager roles.

Table 3. Derived from the prior study by writers. (Authors, 2015)

Groups	Qualifications and Total Frequencies	Number of Announcements That Require at Least One of The Categories
Design as Part of Multifunctional Team	Working in teams/cross-functional teams - 69% Communication skills - 52%	1179 (82%)
Design as NPD Process Leader	Working closely with executives -3,9% Mentoring/leadership - 17% Marketing research - 7,6% Brand management skills - 7,1% Project management and organizational skills - 53% Problem solving - 18% Client interaction/management - %22 Communication skills - 52%	1169 (82%)
Designers' Working Environment	Multi-tasking/flexibility - 23% Working independently/ self-manage/self-motivated - 25% Working in a fast-paced environment - 28% Working under pressure - 5,6% Self-starter/proactive - 15%	826 (58%)

However, in this research, codes were not evaluated according to industries. Also the evidence about why organizations demanded these qualifications was limited.

3.2. Research Method

A total of 50 companies were interviewed in this study. Companies were chosen among 5 industries, each designing their own products. It was aimed to ask organizations their expectancies from designers, so each of these firms employ designers either regularly or project base. Therefore, purposive sampling was used as the sampling method (Robson, 2002).

Companies were interviewed mostly at industrial exhibitions; packaging industry at Avrasya Ambalaj 2015, furniture accessories at Intermob 2015, shoe & bags at Aymod and jewellery at İstanbul Jewellery Show Ekim. Advertising & exhibition industry was interviewed through e-mail. Due to the medium and environment, interviews were kept short and evolved around one single question. Duration was between 5-20 minutes; coding was done during interviews and notes were taken when necessary.

Initial question was “What are the qualifications you demand in a designer that you employ, other than the functional designer abilities?”. Most of the respondents answered this question by basically explaining their work environments. Additional questions were asked when needed.

4. Results

Results of the study will be evaluated by industries.

4.1. Bags and Shoes Industry

The codes for the shoe & bags industry can be seen below.

Table 4. Codes for shoe & bags industry

SHOE & BAGS	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Total
Working in teams/cross-functional teams	X					X			X		3
Working independently/self-manage/self-motivated											0
Working closely with executives	X		X						X		3
Mentoring/ leadership							X				1
Marketing research	X	X			X	X	X	X		X	7
Brand management skills											0
Business management skills											0
Multi-tasking/flexibility											0
Working in a fast paced environment											0
Project management and organizational skills		X		X			X	X	X	X	6
Working under pressure											0
Self starter/proactive											0
Problem solving				X							1
Client interaction/ management				X							1
Communication skills				X				X			2

Shoe & bags organizations can be evaluated within fashion industry. They work on season base and produce their own products to be sold by retailers.

The top two codes for this industry is “project management and organizational” skills with 6/10 frequency and “marketing research” with 7/10 frequency. As the designs in this industry is strongly related with trends, companies mostly demand that designers do their own market research and bring their insights about fashion trends to the firm; so they require marketing research capability from a designer. Firms also mostly request project management and organizational skills but somewhat in a limited way. Companies demand designers to deal with design process by themselves, but only until model sketches are drawn.

“They should bring us many, many model drawings... tens of. The production is our task. I can produce what they draw, and even if 5 or 10 of them is sold in the market, their job is done” C2

Time and pace based requirements like working in a fast paced environment; multi tasking and working under pressure are not mentioned by interviewees. This may be because the industry’s pace is already set by seasons and long term planning can be done.

One of the companies, C4, was mostly working with a boutique style, so required designers to bring alternative ideas to current trends. This included with working with customers for related projects, and effects can be seen on communication skills and problem solving skills requirements.

4.2. Furniture Accessories Industry

The codes for the furniture accessories (handles, wheels, foots, etc) industry are as follows:

Table 5. Codes for furniture accessories industry

FURNITURE ACCESSORIES	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Total
Working in teams/cross-functional teams	X		X	X	X		X	X	X	X	8
Working independently/self-manage/self-motivated											0
Working closely with executives						X	X		X		3
Mentoring/ leadership						X					1
Marketing research							X	X	X		3
Brand management skills											0
Business management skills							X				1
Multi-tasking/flexibility					X	X		X	X		4
Working in a fast paced environment											0

Project management and organizational skills	X	X	X	X	X	X	X	X	X	X	10
Working under pressure											0
Self starter/proactive											0
Problem solving	X										1
Client interaction/ management		X		X		X		X	X	X	6
Communication skills	X	X	X	X	X	X		X	X	X	9

The most required qualifications in furniture accessories industry are working in cross-functional teams with a frequency of 8, project management skills with a frequency of 10 and communication skills with a frequency of 9 over 10.

Furniture accessories industries have a mixed customer base, as they can both design products for a specific furniture producer or design their own products to be sold by retailers. As designers do not define qualifications of the products just by interpreting trends, qualifications for working with other counterparts were demanded, such as working with teams and client interaction skills (6/10). This also diminishes the request for marketing research skills, when compared to industries driven by fashion trends.

“Our marketing team deals with the needs of the customers. Designer just needs to turn them into products to be realized by our production team.” C5

As sometimes designers have to work with their corporate customers' pace, multi tasking is required by some of the companies. But most of the companies declared that custom designs for other companies do not form the majority in their total design work, effects of this criterion is limited.

4.3. Jewellery Industry

The frequencies for the jewellery industry are as follows:

Table 6. Codes for jewellery industry

JEWELLERY	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Total
Working in teams/cross-functional teams				X	X	X		X			4
Working independently/self-manage/self-motivated			X				X				2
Working closely with executives	X		X		X	X			X		5

Mentoring/ leadership											0
Marketing research	X	X			X			X	X	X	6
Brand management skills											0
Business management skills		X		X	X	X				X	5
Multi-tasking/flexibility											0
Working in a fast paced environment									X		1
Project management and organizational skills	X	X	X	X	X	X	X	X	X	X	10
Working under pressure											0
Self starter/proactive		X		X				X		X	4
Problem solving		X		X							2
Client interaction/ management	X	X		X				X			4
Communication skills	X	X	X	X	X	X		X	X		8

Jewellery industry resembles shoe & bags industry, as it is related to trends; they also both work with end users and retailers. However, since the materials used in the sector are quite expensive and amount of material used is very decisive in the final price of the product, designers have a closer link with production teams and customers.

The most required three qualifications in jewellery sector are marketing research with a frequency of 6, project management skills with a frequency of 10 and communication skills with a frequency of 8.

Similar to bags & accessories sector, marketing research and project management skills are two of the most demanded qualifications. However, especially when designing boutique products for exclusive customers, designers get in contact with end users or retailers.

“It is designers’ job to get in contact with customers.. We expect designers to follow market and add their insights to products.” C9

Since the industry works with a seasonal pace, just like shoe & bags industry, schedule is not tight. Therefore qualifications addressing adapting to tight schedule are not frequently requested. However, producers require designers to take more initiative by demanding them to get more involved with business management aspects, work with executives and be a self starter, when compared to shoe & bags industry.

4.4. Packaging Industry

The requested qualifications for the packaging industry can be seen in the table below.

Table 7. Codes for packaging industry

PACKAGING	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Total
Working in teams/cross-functional teams		X		X		X	X	X			5
Working independently/self-manage/self-motivated	X		X	X					X		4
Working closely with executives	X	X		X			X				4
Mentoring/ leadership	X										1
Marketing research	X	X						X		X	4
Brand management skills											
Business management skills	X					X					2
Multi-tasking/flexibility								X		X	2
Working in a fast paced environment				X	X	X		X			4
Project management and organizational skills	X		X	X		X	X	X		X	7
Working under pressure						X		X	X		3
Self starter/proactive					X						1
Problem solving	X		X			X	X			X	5
Client interaction/ management	X	X		X		X	X		X		6
Communication skills	X	X	X	X			X	X		X	7

Packaging industry is strongly defined by corporate customers' demands. Companies work with defined demands by customers, and pace of the organizations fluctuates according to demands from the market. Unlike furniture accessories industry, companies almost always act according to demands; project periods are shorter and production quantities are higher.

The most asked qualifications are mentioned by slightly more than half of the organizations interviewed; project management skills has a frequency of 7, client interaction and management have a frequency of 6, while communication skills is mentioned by 7 companies. Also, problem solving skills and working with teams were hinted by half of the companies.

Time constraints are one of the major factors that affect expectations of companies from designers. Some of the companies mentioned existence of pressure in the work environment and multitasking as factors designers should deal with. Also client interaction skills is requested both for more accurate outcomes and

to manage time constraints.

“They should be able to communicate with customers... Because we don’t have time for it.” C4

Unlike other sectors, packaging firms demand their designers to expand their process management skills to production process.

“The top agencies in the industry do not deal with production. However we are more like an overall service provider, so our designers have to deal with production also.” C6

4.5. Advertising and Exhibition Industry

The codes for the advertising and exhibition (fair stands, product stands, etc.) industry is as follows:

Table 7 Codes for advertising and exhibition industry

ADVERTISING AND EXHIBITION	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Total
Working in teams/cross-functional teams	X	X	X	X				X		X	6
Working Independently/ self-manage/self-motivated	X								X		2
Working closely with executives	X	X	X	X					X		5
Mentoring/ leadership	X								X		2
Marketing research	X	X	X	X					X		5
Brand management skills											0
Business management skills	X	X							X		3
Multi-tasking/flexibility	X	X		X	X	X	X	X	X	X	9
Working in a fast paced environment	X	X	X	X	X	X	X	X	X		9
Project management and organizational skills	X	X	X	X	X	X	X	X	X	X	10
Working under pressure	X	X		X							3
Self starter/proactive	X	X							X		3
Problem solving	X	X	X	X	X	X	X	X	X	X	10
Client interaction/ management	X	X	X	X	X	X	X	X	X		9
Communication skills	X	X	X	X					X		5

Advertising and exhibition sector is also strictly constrained with corporate customer demands and time tables. Unlike other industries, some of the products such as fair stands can be custom produced for once according to the stand area and budget. Workload also fluctuates according to customer demands.

Six of the mentioned codes were requested by more than half of the companies. Problem solving skills and project management skills are demanded by all of the companies, while 9 of the interviewed organizations also demanded multi tasking and flexibility, working in a fast paced environment, client interaction and management. Ability to work in teams was also mentioned in 6 interviews. Communication skills, working closely with executives and marketing research have moderate frequency, while business management, working under pressure and being a self-starter were mentioned just below the average frequency.

“...we prefer face to face communication, rarely a project may be given through e-mail. We care for a continuous communication” C2

“When needed, brainstorming is done with chiefs or executives by the relevant designer on the project or the design team.” C1

“Being able to work with flexible work hours is required.” C8

“Production pursuance is done when necessary” C1

From the codes and comments, it can be interpreted that companies mostly work with pace of the customers, therefore designers should be able to adapt to the conditions with minimum supervision. Also, designers get involved in a larger percent of total product development process, as they get involved in the process from customer brief to production stage.

5. Conclusion and Further Studies

When results of the current study are investigated, it may be suggested that requirements from designers can change according to industries they work. Therefore, a system effect in business dimension can be seen on roles that designers take.

Shoe & bags and jewellery industries require more functional specialists more than other sectors. Marketing research and project management skills are required in more than half of the companies in both industries. Jewellery organizations also require communication skills, as designers have to work closer with marketing staff and production team; as the industry is more price and production sensitive than shoe & bags industry. In these sectors companies' main expectation is to produce fashionable products, so they need to rely on designers' functional capabilities. Most of the time companies declare that they only request drawings from designers and they can go on with the rest of the process without the involvement of designer.

Furniture accessories sector has both own design production and custom design production for furniture firms. So this industry requires communication skills more than fashion related industries. Also companies require designers to be a team player, as production of furniture accessories is usually by molding and most of them go through a finishing process; unlike jewellery or shoes & bags. Therefore companies require designers to get more involved with the production and marketing staff. The role that best suits to a designer in this industry could be designer as a part of a multifunctional team.

Packaging and advertising & exhibition industries are more corporate customer related, so the work pace is mostly defined by customers. In the interviews, organizations declared that most of the time sales staff does not have the time for pursuing the complete product development process, therefore they demand

that designers follow through this process. So, the qualifications they require are process management, communication skills, problem solving, being a team member and client interaction, hinting the role designer as NPD process leader.

Therefore, the systems that companies work within seem to effect requirements for designers. As a result, designers take different roles in companies according to business dimension. Designers seem to have managerial roles within industries that require working closely with customers on project bases. However, industries that can control their own pace that work on seasonal periods require functional skills more than managerial skills, as they rely heavily on designers' capabilities on perception of trends and fashion.

Due to the limited time and length of this study, 5 industries were studied through 50 firms. Research can be expended with more interviews or by coding more job announcements through different industries. Also, industries can be studied further in terms of work pace and environment in order to match qualifications better with related industries.

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Determinación sistémica de valores tangibles e intangibles y atributos clave para el desarrollo de productos-joya

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Resumen

Análisis de los aspectos clave que influyen en la determinación de atributos tangibles e intangibles contenidos en aspectos para el diseño de producto-joya contemporánea, como potenciadores de valores diferenciales de comportamiento y preferencias por parte del consumidor, así como, por las propias organizaciones del sector en términos del fortalecimiento del capital intelectual, competitividad e identidad, a través del diseño y la gestión del conocimiento.

La metodología consideró en primera instancia la recogida de información mediante distintas fuentes documentales (revistas científicas y profesionales, informes, instituciones, eventos especializados, libros, entre otros). A continuación, se emplearon métodos cualitativos para analizar la opinión de expertos y consumidores en América Latina y Europa, a los efectos de contrastar la importancia de los resultados obtenidos mediante información documental y sesiones grupales. Además, se observan las tendencias en entornos de desarrollo e interacción con el producto a través de distintos canales de comunicación especializados para analizar factores como el diseño, materiales y procesos que contribuyen en la toma de decisiones de compra.

Se destacan los hallazgos sobre componentes relacionales en el producto-joya contemporánea y su contexto en cuanto a la innovación, así como la actuación de atributos clave en la definición del diseño y desarrollo del producto, para el consumidor y los productores del sector. Desde la comprensión de valores tangibles e intangibles, se esboza una caracterización del producto, en el marco de un modelo sistémico de gestión del conocimiento, en el que se presentan evidencias relevantes que pretenden favorecer la toma de decisiones del proceso inicial de diseño de joyería contemporánea, en un campo donde la literatura es limitada. La muestra de expertos es consistente y fiable, se logró consolidar datos en siete países, sin embargo, se espera continuar explorando más contextos geográficos y culturales. Se considera que la diversidad en el origen y procedencia actúan como grupos de control multidisciplinar. El estudio busca reconocer los insights del usuario para contribuir con su satisfacción individual y colectiva, mediante una configuración oportuna del producto.

El estudio posee gran valor especialmente para pequeños fabricantes y diseñadores de joyería como por ejemplo de autor, que buscan mayor participación en el mercado. Los aportes realizados se centran en el ámbito empírico, técnico, académico y empresarial relacionado con el producto-joya contemporánea, así como las aportaciones de relevancia

detectadas para el investigador y el diseñador; también pueden servir como base para otros estudios enfocados en el diseño y la gestión en sectores productivos basados en los oficios artesanales.

Palabras clave: *knowledge, design attributes, intangible values, jewellery industry, identity.*

Abstract

Analysis of the key aspects that influence the determination of tangible and intangible attributes, which are contained in aspects of product design jewel contemporary, as enhancers differential values of behavior and preferences by consumers, as well as by the organizations themselves the sector in terms of strengthening the intellectual, competitiveness and identity capital through design and knowledge management.

In the first instance, the methodology considered the collection of information through distinct documentary sources (scientific and professional journals, reports, institutions, specialized events, books, etc.). Then qualitative methods were used for the analysis the opinion of experts and consumers in Latin America and Europe, in order to contrast the importance of the results obtained through documentary information and group sessions. In addition, trends are observed in development environments and interaction with the product through different communication channels specialised for the analysis factors such as design, materials and processes that contribute in making purchasing decisions.

The outstanding findings on relational components in the product-jewel contemporary context in terms of innovation and performance of key attributes in the definition of design and product development for the consumer and producers in the sector. From the understanding of tangible and intangible values, product characterization was outlined as part of a systemic model of knowledge management, in which relevant evidence intended to promote decision making initial process design contemporary jewelry are presented in a field where literature is limited. The expert panel is consistent and reliable. Data were consolidated into seven countries, however, it is expected to continue to explore more geographical and cultural contexts. It is considered that diversity in the origin and source of multidisciplinary groups act as control. The study seeks to recognise the user insights to contribute to their individual and collective satisfaction, through timely product configuration.

The study has great value especially for small manufacturers and jewelry designers such as Signature jewellery, who seek greater market share. Contributions to focus on empirical, technical, academic and business related to the product scope contemporary jewel. The most important contributions are focused on the researcher and designer; they can also serve as a basis for other studies focused on the design and management in productive sectors based on the crafts.

Keywords: *a short list with a maximum of five keywords will be included. For example: design, systems, methods, processes, etc. They will be separated by commas.*

1. Introducción

En el presente trabajo se ha considerado un conjunto de factores como recursos estratégicos que pueden influir significativamente en la variación y los desarrollos del producto joya; mediante la consideración de contenidos sociales y culturales: el conocimiento como recurso metodológico, tecnológico e inmaterial y la carga simbólica del objeto, ambos, componentes potenciales de innovación que influyen los resultados del diseño y son determinantes en la diferenciación de la joya.

El objetivo principal propuesto en este artículo, se orienta a la valoración de los aspectos clave de diseño como fuente de intangibles (conocimiento, expectativas y deseos, reflejados en los atributos) en la innovación del producto joya contemporánea y su contexto organizacional. El análisis metodológico desde una perspectiva cualitativa y cuantitativa, implicó observar los resultados obtenidos tanto desde la visión del diseño como de los valores propios y culturales del objeto. Se desarrolló un cuestionario dirigido al experto, el cual consideró la intervención de diversas áreas del conocimiento como recurso aportador en la creación de valor del producto, de la innovación y del diseño.

Mediante la información basada en la revisión documental y el análisis de los resultados obtenidos: la opinión del experto en joyería contemporánea, del diseñador con conocimiento específico (modelo sistémico de diseño) y de las expectativas del consumidor, se detallan los atributos de diseño configuradores del producto joya contemporánea contribuyentes, con la innovación y la creación de nuevos productos.

Por otra parte, en la clasificación de los atributos finales; se consideran criterios específicos definidos en forma, función y ergonomía (Hernandis & Iribarren, 2000) para la determinación de objetivos específicos y portadores clave de información en la fase creativa para el desarrollo del producto-joya contemporánea. En los siguientes epígrafes, se presentan los componentes que aproximan los aspectos considerados en este estudio y su valoración específica.

1.1. Componentes intangibles y capital intelectual en el desarrollo del producto joya

1.1.1. *El conocimiento como recurso estratégico y diferenciador: capacidades y habilidades*

Las capacidades y habilidades en el desempeño metodológico y tecnológico se basan tanto en el conocimiento como en la experiencia. Vicente Lorente (2000, p. 114) sostiene que las habilidades individuales idiosincrásicas y la prueba y el error en el proceso conforman el buen hacer del artesano y por lo tanto su experiencia; para esto cita a Barney (1991) en la afirmación referente a que el recurso humano puede constituir ventajas competitivas, siempre y cuando se cumpla con una serie de criterios, para la solución de un problema, por lo que la producción de conocimientos es esencial para mantener el éxito competitivo y organizacional. La capacidad de la organización para renovar y lograr formas novedosas e innovadoras de ventaja competitiva se convierte en lo más importante (Ramezan, 2011, p. 93).

Gil y Bedolla (2009) en búsqueda de nuevas estrategias de aproximación al usuario, para el sector artesano, destacan que contar con las distintas áreas del conocimiento en el trabajo colectivo favorece el emprendimiento para la competitividad, evita la inestabilidad y la pérdida de tradición en el sector. Al igual que el «stock» de recursos tecnológicos, el capital humano puede asociarse a situaciones de especificidad, complementariedad, dependencia histórica y ambigüedad causal que aseguran su inimitabilidad y valor (Becker y Gerhart, 1996 en Vicente Lorente, 2000, 114).

Con relación al diseño, Hernandis e Iribarren (2000: 42-53), plantean el conocimiento como recurso de gestión (a niveles de: explotación, gestión, evolución y mutación) para el desarrollo de productos (en fase teórica, fase constructiva y fase informática), y así, la ejecución del proceso se define a partir de distintos niveles y etapas en la fijación y el logro de los objetivos propuestos. La metodología se sustenta en el

análisis, la descripción y la detección de problemas al igual que posteriores correcciones en el diseño industrial, ya sean de tipo técnico, de mercado o del conocimiento.

Por otra parte, en el campo cognitivo y emocional sobre productos tecnológicos, se expone que los atributos del objeto están referidos a sus características propias tangibles e intangibles (prestaciones, usos y funciones) que le determinan como objeto multi-atributo y que la combinación de sus atributos, no necesariamente afectan de la misma manera a consumidores y usuarios. Bajo este criterio, sustentan que un producto puede ser percibido desde cualquiera de sus dimensiones, definidas en: la esfera funcional (la novedad tecnológica y la congruencia), simbólica (la similitud visual de los productos existentes), y estética (producto atractivo) Rindova y Petkova, 2007 en Lee, et al. (2011, p. 1196); las cuales pueden ajustarse a características propias del producto joya, debido a su capacidad relacional y comunicativa de los aspectos tecnológicos y simbólicos que representan sus desarrollos y sus formas.

En el marco de los valores que componen el capital intelectual, desde la perspectiva de recursos humanos, know-how y relaciones de la empresa con el entorno, se hace especial referencia al capital relacional que ofrece información acerca de las tendencias o intereses que muestran los agentes de su entorno, los cuales resultan cruciales para detectar oportunidades tecnológicas o de mercado que guíen su proceso de desarrollo de nuevos conocimientos (Martín de Castro, et al., 2009, p. 87). Según Edvinsson & Sullivan (1996) citados por Hsu & Fang (2009, p. 668), el capital intelectual mejora el desempeño en el desarrollo de nuevos productos, ya que transforma el conocimiento en valor, pero Hsu & Fang van más allá al afirmar que los beneficios de nuevos productos provienen más del capital relacional que de la inversión en capital humano o estructural. (2009, p. 673)

No obstante, otro de los recursos intangibles a los que se hace mención, se refieren especialmente al conocimiento acumulado por la empresa (know-how entre otros tipos de conocimientos), donde la fuente principal es el factor humano (Conner, 1991) y se propone el conocimiento (sus dominios y especialidades) como recurso intangible asociado a factores específicos, sociales y culturales (Vecco, 2010) que asegura la creación de valor en los productos, facilita la creatividad, direcciona a la innovación (Pollalis & Dimitriou, 2008, pp. 310-311) y contribuye con aspectos importantes vinculados al contexto del producto-joya, como por ejemplo, la personalización del objeto mediante la adaptación y experimentación de la técnica y el material (Moraes, 2010).

Además de las consideraciones epistemológicas es importante destacar que estos recursos pueden ser medidos y contabilizados desde la perspectiva de algunos autores como Guthrie, et al. (2012, p. 70) que proponen la contabilidad del capital intangible (ICA por sus siglas en inglés) como una tecnología de gestión, contabilización y rendición de informes hacia el entendimiento, midiendo y reportando los recursos del conocimiento tales como, competencias de los empleados, relaciones con los clientes, marcas, relaciones financieras y las tecnologías de la información y la comunicación, en el desempeño técnico, creativo y de aproximación al consumidor.

1.1.2. El conocimiento en el marco del producto joya

Mc Phail expresa que el conocimiento, la característica definitoria de esta nueva época, es ahora considerado como el principal recurso económico, con los nuevos medios y tecnologías de la comunicación, como facilitadores principales de su uso (2009, p. 804). En este contexto, las herramientas tecnológicas se comportan como un medio tangible, que dinamizan las formas del conocimiento (recurso intangible) basadas en la especificidad, la complejidad y la personalización.

En sectores tradicionales donde los procesos idiosincrásicos conforman la identidad y la esencia del producto como sucede con la joya, la inserción tecnológica y sus avances deben proponerse como herramienta-puente a la modernidad sin ser el reemplazo del recurso humano (artesano, diseñador,

creador de joyas, etc.). Esto implica la conservación de la técnica y de las cargas simbólicas y culturales, características inherentes al objeto, en la definición de los valores intangibles como parte de la significación cultural y de las tendencias actuales de consumo, al mismo tiempo que la adaptación de los procesos demandados por el entorno como lo propone Vecco, (2010); de esta manera, puede garantizarse una vía a la estabilidad del sector joyero en la detección de las nuevas expectativas del usuario (sociales, culturales y emocionales). El valor de las relaciones que mantiene una empresa con los diferentes agentes del entorno con los que se relaciona (principalmente clientes, aliados, proveedores, así como otras empresas e instituciones) o capital relacional, sirven como fuente de información y conocimiento para la propia empresa. (Martín de Castro, et al., 2009, p. 92)

En consecuencia, el conocimiento adquirido como factor que influencia los desarrollos y sus resultados, debe asimilar las oportunidades tecnológicas para la creación de nuevas ideas. Esto apunta también desde una visión organizacional, a la reafirmación del recurso humano como recurso crítico que permite desarrollar y mantener ventajas competitivas basadas en una mayor flexibilidad y capacidad de adaptación al entorno. (Markides y Williamson, 1996 en Vicente Lorente, 2000, 115)

Lo anterior se complementa con la afirmación de Hernandis e Iribarren (2000, p. 53) sobre la gestión del recurso técnico que supone la consideración de características y medios adaptables al alcance del entorno en que se esté trabajando; lo cual necesita contar con el dominio especializado de la técnica y de las herramientas mediadoras para el mejoramiento de la exhibición comunicativa del objeto y el desenvolvimiento creativo. A su vez, los cambios tecnológicos favorecen la exploración técnica y material (experimentación creativa), la aproximación al usuario, la adaptación a ecosistemas actualizados y la creación de ventajas competitivas, que no siempre demanda la pérdida de la tradición, ya que puede ser adaptada a distintos niveles de complejidad necesarios para el sector.

Por lo tanto es necesario destacar que en entornos como el de la joya, debido a su capacidad de conservación, se busca la acentuación de características orientadas a lo único, lo artesanal y lo cultural del objeto como valores intangibles culturales y simbólicos; elementos que resaltan lo propio y lo auténtico (Medina & Hernandis, (2012, p. 71), como camino para la creación de nuevas ideas. Una empresa con una mejor capacidad para adquirir e integrar conocimiento se desempeñará mejor en el proceso de desarrollo de producto, logrando así un mejor rendimiento en el desarrollo de nuevos productos. (Hsu & Fang, 2009, p. 673)

1.2. La experimentación del contexto simbólico de la joya

Un valor que desempeñan marcas joyeras como por ej. Majorica-España o la plata de Taxco-México (AL Invest IV, 2010) con la marca país, designan a la indicación geográfica un atributo intangible basado en el origen, señal intrínseca relacionada con el producto (Auger, et al., (2010, p. 141) que se imputa a la estética del objeto (Bense en Dorfles, (1972, p. 41); Löbach, (1981, p. 62) y asociada a otros ámbitos vitales que le afirman como condición estratégica de competitividad dentro del sector joyero, donde los componentes materiales son dignos representantes de sus entornos creativos, productivos y de uso.

La experimentación consciente de la técnica y del material como elementos asociados a la carga signífica del objeto (Barthes, 1993 en Santisteban, 2009), conlleva al desarrollo de características emblemáticas basadas en lo autóctono y lo auténtico. Esto ha permitido que en ecosistemas artesanales como el de la joya (diferentes a los de productos agrícolas o alimenticios, como por ej. vino, café, entre otros) la denominación de origen, también constituya un sistema de características propias del producto (atributos).

De acuerdo con esto, Auger, et al., (2010, p. 145) se refieren a algunos autores en la importancia de la marca considerada como una señal de información importante o atributo intangible (Aaker, 1991; Wernerfelt, 1988), que actúa de manera específica en la caracterización e identificación del usuario a

través del objeto; y Richardson et al. (1994), describen la marca como un trozo de información que representa un compuesto de la información, reproduce roles dentro del proceso de toma de decisiones de los consumidores, pero la mayor parte de esas funciones giran en torno a una reducción en la incertidumbre.

De acuerdo con lo anterior, Dorfles (1972, p. 69) define el redescubrimiento actual de materiales naturales un hecho participante con la restitución del valor simbólico al objeto gracias a cargas signícas, que al igual que las palabras, cobra vida; así las particularidades como el olor o el color, simbolizan pensamientos y creencias (Falchetti, 1999), conforman el sistema comunicativo del objeto (Codina, 2009), y son definidos como incidentes en la personalidad del individuo y del grupo étnico (Korzybski en Dorfles, 1972, p. 85).

En consecuencia, se determinan aspectos clave que regirán los resultados de este estudio: el conocimiento y las adaptaciones tecnológicas, como recursos tangibles e intangibles fundamentales en el desarrollo del producto joya y su contexto relacional, además de atributos que deben estar contenidos en los objetivos de diseño tanto formales, como funcionales y ergonómicos, según el planteamiento sistémico de Hernandis e Iribarren (2000). Asimismo, se plantean las siguientes hipótesis:

- H1. El análisis de los componentes relacionales del producto joya y su entorno cultural aporta elementos configuradores clave de innovación y diferenciación para el experto creador de joyas.
- H2. Los atributos hacen parte de una o más categorías y pueden actuar bajo dos o más criterios simultáneamente, en términos de forma, función y ergonomía.
- H3. A partir de la comprensión de los tangibles e intangibles caracterizadores del producto joya contemporánea, se plantean las cargas predominantes del objeto a partir de valores que se corresponden con categorías estéticas (forma) preminentemente relacionadas con sus cargas simbólicas propias.

2. Metodología

La importancia procedimental de este trabajo se enfoca entre otros aspectos, en la presentación de los resultados específicos de la opinión del consumidor y en segunda instancia, del desarrollo metodológico que implicó el tratamiento de las encuestas a expertos en diseño y joyería. Por esta razón, el proceso ha tenido en cuenta la investigación cualitativa y cuantitativa de tipo experimental (Blaxter et. al., (2000); datos e información precedentes, el estudio del consumidor y la información sobre expertos presentados en este artículo, los cuales fueron recogidos principalmente de la revisión documental y de la aplicación de un cuestionario.

La extracción de categorías de los atributos. En esta fase se llevó a cabo un panel compuesto por expertos relacionados con dos campos: el diseño y la joyería, en este último se incluye tanto al artesano joyero como al empresario. Al final del proceso, de acuerdo con las gestiones de análisis realizadas a nivel grupal y perceptual, los atributos más apropiados fueron determinados a partir de categorías sistémicas de diseño definidas en forma, función y ergonomía según el modelo de Hernandis e Iribarren (2000). Los componentes de diseño arriba definidos, son considerados para el análisis del producto joya contemporánea, desde la congruencia de cada uno de estos con el objeto y sus desarrollos.

A partir de la técnica grupal, de la que se realizaron varias sesiones, se determinaron los atributos en tres pasos: en primer lugar, creación de una lista básica de atributos por parte de los expertos (Kleij & Musters, 2003), en la cual se generaron setenta y tres elementos; en segundo lugar, modificación de ésta

lista mediante una petición a los participantes para que expresasen sus opiniones acerca de la importancia de los ítems, lo que simplificó el listado. Por último, los expertos generaron un listado final de acuerdo al preliminar y a las opiniones de los participantes (Vigneron & Johnson, 2004, p. 494); de lo que se obtuvieron treinta atributos, abordados mediante la técnica de diferencial semántico (Osgood et. al., (1957). También se determinan los componentes categóricos de diseño (estética, materia prima, viabilidad técnica, control de calidad, mercado, psicología), basados en la información obtenida a partir de la revisión documental y del contexto. Esto dio lugar a la determinación de los atributos considerados en el cuestionario final.

2.1. Recogida de datos

El proceso de aplicación del cuestionario y el contacto con el experto en joyería contemporánea. Este desarrollo incluyó preguntas directamente relacionadas con los atributos específicos y otros factores propios del producto-joya (metodología, tecnología, innovación). El perfil del experto en joyería fue uno de los aspectos importantes a abordar (ver Tabla 1). La construcción del cuestionario, aplicación y recopilación de datos se hizo entre junio de 2011 a enero de 2012; y la puesta en práctica involucró participantes de Latinoamérica y Europa previamente seleccionados (según su experiencia y trayectoria). La asistencia a eventos relacionados con la joya (concretamente en Madrid y Valencia), llamadas telefónicas, el envío del formato online, video conferencias y visitas convenidas en el lugar de trabajo del experto fueron necesarias para la obtención de veinticinco respuestas, con las retroalimentaciones correspondientes. El formato incluyó una guía breve de presentación e introducción, los cuales fueron traducidos (español, inglés y alemán) para una mejor comprensión y la obtención de los datos esperados.

En relación con los atributos configuradores de la joya contemporánea, se planteó un listado inicial de 30 pares opuestos de adjetivos como lo plantearon Vigneron y Johnson, (2004, p. 494) lo que permitió obtener, por parte del experto en joyas un total de trece atributos “totalmente importantes”. Estos fueron contrastados con resultados previos obtenidos con base en la opinión del consumidor, (catorce atributos) para observar las respuestas coincidentes, que determinaron un listado de diez atributos finales (ver Tabla 2).

La opinión del experto en joyería. A través de la literatura se identificaron tres ítems que afectan los desarrollos de la joya contemporánea definidos en: las metodologías como conceptos estratégicos de inspiración y la tecnología como las nuevas maneras del crear y del hacer, planteados como vectores hacia la innovación (conceptos materiales y herramientas) en la creación de valor del producto; los cuales rigen el cuestionario dirigido a expertos en joyería.

Con respecto a las metodologías, los expertos opinaron que satisfacer la demanda del cliente y proponer una mayor variedad de productos al mercado (n=9; 36%) son las principales ventajas de su uso para el desarrollo de productos (ver Gráfico 1).

La tecnología como herramienta de apoyo a los desarrollos en el sector joyero (en referencia a tecnologías de información y comunicación, herramientas y maquinaria actualizadas, medios de distribución, etc.), donde las ventajas más representativas se puntualizaron en la redefinición de los medios de promoción y distribución y la aparición constante de materiales nuevos y adaptables a las joyas (n=23; 92% respectivamente). La mayor desventaja se determinó la minimización de la exclusividad (ver Gráfico 1).

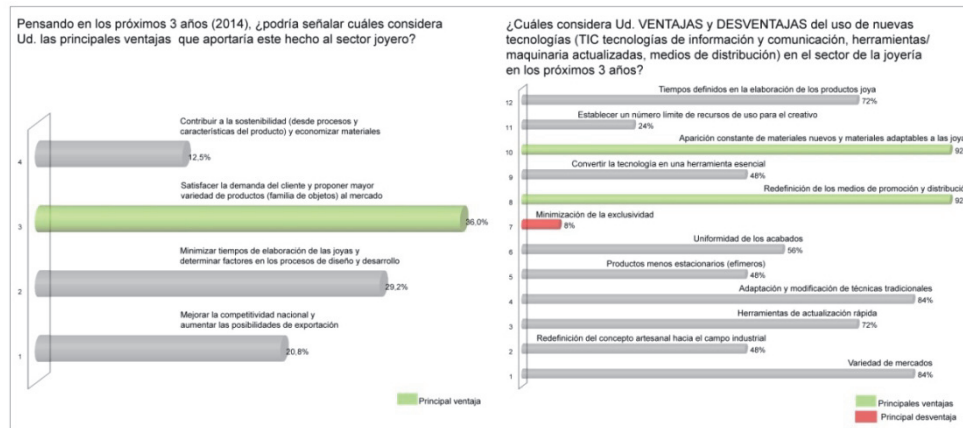


Gráfico 1. Ventajas y desventajas en los desarrollos del experto

Atributos-objetivo de diseño. La definición de atributos que deben estar contenidos en los objetivos del proceso de diseño, constituyen una dimensión cualitativa que se lleva a cabo para evaluar la idoneidad funcional y no funcional de alternativas del producto, frente a diversos criterios tal como lo proponen Sen, et al. (2009, p. 5274). Así, desde la metodología abordada en este estudio, se detallan los atributos finales (ver Tabla 2), basados en la relación atributo-criterios de diseño definidos en forma, función y ergonomía, según el modelo de Hernandis e Iribarren (2000) y son atribuidos a valores porcentuales (ver Gráfico 3) que coadyuvan en la determinación del siguiente paso, en el planteamiento de objetivos que verifiquen los alcances del cumplimiento, la colaboración y la comunicación en el desarrollo de los procesos.

Se exponen conceptos desde la perspectiva del diseño según Hernandis e Iribarren (2000, pp. 60-66), debido a la afinidad entre los términos y relaciones con el producto y el contexto de la joya contemporánea. Los componentes utilizados para este análisis (estética, materia prima, viabilidad técnica, control de calidad, mercado, psicología), son definidos por los autores como variables influyentes en el proceso de diseño y desarrollo de productos; a través de los cuales se determinarán los objetivos formales, funcionales y ergonómicos, como criterios específicos que definen un objeto de diseño. Con base en estos planteamientos, se analizarán a posteriori los objetivos globales pertenecientes a cada uno de los sistemas fundamentales, así como los subobjetivos consecuencia inmediata de la tarea a cumplir por los componentes detectados (Hernandis & Iribarren, 2000, p. 68).

3. Resultados

3.1. Análisis de los resultados

El análisis de los datos se hizo mediante Statistical Package for the Social Sciences 11.5 (SPSS). En el listado de atributos el cálculo del coeficiente alpha de cronbach ($\alpha = 0,92$) fue necesario para comprobar la fiabilidad de la escala utilizada (IBM, 2012). Se hallaron frecuencias y medias para confirmar la hipótesis uno (H1), que define el listado final de atributos específicos de diseño, como características propias del objeto y configuradores del producto joya contemporánea.

Perfil del experto en joyería contemporánea. Se analizaron un total de veinticinco cuestionarios aplicados a expertos en joyería con el siguiente perfil:

Empírico (n=4), técnico (n=7), académico (n=10) y empresa (n=4), áreas de mayor desempeño en el sector. La ubicación geográfica se consideró según 1) la importancia cultural y artesanal en los objetos de joyería; y 2) el reconocimiento del trabajo contemporáneo y experimental con otros materiales distintos a los más tradicionales. Bajo estos principios se definieron también Latinoamérica (n=9; 36%) y Europa (específicamente de España (n=9; 36%) y Alemania (n=7; 28%) como los lugares de interés. El principio geográfico se tuvo en cuenta, con el fin de implicar diferentes perspectivas en distintos contextos con particularidades idiosincrásicas, como factor influyente en el desarrollo de la joya. En consecuencia, se obtuvo el contacto con expertos en joyas de Argentina, Brasil, Colombia, México, España y Alemania como lugares donde la joyería contemporánea ha hecho presencia de manera importante e innovadora (ICEX, (2012); Eurostat, (2009); LEGISCOMEX, (2007); ESADE, (2011)); el aporte participativo europeo se concentró de la siguiente manera: España con nueve expertos (Valencia, n=4 y otras ciudades, como Madrid, Barcelona, Córdoba, Andalucía n=5); Latinoamérica con una muestra igual, y Alemania con siete participantes. Esto permitió un equilibrio entre el panel de expertos.

Tabla 1. Perfil experto en joyería

		n	%
Ubicación geográfica	Valencia	4	16
	Resto de España	5	20
	Latinoamérica	9	36
	Europa (Alemania)	7	28
	Total	25	100
Experiencia	3-5 años	2	8
	6-12 años	11	44
	13-19 años	3	12
	20-30 años	4	16
	> 30 años	5	20
	Total	25	100
Formación *	Especialista	9	36
	Profesional	14	56
	Técnico	8	32
	Artesano	15	60
	Cursos específicos	9	36
	Otros	8	32
	Total	25	100
Área	Empírico	4	36
	Técnico	7	56
	Académico	10	32
	Empresa	4	60
	Total	25	36
Principal actividad *	Tienda	13	54,2
	Taller	20	83,3
	Marketing	8	33,3
	Investigación	7	29,2
	Distribuidor	5	20,8
	Otros	4	16,7
	Total	25	100

* Aspectos en los que el experto se ubica en más de una categoría

La experiencia en el tema de las joyas oscila entre 6-19 años (56%). El nivel formativo se define en dos o más categorías entre especialista, profesional, técnico, artesano y cursos específicos, lo que permitió conocer el tipo de conocimientos entre el recurso humano (ver Tabla 1).

La principal actividad se determinó también en más de una categoría entre tienda, taller, marketing, investigación, distribuidor; lo cual puede deberse a la definición actual y no tradicional sobre la actividad organizacional correspondiente al término empresario (gerentes, consejeros e industriales), bajo el concepto que más que ser personas de negocios independientes se caracterizan por la ejecución del hecho o los hechos que dan sentido a la palabra y la realización de nuevas combinaciones (Schumpeter, 1963, pp. 84-85). La elección del panel consideró para la evaluación, la adecuación de contenidos específicos propios del estudio, en favor de la información requerida a partir de distintas perspectivas en el ámbito de desempeño. Puesto esto en consideración, se valoró formación y experiencia en las áreas correspondientes al campo empírico, académico, técnico y organizacional.

Atributos de diseño configuradores del producto joya contemporánea: la opinión del experto en joyería. Los atributos incluidos en una escala de Likert de siete puntos, donde 1 es nada valorado y 7 totalmente valorado, fueron reducidos a trece como “totalmente importantes” para el experto en joyería, entre los que se obtuvo una media de cinco o superior. Estos fueron definidos en: natural (m=5,00), diseñado (m=5,96), distinción del empaque (m=5,64), moderno (m=5,92), único (m=5,76), exclusivo (5,88), artesanal (m=5,84), alta calidad (m=6,04), seguro (m=5,96), especializado (m=5,40), innovador (m=5,80), auténtico (m=5,92) y cómodo (m=5,68) (ver Tabla 2).

Tabla 2. Atributos de configuración para el desarrollo de una joya contemporánea

($\alpha=0,92$)	Media	n	%		Media	n	%
elegante (c)	5,20	7	28	emblemático	4,24	3	12
natural (e);(c)*	5,00	8	32	artesanal (e);(c)*	5,84	14	56
brillante	4,04	4	16	alta calidad (e);(c)*	6,04	15	60
permanente (c)	3,96	5	20	complejo	4,16	3	12
diseñado (e);(c)*	5,96	16	64	seguro (e);(c)*	5,96	11	44
distinción del empaque (e)	5,64	11	44	tecnológico	5,04	4	16
moderno (e);(c)*	5,92	12	48	especializado (e)	5,40	8	32
único (e);(c)*	5,76	14	56	innovador (e);(c)*	5,80	13	52
detallado	4,08	2	8	prestigioso	5,08	6	24
sencillo (c)	5,24	131	33,2	costoso	4,28	2	8
autóctono	4,64	2	12	de marca	5,32	7	28
exclusivo (e)	5,88	13	52	flexible	5,04	5	20
auténtico (e);(c)*	5,92	13	52	cómodo (e);(c)*	5,68	8	32
sugerente	5,00	6	24	grande	4,08	1	4
proporcional	3,96	2	8	ecológico (c)	5,16	7	28

(e) atributos totalmente importantes para el experto en joyería; (c) atributos totalmente importantes para el consumidor de joyería. * Atributos concurrentes entre la opinión del consumidor y la opinión del experto en joyería

Los resultados arriba presentados se contrastaron con las expectativas del consumidor sobre el producto joya contemporánea, determinados en: *elegante* (m=5,01), *natural* (m=5,54), *permanente* (m=5,29), *diseñado* (m=5,70), *moderno* (m=5,20), *único* (m=5,66), *auténtico* (m=5,91), *artesanal* (m=5,55), *alta calidad* (m=6,18), *seguro* (m=6,09), *innovador* (m=5,45), *cómodo* (m=6,43), *ecológico* (m=5,54) y *sencillo* (m=5,24), también con una media igual a cinco o superior.

Atributos de diseño configuradores del producto joya contemporánea: el contraste de opiniones. El análisis comparativo de los atributos convergentes entre las opiniones del experto-consumidor permitieron obtener resultados más exactos, una reducción de diez atributos: *natural*, *diseñado*, *moderno*, *único*, *auténtico*, *artesanal*, *alta calidad*, *seguro*, *innovador* y *cómodo*, que especifican las características propias inherentes al producto (ver Gráfico 2). Consolidados estos bajo los componentes sistémicos de diseño: *estética*, *materia prima*, *viabilidad técnica*, *control de calidad*, *mercado* y *psicología* propuestos por Hernandis e Iribarren (2000) como esenciales en el desarrollo de productos.

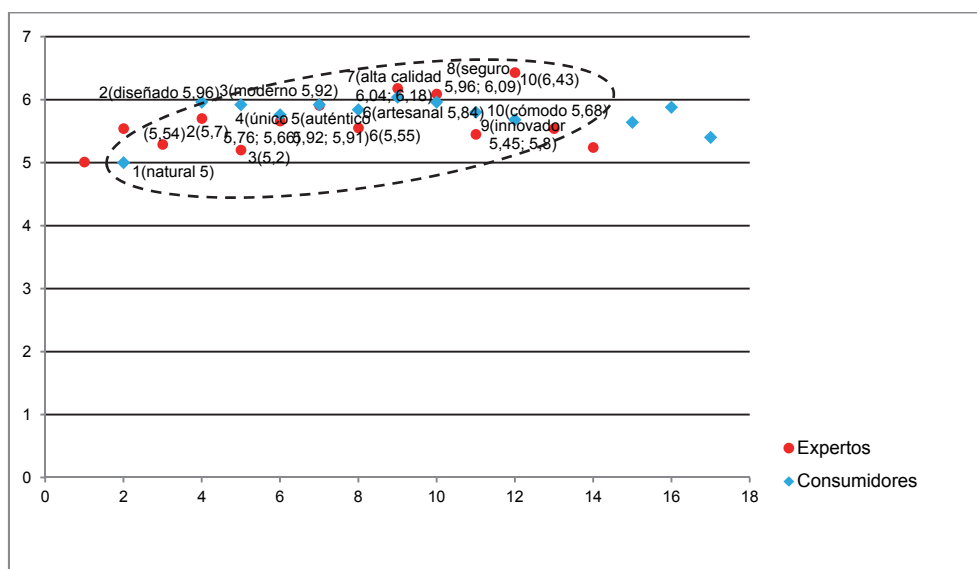


Gráfico 2. Atributos coincidentes entre la opinión del experto en joyería y del consumidor

La definición de los atributos. A partir de los resultados sobre las opiniones confluentes entre expertos (en diseño y joyería) y el consumidor, la revisión documental relacionada con el producto y el diseño (Hernandis e Iribarren, 2000) como participantes en la configuración de la joya contemporánea; el listado final de los atributos más vinculados con en el contexto de la joya, son definidos bajo componentes sistémicos y aspectos asociados al ecosistema de la joya (ver Tabla 3).

Tabla 3. Relación de atributos con componentes de Diseño

Atributo de diseño del producto-joya contemporánea	Componentes sistémicos con los que se relaciona (Hernandis & Iribarren, 2000)	Aspectos sociales, culturales y tecnológicos asociados con los desarrollos de la joya
Natural	Materia prima	Valor simbólico, adaptación al entorno
Diseñado	<div><div>Estética</div><div>Materia prima</div><div>Viabilidad técnica</div><div>Mercado</div><div>Control de calidad</div><div>Psicología</div></div>	Tendencias, identidad, sociedad, cultura, procesos
Moderno	<div><div>Estética</div><div>Viabilidad técnica</div></div>	Tendencias, entorno, procesos
Único	<div><div>Control de calidad</div><div>Psicología</div></div>	Carga emocional, complejidad, resistencia, fiabilidad
Auténtico	<div><div>Control de calidad</div></div>	Técnica, materiales
Artesanal	<div><div>Estética</div><div>Viabilidad técnica</div></div>	Entorno, origen, procesos
Alta calidad	<div><div>Estética</div><div>Materia prima</div><div>Viabilidad técnica</div><div>Mercado</div><div>Control de calidad</div><div>Psicología</div></div>	Tendencias, identidad, sociedad, cultura, procesos
Seguro	<div><div>Materia prima</div><div>Viabilidad técnica</div></div>	Tendencias, complejidad, resistencia, fiabilidad, procesos
Innovador	<div><div>Viabilidad técnica</div></div>	Valor simbólico, adaptación al entorno, procesos, cultura, carga emocional
Cómodo	<div><div>Estética</div></div>	Tendencias, complejidad, resistencia, fiabilidad, uso, salud y bienestar

Materia prima

Mercado

Psicología

Este análisis de relación presentado en la tabla anterior, demuestra que los atributos son mensurables a través de aspectos metodológicos y tecnológicos, que definen los componentes específicos de diseño (estética, materia prima, viabilidad técnica, control de calidad, mercado, psicología), los cuales son atribuidos a recursos tangibles e intangibles definidos en el conocimiento y la adaptación tecnológica correspondientes a los procesos de elaboración y transformación de un producto determinado y sus contextos de implicación.

Clasificación de los atributos: la opinión del diseñador. La elección del panel de expertos en diseño, requirió especial atención en la consideración de un perfil con conocimientos específicos; de esta manera

se determinaron los principios de selección en: el conocimiento y la experiencia en diseño y su relación con el modelo sistémico de diseño. Esto con el fin de evaluar objetivamente los contenidos y favorecer la precisión de los resultados desde una visión más especializada.

Para clasificar los diez atributos finales correspondientes al producto joya contemporánea, se pidió a través de un formato online, su clasificación según los criterios de diseño: forma, función y ergonomía (Hernandis & Iribarren 2000:66); el proceso precisó veintinueve diseñadores docentes y estudiantes de máster en la Universidad Politécnica de Valencia, relacionados con el modelo sistémico de diseño para el desarrollo de productos. En el análisis de los resultados se calculan frecuencias para observar la mayor incidencia en cada uno de los criterios de diseño (forma, función y ergonomía). La clasificación de los atributos finales, según la opinión de los diseñadores fue definida así: diseñado (55,2%) y alta calidad (69%) como aspectos correspondientes a la función; seguro (62,1%) y cómodo (86,2%) están relacionados con la ergonomía, mientras que natural (69%), moderno (89,7%), único (62,1%), auténtico (72,4%), artesanal (75,9%) e innovador (72,4%) son atribuidos a la forma. También se observó que diseñado fue un atributo común entre las categorías de forma y ergonomía con un valor de 55,2%, respectivamente (ver Gráfico 3), lo que confirma la hipótesis 2 (H2).

Para la medición de atributos, es necesario destacar, que un atributo puede ser cuantitativo o cualitativo; sin embargo, la técnica de medición desarrollada en esta fase, fue cualitativa. Esta clasificación permitió comprobar cómo son comprendidos y percibidos los atributos inherentes a la joya, desde una perspectiva del diseño; los resultados señalan que los valores predominantes que le caracterizan, pertenecen a criterios relacionados con la forma lo que confirma la última hipótesis propuesta en este artículo (H3). Además, se ha evidenciado la importancia de cada atributo mediante cantidades porcentuales para la configuración del producto joya contemporánea.

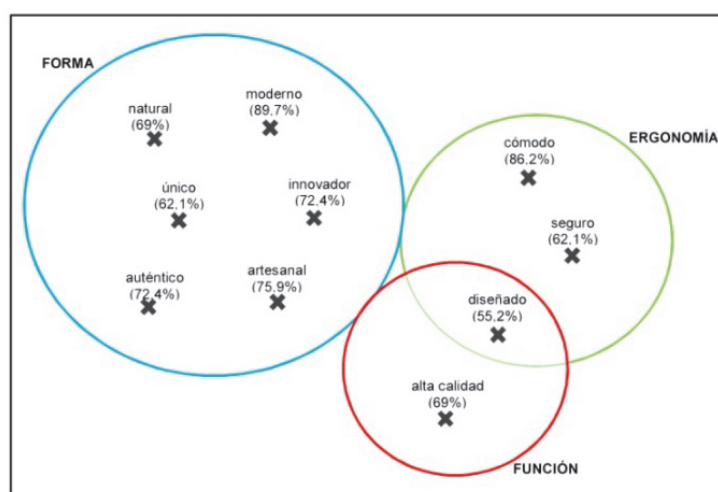


Gráfico 3. Clasificación de atributos según criterios de diseño (forma, función, ergonomía). Ejemplo de la posibilidad de interacción de atributos bajo dos o más criterios simultáneamente. En este caso el atributo diseñado en el ámbito de función y ergonomía.

Finalmente, es necesario destacar que la metodología cualitativa abordada, ha permitido hacer mensurables los atributos. Esta se basó en la clasificación y definición de los mismos, procedimiento fundamental para la indicación de cambios elementales, la toma de decisiones en el proceso de desarrollo y el suministro de información sobre problemas de calidad, comunicación y fallos. Esto permitirá la

definición de objetivos considerando ciertos atributos clave, como tarea primordial para facilitar la comprensión y el desempeño de su ejercicio.

Otros análisis de relevancia. Teniendo en cuenta la importancia del empleo de métodos óptimos en los procesos de análisis, interpretación y diseño como parte esencial de la concepción y subsecuente fabricación de la joya, la tecnología como recurso actualizado que apoya la creatividad, y ambos, como vectores capaces de impulsar la innovación y la creación de valor del producto; son analizados en este artículo desde las perspectivas planteadas, pero surgen otras premisas que involucran estos dos aspectos, tales como la medición de la variable conocimiento por parte del experto en joyas, en términos de la formación, la profesión, especialidad y experiencia, para reforzar los planteamientos iniciales arriba expuestos. De esta manera, y según este procedimiento se observa lo siguiente:

- Con respecto a las metodologías, los expertos concluyen que las principales ventajas para el sector están enfocadas en satisfacer la demanda del cliente y proponer mayor variedad de productos al mercado (n=9; 36%). Esto pensando a un mediano plazo de 3 años.

- En cuanto a la tecnología, los expertos en joyas estimaron que el porcentaje actual del sector en cuanto al uso de nuevas tecnologías, corresponde a valores entre 25 a 75 por ciento (25% - 50%: n=9; 36% y 50% - 75%: n=7; 28%); siendo su principal ventaja la redefinición de los medios de promoción y distribución, y la aparición constante de nuevos materiales y adaptables al producto joya (n=23; 92%, respectivamente) y la desventaja más representativa la minimización de la exclusividad (n=23; 92%), seguida de la redefinición del concepto artesanal hacia el ámbito industrial y la estacionalidad de los productos de joyería (n=13; 52%, respectivamente).

4. Conclusiones

Las conclusiones de este artículo evidencian varias implicaciones prácticas. En primer lugar, los expertos en joyería deben enfocar sus intereses al refuerzo de los recursos intangibles que constituyen el entorno y su trabajo. En segundo lugar, este estudio pretende favorecer la toma de decisiones pertinentes al proceso inicial de diseño de joyas; esto sugiere el tratamiento de la información concreta que puede ser clave en la estrategia de la innovación; y en tercer lugar, se trata de hacer un aporte al experto en joyas, mediante el manejo de información fundamental que posee una fuerte influencia en el criterio de aceptación del producto. Los resultados de análisis cualitativo confirman la relación entre los contextos metodológicos y tecnológicos. Los aspectos y hechos que fortalecen la competitividad del sector se definen en: la experimentación, que permite la creación de otros ámbitos especializados; el dominio del conocimiento como recurso intangible del capital intelectual que propone nuevas lecturas del producto a través de transmitir contenidos emocionales, sociales y culturales; y en la innovación tecnológica como herramienta que contribuye a mejorar el *modus vivendi* del sector y resalta las características propias de la joya actual basadas en lo natural y lo auténtico. De la misma manera, ha permitido perfilar el listado de atributos, a través de la relación con el diseño, como medio que posibilita la innovación en los desarrollos del producto joya contemporánea.

Por otra parte, los resultados constatan que componentes relacionados con factores culturales, como las cargas signícas, afectan al diseño y desarrollo de las características propias del objeto; el cual puede ser interpretado, como elemento de diferenciación de la joya. Asimismo, se obtienen evidencias a favor de la simplificación de los atributos finales como configuradores del producto joya contemporánea; mediante las opiniones obtenidas en la aplicación de los cuestionarios. De esta manera, se confirma la hipótesis 1. No obstante, esta información no es absoluta ya que controlar una característica del proceso no significa necesariamente controlar el proceso; para esto es necesario además, considerar aspectos cuantitativos, que

sin dejar de ser irrelevantes, no son pertinentes en este abordaje. Por esta razón, es importante comprender que los aportes presentados, se proponen como parte del todo.

En acuerdo con lo anterior, es necesario resaltar que la base de este estudio se orientó a la comprensión, observación y análisis desde una visión cualitativa. Teniendo en cuenta que, gran parte de los datos actuales existentes, se han preocupado por dejar muy bien definido el lado cuantitativo del tema joya, basados por ejemplo en mediciones, pesos, densidades exactas del material y el uso adecuado de las herramientas, también es conveniente incluir aportes que contribuyan al mejoramiento cualitativo del producto y sus procesos.

De esta manera, el estudio se direcciona a la aportación de datos relevantes para la configuración del producto joya contemporánea, mediante el análisis y contraste de los resultados entre las opiniones de expertos y consumidores. La implicación del diseño justifica los valores propios del objeto, a través de conceptos basados en el origen y la tradición como lo demuestran los atributos natural, auténtico y artesanal. Por otra lado, los aspectos considerados previamente como el manejo experimental del material y de la técnica, la especialización y la experiencia en el dominio del conocimiento y de las habilidades se plantean como ventajas estratégicas en la mediación metodológica y comunicativa de lo que se requiere y se espera de la joya (insights) en el entorno actualizado, permitiendo la generación de nuevas ideas.

El análisis cuantitativo permitió observar que los aspectos fundamentales, puntualizados en este artículo en el conocimiento y la tecnología, son comprendidos claramente por el sector joyero, como herramientas que le permitirán establecer una estrecha relación con el usuario directo (92%) y conocer la valoración de este frente a lo que el creador de joyas le ofrece. De ahí, que el sector joyero debe enfocar sus objetivos creativos y productivos en la actualización y adaptación de sus productos y procesos, mediante la creación de valor en el ecosistema del producto. Por esto, el experto en joyería debe ser consiente del uso adecuado de las herramientas apoyo, que le permitan aproximarse cada vez más al cumplimiento de las expectativas emocionales, sociales y culturales del usuario, en busca de su lealtad.

La hipótesis 2, es verificada a través de los resultados alcanzados en esta investigación, sugieren además que un atributo puede pertenecer o actuar bajo dos o más criterios simultáneamente. Esto se evidencia en la identificación del atributo diseñado, clasificado en forma y ergonomía; lo cual significa que ningún atributo es exclusivo sino que, dependiendo de las condiciones estéticas, comunicativas y del entorno del producto, un atributo puede afectar de forma integrada los resultados del proceso, no siendo incompatible con los demás atributos, sino más bien complementario. Los significados que abarcan los conceptos de conocimiento y tecnología dentro del contexto simbólico del objeto, desde una perspectiva sistémica de diseño (Hernandis & Iribarren, 2000), fueron percibidos por los diseñadores participantes, dentro de las características propias del producto joya, como signos atribuidos a la estética (forma). Esto teniendo en cuenta la clasificación realizada, a partir de criterios de diseño definidos en forma, función y ergonomía (Hernandis e Iribarren, 2000). De esta manera se valida la última hipótesis (H3) planteada.

Otro aporte clave, se define en la utilidad que supone la medición cualitativa desarrollada. La clasificación de los atributos posibilita una fácil comprensión por parte del experto en joyas sobre la información que sugiere, si esta es requerida para el desarrollo de sus procesos, esta también puede ser considerada de manera total o parcial. Los aportes que provee este estudio, cuentan con la cualidad de ser flexibles y no definitivos, en la mejora de calidad, comunicación y aceptación de producto a diseñar.

Finalmente, el estudio es de gran valor sobre todo para los minoristas de joyería, que buscan el aumento de su cuota de participación en el mercado. El enfoque de los aportes está centrado en la información específica tanto para el empírico, el técnico, académico y el empresario relacionados con el producto joya contemporánea como para el investigador y el diseñador. Además, esta investigación contribuye a la

incorporación de nuevos datos en el campo de la joya, desde diferentes puntos de vista distintos a los aspectos cuantitativos.

5. Futuras investigaciones

Para concluir se pueden señalar interesantes sugerencias de los resultados hacia la investigación futura. En primer lugar, para aproximarse aún más al concepto de percepción del usuario, es importante identificar en tiempo real los insights del consumidor sobre los aspectos tangibles e intangibles que comunica el objeto. Se pretende aplicar otras medidas que superen las insuficiencias de un tratamiento verbo-céntrico que refinen la información y los resultados obtenidos hasta el momento. Para esto se propone el estímulo sensorial con un grupo definido de posibles consumidores de joyas, donde se resalten las características y posibilidades materiales e inmateriales de los atributos propios del producto joya contemporánea. En segundo lugar, con respecto a los resultados obtenidos se propone la incorporación de nuevos aportes teóricos útiles para el estudio desde la perspectiva del diseño y prácticos para el sector de la joyería contemporánea. Por último, un análisis pormenorizado de la actividad de estímulo sensorial debería revelar los aspectos que definen los objetivos de los atributos propuestos, características inherentes al producto. De esta manera, el reto que se plantea enfoca el análisis detallado de las diferentes alternativas metodológicas y de análisis que consideraron este estudio, para así poder extraer conclusiones sobre el efecto que ejercen los tangibles e intangibles metodológicos y tecnológicos como consecuencia de la innovación, así como ofrecer un lenguaje común de los resultados más importantes para el experto relacionado con las joyas.

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Design e desenvolvimento de novos produtos através da transferência de conhecimento entre Brasil, Espanha e Portugal

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Resumo

Este documento relata a experiência adquirida através de um projeto de cooperação internacional realizado entre quatro instituições de ensino e pesquisa, tendo em vista a aplicação técnica do conhecimento do design para a criação e desenvolvimento de novos produtos a partir do uso de três matérias-primas naturais distintas: fibra, madeira e pedra. Das metas almejadas buscou-se principalmente a capacitação dos discentes de Design do Departamento de Design e Expressão Gráfica da Universidade Federal do Amazonas (DEG/UFAM) para atuação e o desenvolvimento de novos produtos; a valorização de matérias-primas naturais da Amazônia, assim como o saber tradicional, cultural e do design e a troca de conhecimento, tecnologia, experiência profissional e científica entre os seus participantes. O projeto foi desenvolvido com base em pesquisas qualitativas e quantitativas, com caráter descritivo, explicativo, exploratório e experimental. Foram realizados: levantamento de dados bibliográficos e de publicações científicas sobre as matérias-primas, pesquisa in loco e estudo de casos. Também realizou reuniões em equipes e aplicou como método de investigação a técnica focus group e a prática de formulários de observação. Como resultados o projeto gerou 13 (treze) protótipos de produtos, com base no conhecimento e técnicas compartilhadas entre as instituições parceiras, 11 (onze) registros de patentes, 1.000 (mil) exemplares de catálogos apresentando as informações técnicas e científicas referentes aos produtos da pesquisa, e, por fim, fortaleceu as parcerias internacionais e institucionais envolvidas no projeto, com possibilidades de novas ações, em conjunto, para o futuro.

Keywords: *Design, Matérias-primas naturais, Novos produtos, Transferência de conhecimento, Cooperação Internacional.*

Abstract

This paper reports the experience gained through an international cooperation project carried out in four educational and research institutions, with a view to technical application of design knowledge for the creation and development of new products from the use of three natural raw materials different: fiber, wood and stone. The desired goals was, primarily, training of Design students of the Department of Design and Graphic Expression of the Federal University of Amazonas (DEG / UFAM) for performance and development of new products; the valuation of natural raw materials from the Amazon, as well as traditional knowledge, cultural and design, and the exchange of knowledge, technology, professional and scientific experience among its participants. The project was developed based on qualitative and quantitative research with descriptive, explanatory, exploratory and experimental. It carried out: survey of bibliographic data and scientific publications about the raw materials, on-site of the research and case studies. Also it held meetings in teams and applied as a research method the focus group technique and practice forms of observation. As a result the project generated thirteen (13) prototypes of products based on knowledge and shared technology between partner institutions, eleven (11) records of patents, one thousand (1,000) copies of catalogs presenting the scientific and technical information relating to products's research, and finally was strengthened the international and institutional partnerships involved in the project, with possibilities of new shares together for the future.

Keywords: *Design, Natural raw materials, new products, knowledge transfer, international cooperation.*

1. Introdução

O desenvolvimento de novos produtos é considerado como um meio importante para a criação e sustentação da competitividade (DE TONI, DEONIR; MILAN, GABRIEL SPERANDIO y SCHULER, MARIA, 2005). Identificar as oportunidades que busquem sistematicamente informações que permitam a organização adequada para a aceitação comercial de produtos e/ou serviços, pode dispor de uma grande probabilidade de sucesso, com soluções às necessidades expressas pelo mercado (PACHECO, K. M. M.; ORTUÑO, B. H.; MIRANDA, I. P. A.; NASCIMENTO, C. C. y PACHECO, A. S., 2011). O potencial existente no uso das matérias primas naturais para o desenvolvimento de novos produtos além de gerar benefícios econômicos à sociedade, também vem sendo cada vez mais valorizado pelos meios acadêmico, científico, tecnológico, e industrial. Universidades, Institutos de Pesquisas e Órgãos de Fomentos, vêm nos recursos naturais a oportunidade de valorizá-los e lhes atribuir novas funções de uso e consumo, através da colaboração mutua entre instituições que prezam pela qualidade da formação e capacitação profissional de pessoas, principalmente aquelas que se preparam, identificam ou atuam no campo de projetos e desenvolvimento de produtos a partir utilização de materias-primas naturais. Sabendo que a formação acadêmica é o primeiro grande passo para que os alunos compreendam como planejar e desenvolver um novo produto, de acordo com as necessidades do mercado, agregando a isso fatores estratégicos e inovadores que possam garantir a sua aceitação por parte dos consumidores, e que a

transferência de conhecimento, de tecnologia e de experiência são aspectos primordiais durante esse processo, o Departamento de Design e Expressão Gráfica ((DEG) da Universidade Federal do Amazonas (UFAM/Manaus-Brasil); o Laboratório de Engenharia de Artefatos de Madeira (LEAM) do Instituto Nacional de Pesquisas da Amazônia (INPA/Manaus – Brasil); o *Departamento de Ingeniería Gráfica del Diseño* (DIG) da *Universitat Politècnica de València* (UPV/Valencia – Espanha) e o Centro Tecnológico da Pedra Natural de Portugal (CEVALOR/Borba – Portugal), uniram-se através do apoio financeiro da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES/ Brasil), para desenvolver um Projeto de Cooperação Internacional, intitulado como: Design e Desenvolvimento de Novos Produtos a Partir de Matérias-Primas Naturais da Amazônia, que colocasse em prática a aplicação técnica do conhecimento do design para a criação e desenvolvimento de novos produtos a partir do uso de três matérias-primas naturais distintas: fibra, madeira e pedra. O trabalho também contemplou os seguintes objetivos:

- Valorizar as matérias-primas naturais da Amazônia, assim como o saber tradicional, cultural e do design;
- Trocar conhecimento, tecnologia, experiência profissional e científica entre os seus participantes;
- Capacitar os discentes de Design do Departamento de Design e Expressão Gráfica da Universidade Federal do Amazonas (DEG/UFAM) para atuação e o desenvolvimento de novos produtos;

2. A proposta do Projeto

A ideia para desenvolver um projeto de cooperação internacional, partiu da tentativa de relacionar e unir elementos naturais de lugares distintos para a composição estrutural de um design de produto. Com essa intenção, a proposta buscou envolver a participação de três países: Brasil, Espanha e Portugal, e com eles trabalhar uma parceria em prol do uso de matérias-primas naturais, entre elas: da Amazônia e da Europa, para a gestão e fabricação de novos produtos, de modo a valorizar e prezar pelos aspectos técnicos, científicos, socioculturais, econômicos e eco sustentáveis. Outro fator também a ser considerado para a prática da pesquisa, seria ter o design como agente gerenciador das atividades e dos processos de transformação desses recursos naturais e de outros materiais que pudessem ser necessários para a criação e o desenvolvimento dos produtos. Para a materialização da proposta foi importante identificar as instituições que poderiam fazer parte da equipe técnica do projeto e com elas definir quais as matérias-primas a serem investigadas, os objetivos que deveriam ser alcançados e as etapas necessárias para a realização da pesquisa. Os convites para compor parcerias foram feitos às seguintes instituições de ensino, pesquisa e tecnologia: Instituto Nacional de Pesquisas da Amazônia (INPA- Brasil); Universitat Politècnica de València (UPV – Espanha); e Centro Tecnológico da Pedra Natural de Portugal (CEVALOR – Portugal), que após conhecerem melhor os princípios do trabalho, aceitaram de imediato a fazer parte do mesmo. A Universidade Federal do Amazonas (UFAM), através do Departamento de Design e Expressão Gráfica - considerado o autor da proposta, foi nomeada a sede do projeto. A iniciativa obteve a aprovação por parte da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), que financiou a realização da pesquisa no Brasil, por meio do Programa Pesquisador Visitante Especial (PVE), conforme a Chamada Pública N° 61/2011.

2.1 Objetos do estudo

A opção de trabalhar com a fibra vegetal de tucumã-i (*Astrocaryum acaule*) do Amazonas, algumas espécies de madeiras naturais da Amazônia e a pedra mármore branco de Portugal com veios, como objetos de estudo, foi realizada em concordância com a Coordenadora Técnica do Projeto, a Pesquisadora Visitante Especial e a CAPES e também em função das especialidades e produções científicas das pesquisadoras principais e das instituições parceiras que dispunham das referidas matérias-primas. Os recursos naturais utilizados na proposta possuem características técnicas interessantes. E quando adaptados para produtos são capazes de oferecer muitas vantagens aos consumidores e ao mercado. A seguir, alguns dos dados identificados e considerados importantes em cada um deles.

1.1.1. Fibra de tucumã-i (*Astrocaryum acaule*)

Esta fibra deriva do tucum originada pelo gênero *Astrocaryum* da espécie *acaule*, também conhecida por tucumã-i (Fig.1), uma classe de palmeira localizada em grande parte na região do Alto Rio Negro – no estado do Amazonas, norte do Brasil. É produzida, cultivada e processada de forma sustentável e artesanal por comunidades indígenas e caboclas (MACIEL et al., 2011). Possui características físicas plausíveis, e pode ser aplicada em diversos tipos de produtos, desde acessórios para uso pessoal como pulseiras, colares e bijuterias, até produtos com uma escala maior, como vasos, cestos e até mesmo roupas. O uso da fibra em produtos é flexível, pois é útil para diversas categorias (PACHECO et al., 2011). Além da aparência exótica e o aspecto visual atrativo, é bastante resistente, sem produzir elementos tóxicos ou mal cheiro, possibilitando uma aplicação segura, reforçada pela maleabilidade da sua estrutura que torna-se adaptável aos mais diferentes e variados tipos de produtos.



Fig. 1 Fibra de tucumã-i (*Astrocaryum acaule*) e sua aparência exótica

1.1.2. Pedra mármore branco de Portugal com veios

A pedra mármore branco de Portugal com veios (Fig.2), apresenta como características inerentes: dureza, resistência e vergadas. Descrevendo-a macroscopicamente tem-se: calcário microcristalino rosado, bioclástico a bioconstruído, abundantemente fossilífero, com bastantes estilólitos, alguns deles semi-abertos, e esparitizado (INETI, 2014). O seu processo de produção envolve a mistura de alta tecnologia com o trabalho artesanal. A sua aplicação e funcionalidade são amplamente justificadas pelas suas características técnicas. Além de apresentar boas características físicas e mecânicas, resistência e durabilidade, observando o comportamento humano a partir de produtos ou ambientes criados a partir dessa matéria-prima. Além disso, possui em suas características intrínsecas, que influenciam o bem-estar humano, os fatores-chave do material na criação de novos produtos, assim como muitas outras variáveis consideradas importante a todo o processo (CEVALOR, 2014).



Fig. 2 Pedra mármore branco de Portugal com veios

1.1.3. Madeiras naturais da Amazônia

As madeiras amazônicas (Fig.3) por sua facilidade de obtenção e manuseio, são um dos recursos naturais mais utilizados pelo homem, os produtos gerados a partir delas atendem satisfatoriamente diversos tipos de mercados e consumidores, por apresentarem boa durabilidade e adaptação ao processo de acabamento, alta resistência física e mecânica, variações entre alta e média densidade (NASCIMENTO y MONTEIRO DE PAULA, 2012).

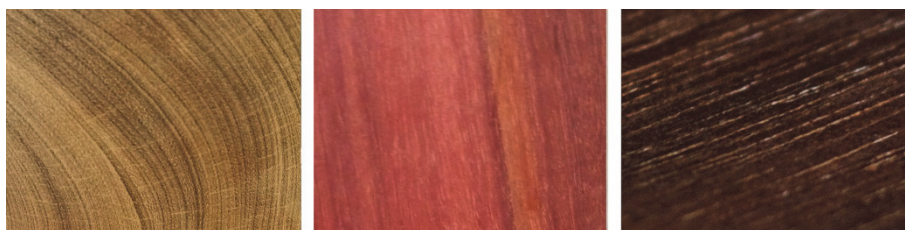


Fig. 3 Algumas das madeiras amazônicas utilizadas no projeto

Devido a grande variedade, é comum que se atribua o mesmo nome vulgar às várias espécies de madeiras botanicamente distintas, e do mesmo modo, com propriedades tecnológicas diferenciadas. Ainda que estas matérias-primas gerem resíduos a partir dos seus processos de adaptação para produtos, estes mesmos resíduos podem ser reaproveitados e transformados em novos produtos, atividade que condiz com o propósito da eco sustentabilidade.

Assim, das madeiras amazônicas selecionadas para o projeto destacam-se: itaúba (*Guarea trichilioides* L.), maçaranduba (*Manilkara huberi* Ducke), cedrinho (*Erismia uncinatum*), tanibuca (*Buchenavia huberi* Ducke), anjelim-pedra (*Hymenolobium petraeum* Ducke), marupá (*Simarouba amara* Aubl), louro Aritu (*Licaria aritu* Ducke), guariúba (*Claricia raecemosa* Ruiz), sucupira (*Bowdichia nitida*), cedro (*Cedrela fissilis*) e anjelim-vermelho (*Andira parviflora* Ducke).

2.2 Participação das instituições parceiras no projeto

O projeto foi estruturado com base em quatro vertentes: Ensino, Pesquisa, Tecnologia e Mercado, visando também os aspectos científicos, socioculturais, econômicos e eco sustentáveis. Para tanto, a parceria realizada com duas instituições europeias (Espanha e Portugal), uma local (pertencente à cidade de Manaus no estado do Amazonas/Brasil) e uma de fomento de caráter nacional (Brasil), foi extremamente importante e estratégica. Cada instituição envolvida (Fig.4), pôde colaborar de acordo com a sua *expertise* e proporcionar espaços, equipe técnica e materiais para a realização da pesquisa.



Fig. 4 Instituições parceiras do projeto: UFAM, INPA, UPV e CEVALOR

Das competências atribuídas e prestadas por cada instituição parceira:

- Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES/ Brasil) - Órgão financiador do projeto e investidor na formação e aperfeiçoamento de recursos humanos e de alto nível no país e exterior, serve de instrumento para a comunidade universitária na busca de um padrão de excelência acadêmica para prática e desenvolvimento de projetos e pesquisas e promoção da cooperação científica internacional;
- Departamento de Design e Expressão Gráfica (DEG) da Universidade Federal do Amazonas (UFAM/Manaus-Brasil) - Sede de desenvolvimento do projeto. Como coordenação geral da pesquisa, disponibilizou 01 (um) laboratório de design: para a prática das atividades de produção de relatórios técnicos, reuniões com as equipes de trabalho, realização de briefings e demais métodos de investigação, criação das alternativas para protótipos e acompanhamento de trabalhos manuais concretizados pelos especialistas técnicos e artesãos participantes da equipe; e 01 (uma) marcenaria: para a produção de uma parte das peças idealizadas pelo projeto. O DEG foi responsável por liderar as investigações feitas sobre a fibra de *tucumã-i* (*Astrocaryum acaule*), e orientar quanto a postura e conhecimento do design a serem adotados e aplicados durante às ações tomadas para o levantamento e análise de dados, definição dos requisitos e parâmetros para os processos de criação e geração das alternativas de protótipos, produção e acabamento dos protótipos, criação e desenvolvimento do material gráfico e de divulgação do projeto, planejamento e organização das exposições dos produtos e produção de relatório final com os resultados do projeto;
- Laboratório de Engenharia de Artefatos de Madeira (LEAM) do Instituto Nacional de Pesquisas da Amazônia (INPA/Manaus – Brasil), parceiro e colaborador no processo de investigação e escolha das espécies de madeiras amazônicas utilizadas pelo projeto. O LEAM foi responsável por liderar as investigações feitas sobre as madeiras amazônicas, orientou quanto os aspectos tecnológicos, processos de adaptação e produção dos produtos a partir delas. Assessorou

tecnicamente na construção das informações, sobre as espécies catalogadas e certificadas, para esclarecer a respeito do uso das madeiras nas composições estruturais dos produtos. Auxiliou a equipe técnica do projeto durante as pesquisas de campo realizadas em cidades que disponham de produtos artesanais desenvolvidos com as mesmas madeiras utilizadas no projeto. Disponibilizou mais de 15 (quinze) espécies de madeira amazônica para a realização do projeto, 01(um) laboratório técnico equipado com ferramentas e maquinários para proceder com a fase de levantamento de dados sobre as madeiras e 01 (uma) marcenaria para a produção da outra parte das peças idealizadas pelo projeto;

- *Departamento de Ingeniería Gráfica del Diseño (DIG) da Universitat Politècnica de València (UPV/Valencia – Espanha)*, parceiro e colaborador no processo de orientação sobre as atividades técnicas do design. O DIG, em conjunto com o DEG, forneceu informações técnicas sobre os atributos do design necessários para o desenvolvimento de novos produtos e sobre os métodos sistêmicos a serem aplicados durante as etapas de criação e geração de alternativas para os protótipos. Recepcionou a Pesquisadora Visitante Especial, nas dependências da Escuela Técnica Superior de Ingeniería del Diseño, para junto desenvolverem um workshop sobre as pesquisas levantadas no Brasil e Portugal, referentes aos objetos de estudo, e acompanharam as criações (propostas de produtos) dos alunos de design da UPV para avaliarem e decidirem os protótipos do DIG a serem confeccionados pela equipe técnica do projeto nas dependências do DEG/UFAM e LEAM/INPA ambos no Brasil, como também no Centro Tecnológico da Pedra Natural de Portugal CEVALOR, em Borba/Portugal.
- Centro Tecnológico da Pedra Natural de Portugal CEVALOR/Borba – Portugal), parceiro e colaborador no processo de adaptação e uso da pedra mármore branco de Portugal com veios para o desenvolvimento dos produtos do projeto. A CEVALOR juntamente com a Pesquisadora Visitante Especial, foram as fontes de orientações e informações sobre a pedra - um dos objetos de estudo. O centro disponibilizou a sua marmoraria com maquinário eficiente e de primeira linha, e 01 (um) técnico profissional para assessorar a equipe técnica do projeto nos trabalhos de confecção dos protótipos que possuíam a pedra mármore branco de Portugal com veios em suas estruturas. Relacionou as atividades de investigação sobre a pedra com a importância da transferência tecnológica, demonstrando as etapas de adaptação e transformação da mesma, ressaltando o bom uso da matéria-prima, formando o conhecimento e informando o diferencial das rochas ornamentais e industriais.

2.3 Formação, capacitação, troca de conhecimentos, experiências e tecnologias

O projeto inicialmente buscou preparar o conhecimento dos seus participante sobre a importância do uso de matérias-primas naturais da Amazônia junto a um recurso natural europeu (pedra), para o desenvolvimento de novos produtos. Para isso, a equipe técnica do projeto (Fig.5), dividiu-se em três grupos distintos: grupo de pesquisa sobre a fibra de tucumã-i (*Astrocaryum acaule*); grupo de pesquisa sobre as madeiras naturais da Amazônia; e grupo de pesquisa sobre a pedra mármore branco de Portugal com veios. Após a referida divisão, foi dado início a fase do levantamento de dados sobre cada objeto de estudo.



Fig. 5 Equipe técnica do projeto em reunião para divisão dos 3 grupos de pesquisa distintos

Cada equipe (Fig.6, 7 e 8), recebeu as devidas orientações por parte de suas coordenadoras de pesquisa, e saíram a campo em busca de informações técnicas e científicas, assim como exemplos de experimentos ou estudos similares que tenham registrado dados sobre tais recursos. Os componentes de cada grupo tiveram a oportunidade de consultar, dialogar, trocar e registrar informações a respeito do objeto da sua pesquisa junto a especialistas, instituições, lojas, empresas e mercado que trabalham com o tema da investigação.



*Fig. 6 Grupo de pesquisa sobre a fibra de tucumã-i (*Astrocaryum acaule*)*



Fig. 7 Grupo de pesquisa sobre as madeiras naturais da Amazônia



Fig. 8 Grupo de pesquisa sobre a pedra mármore branco de Portugal com veios

Esses contatos, puderam relatar, mostrar e indicar a todos os participantes do projeto as oportunidades e limitações que as materiais primas poderiam apresentar com respeito ao propósito da pesquisa. Ao passo que cada grupo conseguia ir compreendendo o universo do seu objeto de estudo, produzia um relatório parcial resumindo os dados capturados a cada etapa da investigação. Tais documentos tornavam-se a bússola que direcionava os caminhos a serem percorridos mais a diante. É importante ressaltar que, a cada relatório parcial entregue, os três grupos se reuniam e cada um deles explanava o que haviam vivenciado e aprendido até aquele momento. Durante as explicações, os representantes das instituições parceiras e unidade sede do projeto faziam também as suas contribuições, de modo a ajudar às equipes nas tomadas de decisões e futuras ações para o andamento das pesquisas. Esta primeira experiência (divisão das equipes e o levantamento de dados sobre os objetos de estudo) proporcionou aos discentes, docentes, técnicos e colaboradores do projeto um aprendizado em conjunto, o que facilitou as trocas de informações e definição dos métodos e as atividades que poderiam ser utilizadas para registrar dados e melhor aproveitá-los durante as fases da criação, desenvolvimento e produção dos protótipos da pesquisa.

2.4. Proposta para novos produtos

Uma vez compreendido o universo de dados levantados sobre cada recurso natural estudado, as coordenadoras das equipes reuniram-se para definir os requisitos e parâmetros que deveriam ser trabalhados durante a etapa da geração de alternativas para a confecção dos protótipos dos produtos. Das condições estabelecidas, foi determinado que os produtos elaborados deveriam atender a ambientes comerciais de alto nível, como: hotéis, restaurantes e demais estabelecimentos com enfoques temáticos. O projeto do produto deveria contemplar em sua estrutura, no mínimo, duas das matérias primas estudadas, com o propósito de comparar a evolução e/ou o enriquecimento material e visual das peças. Dado o desafio, cada aluno deu início a criação da sua proposta de produto. Ainda que as propostas fossem individuais, os grupos faziam questão de se reunir e discutir sobre suas ideias (Fig 9).

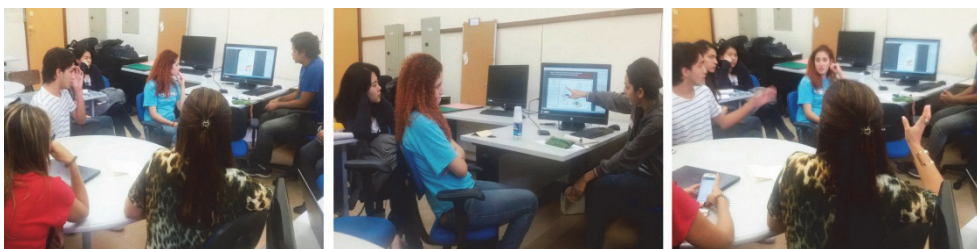


Fig. 9 Alunos e professores do projeto, reunindo e discutindo ideias para a geração de alternativas

Da mesma forma, faziam questão de se aconselhar com os representantes das instituições parceiras – através de consulta local, e-mail ou vídeo, para saber o que pensavam a respeito de suas criações (Fig.10), o interesse pelas opiniões eram primordiais quando partiam das universidades, institutos e empresas colaboradoras que trabalhavam diretamente com as matérias-primas, as quais os alunos queriam utilizar em suas propostas. Mais uma vez, a troca de conhecimento e informações foi fundamental durante esta fase, inclusive com demonstrações de algumas tecnologias e ferramentas de trabalho (pertencentes a essas instituições) que poderiam auxiliar na materialização das ideias. Assim, a cada orientação dada, os alunos melhoravam os conceitos sobre suas propostas e trabalhavam com mais representação os seus desenhos.



Fig. 10 Alunos discutindo suas ideias com colaboradores de instituições parceiras do projeto

É importante destacar que a geração de alternativas foi realizada tanto pelos alunos de graduação de design da Universidade Federal do Amazonas (DEG/UFAM) como também pelos alunos de pós-graduação (mestrado) da Universitat Politècnica de Valencia (DIG/UPV) na Espanha. Estes últimos, tiveram a oportunidade de participar de um workshop realizado pela Professora Visitante Especial do projeto, na cidade de Valencia/Espanha, que relatou e apresentou os resultados da fase de levantamento de dados realizados, meses antes, pelos grupos de pesquisas formados pelos alunos de design da UFAM. As atividades relacionadas à geração de alternativas resultou na produção de painéis semânticos (Fig.11 e 12), originados pelos alunos da UFAM e da UPV, com base nos requisitos e parâmetros estabelecidos e explicações técnicas e conceituais do design à materialização das suas propostas de produtos.



Fig. 11 Exemplo de painéis semânticos gerados pelos alunos participantes do projeto

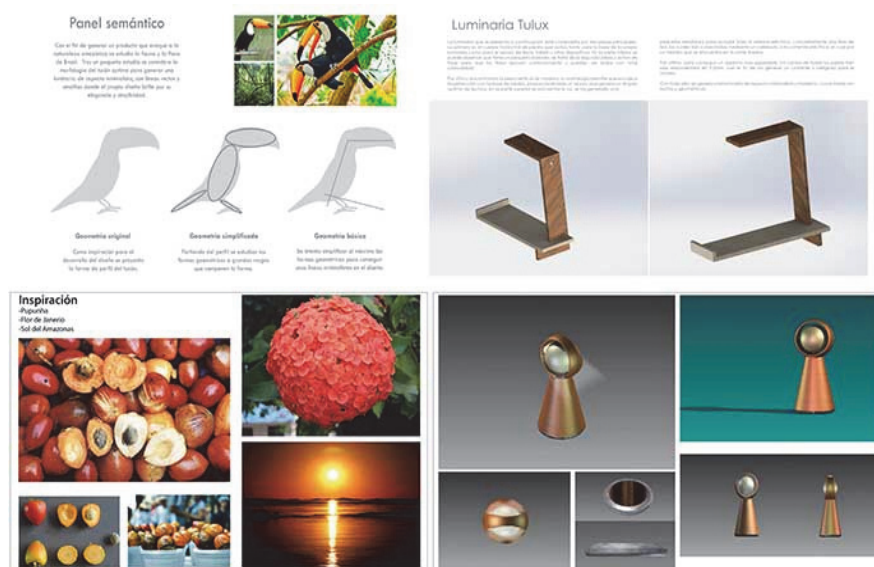


Fig. 12 Outro exemplo de painéis semânticos gerados pelos alunos participantes do projeto

As propostas geradas pelos alunos também foram inspiradas em elementos da fauna e da flora da região amazônica, o que pode ser considerado um grande enriquecimento cultural para todos os participantes, além de valorizar ainda mais a estruturação física e estética dos produtos.

3. Materiais e métodos

A pesquisa teve como propósito trabalhar com dados qualitativos e quantitativos, classificados como: exploratórios, descritivos, explicativos e experimental (Gil, 2010). Apresenta uma abordagem conceitual sobre as percepções das pessoas sobre as questões sociais e fatos sobre o estado atual do fenômeno em estudo, descrevendo a natureza das condições em uma situação (Marconi e Lakatos, 2006). Um breve estudo estatístico, cujos dados foram organizados e analisados a partir da distribuição de frequência e o cálculo de médias, permitiu observar as opiniões coletadas, o problema e o tipo de impacto entre os seus elementos (Blaxter, Hughes, & Tight, 2002), de modo a determinar a força da associação ou correlação entre as variáveis resultantes da opinião de uma população específica. Como fontes de investigação foram utilizados: livros, artigos publicados em congressos e revistas científicas, registros de entrevistas, jornais e dados divulgados por instituições ou pesquisadores, em páginas de internet. O universo da pesquisa contemplou três grupos de participantes distintos: Proprietários e/ou vendedores de estabelecimentos de comercialização dos recursos naturais investigados, na cidade de Manaus; comunidade acadêmica do Departamento de Design e Expressão Gráfica da Universidade Federal do Amazonas, também pertencente à cidade de Manaus/Amazonas – Brasil; e comunidade acadêmica do Departamento de Ingeniería Gráfica da Escuela Técnica Superior de Ingeniería de Diseño da Universitat Politècnica de València, na cidade de Valência/Espanha. O tempo para a realização do referido trabalho foi de um ano e meio e dos procedimentos adotados para a coleta de informações, ferramentas e métodos para o controle e qualidade dos dados, a equipe do projeto utilizou: formulários de orientação – produzidos pelas coordenadoras de cada grupo de trabalho específico, para o registro da pesquisa de campo realizada junto ao mercado de produtos naturais; reuniões semanais com os grupos de pesquisa (*focus group*) para explanação e discussão sobre os dados coletados – tais reuniões eram registradas com câmera fotográfica, filmadora e os resultados gravados em arquivos digitais para posterior produção do relatório final do

projeto; questionário de observado, produzido pela coordenação geral do projeto e a pesquisadora visitante especial, para o registro das informações capturadas durante as exposições dos produtos da pesquisa. Para o processo de criação das propostas, os alunos utilizaram das técnicas conceituais do desenho técnico, de observação, renderização, construções de painéis semânticos. Dos softwares gráficos utilizados foram: CorelDraw, Illustrator, Indesign e Photoshop. E dos softwares 3D: AutoCAD, 3D Max, Blender, etc. O processo de confecção das peças foi realizado nos laboratórios, marcenarias e marmoraria das 4 (quatro) instituições parceiras – Brasil, Espanha e Portugal, com assessoramento constante dos seus pesquisadores, docentes e técnicos. Os recursos naturais de estudos foram doados, em forma de resíduos, pelo Instituto Nacional de Pesquisas da Amazônia (INPA) – doador da madeira, Centro Tecnológico da Pedra Natural de Portugal (CEVALOR) - doador da pedra, e a empresa de artesanato Arte Tukano pertencente a duas artesãs colaboradoras do projeto, que são vinculadas à comunidade Juquirá - produtora da fibra de tucumã-i (*Astrocaryum acaule*), no Amazonas. O projeto também realizou 2 (duas) exposições, para as quais desenvolveram-se os materiais gráficos de divulgação dos resultados e a produção de um catálogo visual com as informações técnicas e conceituais do projeto e, consequentemente, dos seus produtos – os quais foram reagistrados para obtenção das patentes junto à Pro-reitoria de Inovação Tecnológica da Universidade Federal do Amazonas (UFAM) no final do ano de 2015.

4. Resultados

O processo de confecção dos produtos foi árduo, trabalhoso e intenso. Todas as práticas foram acompanhadas tanto pelas coordenadoras das equipes e colaboradores parceiros, como por cada autor das peças. Para cada dia de produção dos protótipos eram registrados os dados da confecção. Para o processo de produção das propostas geradas, as atividades distribuíram-se entre o Laboratório de Artefatos de Madeira – LEAM, do Instituto Nacional de Pesquisas da Amazônia, e a Marcenaria do curso de Design da Universidade Federal do Amazonas, ambos dotados de maquinários, equipamentos e técnicos especializados para os procedimentos operacionais necessários à produção das peças. Os treze produtos selecionados tiveram como critério de seleção principal, a viabilidade de produção. Analisadas as formas de confecção de cada produto selecionado, foi dado início ao processo de produção dos mesmos. Os primeiros produtos confeccionados, reuniam em sua estrutura os recursos naturais de pedra mármore branco de Portugal com veios e de madeira. Assim sendo, as peças que exigiam a pedra na sua formação tiveram estas partes trabalhadas no Centro Tecnológico da Pedra Natural de Portugal (Fig. 13), na cidade de Borba em Portugal, sob a supervisão da Pesquisadora Visitante Especial e de um técnico profissional da CEVALOR. Quando as peças não apresentavam a estrutura ideal e conforme os desenhos técnicos dos alunos, o técnico e a pesquisadora verificavam as possibilidades de eventuais modificações e trabalhavam tais mudanças de acordo com o consentimento dos autores.



Fig. 13 Processo de produção de um dos produtos com a pedra mármore branco de Portugal com veios

Após confeccionadas todas as partes de peças que exigiam conter a pedra em suas estruturas, foi iniciado a produção dos produtos com a fibra de tucumã-i (*Astrocaryum acaule*), e com as madeiras amazônicas. O trabalho realizado com a fibra foi realizado no Laboratório de Design, do Departamento de Design e Expressão Gráfica da Universidade Federal do Amazonas e procedido por duas artesãs indígenas (Fig. 14), que junto a alunos e professores, fizeram a escolha dos tipos de tramas e as cores da fibra.



Fig. 14 Processo de confecção de produtos com a fibra de tucumãi (*Astrocaryum acaule*)

Como muitos dos produtos, embora utilizassem fibra na proposta, não possuíam o detalhamento de como as tramas de composição dos tecidos, gerados a partir da fibra, poderiam ser fixadas nos produtos, permaneceu-se na realização de ajustes e modificações ao longo da execução dos projetos, fomentando a troca de experiências entre alunos, professores e artesãs. As partes dos produtos com madeira (Fig. 15), também foram executadas paralelamente ao trabalho feito com a fibra, sendo que apresentando maior complexidade. Todo o processo foi realizado tanto no Laboratório de Engenharia de Artefatos de Madeira do Instituto Nacional de Pesquisas da Amazônia (LEAM/INPA), uma vez que este laboratório além de possuir maquinário mais atual, também é referência em tecnologia da madeira, como na marcenaria do DEG na UFAM. A princípio as partes projetadas em madeira foram confeccionadas em materiais derivados como tábuas de madeira compensada, pois as espécies doadas para o projeto ainda não haviam chegados na ocasião. Após esse primeiro experimento e a doação das madeiras, a confecção foi orientada conforme os desenhos técnicos dos alunos e conhecimento dos especialistas envolvidos.



Fig. 15 Processo de confecção de produtos com madeiras amazônicas

Finalizada a etapa de confecção dos produtos, a equipe técnica do projeto realizou o registro fotográfico das peças nos ambientes idealizados para o uso das mesmas (Fig. 16).

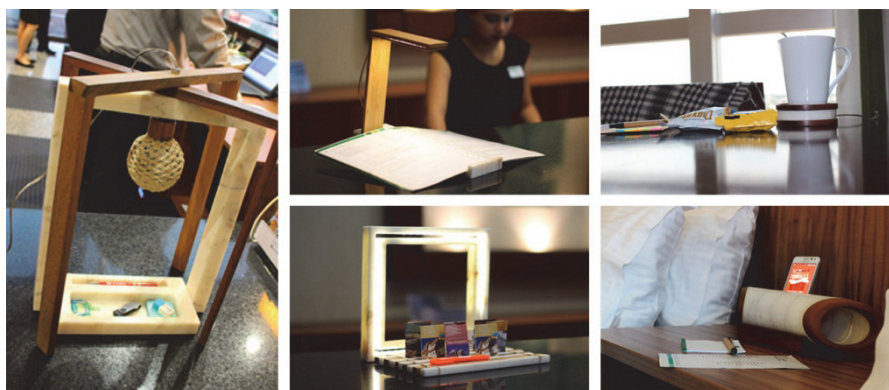


Fig. 16 Registro fotográfico de alguns dos produtos em ambientes de hotéis e restaurantes temáticos

Em paralelo a referida prática, teve início a produção de informações técnicas para a elaboração do Catálogo Visual dos produtos e também do material de divulgação do projeto. Durante registro fotográfico, muitos curiosos perguntaram sobre a origem dos produtos e como ter acesso a eles através da venda e comercialização no mercado. Naquele momento, não foi dada nenhuma informação a respeito, uma vez que os alunos sabiam que não era possível divulgar dados da investigação e concepção dos produtos, devido os mesmos estarem em processo de tramitação para registro de patentes na UFAM. No entanto, como parte dos resultados alcançados pelo projeto, a Pro-reitoria de Inovação Tecnológica (PROTEC/UFAM) permitiu que a equipe técnica apresentasse os trezes produtos gerados, nas exposições (Fig. 17 e 18), programadas para as comunidades acadêmicas do DEG/UFAM, no Brasil e do DIG/ETSID, na Espanha.

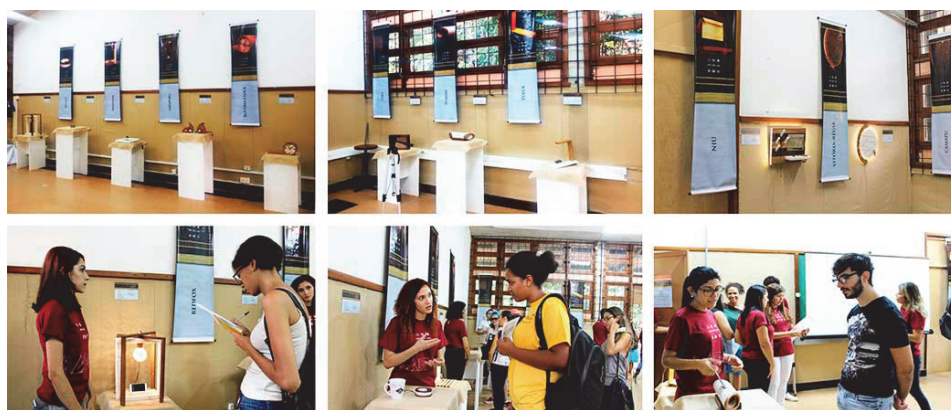


Fig. 17 Exposição dos protótipos na Universidade Federal do Amazonas (DEG/UFAM – Brasil)

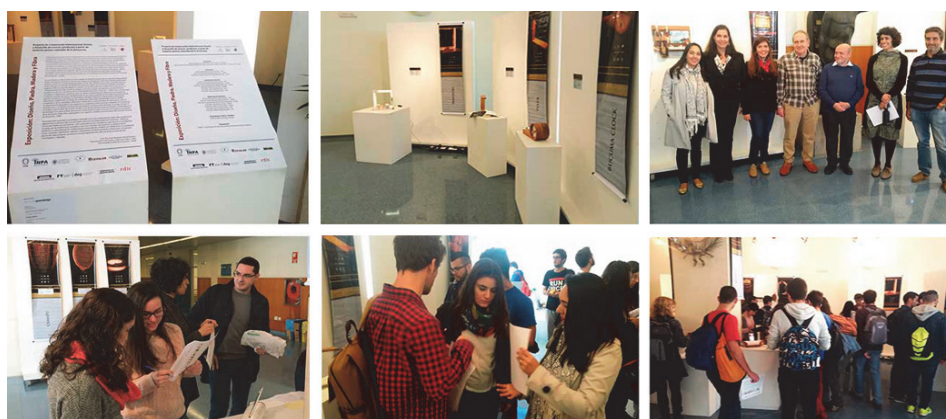


Fig. 18 Exposição dos protótipos na Universitat Politècnica de València (ETSID/ UPV – Espanha)

Em ambas as exposições, os participantes foram consultados a respeito da combinação feita entre os materiais utilizados nas peças, os atributos do design dos produtos e os novos produtos projetados a partir do uso da fibra vegetal de tucumã-i (*Astrocaryum acaule*), da pedra mármore branco de Portugal com veios e de algumas espécies de madeiras naturais da Amazônia. De acordo com os dados registrados e analisados por meio da distribuição de frequência e o cálculo de médias, a maioria dos entrevistados ($n=208$; 100%), aprovou a iniciativa do projeto de combinar três recursos naturais distintos na formação de produtos, pois considera que o uso dessas matérias-primas na composição dos produtos oferece boas vantagens com relação a aspectos como: custo/benefício, processo produtivo e benfeitorias aos campos socio-econômico-cultural das localidades envolvidas no projeto. Com respeito aos atributos do design aliados/combinados às características das matérias-primas empregadas nos produtos desenvolvidos, numa escala de 1 a 4 – onde 1 significa ‘pouco importante’ e 4 ‘bastante importante’, o fator ‘composição’ foi o mais relevante e deve ser o elemento prioritário a ser respeitado ($m=3,38$), sendo reforçado pelos fatores de ‘resistência’ ($m=3,31$) e ‘valor cultural’ ($m=3,24$). Para o universo amostral, a reunião desses três aspectos fez das propostas de produtos um diferencial para a segmentação de mercado escolhida pelo projeto, além de oferecer benefícios aos seus possíveis consumidores. Quanto aos novos produtos apresentados nas exposições, grande parte do público consultado ($n=208$; 93%), afirmou a ideia transmitida pelo conjunto de objetos criações é a ‘inovação’, fator considerado, pelo universo amostral, como fundamental aos projetos de design que trabalham com a transferência de conhecimento e de tecnologias para a gestão e fabricação de novos produtos, acompanhadas da valorização dos aspectos técnicos, científicos, socioculturais, econômicos e eco sustentáveis, para o alcance de novos mercados. Após constatar a positiva aceitação por parte de ambas as comunidades acadêmicas, localizadas Manaus/Brasil e Valencia/Espanha, e receber os cumprimentos por parte do Instituto Nacional de Pesquisas da Amazônia (INPA) e do Centro Tecnológico da Pedra Natural de Portugal (CEVALOR), demonstrando a imensa satisfação com os resultados alcançados com a pesquisa, a Universidade Federal do Amazonas - através da equipe técnica do projeto de cooperação internacional: pedra, madeira e fibra, conseguiu estreitar os laços entre as instituições parceiras e receber convites para futuras atividades de pesquisa em conjunto. Além disso, o projeto ainda pode relacionar os seguintes resultados positivos obtidos:

- 13 (treze) protótipos de produtos, confeccionados com duas ou três das matérias-primas de estudo: pedra, madeira e fibra;

- 1000 (mil) exemplares de Catálogo dos Produtos confeccionados através do projeto, publicação cujo número do ISBN é: 978-85-7401-808-9;
- 13 (treze) Pedidos para Registro de Patentes, dos quais 11 (onze) foram aprovados recebendo as devidas numerações que podem ser consultadas no banco de dados do Instituto Nacional da Propriedade Industrial (INPI): BR3020150058021 / BR3020150059583 / BR3020150059567 / BR3020150058307 / BR3020150058315 / BR3020150058331 / BR3020160008795 / BR3020160008809 / BR3020160011397 / BR30 20160011192 / BR3020160011184. Dos demais pedidos encontram-se em processo de avaliação no INPI;
- Apresentação dos produtos do projeto, através de exposições no Brasil e na Espanha;
- Alto grau de aceitação por parte do público visitante de ambas as exposições;
- Quatro artigos publicados em congressos internacionais nos EUA, Brasil e Espanha.

Encerrando as atividades, a coordenação geral do projeto recebeu um convite por parte da Reitora da Universidade Federal do Amazonas, para participar da solenidade de apresentação do catálogo de produtos do projeto de cooperação internacional, junto a outros lançamentos da Editora da UFAM (Fig. 19), como forma de reconhecer a dimensão da pesquisa e a importância do trabalho desenvolvido, bem como a internacionalização da produção científica da instituição. Na ocasião, toda a equipe técnica do projeto foi parabenizada pelo significativo e maravilhoso trabalho realizado em parceria com o Instituto Nacional de Pesquisas da Amazônia (INPA), o Centro Tecnológico da Pedra Natural de Portugal (CEVALOR/Portugal) e a Universitat Politècnica de València (UPV/Espanha).



Fig. 19 Coordenação técnica do projeto no lançamento do catálogo dos produtos pela Editora UFAM

Torna-se importante ressaltar que a força de vontade em atingir os objetivos traçados pelo projeto, foi grandiosa por parte dos seus componentes, algo que facilitou significativamente para a realização da fase de levantamento de dados da pesquisa e, principalmente, da produção dos protótipos. As dificuldades foram muitas, contudo foi possível alcançar além das metas atingidas. Através da união e determinação da equipe técnica, realizar muitos feitos, entre deles:

- Capacitação dos discentes de Design do Departamento de Design e Expressão Gráfica da Universidade Federal do Amazonas (DEG/UFAM para o desenvolvimento de novos produtos com matérias-primas naturais da Amazônia;
- Troca de experiência profissional, técnica e científica entre os seus participantes;
- Valorização de matérias-primas naturais regionais;
- Valorização do saber tradicional, cultural e do design;

- Incentivo a participação de acadêmicos, técnicos e docentes em projetos de pesquisa que tenham o design como fator diferencial e estratégico para o melhor uso e aplicação de recursos naturais no mercado de produtos decorativos e utilitários;
- Interesse pela realização de novos projetos com instituições internacionais.

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The Pragmatism as a semiotic route to designing – Understanding the inferential logics of sense attribution

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Abstract

The aim of this paper is to theoretically discuss the inferential logics of sense attribution to everyday objects. Such discussion takes part of our attempt to explore the possibility of development of a method for systematic research and analysis of the relationship established between users and artifacts in their context of use and specific circumstances. Taking into account the notions of sensible effects, practical bearings, and sense, the argumentation, supported by the Peircean pragmatism, tries to frame their connections with processes of logical mental mediations that emerge when design-agents (e.g., users, designers, and design researchers) deal with everyday objects. The contribution and final considerations of this paper may address issues from the fields of design (practically) and semiotics and design (theoretically and empirically) through possibly enlarging the understanding of the mediation processes, so-called inferential logics of sense attribution.

Keywords: *Semiotics inside Design, Pragmatism, Culture, Product Analysis, Methodology.*

1. Preliminary statements, definitions, and issues

The activity of design has historical, cultural, and social responsibility. From historically being an input to enhance the production of artifacts, the activity of design has been turned into an intrinsic cultural aspect of the processes of evolutionary movements/advances of the contemporary society and, consequently, had its borders of actuation extended, being employed in fields as communication, services, marketing, and so forth (Zingale & Domingues, 2015).

Inasmuch as contemporary the actuation borders of design activity had been extended, as a discipline, in our viewpoint as well as in the view of specific areas that regard the field of design, the activity of design lacks systematic approaches (Cf. Deni, 2015); in addition, even though recognized as relevant (Kotler & Rath, 1984), the design activity is also criticized due its unstable scientific foundations (Findeli, 2014), and, as stated by Borja de Mazota (2014), misses the employment of scientific reasoning in its development. Considering that, we are taking a step backward, we are *working on the basis*. Thus, the core aspect of this paper is the debate on the inferential logics of sense attribution to everyday objects. In fact, the arguments herein presented take part of a broader investigation that aims at the evolvement of a full methodological research framework. Such framework intends to explore the possibility of development of a method of *systematic research* and *analysis* of the relationship established between users and artifacts in their context of use, which aims at supporting processes of materialization of intangible features into artifacts (e.g., global products).

In the field of design, specifically *semiotics and design*, the need of development of processes that foster the systematicity is considered crucial. Deni, in the essay *For a History of Semiotics of Design Projects*, has stated: “what is still missing [...] is a *systematic* [emphasis added] reflection on the predictive capability of semiotics” (2015, p. 10).

Said that, the discussion starts with two statements: Umberto Eco’s understanding of *functions* present in the chapter *Function and Sign: Semiotics of Architecture*; and the pragmatistic maxim contained in *How to make our Ideas Clear*, by Charles Peirce.

Understanding the notion of function in the world of everyday objects may be considered a complex task. Usually artifacts are designed to fulfill specific needs, which are generally shaped by professionals commissioned to develop particular objects and projects or to solve determined problems through design. Nevertheless, by the end of product lifecycle – from conception to disposal, and reuse or recycle –, users are the ones who incorporate functions and “close” the design cycle of artifacts (Cf. Zingale & Domingues, 2015). Said that, from users’ viewpoint, it seems that artifacts do not only function, they also communicate *possible* ways of performing tasks. In this sense, from this specific perspective, designing artifacts may be considered a particular provocation to semiotics (Cf. Eco, 1980). Thus, we might be facing what Eco stated concerning the relation among communication, functions, and semiotics:

Seeing functions from the semiotic point of view might permit one to understand and define them better, precisely as functions, and thereby to discover other types of functionality, which are just as essential but which a straight functionalist interpretation keeps one from perceiving (Eco, 1980, p. 12).

Let us now retrieve Peirce’s statements on, in certain way, *possible functions*:

Consider what *effects* [emphasis added], that might conceivably have *practical bearing* [emphasis added], we conceive the object of our conception to have. Then, our conception of these effects is the whole of our conception of the object (Peirce, CP 4.402).

From the Peircean pragmatistic maxim, attention should be called to the terms *effects* and *practical bearing*¹⁷. Both terminologies, associated with the concept of *sense*, are of great importance to support the evolution of the theoretical discourse that will follow. The notion of sense herein adopted is also retrieved from Peirce's writings, where the term effect also appears: "Our idea of anything is our idea of its *sensible effects* [emphases added]" (Peirce, CP 5.401). According to Peirce, the senses of any sign (e.g., artifacts, advertisings) are associated with all possible *interpretative answers* and *practical consequences* derived from *sensible effects* that they produce or could produce (Zingale & Domingues, 2015). Therefore, considering that signs can be also understood as processes of *mental mediation*, interpretative answers and practical consequences, urged by sensible effects, are direct linked to inferential logic mechanisms – induction, deduction, and abduction – in processes of sense attribution to artifacts, characterizing what we will name as a *semiotic flux* (Figure 1).

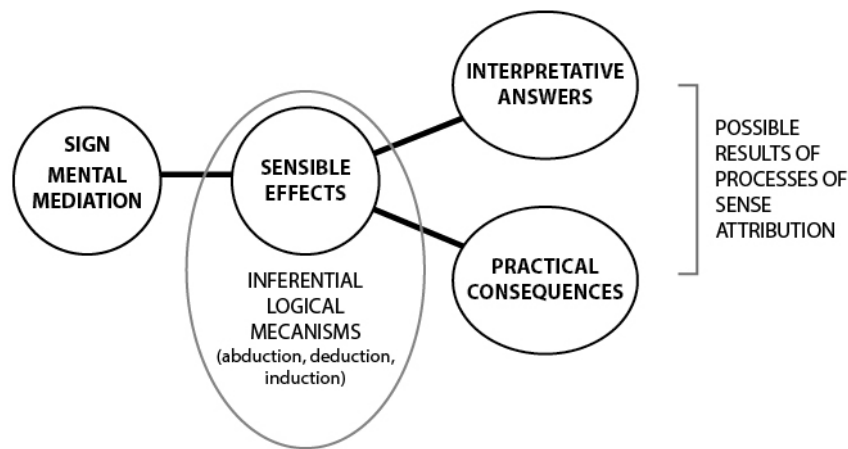


Fig. 1. General framework of the semiotic flux. Diagram by Felipe Domingues.

Such processes of mental mediation are an intangible aspect that conduces individuals, users, to a semiotic flux, that is, leads to a series of mental actions of sense attribution that, in their turn, have bonds with the individuals' cultural background. Stated that, one would ask: How to frame and analyze this sort of intangible aspects in the context of use and specific circumstances?

2. Design and the pragmatist approach

As previously stated, in semiotics functions can be seen as acts of communication, considering artifacts also communicate their *possible* functions (Eco, 1980). Acts of communication emerge from and are closely related to the cultural and social dimensions of design, specially when we focus on the semiotic flux of sense attribution, which regards to the mental action of agents^{18,19} involved in artifacts fruition and

¹⁷In order to maintain reading linearity and connectivity among concepts along this essay, the term *practical bearing* will be replaced by *practical consequence*.

¹⁸It is noteworthy that, although many actors, or agents (e.g., industry, history, fields of study, and so forth), involved in the processes of design may be suitable for analyzes, in this essay the discussion is focused in three of them: the user, the designer, and the researcher.

¹⁹Actors like users, designers, and researchers will be generally named as *design-agents*, unless there is a need to specify which one we are referring to.

configuration. In such dimensions, users operate actions of standard use, redesign, invention and reinvention by expressing their free wishes in a full and unrestrained way (Cf. Deni & Proni, 2008; Bianchi, Montanari, & Zingale, 2010), but what kind of users? Considering that the term ‘users’ is a generic terminology, it would not be feasible to explore the possibility of framing individuals’ mental logics of actions of use without defining which users we are referring to. In this essay, when using the terminology *user*, it concerns to standard and specialized ones involved in the processes of design and will be named *design-agents*, in contrast with what Zingale and Domingues (2015) named as *user-agent*. Regular-user, design-user, and research-user will be taken as sub-categories of design-agents. In our understanding, design-agents are bodied entities that are *affected* by their cultural backgrounds, and then have varying mental behaviors, which *affect* their interpretative answers and practical consequences when facing problem-solving situations.

Let us now consider that artifacts act like transmitters of personal and collective values, and, as stated by Eco (1980), communicators of possible functions, taking part of the definition of our cultural systems. Once accepted such qualities of the artifacts, due to their capability of affecting some of the individual’s mental representations (e.g., beliefs), artifacts extend the social responsibility of the design activity.

In design semiotics, a better comprehension of such extended social responsibility can be reached through following a pragmatistic route started by Peirce, which can be firstly found in the pragmatistic maxim (Zingale & Domingues, 2015). In the pragmatistic approach, the notions of *interpretative answers* and *practical consequences*, which can substitute the notion of *sense*, respectively emerge as crucial matters due to their influence on cognitive and physical environments. In our viewpoint, in the design activity, the preconfiguration of sense into artifacts based on *actual* interpretative answers and practical consequences is a step further in the contemporary processes of conception, adaptation and positioning of design artifacts. Well, if, in order to place such features in design artifacts, we are fostering the need of better understanding immaterial characteristics by retrieving them from facts of everyday life, then we are also talking about searching for answers in the fields of Anthropology and Communications. It is to say that, the senses we are dealing with are not found and retrievable only in material artifacts and cannot be considered only a semantic value within a system, but a symbolic cultural feature. Therefore, differently from what Lévi-Strauss has taught us with the anthropological structuralism, the cultural understanding of Clifford Geertz, in our view, seems to better address the pragmatistic approach we are fostering. As stated by Geertz, culture is “a system of *inherited conceptions* [emphasis added] expressed in symbolic forms by means of which men communicate, perpetuate, and develop their knowledge about and *attitudes toward life* [emphasis added]” (1973, p. 89). Defined what is our actual understanding of culture, we can now turn back to Peirce, which clearly establishes the notion of meaning production in relation of systems of *inherited conceptions*, or *habits*: “what a thing means is simply what habits it involves” (Peirce, CP 5.400); and its *attitudes toward life*, or *practical bearings*: “consider what effects, that might conceivably have practical bearing” (Peirce, CP 4.402).

At this point, the theoretical link between what has being stated until now and the logics of sense attribution to artifacts must be established. Considering that even individuals located within the same cultural environment may give different interpretative answers when coming into contact with same issues, what could lead them to provide same mental and practical responses? What could conduce them to act differently in specific circumstances but facing same issues? Answering these questions seems to be a hard task due to the subjectiveness, then *how* to deal with it.

Peirce and Bonfantini seem to provide us paths to cope with such semiotic issues. The notions of *doubt*, *belief*, and *plausible hypothesis* then emerge to confront symbolic cultural issues. As stated by Peirce,

“both, *doubt* and *belief* [emphasis added] have positive effects upon us, though very different ones. Belief does not make us act at once, but puts us into such a condition that we shall behave in some certain way, when the occasion arises. Doubt has not the least such active effect, but stimulates us to inquiry until it is destroyed” (Peirce, CP 5.373).

It is to say that, *doubt* has the characteristic to put us in a state of probing, otherwise *belief* makes us aware of how we should proceed when events occur. In the activity of design, such state of probing can be associated with the passage from a *problematic state* to a *solution* to a problem by the identification of an *interpretant artifact* (Zingale & Domingues, 2015).

In the using scene, users, or design-agents, interpret problematic realities. That is, face issues that are not immediately fulfilled with standard interpretative answers in state of belief conducting them to a state of doubt, which fosters design-agents to, in brief *decision-making moments*, randomly come up with *plausible hypotheses* that aim at providing possible solutions to a problem.

The mental act of turning a problem into a process of decision-making leads to the execution of inferential design processes, also understood as inferential logical processes, which take into account the knowledge of the problem and the prefiguration of a possible solution (Cf. Bonfantini, 2000; Zingale, 2012). The prefiguration is based on the search for answers by selection within plausible hypothesis, as taught us Peirce.

Taking into account the previous statements, based on the aim of this paper, one might be wondering how to research, frame and better comprehend mental actions as the ones previously described – *inferential logical processes* and the search for *plausible hypotheses*. According to Zingale and Domingues (2015), the answer or a possible methodological approach to face inferential issues, which also can be addressed as the fundament of the pragmatistic design method, can also be retrieved from Peirce. According to the author, “the only way to discover the principles upon which anything ought to be constructed is to consider what is to be done with the constructed thing *after* [Emphasis added] it is constructed” (Peirce, CP 7.220). Furthermore, Peirce indicates a possible way to support the evolvement of the so-called pragmatistic design method: “That which is to be done with the *hypothesis* [Emphasis added] is to trace out its consequences by deduction, to compare them with results of experiment by induction, and to discard the hypothesis, and try another [...] which shall resist all tests” (Peirce, CP 7.220).

From this passage, considering the logical sequence purposed by Peirce, an inferential logic could be drawn: abduction, deduction, and induction, remembering that, in Peirce’s Macroargument, the emerging hypotheses are the abductive processes. According to Bonfantini (1980), this is an endless process, an unlimited semiotic cycle as described in the Peircean Macroargument (Figure 2).

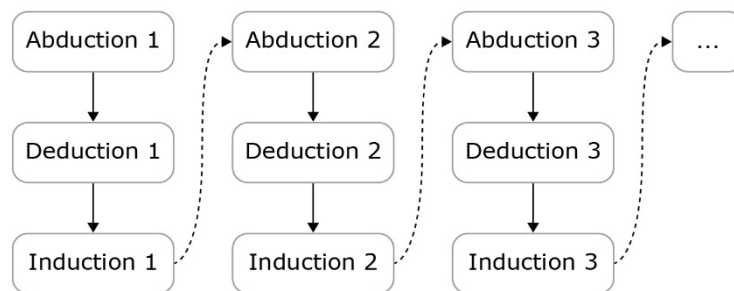


Fig. 2. Peirce's macroargument. Diagram by Salvatore Zingale.

As Peirce stated, such cycle “shall resist all tests” possibly leading to operative and productive stages (Zingale & Domingues, 2015). Though, this is an open-end process, once artifacts are placed in diverse contexts and individuals deal with specific circumstances, the tests start over and over again, and every use may constitute a new interpretant. “The inferential cycle is the ‘design life’ of a product and it acts before, during and after the design” (Zingale & Domingues, 2015, p. 3) and, in certain way, it involves all agents that use the artifacts (e.g., regular users, designers, researchers, and so forth).

Consequently, the senses of artifacts may be found inside cultural systems and searched within concrete consequences that they are involved in, where they in fact exist and affect individuals’ minds. Therefore, once an artifact is brought into the living scene, it can become a mediation artifact, starting mediation processes that, in turn, conduce individuals to act in specific way in order to find possible solutions to specific problems (Figure 3).

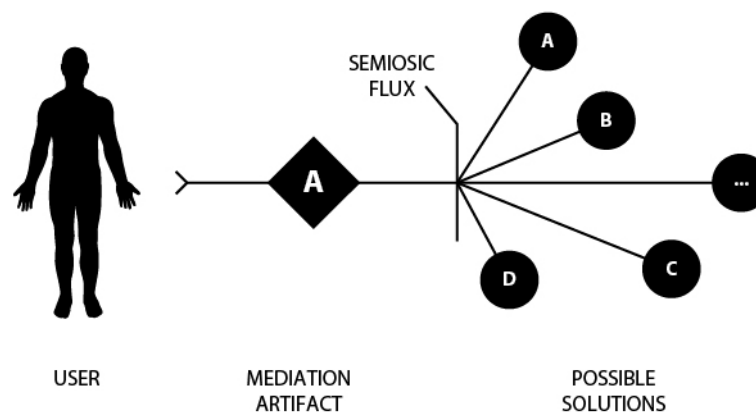


Fig. 3. Mediation artifact and possible solutions. Diagram by Felipe Domingues.

That is, the senses of artifacts change in its use, continuing and completing the meaning of them (Bonfantini & Zingale, 1999). The mental and practical consequences of using acts configure the achievement of the completion of the senses of everyday objects, fulfilling their functions in the long run. It is to say that, the use phase can be understood as an extension of the formal design phase (Zingale & Domingues, 2015). Thus, the full design process is composed by two cyclic phases: design and use phases, formal and informal design stages, respectively. In our understanding, the existence of such phases is one of the reasons that foster the need of comprehension of the logics of sense attribution in-depth, keeping in mind that, our focus is on the informal phase.

2.1 General logics of sense attribution

As previously stated, the senses of artifacts can be searched in many phases artifact development, from conception to use and consequences. In spite of that, the pragmatist approach does not regard only to search for the senses of artifacts, but also to better situate the emerging senses inside the frame of the inferential relations involving the agents of design (Zingale, 2009). In fact, considering that we understand the design activity as an open-ended process, it is needed to enlarge the notion of “design logic”. Recently Zingale and Domingues (2015) stated the “design logic” placing its dialogic correlation to the interpretation of use employed by user, defined as “user logic”, Figure 4.

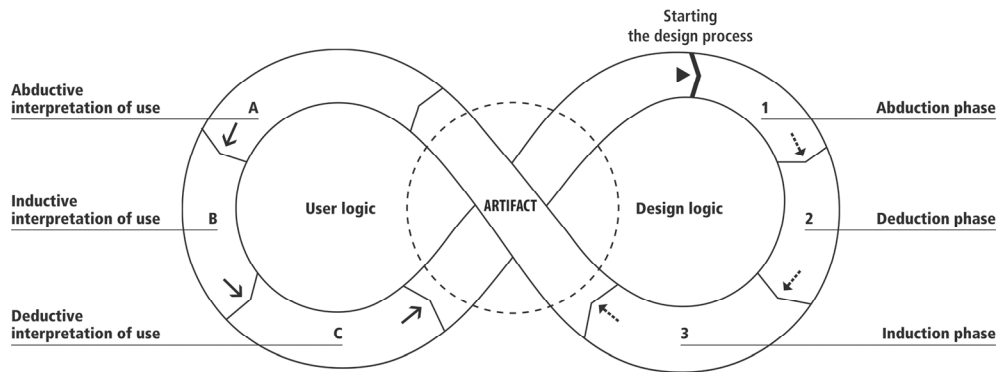


Fig. 4. User logic and design logic. Retrieved from Zingale and Domingues (2015).

According to the authors, the dialogic process may start with the initial idea of conception and production of an artifact. Subsequently, once the object is inserted in a specific context, the user is the one who perform actions employing the artifact. These performative logic actions guarantee the unlimited semiosis in a permanent design process. Moreover, due to its central position in the diagram, the artifact assumes a mediation role in the threefold process of design semiosis, becoming an “entity into which the designer *inscribes* value and from which the user *infers* value” (Zingale & Domingues, 2015, p. 4). In the diagram, a dialogical process of the design action is represented, where the former step is evolved in the designer’s mind, materialized into an artifact delivered to any artificial reality, in which the user’s mind take place. In its turn, the user’s mind, on the basis of cultural standards and personal needs infers values.

The contribution of Zingale and Domingues (2015) to the understanding of the design logics establishes and clarifies relevant aspects of the process of sense attribution to artifacts. Nevertheless, one would ask how the *end-user’s inferential responses* could be identified, analyzed, and reported back to the design(-logic) phase? This question states another key point: the role of the design researcher in the design activity as well as in discussions on design and semiotics.

At this moment, considering that this paper is a step toward a try to address the question, herein we will focus at the evolvement of what we consider part of the analytical phase: framing the logics of sense attribution. Keeping this in mind, the next topics, based on Zingale (2009) and Zingale and Domingues (2015), are our attempt to describe such logical processes by framing the logical inferential processes in the design-agents’ minds.

2.2 Framing design inferential logics

The three inferential movements – abduction, deduction, and induction – contained in the Peircean Macroargument can be employed in design, as Zingale (2009) taught us. According to the author, and in the explanations that follow²⁰, **A** should be assumed as *antecedent* of the abductive reasoning, that is, *an* inferential logical process leads to a formal process of design, the artifact emerges; and, **C** stands to the *consequent* of the abductive reasoning, that is, during the use phase of an artifact consequences come out, new inferential cycles start. Let us now see case by case.

In the case of the *abductive inferential movement*, a hypothetical *sensible effect* or *effect of use* comes out. A consequent (**C**) derived from an antecedent (**A**), then (**C**) is considered worth for design – Figure 5.

²⁰ Considering that this paper is an attempt to evolve and keep up the discussion stated by Zingale (2009) and Zingale and Domingues (2015), in order to preserve the logical criteria, herein we will use exactly the same logical components: **A** stands for *antecedent*; **C** stands for *consequent*).

$$\underset{h}{C} \longrightarrow \underset{h}{A} \dashv\vdash \underset{i}{C}$$

h: hypothetical i: intended $\dashv\vdash$: possibly

Fig. 5. Abductive inferential movement in design. (1) A hypothetical effect or consequence (C) is thought and plausible to be brought into materiality; (2) An agent evolves the understanding of how the emerged artifact (A) has to be designed with the aim at fostering that specific consequent (C); then, (3) There is the possibility of the artifact conceived (A) produce the intended consequence (C). Diagram by Felipe Domingues.

In abductive instance *sensible effects* or *effects of use* constitute the inferential movement. As result of the inferential movement, (A) is the produced artifact conceived according to hypothetical consequences (C), that is, designed aiming at inscribing sensible effects or effects of use emerged from the use act. According the Zingale and Domingues (2015), “the design hypothesis then develops from imagining the possible consequences of the object of design” (p. 5). Let us now switch to the second inferential movement: deduction.

In the case of the *deductive inferential movement*, consider that a given artifact (A) leads to a consequence (C) – Figure 6.

$$\underset{h}{A} \longrightarrow \underset{i}{C} \longrightarrow \underset{r}{A} \longrightarrow C$$

h: hypothetical i: intended r: real

Fig. 6. Deductive inferential movement in design. (1) If an artifact (A) is designed, expected consequences (C) can emerge; (2) The artifact (A) is materialized and brought to the real world; then, (3) (A) will surely produce (C) consequences. Diagram by Felipe Domingues.

The deductive movement is an exploration that starts from a hypothesis based on cultural and previous knowledge, which includes experiences. The results of such exploration are mental evaluations on the design feasibility, that is, whether the artifact of matter can be brought into the material world, whether it *functions* as intended or not, producing determined consequences in specific contexts and circumstances. That is, this instance is characterized mainly by the attempt of answering questions (e.g., If the product we have in mind right now actually existed, what kind of features would it require What kind of interpretation of use would it bring with it).

Lastly, considering that the previous movement (deductive) leads to a positive response, the *inductive inferential movement* is characterized by testing and verifying *if (A) truly has (C)* as a consequence. A testing phase may take place; a logical inference should be empirically probed – Figure 7.

$$\underset{r}{A} \longrightarrow \underset{v}{C} \dashv\vdash \underset{c}{C}$$

r: real v: verified $\dashv\vdash$: possibly c: constant

Fig. 7. Inductive inferential movement in design. (1) The effect of sense is projected, an artifact is designed (A); (2) The effect of sense is probed: (A) provides consequences (C); (3) Perhaps the artifact (A) provides such consequences (C). Diagram by Felipe Domingues.

The inductive movement is a phase of experimentation, is the phase of laboratory testing of hypotheses, prototypes, and models. According to Zingale and Domingues (2015), the experience-experimentation dyad is one of the core and decisive phases of design process: in the verifying phase, methods are required. Hence, the inductive inferential movement is the one that requires empirical tests; in the design phase real data should be analyzed in order to verify determined hypotheses, increasing their validity as projectable senses. But how do these inferential movements operate in the living scene.

2.3 Semiotic fluxes in the living scene

Inasmuch as the general understanding of design inferential logics has been stated, the actual issue should be now addressed to how such logics operate in the living scene, that is, now the focus is on real contexts of use and in specific circumstances.

Yet, in this kind of discussion, where the inferential interpretation is often based on partial knowledge (Zingale & Domingues, 2015), Peirce seems to provide us general guidelines: “The object of reasoning is to find out, from the consideration of what we already know, *something else* [emphasis added] which we do not know. [...] The question of validity is purely one of *fact and not of thinking* [emphasis added]” (Peirce, CP 5.365). Thus, in order to make possible the theoretical framing of sense attribution, let us now consider individuals using a specific object in their cultural environment to solve a specific problem.

In the logics of sense attribution, our interest is in the something else that emerges from the fruition act, that is, in the *possible functions* identified, or conceived, by the user, keeping in mind that herein users are named design-agents. Such possible functions may be related to what Peirce stated on *Plausible Hypothesis*, discussed by Bonfantini (2000). According to Peirce, to regard a hypothesis as plausible, it must fulfill three requirements before being put into the experimentation phase: The hypothesis must be suitable for experimental tests, it must explain the surprising facts of matter, and must be economically viable (Cf. Peirce, 7.220).

Said that, starting from a suprising fact (e.g., the need to solve a problem), the mediation process is the complex of inferential processes that conducts individuals to *acts of use*, mental or practical, what Zingale and Domingues (2015) named as *user logic*. Nevertheless, such processes of sense attribution do not happen in a formal sequence in the using phase. In fact, they may occur randomly based on the individuals’ needs and previous experience, retrieving knowledge from their cultural background and hypothetical ways of use fostered by the artifact itself. Thus, keeping this in mind, to a given artifact, it is ideal that the result of the inferential processes the artifact urges is the achievement of any mental or practical desired task, that is, a *pre-figured task*. Nevertheless, as previously stated, plausible hypothesis can lead users to act in different manners. Then, let us explore how the three inferential movements, deduction, induction, and abduction, hypothetically operate and foster *possible outcomes*.

Firstly, a *deductive* process is usually guided by rules to be followed: *law*, *impaired instruction*, and a *habit*, a *tradition* (Zingale, 2009). Guided by a *law* the design-agents’ minds follow stated instructions, or cultural codes. Consequently, the inferential movements take general values as truth and are passive to juridical pronouncement. In the case of laws design-agents are restricted to almost no personal initiative. In here, mental actions may be defined as a plan to be followed to achieve a specific benefit. Differently, an *impaired instruction* is characterized by the transmission of information among individuals. In this case, the inferential movement is based on existing know-how. In its turn, a *habit*, as defined by Peirce, is

a guideline that leads individuals to take stable inferential movements, following cultural patterns. According to Zingale and Domingues (2015), a habit is a result of an abduction, that is, is a *desire to have*, a rule that one accepts [...] but is not necessarily obliged to follow. [...] Should be intended as the invention of a practice rather than allegiance to a code: a rule that a user designs, in a sense, and adopts autonomously (p. 7).

Secondly, the *inductive* movement takes place when there is no trace of rule. The inductive movement, as in the case of the abduction, is composed by three phases of reasoning: *observation*, *experimentation*, and *verification*.

The *observation* phase is exploratory. It is the try to identify significant associations contained in an artifact. According to Zingale and Domingues (2015), significant associations are connections among things that can conduce to cognitive contents, which, in turn, lead to identification of rules and constants. Thus, the exploration remains until the solution is found. In the inductive inferential movement the *experimentation* phase occurs based on previous and current experience. That is, individuals act in accordance with previous deductive knowledge plus ongoing comprehension gained during processes of *verification*. Therefore, induction is the introduction of the sense attribution process, is the understanding of use by experimenting an artifact, a first phase of an abductive process.

In the absence of rules (deduction) as well as possibility of experimentation (induction), the inferential movement that takes place is the abduction (Cf. Zingale, 2009). In abductive inferences, individuals may *try* to find answers based on their own experience and cultural background. Thus, the logical movements in the design-agents' minds occur on the basis of *habits*. Supported by their own knowledge, individuals attempt to hypothesize rules (Bonfantini & Proni, 1980). In fact, the abductive reasoning precedes inductive experimentation, because in the attempt to use a product appropriately, the first 'stab' is always a gamble (Zingale & Domingues, 2015). Furthermore, abductive processes can be regarded as abductive-invention, or reinvention. Therefore, the abductive movement, also named *retroduction*, is a return backwards, from effect to cause, is a "projective gaze" (Zingale, 2009, p. 186). That is, "from the formal configuration of an artifact (effect) it is possible to abduct the rules of use planned into it (cause) (Zingale & Domingues, 2015). Abductive-invention usually succeeds in dealing with the limits of artifacts: suitability, feasibility, and availability. *Suitability* to purpose, the artifact does not do what it is supposed to do; *conception*, a possible use has not been envisaged; *availability*, the artifact does not exist or is impossible to find (Zingale, 2009).

3. Discussion

It is important to highlight that one of the aims of this paper is to foster discussions on the employment of the pragmatistic semiotics within processes of product development, particularly in early stages of product analyses and design. Said that, let us now retrieve the questions we stated along this essay.

The first question concerns to whether is possible to develop a method to frame intangible aspects in the context of use and specific circumstances. Even though, at this stage of the research we are taking a theoretical "stab", in our viewpoint, it *is* possible and a *valid* research our attempt to frame intangible aspects such as cultural interpretative answers and practical consequences. In this sense Peirce gave us fundamental theoretical guidelines that support the research method we are evolving. As stated by Peirce, "the question of validity is purely one of *fact* [emphasis added] and not of thinking" (Peirce, CP 5.365). It is to say that, the answers for this sort of research question are in the *living scene*, in the *consequence of things* in the users' lives. Along this essay, based on Zingale (2009) and Zingale and Domingues (2015), we have theoretically shown how users' mental behavior may act in order to attribute sense to artifacts

(Cf. Figures 2, 4, 5, 6, and 7). In spite of that, as a theoretical exploration, other questions naturally emerge, conducting the discussion to another issue.

The second question regards to user specificity. Zingale and Domingues (2015) have presented a diagram that graphically explains the endless design cycle (Cf. Figure 4). In the diagram, which has an artifact in its center as an entity where values are inscribed and inferred, the authors described the processes of design semiosis regarding *user-* and *design-logics*. Contemporary, there are academic and industrial demands for *systematic* and *scientific* research in the fields of design and semiotics (Cf. Deni, 2015; Borja De Mazota, 2014; Findeli, 2014; Domingues, 2011), thus, our attempt is to bring the pragmatistic semiotics into the field of design. In this sense our contribution to the evolvement of the already mentioned diagram, is including the figure of the design-researcher, Figure 8.

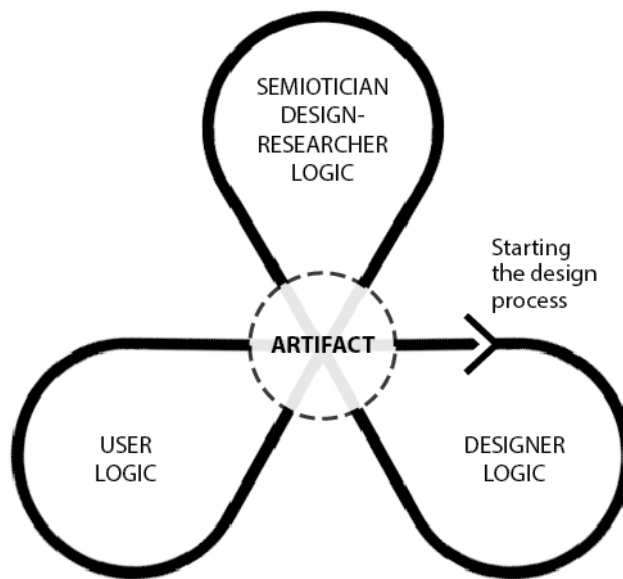


Fig. 8. The propeller model: design-agents' semiotic flux. Diagram by Felipe Domingues.

The diagram above is also a try to bring into the discussion the role of the *semiotician design-researcher* in processes of product development and analysis; is also an attempt to confront Eco's statement on the role of the designer, which we do not believe is possible in case of most designers. Eco (1980) says that before thinking as a designer, the design professional should "think like a sociologist, an anthropologist, a psychologist, an ideologist, etc." (p. 48). Nevertheless, in this paper it was not possible to develop the diagram present in the Figure 8 due to, in our viewpoint, the need of empirical research and discussions on the theme. In addition, the contemporary literature, does not provide answers for the presented triadic relation. Consequently, at this moment we have no answer to the actual issue and the ones that may emerge from it. Consequently, the third and forth questions, which are interrelated and inquiry the correlation among individuals vs. contexts vs. interpretative answers vs. practical consequences, in our viewpoint, also require empirical and experimental research.

Lastly, the fifth question, is also related to the role of the semiotician design-researcher, that is, concerns in answering how the end-user's semiotic responses could be identified, analyzed and reported back to designers in early stages of design as well as in the design-logic phase as shown in Figure 8. It is to say that we have, at least three stages to be taken into account and evolve. In different levels of depth, these

phases are under development²¹, but herein we have no enough space to bring them into the discussion, keeping in mind that in this paper our focus was on the analytical aspect of the pragmatistic semiotic research in design.

4. Conclusion

Regarding to implications for theory, this paper adds knowledge to the discussions postulated by Deni (2015), on the need of the evolvement of systematic analyses on the predictive faculty of semiotics concerning specific circumstances. In addition, incorporates information at the dialogue with Boztepe (2007), regarding the establishment of research frameworks that take into account the analyses of cultural aspects for the development of global products.

With respect to implications on empirical and practical applications, the statements presented in the paper intends to allow the actors involved in the process of analysis and design of artifacts to better comprehend and frame what is behind the fruition act: the inferential logics of senses attribution. Moreover, it is believed that such comprehension may aid the processes of decision-making at the very early stages of design, adaptation and market positioning of goods (e.g., global products).

Through discussing and evolving the purpose of a method of framing the pragmatistic dimension of the artifacts purposed by Zingale and Domingues (2015), this paper may contribute to fields related to the design activity fostering interdisciplinarity. We believe that the better theoretical comprehension of the semiotic flux strengthen the analytical phases of design process, especially by placing the pragmatistic semiotics approach in processes of product development; keeping in mind that, in these processes experimental tests are crucial to validate the materialization of intended consequences.

Concluding, in further stages of the so-called broader investigation, the evolvement and application of such inferential examination, considering data retrieved from the living scene, may aid the analyses and introduction of symbolic features into artifacts in the very early stages of design. Consequently, providing scientific instruments to increase the understanding and validity of the intangible aspects of design by systematic analyses.

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²¹ For the *identification* phase, refer to Domingues (2011) and Domingues, De Moraes and Zingale (2014), both investigations were supported by the Research Foundation of the State of Minas Gerais (FAPEMIG/Brazil) in partnership with Whirlpool Latin America (Advanced Design Sector – Joinville, SC, Brazil). For the *reporting back* semiotic information to designers, Domingues developed formal workshops/lectures on semiotics at Whirlpool Latin America (2010-2013, Joinville, SC, Brazil) and carried out the experimental workshop *Semiotic Interferences in the Artifacts Design* [translated from the original in Portuguese] at the University of the State of Minas Gerais (2013, Belo Horizonte, Brazil).

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Advanced design as a systemic practice for innovation on territory: Creative Digital City case, Guadalajara, México.

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Resumen

El Diseño Avanzado es una practica orientada a la busqueda y visualización de oportunidades de innovación futuras, una práctica que si se realiza sistemáticamente crea corredores de innovación para las empresas que trabajan bajo el concepto de innovación continua.

Estas prácticas han sido poco documentadas, en especial cuando se trata de su aplicación en la innovación territorial, de manera que se hace crucial para las regiones entender la complejidad implícita en estas dinámicas, así como el nuevo rol del diseñador, pues su labor, aparece en etapas tempranas en las cuales, la anticipación, el diseño estratégico y la sistémica aplicada, juegan un papel fundamental en la identificación de oportunidades de desarrollo y aporte del valor para el territorio. En tal sentido, el presente artículo tiene como objetivo, disertar sobre estos fundamentos a través de la exposición de un caso específico: Ciudad Creativa Digital, proyecto de ciudad inteligente que suma los objetivos de renovación del entorno urbano de la ciudad de Guadalajara, con la creación e impulso de la industria creativa en México. La metodología utilizada para tal fin, se basa en el análisis sistémico de los diferentes actores y variables que intervienen en el caso. Los resultados obtenidos como producto de interrelación del sistema, son la configuración de mapas o rutas que muestran áreas de oportunidad para la innovación en una localidad determinada; situada dentro de una economía emergente que evoluciona de una estrategia de desarrollo económico basado en la manufactura, a una estrategia basada en el diseño y la innovación, con la creación de regiones del conocimiento y ciudades inteligentes.

Keywords: *Diseño Avanzado. Diseño estratégico. Sistémica aplicada. Territorio. México.*

Abstract

Advanced design practice focuses on search and visualization of innovation opportunities. While applying systematic, this practice creates innovation brokers for companies that work under continual innovation concept. These performs have not been widely

documented, particularly when they're about its application on territorial innovation, reason why is crucial to regions understand the underlying complexity in these dynamics, as well as designer's new roll. Designer task appears on the earlier phases on which anticipation, strategic design and applied systemic play a fundamental role to be able to identify development opportunities as well as value contribution to territory. In this regard, this paper aims to discourse about these statements through a specific case exposition: Digital Creative City, smart city project that sums renewal goals of urban environment of Guadalajara city, involving creation and promotion of the creative industry in Mexico. The methodology used for this purpose is based on systematic analysis of the different performers and variables involved in the case. Outcomes obtained as a result of interaction of the system are maps or routes configurations that show areas of opportunity for a specific local innovation; located within an emerging economy which evolves from an economic development strategy based on manufacturing, to a strategy based on design and innovation with the creation of regions of knowledge and smart cities.

Keywords: *Advanced design. Strategic design. Systemic. Territory. México.*

1. Introducción

El desarrollo e impacto de la ciencia y la tecnología han determinado la orientación y desarrollo de las formas de comunicación y las dinámicas económicas y sociales de vida en el planeta. En este contexto, surgen en el transcurrir del tiempo nuevas y particulares necesidades que implican también una continua renovación del rol estratégico del diseñador como creador focalizado en el campo de la visualización del porvenir dentro de la configuración de formas de subsistencia estructuradas como sistemas interdependientes.

En tal sentido, el Diseño Avanzado se expone como una práctica orientada a la búsqueda y visualización de oportunidades de intervención futuras, en diferentes contextos de acción: empresas, entes gubernamentales, organismos, instituciones educativas, etc. Uno de los ejemplos más resaltantes, puede encontrarse en el uso de sus fundamentos para la planificación, el diseño y el ordenamiento de las ciudades y sus componentes, dado que el tratar de anticipar las relaciones y formas de desarrollo del porvenir, juega un papel fundamental en las políticas de inversión e intervención a grandes escalas.

Al respecto, es esencial y definitorio para las regiones entender la complejidad implícita en las dinámicas antes mencionadas, así como el nuevo rol que el diseñador tiene dentro de las éstas, pues su labor, pasa a ser crucial en las etapas tempranas de investigación en las cuales, la anticipación, el diseño estratégico y la sistémica aplicada, se suponen elementales en la identificación de oportunidades de desarrollo y aporte del valor para el territorio.

Sobre esta consideración, el presente artículo tiene como objetivo, disertar sobre estos fundamentos a través de la exposición de un caso específico: Ciudad Creativa Digital, proyecto de ciudad inteligente que suma los objetivos de renovación del entorno urbano de la ciudad de Guadalajara con el impulso de la industria creativa en México.

Visto como un sistema, este proyecto se visualiza para el centro histórico de la ciudad con la mirada puesta en la recuperación de la calidad de vida y la tradición de la zona y en la generación de nuevas oportunidades económicas, sociales y productivas para la comunidad que la habita. Como eje estratégico se marca un modelo urbano interconectado, sustentable y flexible que aborde temas como la movilidad, la infraestructura, la sustentabilidad y en general el diseño urbano.

En virtud de ser un proyecto estratégico multidisciplinar de carácter territorial, se considera idóneo para abordar temáticas en la formación de futuros diseñadores desde el punto de vista de ese nuevo rol demandado por la realidad. Igualmente lo es para ser tomado como referencia en el estudio y aplicación de fundamentos del diseño avanzado en la consideración de un caso específico. Al respecto, el planteamiento de investigación de este artículo, se llevó a cabo con la participación de tres sectores estratégicos: instituciones de educación superior, empresa y entes gubernamentales. (universidad, industria y gobierno).

Como hipótesis de apoyo se planteó que a partir de la práctica de proyectos de diseño avanzado desarrollados de manera sistémica, se pueden crear portafolios que funcionan a nivel estratégico para la industria o el desarrollo territorial.

Durante la investigación de tipo cualitativa se realizó con investigación documental y de campo. La metodología utilizada se basó en el aprendizaje basado-en-proyectos o Project-based learning, en el análisis sistémico de los diferentes actores y variables que intervienen en el caso y en la consideración de datos de entrada y de salida y de su interrelación para detectar énfasis y jerarquías que una vez analizadas, pudiesen contemplarse como áreas de oportunidad e innovación dentro de la propuesta general.

Los resultados obtenidos como producto, se plasman en mapas o rutas que muestran áreas de oportunidad para la innovación en una localidad determinada y en el marco del proyecto de ciudad creativa digital.

De todos los trabajos desarrollados, se exponen en este artículo sólo tres ejemplos, con el propósito de distinguir los factores que en cada caso, fueron determinantes para generar la propuesta y los énfasis de desarrollo de las mismas. Cabe resaltar como principal aporte, el valor que tiene la información generada desde y para cada una de las entidades participantes.

Particularmente en el ámbito docente, constituye un espacio de formación profesional que otorga la responsabilidad de visualizar a través de herramientas específicas, sistemas sostenibles abordando el proceso de diseño, mas allá de la conceptualización de productos y servicios, de manera interdisciplinar.

Para la empresa y la administración, la consideración objetiva de factores de innovación viables y/o futuribles, derivados del análisis conjunto de todas las variables de entrada presentes en cada problema a resolver, o la visión estratégica con escenarios o posibilidades de futuro.

2. Estado del Arte

En las últimas dos décadas diferentes autores han estudiado y planteado la dimensión estratégica del diseño y cómo la actividad del diseño cuando aparece a nivel de la estrategia empresarial, tiene la capacidad de crear oportunidades de innovación que transforman la cultura de la empresa; (Heskett, 2002) lo menciona como una de las culturas de diseño, dentro de la diversificación que históricamente ha vivido la disciplina, en sus diferentes prácticas y manifestaciones.

Esta dimensión estratégica casi siempre es planteada por los autores como uno de los niveles superiores en que el diseño puede impactar en su actuar, es decir, como el estadio en las prácticas del diseño en que

añade mas valor, por ejemplo (Celi, 2012) en su pirámide del valor del diseño, sitúa al diseño estratégico (o la aplicación del “design thinking” al nivel estratégico) en la punta, sugiriendo el diseño estratégico como la actividad del diseño que aporta el mayor valor en las empresas.

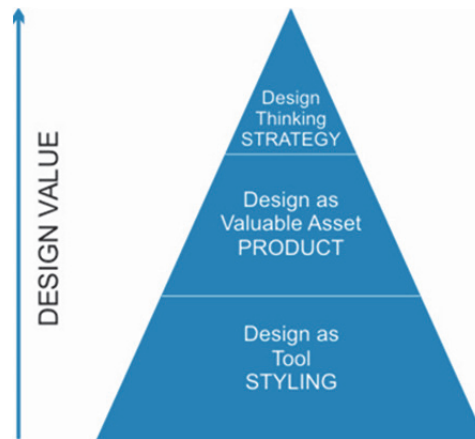


Fig. 1. Adaptado de Design Value. Fuente : Celi (2012)

Por otra parte, el valor del diseño de acuerdo a (Best, 2015) puede ser segmentado en tres actividades principales, la primera es la estratégica (la segunda son los procesos y la tercera es la implementación); dentro de la primera categoría la autora propone como una de las herramientas que las empresas pueden tener para encontrar oportunidades estratégicas la creación de escenarios, que ella misma llama “futuro imaginable” haciendo referencia a (Drucker, 2005) que menciona este mismo concepto cuando se refiere al desarrollo de un completamente nuevo producto o servicio: la creación de un futuro imaginable y de esa visión ir hacia atrás hasta el presente. En ambos planteamientos se sugiere el diseño estratégico como una actividad anticipatoria que conecta la visión estratégica de la empresa con escenarios o posibilidades de futuro.

A la actividad de diseño que tiene la particularidad de prefigurar el futuro algunos autores le refieren como Diseño Avanzado (Celi, Celaschi, Borja de Mozota, Iñiguez et al); de acuerdo a (Celi, 2010) la actividad del diseño avanzado aparece el territorio pre-proyectual y ampliado, tratando principalmente con proyectos extensos: extendidos en tiempo, espacio, incertidumbre y complejidad; esta noción de proyecto extendido (sobre todo en el caso de tiempo), se refiere a la actividad de diseño que desarrolla proyectos en un horizonte temporal ampliado, mucho mayor al del proyecto tradicional (llamado también NPD), el horizonte puede ser de años, lustros y hasta décadas.

“Lo que el diseño denomina diseño avanzado o prospectivo se está convirtiendo en la actualidad en un modelo dominante, es decir, ...se convertirá en la actualidad en un fenómeno de masas en la actividad del diseñador” (Mozota, 2006).

Una de las características principales del ADD en que los autores coinciden es el rol “visionario-estratégico” de la actividad, de acuerdo a (Desserti, 2010) en el ADD la actividad del diseño se aleja de su rol tradicional de resolución de problemas y se mueve hacia la búsqueda de posibilidades, y en dicho movimiento va de el mundo de las restricciones propias de un proyecto aplicativo, hacia el mundo de las oportunidades de innovación, así como también se mueve del rol técnico del diseño al rol visionario. (Fig. 2)

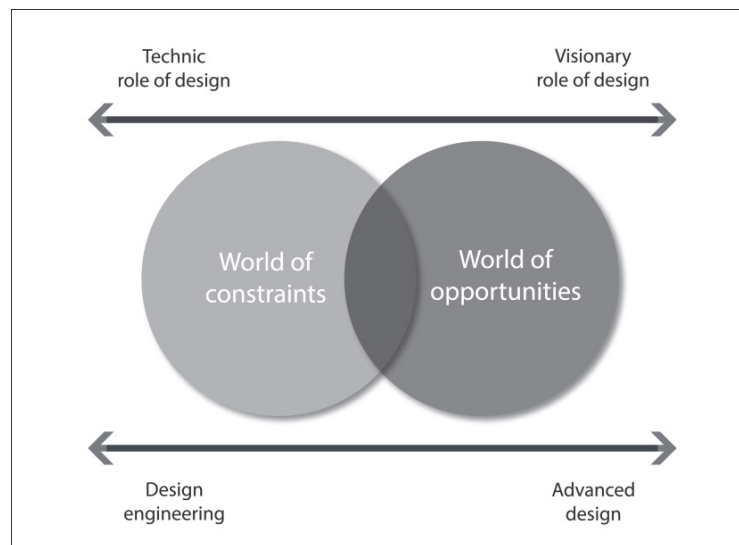


Fig. 2. Adaptado de *Le tensioni del progetto*. Fuente: Desserti (2010)

En el extremo izquierdo del gráfico se puede apreciar el contraste al rol visionario del ADD que de acuerdo a Desserti es el rol técnico del diseño, el diseño ingenieril.

En esta dimensión “visionaria”, (Borja de Mozota, 2006) enfatiza la posición estratégica que el diseño ha tomado en la industria como creador de valor e introduce el concepto de el “Diseño como Transformador” (el cual lo menciona como un equivalente al diseño como visión) como uno de los “cuatro poderes del diseño” dentro de las organizaciones:

1. Diseño como Diferenciador
2. Diseño como Integrador
3. Diseño como Transformador
4. Diseño como Buen Negocio

Precisamente en el tercero de ellos describe como el diseño es capaz de generar visiones bajo el concepto de ADD como recurso para crear nuevas oportunidades de negocio; es el rol del diseño como transformador el que mejora las habilidades de una compañía para tratar con el cambio, y también, desarrolla la pericia para interpretar de mejor manera la compañía y el mercado y sus futuros.

En la perspectiva de Borja de Mozota el ADD juega un papel estratégico ya que ayuda dar “coherencia al sistema diseño y guía el futuro”. En la siguiente gráfica se puede apreciar como por un lado lo sitúa en el nivel mas alto de los tres niveles en que una empresa puede usar el diseño y por otro lado como lo liga al “liderazgo en diseño” que la empresa puede tener. (Fig. 3)

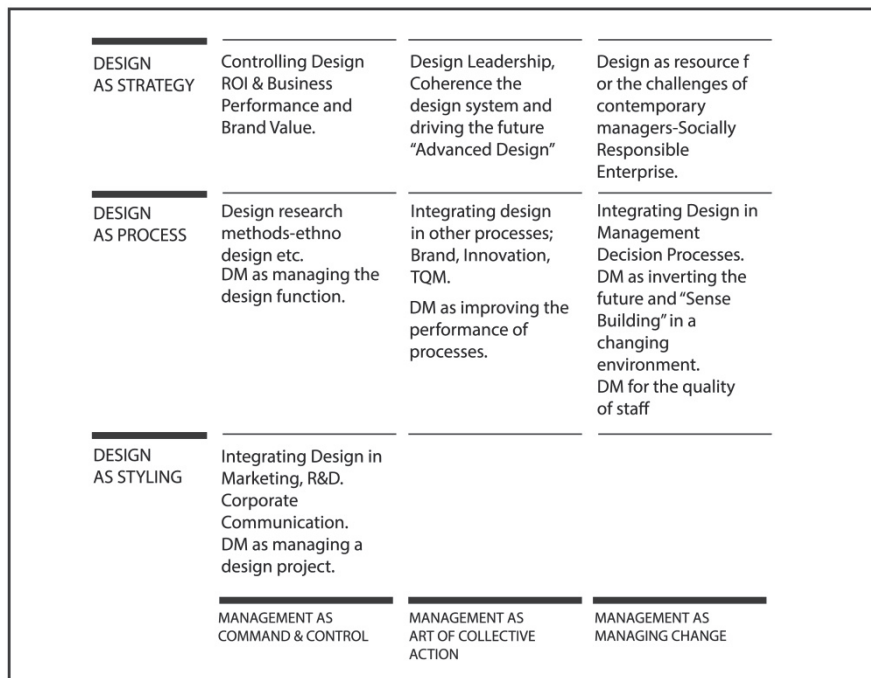


Fig 3. Adaptado de Design management is defined by what you think of design (vertical axis: the learning "ladder" of design), and by what you think of management (horizontal axis). Fuente: Borja de Mozota (2006)

En esta gráfica, se aclara como el ADD no es una herramienta estilística y tampoco esta en los procesos de diseño y métodos de innovación que la empresa desarrolla sino que se ubica en el tercer peldaño definido este nivel como el “Diseño como Estrategia”; donde el diseño se incorpora en las organizaciones a nivel de su estrategia empresarial y toma liderazgo para crear un sistema de innovación para la organización.

De acuerdo a la misma (Borja de Mozota, 2006) en su propuesta de el rol de el diseño como transformador, el ADD en su actuar suma a la capacidad innovadora de las empresas, en diferentes sentidos, tales como:

- Valor Estratégico
- Visión
- Prospectiva
- Gestión del Cambio
- Empoderamiento
- Proceso de aprendizaje de conocimientos
- Imaginación.

Todos ellos importantes para el planteamiento de el como una organización va a sostener a través del diseño la habilidad de cambiar y mejorar.

Esta perspectiva estratégica coincide con la de (DiBartolo, 2014), quien lo explica con la metáfora del “iceberg” (Fig. 4), DiBartolo coloca al diseño de producto como la parte mas visible de la organización o empresa, aquello que es visible para los consumidores y que es resultado de varias actividades mucho mas “profundas” de innovación, el ADD aparece en las actividades no visibles de la empresa, estrechamente ligado a las estrategias de diseño de la empresa y como el primer paso previo al desarrollo de conceptos de diseño que puedan culminar en productos.

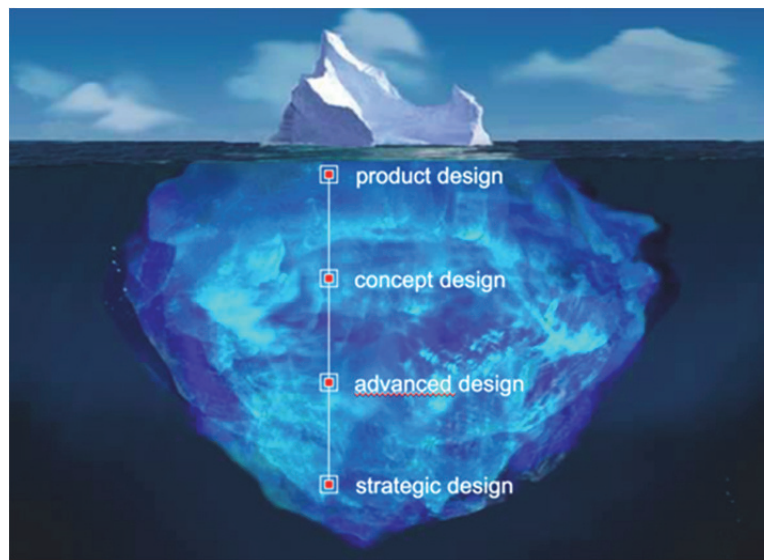


Fig. 4. Adaptado de El Diseño Avanzado. Fuente: DiBartolo (2014)

De acuerdo a DiBartolo es el ADD el que ayuda a conectar el largo plazo de la estrategia, con proyectos que permitan generar diseño conceptual para los plazos cortos que el mercado demanda, el ADD es una especie de interfaz que administra el corto y el largo plazo de la empresa.

En la caracterización desarrollada por (Iñiguez, 2016) sobre el ADD presenta doce atributos que como variables los definen y lo discriminan de entre las culturas del diseño, una de ellas coincide con los autores anteriores mencionados en que la actividad del ADD tiene una dimensión estratégica (atributo 12 de la tabla).

Tabla 1. Atributos del Diseño Avanzado.

<i>Número</i>	<i>Concepto</i>	<i>Descripción</i>
1	<i>Complejo</i>	<i>Gestiona la complejidad</i>
2	<i>Meta-proyectual</i>	<i>Analiza de manera cualitativa los procesos</i>
3	<i>Sistémico-adaptativo</i>	<i>Utiliza metodologías adaptativas, no lineales y no convencionales</i>
4	<i>Multidimensional</i>	<i>Incorpora los axis del tiempo, espacio, experiencia y ética al proyecto</i>
5	<i>Horizontal</i>	<i>Es transversal a las áreas de una empresa</i>
6	<i>Prospectivo</i>	<i>Define escenarios futuros, futuribles</i>
7	<i>Process-oriented</i>	<i>Entiende el diseño como un proceso más que como un resultado</i>
8	<i>Innovation-driven</i>	<i>No da soluciones específicas, guía la innovación</i>
9	<i>Conceptual</i>	<i>Ligado al(os) concepto(s) más que a los productos</i>
10	<i>Visual/Verbal</i>	<i>Tiene un mayor grado de abstracción, se vale del lenguaje en sus procesos</i>
11	<i>Estratégico</i>	<i>Se orienta mas a la estrategia que a la aplicación</i>
12	<i>Multidisciplinar</i>	<i>Es desarrollado con la participación de diferentes áreas disciplinares</i>

Fuente: Iñiguez (2016)

En dicha actividad estratégica se sugiere como el proyecto que visualiza futuros y esta prefiguración funciona como un entorno de innovación continua en que se plantean posibilidades de innovación constantemente, catálogos de posibilidades que representan la estrategia de innovación de la empresa en el mediano y largo plazo.

En este marco de acción, la sistémica juega un papel esencial, dado que el manejo de datos y las interrelaciones encontradas entre las variables de estudio, se constituyen en énfasis de desarrollo de nuevas oportunidades. Por otra parte, el atributo número 3 propuesto por Iñiguez, expone la utilización de metodologías adaptativas, no lineales y no convencionales, que de partida se emplean como sistemas abiertos.

Los procesos de innovación, han sido abordados desde múltiples perspectivas, a través de modelos de distinta naturaleza y desde campos diferenciados de acción al igual que los medios y métodos de trabajo para lograr resultados alineados a la idea, (León, 2009) pero al margen del modelo utilizado, los resultados siempre serán moldeados por causas exógenas y endógenas que rodean la situación de diseño.

Estas causas, contienen variables de entrada que deben relacionarse de manera integral con el propósito de entender y generar sistemas, en el caso del diseño avanzado, la visualización y tratamiento de datos como investigación, para generar escenarios futuribles y áreas de oportunidad, utiliza el pensamiento sistémico como parte de su ADN

3. Material y Método

La investigación conducida por los autores ha sido desarrollada en cuatro años, de Enero 2012 a Mayo 2016, donde el objeto de estudio han sido proyectos de diseño avanzado en que de manera intencionada y expedita se han planteado como ejercicios de deberían producir un catálogo de posibilidades de innovación que produzca una estrategia de innovación para el cliente. El cliente es la Ciudad Creativa Digital que es un proyecto de innovación territorial situado en Guadalajara, Jalisco, México; tiene como visión dos objetivos principales: el primero es el de crear un cluster empresarial de industrias creativas (en específico: animación digital, multimedios, cine y música) y el segundo igual de importante, el crear un proyecto urbano de usos mixtos que rehabilite el centro de la ciudad. Dicho proyecto tiene como antecedentes el cluster de la industria de Tecnologías de Información y electrónica que algunas décadas atrás se planteó como proyecto y que el día de hoy es una realidad (el 60% de las exportaciones del estado son productos de dicho cluster y ha sido denominado como el “silicon valley” de México en diferentes medios).

Los proyectos de ADD para la Ciudad Creativa Digital han incluido como actores la llamada “triple hélice” (universidad, industria y gobierno) ya que han sido desarrollados por estudiantes del Tecnológico de Monterrey Campus Guadalajara en coordinación con los representantes de la industria de la Cámara Nacional de la Industria Electrónica, de Telecomunicaciones y Tecnologías de Información (CANIETI) y con supervisión y apoyo del Gobierno del Estado.

En los cuatro años se han realizado un total de 40 proyectos de identificación de oportunidades, usando las herramientas del diseño y con la metodología de Aprendizaje Basado en Proyectos (PBL), con un proceso basado en el siguiente esquema:

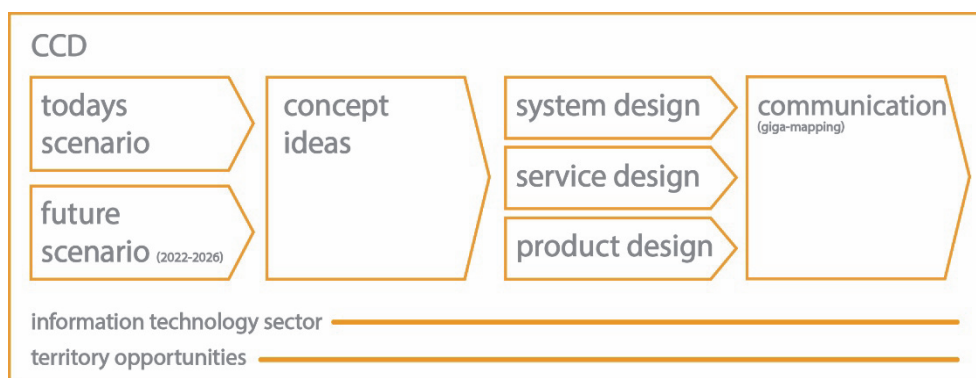


Fig. 5. Proceso de desarrollo de los proyectos. Fuente: Iñiguez (2016)

En cada fase del proyecto se usan diferentes herramientas relativas al diseño, tales como scenario building, ideation, product design, prototyping and giga-mapping. El entregable final funciona como una descripción del recorrido completo del proyecto, que trata de sintetizar los resultados de las diferentes etapas, expresa los resultados de las diferentes etapas y describe el resultado final bajo la herramienta del giga-mapping (Sevaldson, 2011) que es una representación bidimensional que funciona como “nube de información” en que se abarca la complejidad del proyecto, intenta representar de manera visual la realidad no simplificada.

Las herramientas de investigación utilizadas en los proyectos incluye la investigación documental, investigación del campo, action research y la evaluación sistémica en que se analizan los proyectos para la determinación de las variables que intervienen en ellos.

4. Resultados

La dimensión estratégica de los proyectos de diseño avanzado abordados sistemáticamente contienen cuatro variables principales, que son calificadas por los participantes en los proyectos como variables relevantes:

1. Complexity Management – Visualization
2. Opportunity Finding
3. Project Multiplicity
4. Organisational Transformation

A continuación se describe cada uno de ellos y se ejemplifica mediante proyectos particulares y su resultado (giga-map) como es que suceden:

4.1. Complexity management - visualization

Los proyectos de diseño avanzado tienen como uno de sus atributos principales el que amplían la complejidad y variables participantes en los proyectos, por lo tanto funcionan como conductores que permiten navegar en la incertidumbre siempre presente en la innovación. La sistematicidad en los proyectos de diseño avanzado permite navegar en la incertidumbre, encontrar patrones y proponer posibilidades, al mismo tiempo que se visualizan, una suerte de administración de datos complejos de manera no cuantitativa (como lo haría la “ciencia de datos” o el “big data”) sino más bien cualitativa donde la información pasa de ser prospectiva, a ser anticipatoria o prefigurativa. El siguiente giga-mapping ejemplifica la gestión de información compleja de manera cualitativa, donde no se simplifica sino que se privilegia la densidad.

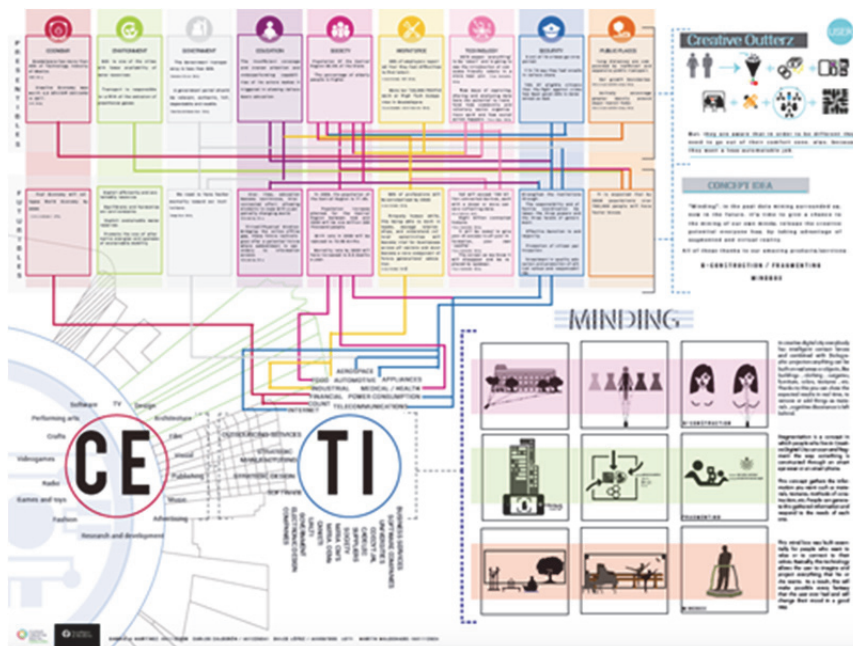


Fig.6. Ejemplo de Giga-map en Complexity Management – Visualization.

4.2. Opportunity Finding

La gestión de información compleja y la creación de posibilidades funciona como una actividad de búsqueda de oportunidades, oportunidades que se buscan en el FFEI, y que tienen un horizonte de aplicación futura. Ante la gran incertidumbre que viven las organizaciones actualmente, el diseño avanzado brinda procesos que facilitan el encontrar posibilidades puntuales que pueden ser vistas a nivel estratégico como apuestas a futuro.

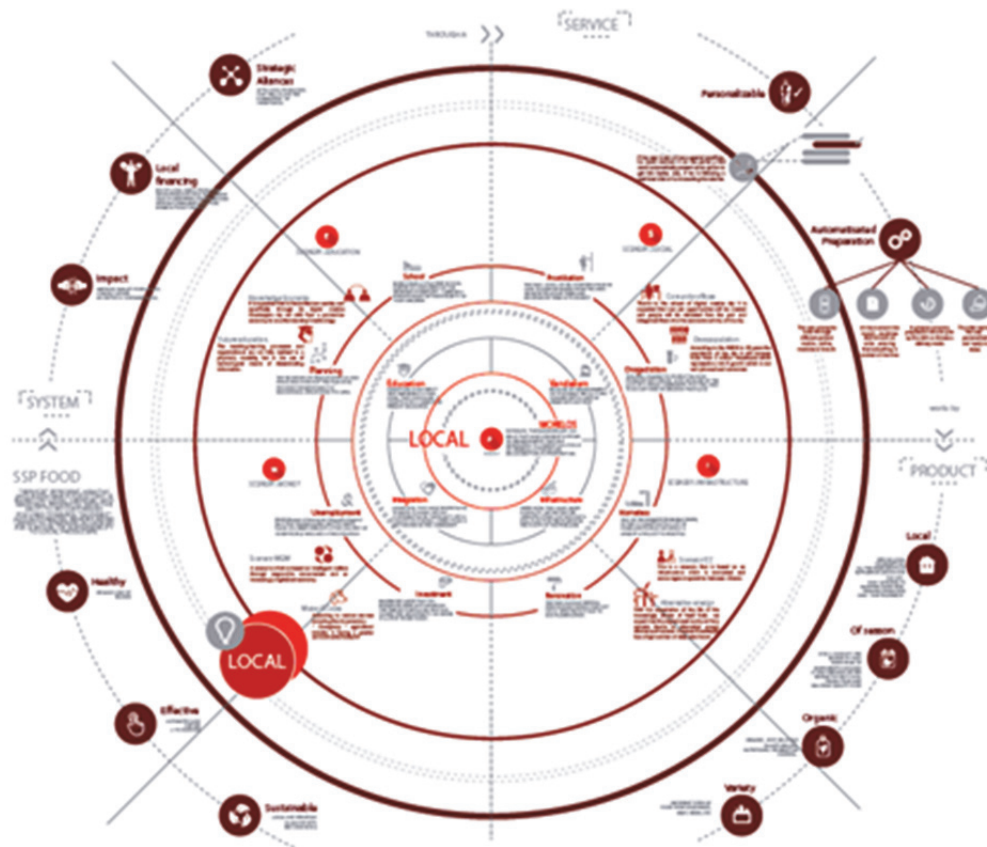


Fig.7. Ejemplo de Giga-map en Opportunity Finding

4.3. Project Multiplicity

Dado que los proyectos de Diseño Avanzado son prefiguraciones de posibilidades, los resultados sientan las bases para que otros proyectos puedan ser desarrollados a partir de ellos, ya sean otros proyectos de Diseño Avanzado como proyectos de NPD. El trabajo sistemático produce catálogos de posibilidades que en continuo se retroalimentan entre ellas y se multiplican, esto es percibido y valorado por los clientes como un potencial multiplicador de innovación. Una nota importante es que no solo el resultado final (diseño de servicio-producto o sistema) es vista como base para ser un multiplicador de proyectos, sino todas las etapas del proyecto de diseño avanzado, dados los procesos de gestión de la complejidad y prefiguración, cada una de sus etapas entrega posibilidades que pueden ser multiplicadas en diversos proyectos.

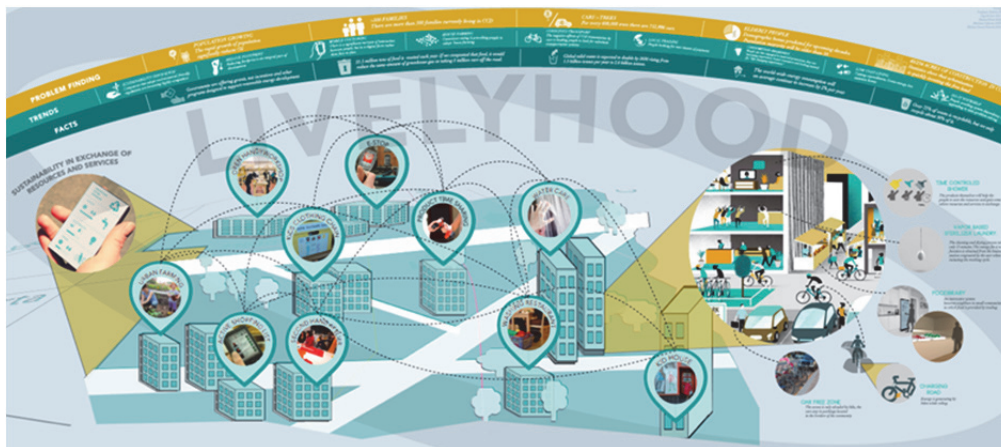


Fig. 8. Ejemplo de Giga-map Project Multiplicity

4.4. Organisational Transformation

Toda vez que los procesos de diseño habilitan a los participantes para gestionar la complejidad, encontrar oportunidades y producen una importante multiplicidad de posibilidades, la organización (entiendase como organización tanto el cliente directo como los diferentes participantes del proyecto) se ven transformados dado el conocimiento y competencias que generan los proyectos. Los nuevos conocimientos, oportunidades generadas y las plataformas multiplicadoras predisponen a los diferentes actores a la innovación, así que toda la organización sufre un cambio cultural.

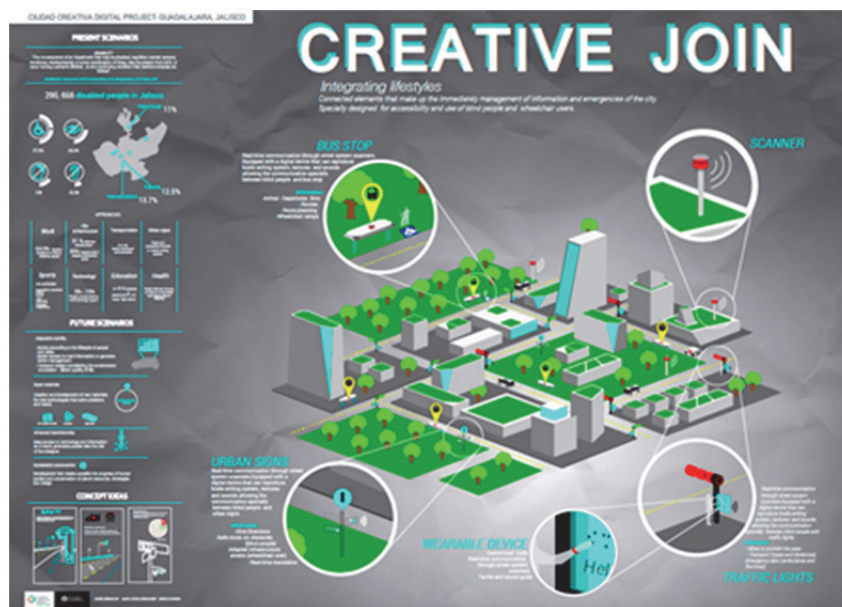


Fig. 9. Ejemplo de Giga-map en Organisational Transformation

4.5. La práctica Sistémica del Diseño Avanzado

Las variables de salida descritas anteriormente son producidas por la práctica sistémica de proyectos de diseño avanzado, son una suerte de innovación continua que incide en las posibilidades de innovación de la empresa (o territorio); inciden desde luego como proyectos que generan innovación per sé, pero también inciden a un nivel estratégico, ya que modifican el “catálogo” de innovación de la empresa e inciden en la visión empresarial dada su capacidad de abordar el largo plazo. Las modificaciones que producen los proyectos pueden retroalimentar nuevos proyectos de diseño avanzado cerrando un círculo virtuoso en que de manera sistémica se conecta la estrategia de innovación (empresarial o territorial) con los procesos continuos.



Fig. 10. La práctica sistémica del diseño avanzado

5. Discusión y conclusiones

Los resultados de la presente investigación validan la hipótesis de partida, basada en el planteamiento de que a partir de la práctica de proyectos de diseño avanzado desarrollados de manera sistémica, se pueden generar portafolios que funcionan a nivel estratégico para la industria o el desarrollo territorial.

En tal sentido el aporte de conocimiento se concentra, por una parte, en el cómo la relación del diseño con contextos específicos, puede hacerse legible en términos de planteamientos concretos aplicables a futuras realidades. Por ejemplo, la generación de avenidas de innovación, que como ejercicios que desarrollan competencias puntuales, y que crean cultura innovadora, son productos concretos y utilizables, dado que han sido validados y analizados como sistema.

Por otra parte, la dimensión de aprendizaje del diseño a partir del PBL, la sistémica aplicada durante todo el proceso y los fundamentos o atributos de la actividad del ADD, demuestran que es viable generar esquemas de gestión y prácticas o formas de trabajo que apunten la formación de los diferentes actores, al momento de desarrollar proyectos de innovación guiada por diseño.

Finalmente, a los resultados dejan evidencia por un lado, de elementos clave que pueden ser utilizados para afrontar la gestión de la complejidad en este tipo de proyectos, a través de la colaboración interdisciplinar que crea lenguajes comunes de comunicación que sirven de plataforma para el diálogo entre diferentes agentes de conocimiento. Por otro, también cabe destacar como evidencia, el desarrollo

de la capacidad prospectiva de las organizaciones y los individuos involucrados en el aprovechamiento de las ventajas proyectuales que representa el ADD.

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Systemic Education and Awareness. The role of project-based-learning in the systemic view

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Abstract

The paper investigates the role of Systemic design²² in a well-structured social network as a tool to solve complex problems difficult to face by the application of a linear approach. It's necessary a change of paradigm: from an approach based on the competition and on the logic of continuous growth to a systemic vision, based on the collaboration, the awareness and the rediscovery of qualitative values. The ecological emergency demands more and more the development of sustainable and resilient communities. We have to change the way of thinking processes and relations, in other words we must be ecoliterate. Infact, ecoliteracy represents the starting point of innovative processes. It gives importance to the relations and to the multidisciplinary team-work. This cultural change begins at the level of the schooling system which now represents the official institution for growing conscious individuals. The current academic system has been defined by the same linear and competitive approach used to delineate our economic systems (social hierarchy, inequalities etc.). In practice, to achieve some important changes we need to act from students of primary school to college students and over. The paper investigates also the issues of the strict hierarchy between teacher and student and the support of collaborative behaviour. In this article we present different case studies (not only from the world of academia) and analyse the role of project-based-learning in order to inspire a new eco-competent generation of people.

Keywords: Systemic view, Awareness, Sustainable communities, Ecoliteracy, Collaboration vs Competition

²² Bistagnino, L. (2011), Design Sistemico. Progettare la sostenibilità produttiva e ambientale. Slow Food Editor, 2nd Edition

1. Introduction

Through the critical analysis of some case studies, this paper intends to investigate different useful tools to the “ecological education”²³. Moreover, it aims to analyse didactic activities which have more influence in the development of an individual and collective awareness to get closer students to the systemic approach. Observed institutions represent useful starting point to evaluate how it's necessary to rearrange also the school system, because actually it's the main organization designated to provide knowledge. In the next pages positive features of case studies will be underlined to define guidelines of systemic education.

2. Social, economic and product environment

Daily activities of human life are placed inside an huge context characterized by a systemic structure. Ecosystems, which are the setting of all human activities, are made up by interconnected subsystems, in which relations and networks represent the core that define their organizational schemes. However, if we look at our economic and product systems, we can easily prove that the way used to manage their processes is very far from natural ways. With the Cartesian revolution and the introduction of the scientific method, we witnessed a rapid change of vision and a dramatic change in the way to tackle complex issues. Moving away more and more from the holistic view, people think that the behaviour of living systems can be investigated like machinery.

Firstly, from the second industrial revolution, western societies have greatly modified the pace of own evolution, moving away more and more from natural cycles of development. Then, from the Second World War, the technological progress is increasing constantly and also it leads the economic, industrial and socio-cultural time. Greater is the speed of technological innovation and greater is the request of quicker production times and more efficient travels. The immediate impact of this uncontrolled acceleration, in all fields of industrial and post-industrial society, is the exponential evolution of its material culture (Thackara, 2005). The industrial society is following the principle “it is faster and it is better” and it achieve a pace not more supported by natural cycles.

The main need of people is the interaction with natural environment, modifying it according to own demand: so design is the essential source of human life, it's the fundamental action of all human being (Papanek, 1971). Nature designs constantly living systems and it rearranges structure and relations to adapt them to new conditions and to maintain them around a balanced equilibrium. Unlike living systems, our economy faces complex problems using a linear approach and “unsystemic” vision, typical of production systems of XIX and XX centuries. This kind of vision considers only one way to solve problems, it suggests preset solution, recommended like the only one able to recover an instability. A critical situation is considered like a breakdown of working machineries: we have to solve this breakdown as soon as possible, using all kind of instruments, but without looking into the real causes and behaviours that could have generate that situation. The main inclination is to reduce all complex systems in elementary parts, in order to modify working principles of each parts, without considering relations between different subsystems and between them and the context. The unavoidable consequence is the loss of worldwide vision and the importance of connections, which are essential requirments of systems. It seems to be progressively evident that frequently the real motivation of all problems is the exclusive application of linear approach in all field of everyday life, producing consequences on ecosystems, which are more and more visible and even less foreseeable.

²³ “Ecological education” refers to a trans-disciplinary approach used to increase in students the awareness around sustainable development (UNESCO, 2002).

Also the management of natural resources is designed along a linear model, in which raw materials are extracted more than enough, are transformed through unsustainable processes without considering their ecological footprint, are used and finally discarded in the environment. But it's difficult to reintroduce them into the natural cycles without suffering damages more or less reversible. Like industrial production, also the consumption model is conceived and spreaded in linear way, in which the consumption of ephemeral goods is intensified. Since the 1970s people started to questioning the economy itself and the political behaviour in relation to the ecological issue, but only in recent times the environmental matter has started to get consequences on the industrial project and design culture (Tamborrini, 2009). If it is true that “the 80% of environmental effect of our goods, services and facilities is defined at the design step” (Thackara, 2006), the design world should become aware to the ecological issue and it should rethink processes to reduce their ecological footprint. We have to modify our behaviour before that the project is at the operative step, so it is necessary to develop a design culture that consider the ability of human systems to have an effect on other ecosystems.

3. School, university and cultural system

Culture is the main feature of human life that explains better than other all aspects of a specific historical period. Therefore we have to reflect about the ways to reproduce it and to impart it to other people. Nowadays culture is considered and leaded like an ordinary output of the industrial society. We are living in ages marked by a lot of changes and governments of different countries consider the education like an instrument of competitiveness that distinguishes a nation from another. They want to educate a huge number of people using less as possible amount of resources. So they set up a real education market inside which culture is exploited like goods able to enrich the government. Schools and universities have the main purpose to spread culture in all classes of society, they must give to the people instruments useful to integrate them into the community. Education should set people in the condition to understand the features of the context and to be aware about the decision-making. For this reason education represents the instrument of people's freedom: educated people are free to understand what is going on around them, free to think and reflect and finally free to express their opinion about a common topic. Nowadays we often confuse education with a basic learning of technical concepts, which are useful in ordinary jobs but they don't help to develop a critical and holistic point of view. Formal education spreaded by schools and university often seems like blocked by the huge amount of subject: students have to learn a lot of disciplines in very brief time and this kind of learning doesn't give enough time to develop critical and “meta-cognitive” abilities (Illich, 1971).

Education is one of the most important moment in the human life, not only professionally, but also individually. The typical speed of our time, in which periods are strained to obtain the most profit, has some effects also in education. Like other aspects of human life, the education system is designed using the linear approach, so it draws a rigid and hierarchical structure that reproduces the same pattern of society, based on competitiveness and unyielding classes (Bourdieu, 1970). The huge list of essential abilities represents a way to control students, because they have to learn them in schedule and it also contribute to increasing the stress of daily life. This stress is the consequence of an overloaded system, which very often seems like a “knowledge factory”. Inside this factory the productivity and the quantity are main topics and its first purpose is to obtain a number like merit: in this scenario the educational path loses its important sense. Especially in Bachelor degree, Masters and PhD we can notice that there is a tendency on focusing the attention on a single field of study, it asks that students have very detailed knowledge, but at the same time they lose the ability to connect topics of different disciplines.

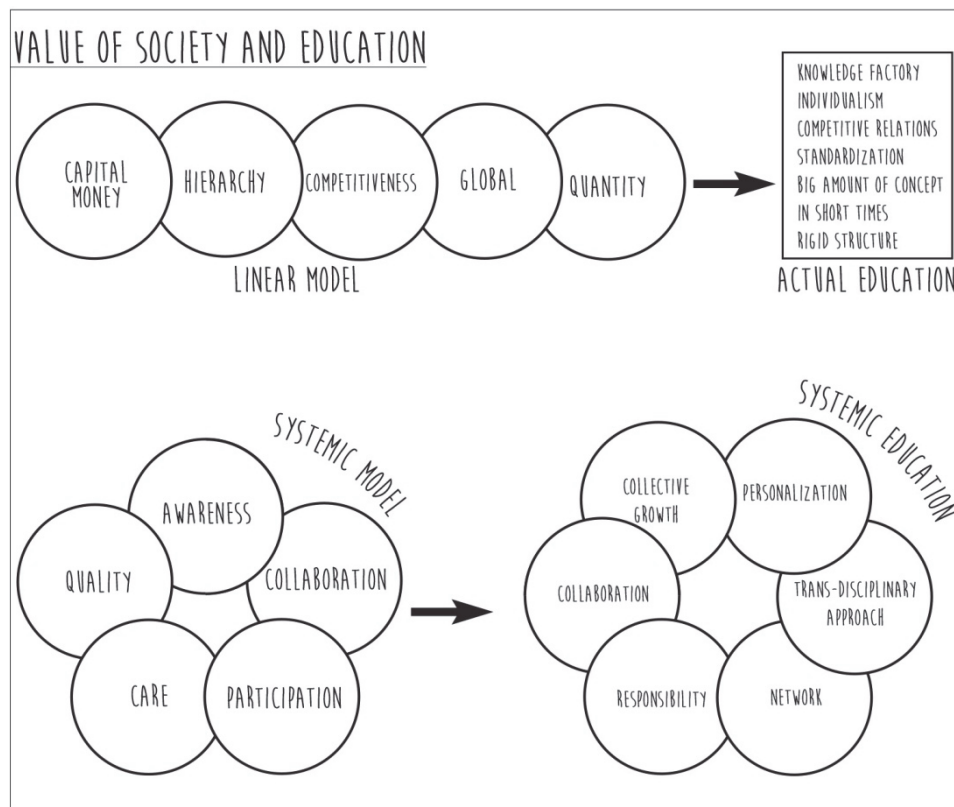


Fig. 1 Comparison between values of linear and systemic model and their consequences on education system.

4. Comparison between linear and systemic model

Looking at the ecosystem's organization, we can learn that all subsystems are interconnected and they are working in collaborative way. A very important role is represented by relations, because they set up the network in which the informal communication and sharing abilities take part between different components and also they contribute to the training of common knowledge. If we compare this mode of operation to the one of human activities, we can easily notice that they are not interconnected and they don't collaborate between them, namely they have a lot of trouble in creating a cooperative network. The main motivation of this gap between human and natural field is due to their opposite systems of values. Ecosystems follow the principles of systemic thinking to organize their structure, which is based on relations, on collaboration and on the quality of their trading and products. On the other hand human activities are the implementation of the linear paradigm and their fundamental values are very far from the systemic view. The linear society is marked by a strict hierarchical structure and competitive relations, used to achieve a dominant position on other people: the wealth of each person is not due to the wealth society, but it is the consequence of aggressive behaviour adopted to achieve a position of economic power compared to other people. The only way to obtain the success is proving to be better than others, using own abilities to achieve an exclusive individual benefit without sharing them with the community. Often the only one aim of relations and tradings between people and companies is the accumulation of monetary capital, which is represent the driving force of the local and global economy. The same economy that imposes a pace following the illusion of an illimitate exponential growth (Capra, Handerson, 2009). To satisfy this constant request of growth by the marketplace, the product system reacts focalising the attention on the mass production and on the number of goods, at the expense of their qualitative values. In this way a standardized production model, which is based on the huge number of products, is adopted like

the only one possible with the aim to preserve the perception of an ephemeral and material richness. Technological development is exploited like the main motivation to plan the obsolescence of industrial products, in such a way that industrial production always replies to superfluous needs of the marketplace. All of these things contribute to the creation of a “Kleenex Culture” (Papanek, 1971) and our ecosystems are not anymore able to support this kind of throwaway culture. The main aim of the hierarchical and pyramidal structure of our society is the accumulation of huge amount of money in hands of few people through the maximization of the profit in more and more brief times. The economy is mainly interested to cash flows and to financial transactions, without considering the real wealth and the capability of systems to react in front of a critical situation. Following this linear development model, our global society has led to a rigid and fragile economic system, which is not able to re-organize itself in an efficient way after a disruption which has changed its balance. At the same time the uncontrolled exploitation of resources and the overproduction of waste have an effect on the environment and they cause a reaction so much violent and unpredictable that escapes more and more often from the human control. The linear cultural paradigm gives us suggestions and interpretations of society which aren't anymore able to satisfy real needs and at the same time to give attention on the natural ecosystem's wellness. We can notice especially in the agriculture and energetic sectors how nature and society are following two different paces: the second one is consuming more resources than the first one can produce them (Thackara, 2006). Ecosystems send a very strong message to humankind in reaction to this exploitation: it's not possible to think and effect anymore on the basis of an hypothetical illumined growth, when available resources are limited. So, nature reacts reducing the amount of available resources and showing in a more emphatic way the consequences of human actions, which cause ecological impacts more and more devastating and that effect unavoidably the financial system (Heinberg, 2011). Just as psychological consequences are evident on people's health: more quickly the economy increases and expands itself and stronger is the perception of heaviness in daily life. The time acceleration in all daily activities (job, relax time, family time...) effects like a spinner on the exponential development of material culture, linking the human nature to the concept of heaviness (Calvino, 1988). For these reasons it's necessary to change the approach used to take on different aspects of human life, we need to change the prospective from whence we are looking at things of our society. In other words it is necessary a change of paradigm from linear to systemic. We are aware that the actual situation needs new tools to understand new conditions and to decide how intervening in the future. So we have to learn a new language that allows to read and to understand consciously the complexity. This implies a change in the culture and in values systems that lead the human behavior.

5. Sustainable communities like organizational model for the future

The ecological urgency encourages the transition from actual settlements into sustainable communities. Nowadays the real challenge is the creation of resilient communities based on the examination and comprehension of natural systems (Capra, 2014). So we have to redesign processes and relations depending on resilience, just like that systems are able to modify their structure to adapt them to new conditions defined by flows and new balances into a complex scenario. Community represents the best expression of “democracy”, inside which different part contribute to increase the decision-making power and the freedom of speech of its members. The attention is focusing in particular on some principal aspects of communities: the economic and decision-making autonomy, the ability to reproduce themselves without any external aid and the network like structure (Bookchin, 1989). The same concept of community suggests an important change of values: inside a community members establish relations based on trust, on awareness and on care for other members. Relationships and exchanges are directed to

put in sharing material goods, knowledge and ability with the purpose to maintain the comfort of the same community. Collaboration is the most important features of all activities inside a community and it has the aim to support and keep a dynamic community. The success and the realization of each person is not based on individualism, but on cooperation and sharing. Therefore people have an active role in the context, they try to act in a sustainable way on the environment and also they try to establish a constant relationship with it. Another important features of the ecological systems is the preservation of the community itself, that finds a way to be self-sufficient through internal processes and exchanges of input-output. This is so different from economy that is based on the exploitation and consumption of external resources. The modification of the cultural background becomes therefore the starting point to define a new system of values.

5.1 Ecoliteracy

To live side by side in armony with ecosystems, we have to re-organize structures, flows and relations of human systems. To do that we need to own instruments to understand living systems and to learn from them, in other words we need to become ecoliterate (Capra, 2011). It's necessary that people learn a new language and that they pass down it to new generations of youngs, because this language can help to design a communicative and exchanging network between different systems. All this requires a big effort in changing our habits and in redesigning our daily processes. However nature can suggest us a lot of examples about how manage our processes in a sustainable way. The first step in this direction is becoming ecoliterate and ecoliteracy have to become an essential part of the cultural background not only of future generations but also of politicians, of managers and of those people who have the ability to modify the environment. To notice significative changes into the society, the systemic view of life must be spreaded to a huge group of people, starting from primary school until post-university education. Rethinking education in a systemic view involves also a reconsideration of the hierarchical relationship between teachers and students, of the study plan and of the way of teaching.

So purposes of ecoliteracy are:

- to build “eco-competent” people, that are be able to read dynamics of living systems, to re-elaborate what they have learned and finally to apply it in daily activities;
- the promotion of collaborative behaviours through multidisciplinary team-work learning;
- the development of individual and collective awareness about ecological and systemic issues through the practice to represent an active role into the community;
- sharing of goods and knowledge with all members of community;
- the re-organization of all activities on the basis of local community's wellness;
- the development of responsibility toward other members and the environment;
- the creation of a huge network of exchanges;
- the deep knowledge about local flows and dynamics and their preservation.

All of this contribute to modify the actual cultural paradigm marked by materialism, not only into communities, but also inside each person. The challenge is overstepping the individualist approach, based on consumption and material supremacy and look at relationships and collaboration like resources of individual and common wealth.

“We find spiritual fulfillment in nature or by helping others. None of these pleasures requires us to consume things from the Earth, yet each is deeply fulfilling. These are complex pleasures, and they bring

us much closer to real happiness than the simple ones, like a bottle of Coke or a new minivan.” (Suzuki and Dressel, 1999, pp. 263-4)

This quotation wants to note how our perception is impaired about what can really give us wealth: the capitalist society suggests us to search happiness in consumption and purchase of material goods, but people can reach the real satisfaction using their abilities for community. Systemic education involves training of listening and understanding skills about other needs and also finding solutions far from the restricted material satisfaction. So it's necessary to develop abilities to understand messages sent by other people and by environment. In ecoliteracy, ecological studies are the fundamental background for other disciplines, directly related like biology and natural sciences or less related like economy, but important because it deals with the flow of raw materials. Systemic education requires a significant transition in educational paradigm: we have to open education to an ecology of mind (Bateson, 1977), involving also spiritual features of human life. Another challenge is the re-connection of the academic world to the real world, reconsidering the experience like an important moment in the educational path.

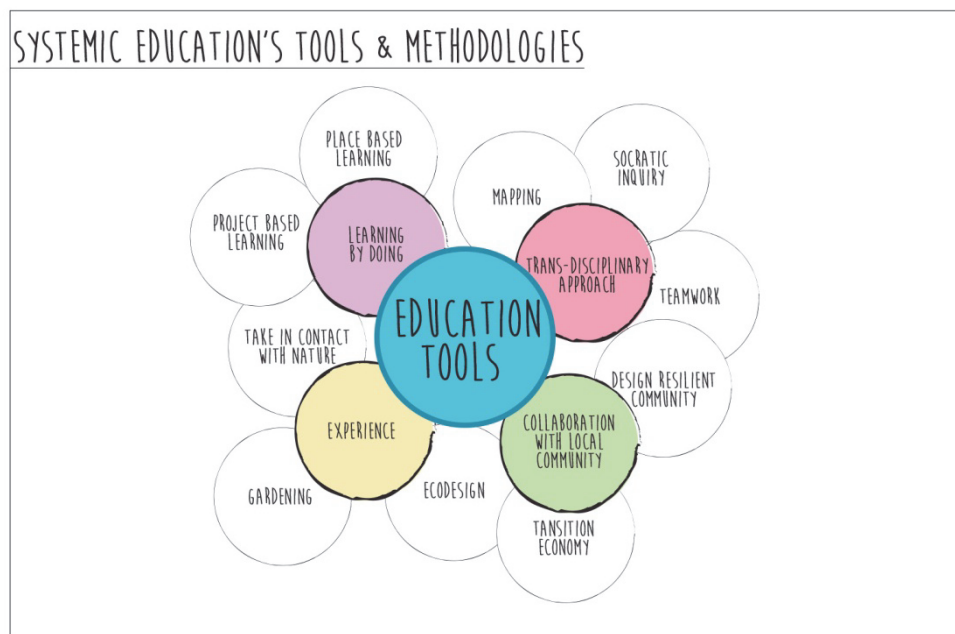


Fig. 2 Description systemic education's features

5.2 Case studies

Many projects around the world offer alternative choices to the traditional education and they consider ecology like the “fil rouge” that links all disciplines. Below some significant case studies will be analyzed, considering institutes and experts linked to ecological topics. The attention will be focused on those realities that handle the education about systemic design.



Fig. 3 Location of institutes and organization involved in sustainable field of study

We can underline a huge network of researchers and activists, involved in different project on global and local scale and moved by the intention to make people aware and to change the strict mechanistic approach in scientific studies. Between those it's important referring to the work of F. Capra, J. Thackara, V. Shiva, S. Kumar e G. Pauli. With their publications and their active role, they try to promote some changes in different fields of society. Fritjof Capra, in his books, disapproves the strict mechanistic approach in research projects and promotes the application of the holistic view in scientific fields. He also extends the network vision to all aspect of human life, from politics to social sciences. He is involved, like co-founder, in “CEL- Centre for Ecoliteracy”, that promotes the ecological language in primary and secondary schools. The institution offers a systemic learning, based on the participation and on the educational power of experience. Students are led, during the learning, of principles of living system through the involvement in practical activities, like school gardening (Capra, 2014). Looking at university education, “Second Nature” (Boston, USA) promotes the ecological education working with a network of colleges in United States. They want to help college campuses into the transition to energetic sustainability. The main aim is to increase the amount of courses in ecological disciplines, to promote the foundation of new research centres, to improve their energy performance and to decrease their consumption.

Other two important exponents, linked to the ecological Indian activism, are Vandana Shiva e Satish Kumar. The first one is involved in conflicts related to the food sovereignty, the agriculture and the farmer's rights and the protection of biodiversity. She is working to make global public some problems that afflict the poorest parts of India. Important is her attention to women's marginalization and its relation with the western development model. Her position regards to the mechanistic scientific research is highly critical, because it distances people from nature and ecological systems from human society. In India she established the “Bija Vidyapeeth – Earth University” into the “Navdanya Biodiversity Conservation Farm”. It is a living and learning centre focused on democratic education, community living and protection of seed's biodiversity. The centre mainly offers courses about agroecology and organic food systems. Another exponent linked to the Earth University is Satish Kumar, activist and editor of

“Resurgence & Ecologist” magazine that give global information about ecology, philosophy, sustainable development and arts. The main purpose is to offer some alternative causes for reflection in comparison to mainstream discussions, acting on individual and collective awareness. Kumar's education is linked to Jain monks and non-violence and he represents for many people a spiritual guide. His activism is put into practice in the foundation of the “Small School” and the “Schumacher College”.

Schumacher College is an international learning centre focused on environmental sustainability, trans-disciplinary and holistic learning. It works together with the Plymouth University and the Transition Network (Totnes, Devon, UK) and it proposes short and post-graduate courses, by accepting students from all parts of the world. So there is a multicultural place of study and teachers adopt community learning and “learning-by-doing” approach in educational activities. Students are divided in teamworks and they get in touch with complex theory, dynamic systems theory, biomimesis, permaculture, ecological design thinking and economy for transition. Practical experience, like gardening, and living community are considered like central moments in the learning path and in the development of ecological awareness. Educational activities include democratic involvement, sharing ideas, moments for individual reflection and practical works useful for the community.

Near to the Schumacher College is the “EDE- Ecovillage Design Education” (EDE), organized by GEN-Global Ecovillage Network and by Gaia Education, promoted for the first time in 2005 at Findhorn Ecovillage in Scotland. Every year a lot of different courses, about sustainability, are proposed in different places around the world, especially in South America. Educational activities take place into “living and learning centres” and they are organized in theoretical lessons, practical activities, workshops, project-based-learning and games, used to teach ecological principles. They propose flexible programs to adapt them to different scenarios like intentional urban and rural communities or colleges. They also apply an holistic view to sustainability, ecology, economy and social studies. Spiritual field is very important in EDE, so they propose to follow a healthy life style and to practice a daily exercise program (like meditation). All of these aspects can be useful to re-connect each person to other people and to the context.

Other two important exponents are the British theorist of design John Thackara and the Belgian economist Gunter Pauli. In different ways they get closer to sustainability and in particular to systemic design. Thackara in 2000 founded “The Doors of Perceptions”, an international network of designers, innovators and students joined together in the research of solutions for a sustainable future. So the network is a real community of practice, in which ideas and knowledge are shared during meetings and workshops. They discuss about the role of technological innovation and which kind of benefit it can offer to future societies, they also talk about networks inside cities and local business. Thackara affirms that the cultural change have to start from the bottom part of the society, from common people that involve themselves in local business to promote the territory. It is very important because “local realities compose the global one” (Thackara, 2012). He also suggests to focus our attention on relationships, because we can realize sustainability, that often is a more theoretical concept, in them.

“In nature, waste does not exist and there is no unemployment. Everything have a role into the system and outputs of an activity become inputs for another one”. (trad. G. Pauli, 2010)²⁴

As Thackara, Pauli suggests to focus our attention on relationships and to consider them like basis of the re-organization of our economic and industrial systems. Through the international network ZERI, composed by economists and other experts, Pauli proposes to reorganize our business in “open systems”,

²⁴ “In natura non esistono disoccupati e neppure rifiuti. Tutti svolgono un compito e gli scarti degli uni diventano materia prima per gli altri”. Pauli, G. (2010). Blue Economy. 10 anni, 100 innovazioni, 100 milioni di posti di lavoro. Edizioni Ambiente.

in which the output of an activity can become the input for the generation of other interconnected activities. Main instruments to realize this network are the biomimesis and the good knowledge of local features.

Near to the “Blue Economy” of Pauli, we can find the Master course in “Systemic Design”, which takes place at the Politecnico of Torino by the prof. L. Bistagnino. “Working on the territory” is the central activity of the educational path. The territory is described by a qualitative approach that underlines its features using flow maps of raw material and energy across local systems. The main purpose is to develop into student abilities of trans-disciplinary analysis and teamwork learning, that are useful to redesign our production model from linear to systemic. Educational activities are organized using the “boss-less” structure: theoretical lessons are replaced by the “learning by doing” method and by the “project based learning”. The professor plays the role of “mentor” and he gives the possibility to teamworks to self-organize their educational path.

5.3. Review

From the comparison of case studies we can notice some differences and similarities in education about environmental sustainability and systemic view. All of these examples show how community of practice, relations, territory and active involvement have an important role in education path.

Some projects are more focused on spiritual education like fundamental moment in the development of ecological awareness. These activities ask to the people to share their abilities, knowledges and ideas and at the same time they have to learn from others and work with them. Practical activities and learning have the aim to encourage collaborative and dynamics behaviours inside groups.

In many projects ecodesign and gardening are used like didactic instruments (ex. Centre for Ecoliteracy and Schumacher College), because they are practical activities that connect the group of student to the context. Often ecological dimension in education is dealt with the project based learning (ex. Gaia Education), because practical involvement can build a more established awareness.

6. Conclusions

The radical transformation of the current structure of societies involves a necessary re-organization of educational system. The organization of future societies in sustainable communities requires that also people and leaderships are appropriately educated. It's necessary to take place the quantitative approach, based on a large amount of concept, with the qualitative learning that suggests different ways to apply theoretical concepts to the real life. The systemic learning of scientific disciplines uses, like didactic instruments, principles of living systems like concepts of scheme (relations), structure and processes. Trans-disciplinary methodology is very important in systemic learning: to develop holistic view is necessary to make connections between different fields of study. For this reason workshop can help students to understand how to apply theoretical notions in realistic context and also it represents the moment in which people can develop awareness about their active role. Students take cooperative behaviours and democratic involvement and their work often have some positive consequences on local communities.

Education has to be rearranged to create a network of interactions that connects people to the context and also this network can be useful to create a learning community. The aim moves from the professionalization of students for the employment to the social education of them, through conscious development and emancipation (Freire, 2004). Redesigning education like an open system, students get to know with concepts of exchange, relations, flows and collaboration, all features typical of living systems.

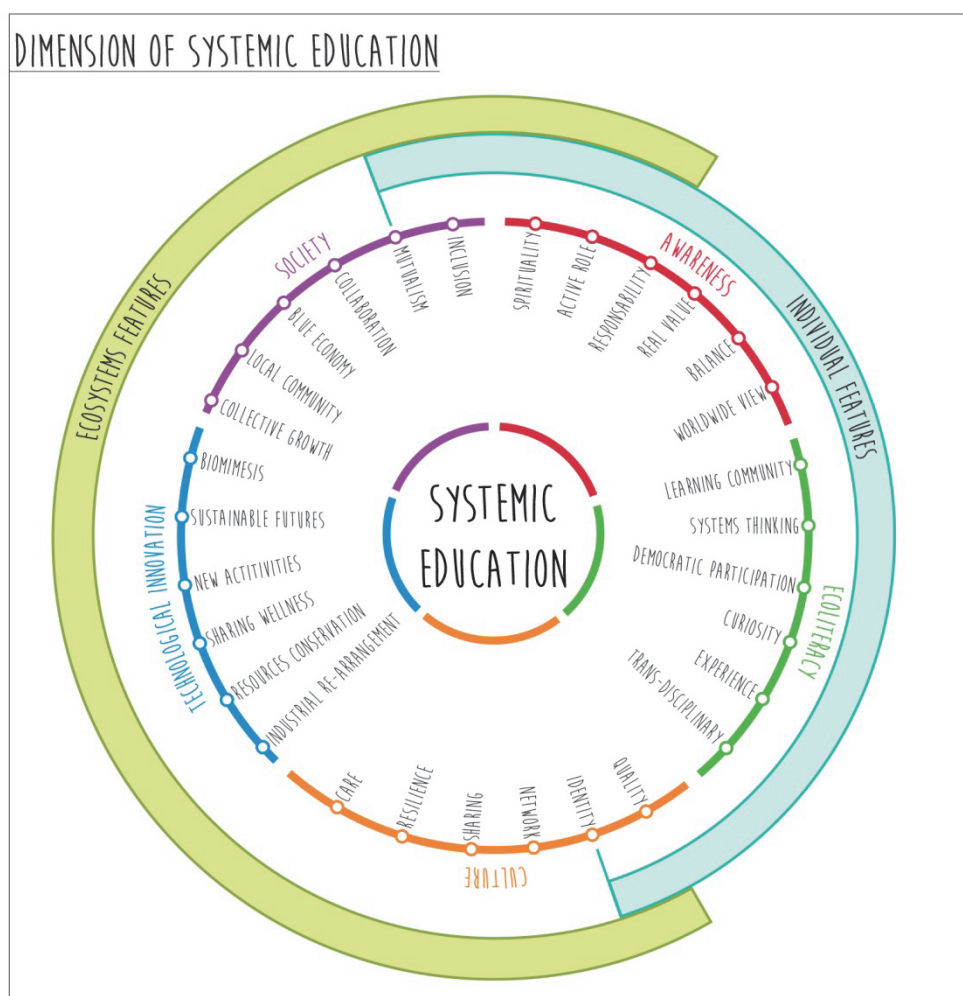


Fig. 4 Dimensions of systemic education

This analysis underlines that we are moving first steps toward a sustainable future and many of these steps are done by small realities which are working on local scale. But this transition requires that increasing ecological awareness effects more strongly on our society, through making a network between design and local economy, socio-cultural and spiritual dimensions of human life.

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Rural Development And Sustainable Innovation. How Systemic Design Approach can contribute to the growth of marginal regions

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Abstract

The objective of this project is to reach sustainable development in rural areas through Design Approaches. We intend here, as “sustainable”, that matches the three dimensions of sustainability, that works for people, planet and profit - a ‘triple P’ challenge. Sustainable development consists of goals, strategies, and processes that together provide more socially, economically and ecologically alternative tracks to conventional development, offering improved livelihoods to the poor in ways that promote both their empowerment and the conservation or improvement of key natural resources so that the basis of productive activities can be maintained into the future (Lele 1991; Pretty 1998). The topic of rural development is very relevant because of the quantity of people, very often poor or extremely poor people, living in rural territories. More than 3 billion people live in rural areas. Design rarely deals with rural development and with the definition of a system that can facilitate the growth and the development of the territory. If it does, design usually focuses on products or services.

The most important futures, which globally all rural areas share in common, are remoteness and isolation. Many development specialists and rural sociologists argue that small structure and cooperation are important strengths that contribute to ethic and social identity. The central role that play territorial context and relationships in the Systemic Design Approach (SDA) makes it a very effective approach to support and encourage rural development in a sustainable way. Applying the SDA, it is possible to manage local resources and local products in a way that allows the economic strengthening of the farmers and communities that live in the territory.

The Systemic Design team of the Department of Architecture and Design (DAD) of Politecnico di Torino has been engaged for years into the develop of the approach of Systemic Design that can be summed up by five basic principles (Bistagnino 2011: 19):

Output > Input: the output (waste) of a system becomes the input (resource) for another one

Relationships that generate the system, each one contributes to the system

Auto-generation systems sustain themselves by reproducing automatically, thus allow them to define their own paths of action and jointly co-evolve

Act locally: context is fundamental because it values local resources (humans, cultures and materials) and it helps to modify local problems in new opportunities.

Man at the centre of the project: Man is connected to own environmental, social, cultural and ethic context.

It is essential to start from the current state of the art, that allows to define strengths and weaknesses, before to design the system, made of flows between actors.

Keywords: *systemic design, rural development, inclusive, cooperation*

1. Introduction

The purpose of this work is to understand how to reach rural development in a sustainable way (that works for people, planet and profit - a 'triple P' challenge) in marginal and complex areas, in particular, in rural areas. Sustainable development consists of goals, strategies, and processes that together provide more socially, economically and ecologically alternative tracks to conventional development, offering improved livelihoods to the poor in ways that promote both their empowerment and the conservation or improvement of key natural resources so that the basis of productive activities can be maintained into the future (Lele 1991; Pretty 1998). The work done has the objective to encourage social innovation processes for the improvement of the quality of life and the economic wellbeing of people in marginal areas. Achieving sustainability, in environmental, economic and social terms, on small rural areas is no longer a possibility but an imperative. Rural areas, all over the world, are fragile environment aggravated by stagnant economies, high unemployment, persistent poverty, deteriorated social well being, lower earnings and diminished health care. Social changes, such as large-scale migration, and climate change have major consequences for small-scale farmers in the developing rural areas of the world. Currently over 50% of the world population still directly depends on rural livelihoods that are highly vulnerable to climate change (McIntyre et al., 2009). Rural development is a very relevant topic because of the quantity of people that lives in this situation. More than 3 billion people live in rural areas and 1.4 billion people are extremely poor. Identification of innovative processes useful for the development of small-scale farmers, therefore, is crucial. Increased infrastructure, market access and information, and creative financial solutions are necessary for sustainable increases in productivity. To reduce poverty in rural areas is necessary to invest in agricultural and rural development.

The most important case study of the research work takes place in Mexico, State of Guerrero, Ahuacutzingo. This region was chosen because of its particular features related to food, both the production and the consumption. Take action on these aspects means managing environmental, social, economic and health consequences. Approximately one quarter of Mexico's 100 million people live in rural areas, and depend primarily on agriculture. Farming is important for land use and for the management of natural resources. Thus farmers are fundamental social, cultural and economic actors in rural areas. Important are also the agro-food networks that are generated. Since the main part of the research is the project with the Cooperative Ahuehuetla in Mexico, we need to consider that agriculture in Mexico is not only a fundamental economic activity of the rural population involving about 37% of the total population, but has also deep social significance and cultural meaning.

The most important futures, which globally all rural areas share in common, are *remoteness* and *isolation*. Many development specialists and rural sociologists argue that small structure and cooperation are important strengths that contribute to ethnic and social identity. Support and facilitate positive change for rural development must include the participation of small communities. Local people need to be encouraged to think about their futures and to put into practice their ideas, founded on their culture and traditions. Therefore, the goal of this research is to lean a process based on capacities and ability of local people.

The central role that play local resources and relationships in the Systemic Design Approach (SDA) makes it a very effective approach to support and encourage rural development in a sustainable way. Applying the SDA, it is possible to manage local resources and local products in a way that allows the economic strengthening of the farmers and communities that live in the territory.

Since farming is a mainstay of most rural economies, the research aims to promote economic diversification combining traditional agricultural skills and new technical and technological know-how. This mainly because rural areas are characterized by a strong and evident contrasting perception of the traditional and local culture. On one side a very strong sense of belonging to the territory, the local culture and the tradition. On the other side the perception, shared by the majority of the population, of what is linked to tradition and indigenous culture as poor, worthless. The answers to the problems of these complex territories, cannot be found only looking to the past. Solutions should be promoters of innovation, with the attention and sensitivity to the local culture. This is the reason why an important section of this work is focused on technologies.

2. State of the Art

2.1. Rural Development (RD) and Social Innovation (SI)

Since the most important objective and goal of the research is to generate rural development we need to define what rural development is, what it really means and what practical consequences might have on the territory and local communities. There is no universally accepted definition of rural development. It is the result of various physical, technological, economic, socio-cultural and institutional factors and it represents an intersection of agricultural, social, behavioural and management of sciences. Rural development can be defined as, helping rural people set the priorities in their own communities by providing the local capacity. According to Robert Chambers, rural development is a strategy to enable a specific group of people, poor rural women and men, to gain for themselves, and their children more of what they want and need. We can define rural development as a Process leading to sustainable improvement in the quality of life of rural people, specially the poor.

2.2. Social innovation

In public discussions and in policy, innovation is still almost exclusively treated and perceived as economic innovation focusing on technical efficiency as well as the commercialisation of science and technology (Adams and Hess 2008, pag 5).

The traditional technological or economic innovation is usually the result of internal research and development conducted in a company or institution that leads to the market introduction of a new product, service or technology. Social innovation, in contrast with technological and economic innovation is not teleological and may not necessarily have an economic impetus.

During this research we discuss social innovation from a rural development perspective. The classic formulas of process and product innovation are part of an economic paradigm, which often represents, itself, the cause of certain problems, especially for the environment. This is also the reason why, the topic of innovation, today, is differently declined, in his social meaning. Social innovation processes work especially where market fails and where public policies do not offer adequate solutions to the challenges. This especially where governance structures are weak to find solutions for complex problems and hesitate to generate answers to the needs in local systems. Social innovation processes are capable of mobilizing, openly and continuously, a large number of actors active in the local system searching useful solutions (Murray et al., 2010).

Brunori et al. (2008) write about the evolution of innovation studies in agriculture, showing the progressive shift from a 'linear' or so called 'exogenous' conception of innovation to a 'systemic' or 'endogenous' approach, defining innovation as a learning process. Brunori asserts that innovation occurs when the network of production changes its way of doing things. In this sense innovation is related to the resulting pattern of interaction between people, tools, natural resources. With this new vision, learning becomes the core of innovation processes.

Innovation thus is not only technological innovation. Is more related to a successful change in production, consumption and distribution systems. Indeed comprehend new practices, artefacts and/or combinations able to generate a process of production, a network, the integration of two different activities.

What I find very interesting and useful for this research is well described by Van der Ploeg et al. (2008). Social innovation must be strongly connected with locality and contextual knowledge. This means that innovation is linked to a specific context, many times to a specific region.

3. Description of the research work

The research work consists of several parts. The structure chosen to describe the research path does not follow the chronological order. The search path has been marked by several revisions and changes in direction.

The work is mainly structured in 3 parts. The first one is the analysis and the definition of the state of the art. The second one is the Systemic Design Project of flows and relationships in collaboration with the Cooperative Ahuehuetla of Ahuacuotzingo, State of Guerrero, Mexico. The last part is the implementation, or definition of the steps necessary to put this project into effect, and the framework that outcomes from the research.

3.1 Ahuacuotzingo, State of Guerrero, Mexico

The territory of the State of Guerrero, and in particular Ahuacuotzingo, has been investigated and analysed from several perspectives.

Named for Vicente Guerrero, a leader in Mexico's wars for independence, the region became a state in 1849. Guerrero is divided into local governmental units called municipios (municipalities), each of which is headquartered in a prominent city, town, or village. Much of the state's population consists of impoverished Indians and mestizos, a significant minority of whom speak an indigenous language as their primary language; more than two-fifths of the people live in rural areas. Considering the standard economic measures, it is easy to notice that Guerrero consistently ranks among Mexico's most impoverished states. The transportation infrastructure is poorly developed and maintained. The rural population lives dispersed among scattered and often very isolated villages; in 2010 just over fifty-eight

per cent of the state's population was spread among more than seven thousand communities with fewer than 2,500 residents.

For a substantial majority of the rural population, the subsistence agriculture with supplemental commodity production or seasonal wage employment remains a way of life.

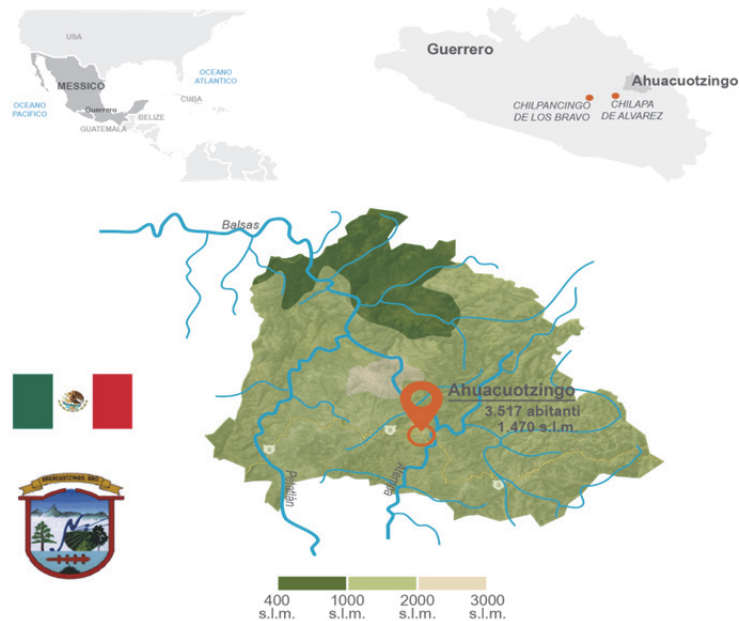


Fig. 1 Map of Ahuacuotzingo, State of Guerrero, Mexico

One of the 81 municipalities of the State of Guerrero is Ahuacuotzingo. Approximately 60 km from the capital Chilpancingo, its territorial extension is of 388,4 km² and the population mainly dedicates to primary Sector. The subsistence agriculture is the most important activity for people of Ahuacuotzingo. Subsistence agriculture is self-sufficiency farming in which the farmers focus on growing enough food to feed themselves and their families. Tony Waters writes: "Subsistence peasants are people who grow what they eat, build their own houses, and live without regularly making purchases in the marketplace." However, despite the primacy of self-sufficiency in subsistence farming, today most subsistence farmers also participate in trade to some degree, though usually it is for goods that are not necessary for survival, and may include sugar, iron roofing sheets, bicycles, used clothing, and so forth.

As many rural areas are, the territory of Ahuacuotzingo is characterized by low population and enterprises density, high unemployment, economic decline associated to a trend of emigration to other states, mainly to United States, and cities far away, with the consequent abandonment of agricultural land and the deterioration of the natural habitat.

Since 1980, Mexicans have been the largest immigrant group in the United States. In 2013, approximately 11.6 million Mexican immigrants resided in the United States (up from 2.2 million in 1980) and they accounted for the 28% of the country's foreign born (41.3 million). This situation generates a radical change in lifestyles, food consumption, and a loss in material culture, because people try to emulate other cultures losing totally their own local culture and traditional know-how. In recent years, few farmers seek to improve the quality of life and well-being returning to cultivate the land in their own hometown. The population of this rural area, rather isolated, reveals to be intimately and intensely linked to the territory and to have a strong sense of belonging and aggregation. In addition, the farmers of the cooperative

Ahuehuetla, with which we have been working, are very motivated for a substantial changing towards sustainable rural development.

The Ahuacuotzingo community was characterized by the production of *panela*, a sugarcane product obtained by boiling and evaporation the sugarcane juice unrefined. Land next to Ahuacuotzingo, now mostly abandoned or underutilized, was intended primarily for this crop and most of the people worked in this sector. With the advent of liberal market, a large quantity of white sugar produced in the United States and other countries, arrived in Mexico. This caused the sudden lowering of the price of white sugar and, consequently, a decrease in demand for *panela* that, by then, had become much more expensive.

Understand how the migration of humans out of rural areas affects those left behind is very important from a social and economic welfare point of view. At migrant destinations, immigrant labour enters into local production activities, complementing some factors while possibly competing with others (including some types of non-immigrant labour). It influences both the level and distribution of income in migrant-host economies. The micro impacts of migration on agricultural productivity are complex. Rozelle, Taylor and deBrauw (1999), using simultaneous-equation methods and a data set from China, found that the loss of labour to migration significantly reduced grain yields, reflecting an absence of on-farm labour markets. One of the most important factors that must be considered in order to investigate the migration impacts, both at migrant origins and destinations, is remittance.

The phenomena of migration, which for decades has driven masses of people from Mexican rural areas to US metropolis, is very complex. It has impact and consequences in the short, medium and long term, and affects the economic, social, cultural as well as environmental. The most pessimistic studies on migration-development interactions in source areas appeared in the 1970s and 1980s. A more optimistic scenario comes out from the researches on this topic in the 1990s. If we want to find the true impact of migration we have to position ourselves in the middle, between these two ways of thinking. In recent years studies about migration suggest that the interaction between migration and key economic variables represents a complex combination of these two ideas. For example, recent studies find that migration has both negative "lost-labour" and positive remittance effects on source economies. In the United States, new research indicates that the impacts of immigration are complex, operating through indirect channels largely ignored by past research. New research methods generally are required to uncover interactions between migration and economic changes at migrant origins and destinations.

Furthermore, we have considered the issue of food security and climate change. Rural areas are characterized by a very strong specificity, social and environmental. It is necessary therefore to investigate these aspects to better understand the strengths and potential of the territory in order to promote the "revitalization".

3.2. A real "security crisis" in the State of Guerrero.

Insecurity and violence associated with organized criminal activity are pervasive in Mexico's southern state of Guerrero. The state's homicide rate is the highest in the country and extortion and kidnapping are commonplace. The state is divided into territories within which either drug trafficking organizations (DTOs) or community policing networks exercise control over local policing functions. What happens in rural areas is that competition between groups of traffickers over the state's prodigious narcotics output creates violent no-man's-lands in buffer zones between territories controlled by rival groups. The single most important source of DTO earnings are profits from the sale of heroin derived from poppy that is grown in the mountains throughout the state. An estimated sixty per cent of Mexico's poppy crop is grown in Guerrero. State efforts to suppress the violence and the associated criminal activities have been disorganized and have not been successful. Part of the problem clearly involves the permeation of state

institutions by DTOs. A substantial portion of the state's population depends on earnings derived from narcotics production and many others depend on revenue streams that involve DTO participation. Reducing the economic role of DTOs will cause substantial dislocation and hardship that the state and federal governments must be prepared to address.

In a communiqué published at the beginning of May 2015, the Tlachinollan Mountain Center for Human Rights warned that the *“violence has no limits, and the lack of capacity of the authorities to confront it is evident. The political class finds itself trapped within its own labyrinth. It fell into the same claws of the crow that gave birth to it, and it has had to submit itself to the very laws of barbarism which it has itself imposed. Guerrero is a territory mined by violence. There is no place there that escapes control by organized crime [...]”*

In 2014, the murder rate in the State of Guerrero was the highest in Mexico and eight times the national average. It was the year that 43 students from the Ayotzinapa rural teachers' college were taken into police custody in the town of Iguala and disappeared. A search expedition did not locate the missing students, but uncovered hundreds of hidden graves of unidentified human remains buried in the gloomy hills outside the town. The murder rate so far in 2015 is 29 percent higher compared to the same period a year ago.

3.3. The contrast place

The rural area of Ahuacuotzingo is characterised by strong and deeply rooted contrasts. This mainly caused by the fact that it is a territory in many ways underdeveloped but which suffered the consequences of globalization. Many inhabitants of Ahuacuotzingo have televisions, someone have mobile phones, few people the internet connection. This is substantially the cause of the larger part of the contrasts.

The analysis done through literature review on rural development and social innovation in rural development and the investigation on Ahuacuotzingo community reveals us the main territorial strengths and weaknesses.

The rural area is fragile and rich at the same time. Weak and strong at the same time. Stable, planted in the area, connected to the environment, aware depending upon it. It's an isolated and distant place from the rest of the world, but very strongly connected to the territory. The reason of contrasts, contradictions and paradoxes lies in the feeling of *mexicanidad* described by Octavio Paz and Carlos Fuentes in their literary work. This emotion is expressed primarily as a deep love for the roots which lives together with an ever-present sense of loss and regret mixed to a sense of pride for the cultural heritage. The portrait that emerges is of a population constantly looking for itself, or rather, for a clear identity. A people in whose veins run two legacies: the indigenous one and Spanish one. The Spanish heritage, for obvious reasons, is a baggage that is experienced by the Mexicans in a contradictory and indefinite way.

4. Systemic design project

The research provides an example of how to create well being and an important economic flow applying the SDA in Ahuacuotzingo context. From the focus on the product the attention moves to flows that generate different activities.

The system project begins with the definition of priorities: first define the actors, than their activities, al last design the material and energy flow. We initially identified the main actors, that is the members of the Cooperative Ahuehuetla, born thanks to this project. The main actors are: 5 farmers (Nacho, Tonio, Josè, Angel and the Cavideco-Centro de Apoyo para el Desarrollo y Vinculación Comunitario, Beto)

holding a total of 43 hectares, but currently cultivating only 12 hectares, 1 group of women that cultivate a greenhouse for the production of organic vegetables, 1 group of women, sisters, who have recovered the activity of production of panela which had been abandoned by their father. The actors of the system work as if they were part of the same organism. Each farmer or actor becomes specialized in one activity in particular. The waste of each activity are used and returned in other productive activities. This allows the generation of new products, which do not exist at the moment. Nacho is the farmer who recently became part of the Ahuehuetla Cooperative. His role in the project is important as a producer of fish. For his breeding he uses worms arising from the production of Tonio. Tonio, which is at the moment the farmer better organized and with the best production, in the project produces sugar cane, which is useful for the feeding of animals but, above all, is brought to the group of women for the production of panela and derivatives. Thanks to the biodigester he produces biogas used in his tortilleria. In this activity he uses the corn that he produces on his field. His other productions are butter, cheese and yogurt, worms, compost, agave. The main activity of Beto is instead the dairy where he produces cheese, butter and yogurt. These products can be partially sold and partially used at the Cavideco. Jose produces sugar cane, corn and nopales. It has a small breeding whose products sells directly on the production site. Angel is the operator of the Cavideco that was founded in 2009. This centre was founded with the objective of developing the skills of men and women respecting environmental sustainability, promoting a natural tourism project and volunteering using local resources for the community development. This centre is one of the key locations for the project. It's a meeting point for cooperative members, here there is the restaurant and the natural swimming pool for the whole community, there are laboratories for the transformation of the food produced by the farmers of the cooperative. Furthermore it's the place where workshops and seminars will be are. An important part of the project provides that the Cavideco will become an essential place to develop the potential of the community. Here indeed practical workshops will be organized for the farmers and for the whole community of Ahuacuotzingo. Seminars and workshops will be organized primarily to support the farmers and other workers of the community in its activities. This part of the project relating to the education and organization of these courses is a practical outcome that we have already achieved. Inside the event Verano Intercultural courses were held to educate farmers in relation to self-construction of micro bio digesters and greenhouses for vermicomposting. Essential activities in the system project. Cavideco will also be the point of contact, the link between the Ahuahueta Cooperative and the rest of the community. Here indeed it will be possible to purchase the products of the cooperative that will become the main results of a virtuous production system that uses in the best way possible the resources of the area and considers the output of the system, not as waste, but as an important input for other productive activities. New products outcome from the Systemic Design project applied to Ahuehuetla Cooperative.

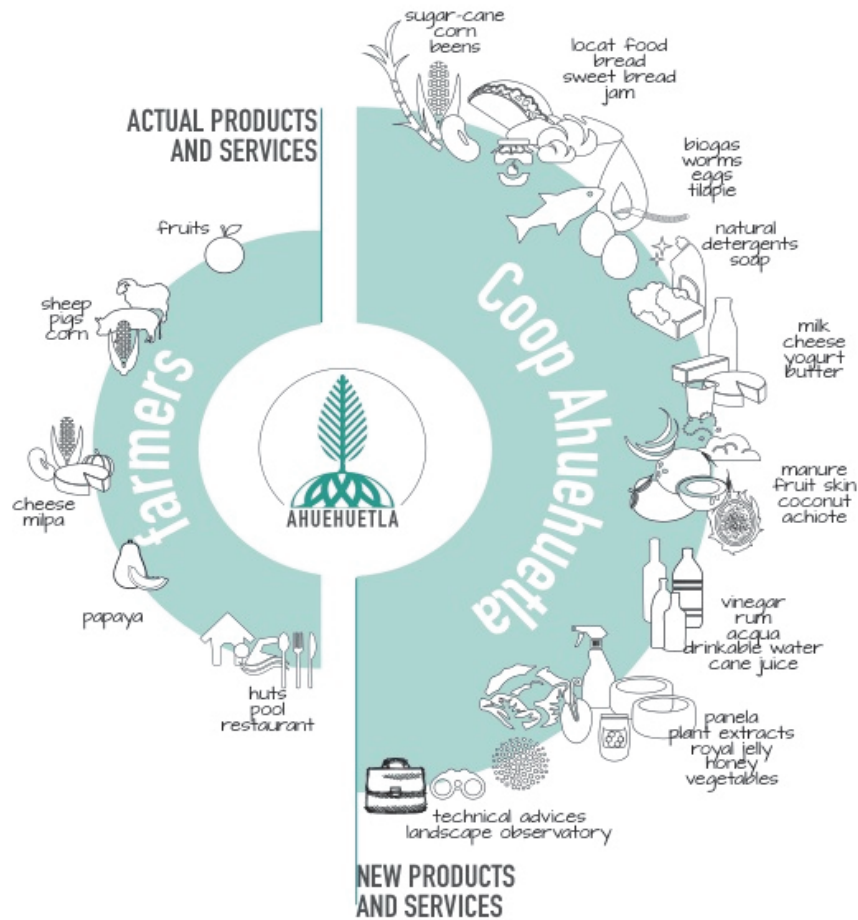


Fig. 2 New products by the Cooperative Ahuehuetla through the application of Design Systemic Approach

5. Main results

The conversion of the waste of the area into resources generates many new products and related production activities, such as fish farming, compost and worm compost, worm farming, seeds self-production, natural filtering of water, biogas, bio detergents and natural soaps, panela (which was the typical and most important production of this area until it has been replaced by the refined white sugar), honey. We have divided the main results in *Preliminary Results* and *Outcomes*.

Preliminary Results are practical results, already achieved during these years of research. First of all the creation of the Ahuehuetla Cooperative, which is the first step of the project, to involve people in the research. Within the project of Ahuehuetla Cooperative, we also dealt with the design of the logo, which is the central visual element that helps to identify and remember the brand. As happen in every company, this icon is a real symbol: the main purpose of it is to summarize and underline shared concepts and values from farmers. It is not only a graphic action, a graphic sign but it is a way to define and promote a strong and precisely identity for the farmers and the entire community. Other fundamental preliminary results are the improvements made in 2015 at the Cavideco. Two biodigesters were built, in which is disposed organic waste and that generates biogas that is used in the kitchen restaurant. Kitchens chimneys were equipped, a small improvement but very important considering the diffusion of respiratory diseases

caused by the production of smoke in the kitchens. Further more we have planted at the Cavideco 40 fruit trees, for the production of oranges, lemons, mangoes, bananas that are used directly in the restaurant or processed in the laboratory. It was built with discarded materials, an entertainment area for children who attend the centre. The sheet metal on the roof has been replaced with a structure waterproofed using a fabric covered with a natural substance derived from the viscous liquid which is obtained from nopal, a typical and widely present plant in the territory. Furthermore, a greenhouse for the production of vermicomposting has been built.

Outcomes are above all regarding the implementation of the project. The Outcomes are the key research results, in line with the objectives set at the beginning of the project. First of all the *framework*, useful for other rural development projects in similar contexts, than the definition of the steps for the *implementation* of the project, the definition of active *actors team* in all phases of the Approach of DS application process.

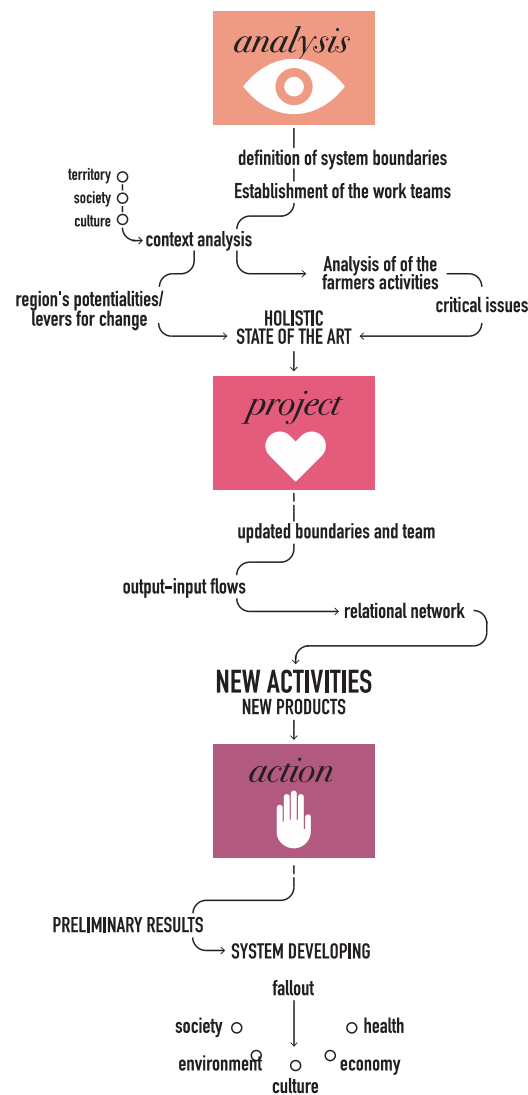


Fig.3 Framework for rural development applying Design Systemic Approach

6. Conclusion

Expected results regard social, economic, environmental and health aspects. The farmers of the cooperative Ahuehuetla can become not only self-sufficient in terms of energy and food production, improving the quality of life, but also increasing the supply of food products, both unprocessed and processed.

During the Field research some important needs from the farmers came up: for example, they need to have counseling and contacts with experts and technicians in the field of organic farming and appropriate technology. This is why we designed and managed also the educational part of the project, mainly divided into two parts. On one side, some practical courses held by technicians and addressed to farmers already have been organised in Ahuacuotzingo at Cavideco. On the other side, Systemic Design seminars addressed primarily to university students can be organized, with the purpose of developing the competences in designing and organizing flows in a system. This is the reason why we are working together with Nuria Costa Leonardo, one of the 1000 women proposed for the Nobel Peace Prize 2005, involved in different projects with the Red Mexicana de Mujeres (rememur) on socially responsible business related to rural development. This also helps us to relate to a distant reality from ours, though often so similar to many other rural areas all around the world. A very important result is the definition of pathways and frameworks that lies under the systemic project. This is what makes it scalable and replicable. The starting data, defined during the preliminary phases of analysis of the Holistic State of the Art, are subject to different variations. It depends on many factors, especially as the impossibility of farmers themselves to quantify their own inputs and outputs. This limit turns out to be insignificant precisely because the main objective is not the quantitative result, but the identification of a framework that can be reused and exported to other rural realities in order to foster sustainable development.

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Products as communication platforms. Investigating and designing the evolution of retail services in the digital era.

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Abstract

In the lifecycle of material products, information and communication have always played a prominent part that, in the digital era, is growing and is expected to grow further, also enabling the blooming of grass root and bottom-up changes in the galaxy of design-production-retail systems. Retail services are not just a way to obtain goods: they provide opportunities for social relationship and cultural growth, and can be considered as a field for social innovation. Our research aims to investigate the systemic changes that are occurring in the realm of information and communication services for the retail of material products, and their consequences on design, production and distribution processes. Our goal is to outline strategic approaches to the design of innovative service/systems and, presently, we mainly focus on two key issues:

- - *understanding and modelling the tangle of factors that determine the user experience in traditional and digital shopping processes;*
- - *develop design methodologies for the creation of new meaningful services, so to support the customers in the understanding of value and in the search of quality in shopping processes.*

The paper investigates new social behaviors related to shopping, such as show-rooming and web-rooming, and we demonstrate that the pervasive use of mobile devices produces new social phenomena in retail processes and enables new opportunities to create value in retail services. From the investigation of online and off-line markets, it emerges the importance of social dynamics and human interactions belonging to physical world: relational dynamics and knowledge acquisition processes play a very important role in the elicitation of senses and emotions, in cultural upgrading, value understanding, quality awareness, trust building. The analysis of these phenomena and the presentations of some design experiences bring us to the definition of some strategic directions guiding the generation of new paradigms of services in the retail field.

Keywords: *Intangible Value, Customer Experience, Behavior Design, Technology Based Service Design, Ethics.*

1. Investigating and modeling the changes induced by ICTs in retail systems

In this paper we present some results obtained within a wide-range research project aimed to investigate the realm of new social and professional phenomena in retail, and to experiment innovative ICT-based services to support commerce and shopping. . The research is carried on through the collaboration between the Interaction&Experience Design Research Lab at the Dipartimento del Design of Politecnico di Milano, and the Joint Open Lab S-Cub created by TIM at Politecnico.

Commerce and retail have been playing a very important role in societies since the dawn of history: search and sale of goods promoted, in the course of time, the exploration of new lands out of the known territories, motivated the construction of road networks and of new cities; commerce represented a strategic asset for entire populations in different eras and location of the world, and the social exchanges that always accompany sales have been also diffused opportunities for information exchange and cultural growth. Nowadays, commerce is one of the main axis of human consortiums and of industrial systems: not only it is the main way for the distribution of goods and one main leverage of economies. Beyond that, the availability of retail services influences several aspects of life quality and can significantly affect the appearance and the social dynamics of local environments.

In the last decades, the pervasive diffusion of ICT-Information and Communication Technologies, of Internet and of online services produced substantial changes in the sale systems through the creation of e-commerce opportunities, and, in some cases, deeply affected the entire product/service system, as in the case of musical and publishing products for which the de-materialization of goods has been accompanied by a revolution of the whole distribution system.

Still, the present situation seems to be a transitory one, far from achieving a steady order, and we are witnessing a tangle of different trends and contradictory phenomena.

Online service providers are getting ubiquitous and all-comprehensive; they increase their effectiveness offering real-time delivery of goods of any kind: from fresh foods to furniture, medicals, books and so on; they host industrial products but also offer e-commerce facilities to little-scale producers, artisans and manufacturers. Amazon and other companies refined the usability of their digital services so to make “natural” the online shopping processes, reducing the complexity of procedures for selection, data filling and payment, and making them almost automatic. New websites and mobile services appear everyday to support online sales, to allow product personalization, and promoting information and social activities related to the shopping experiences.

Most of the existing ecommerce services produce very poor information about products and little or none opportunities of social interaction between customers and producers or sellers. On the other hand, due to the diffusion of smart phones, consumers enact personal strategies to ensure to themselves the desired conditions of good purchasing, to obtain information about the products of interest, and engage themselves in forms of entertainment related to shopping. In the whole, the introduction of ICTs in the realm of retail is enacting some disruptive changes, involves new stakeholders, and produces new service paradigms based on different systems of mediation and disintermediation. It is quite evident that, on a long term perspective, these changes will also influence industrial processes and organizations, and will have effects on the quality of material goods, on the perception of quality and on the evaluation criteria that guide customer choices and preferences. While the fast growing of online sale services is impressive and can actually endanger the future of little and local shops and sale-business, in countries such as Italy, the opportunities to create new services and new forms of value in retail are still underexploited and several stakeholders of the shopping system still seem unable to face the change.

In this context, there are a number of different topics that it is worth to investigate in a design research. The research reported in this paper focuses on hybrid processes, involving customers both online and in stores; our final aim is the design of innovative services for retail, capable to provide new forms of value to customers in the fruition of retail services. Physical stores represent important economical and social resources for local environment, and we believe that ICTs can be employed to empower the quality of their business; furthermore, as customers are already vastly employing digital devices with respect to their shopping activities, little shops with local business should embrace the opportunities offered by technology so to better respond to users needs.

In the design tradition, designers act on material attributes of products to provide new value in terms of form, sensorial engagement, symbolic significances, and aesthetic qualities. Furthermore, interior designers act on the appearance of retail spaces and on their organization so to create meaningful contexts where material products can be better offered to customers and where the shopping experience can become more interesting and appealing. The characteristics of physical stores influence the customer experience, and their perception of quality of products, so affecting the final satisfaction; the design of interiors can provide a suitable frame for presenting and interpreting forms and functions of products, they can envision scenarios, values and inspiring storytelling, and produce experiences that are worth on themselves. In our approach, the role of experience and service designers is quite similar to role played by interior designers in the project of a new store: our goal is the experimentation of services capable to create value in terms of meaningful engagement of customers during the shopping process, both online and in store. We refer more to the dialogic and dynamic dimensions of the experience rather than to the physical appearance of stores and digital services, and our references are in the field of the aesthetics of interaction (Pillan 2015).

“Designing such products and systems requires an aesthetic that goes beyond traditional static form aspects. It requires a new language of form that incorporates the dynamics of behavior. We argue that once we start designing the aesthetics of interactive behavior, a social and ethical dimension is introduced as well.” (Ross and Wensveen 2010)

In the existing services of e-commerce, ICTs support the accessibility of products making them available from everywhere, for everyone, at any time; furthermore, they offer limitless opportunities of information and social exchange about goods. For these reasons, the discussion about digital services for retail is often focused on factors related to process effectiveness and on market opportunities, such as on the use of data and big data to orient production, on new forms of advertising, on production systems allowing product personalization and more.

In our research, the focus is mainly on the quality of the customers experience related to the shopping process. In order to design new digital services for retail, we are now investigating the conceptual meaning of value in retail; furthermore, we study new social behaviors related to shopping, such as those indicated as showrooming and web-rooming, demonstrating that the pervasive use of mobile devices produce new social phenomena in retail processes and actually creates hybrid physical/digital experiences. The study of these new trends provides some interesting insights with respect to the new needs and expectations of customers. In our research, the shopping experience is framed not just in terms of efficiency of purchase, but we also investigate the opportunities in terms of knowledge, awareness, social exchange, and value proposition that can be generated by the use of digital technologies to support information and decision processes in stores and online. To investigate the point of view of retailers, we are also conducting some design experiments and in this paper we report some outcomes of a workshop performed in Milan in via Canonica, an area rich of little stores that still have a very limited use of ICTs in their business.

In order to produce new value for physical shops and stores, design should focus on two different aspects that make the off-line experience unique, valuable and difficult to be replaced by online services, at least in their present organization. From our research, two directions seems to offer promising design directions. The first one is the hedonistic and practical exploration of the qualities of goods; the second one is the social engagement between sellers and customers. As a result of our research, the presence of qualified persons in store change the perception of the quality of products and also the shopping experience that, in turn, influences the perception of the product quality.

2. A discussion about value in retail services

In the very beginning of their book, P. Newbery and K. Farnham state that “Value is a predicated on asymmetry” since, if we define value as “a fair return or equivalent in goods, services, money for something exchanged”, the value produced in business depends on the fact that “one side has a something that the other desired”. In the design of product/service systems, the “value comes in different flavors” and the intangible value related to services or, in a wider sense, to the quality of experience, is still hard to evaluate as a number of different needs and factors influence it, such as security, novelty, excitement, habit, knowledge, practical and hedonic motivation and more (Newbery and Farnham 2013).

The design of innovative retail services should provide new forms of intangible value to customers; on the other hand, the quality of retail services is often tightly intertwined to the quality of goods or, at least of the perceived quality of sold products. So, in order to investigate the factors that mostly influence the customer experience in a shopping process, we need to identify the different ways in which the quality of goods influence the quality of retail services. Apparently, the quality of material products can be easily defined in terms of objective attributes such as materials, production processes, durability, economical and environmental sustainability, and so on. Actually, this definition is not trivial at all, since the different aspects that we can consider are not simply inter-related and, in some cases, they conflict. Every act of shopping begins long time before the moment when the actual purchase is accomplished: even when we buy a simple product such as a box of spaghetti in a supermarket, our mind performs complex decision activities, most of which are very quick and not conscious; all of them, anyway, refer to past experience, memories, evaluation criteria that are the construct of our emotional and cognitive attitudes. Furthermore, different cultures assign different importance to some factors such as authenticity (with respect to the brand, place of origin, materials, etc.) in the evaluation of quality. (Carroll 2015) For each customer, the quality of a purchased product is almost never absolute: each human being is subjected to anchoring and priming effects, and is therefore influenced by context factors; as a rational evaluation of the quality of a product is a very complex task, customers employ approximation strategies during shopping to satisfy their need of making some sense in the decisions (Kahneman 2011). Actually, the perceived quality strongly depends on the personal motivation of customers, on the desire of obtaining an item, on the availability to pay for prestige, appearance, aesthetics; on judicial, religious or moral issues, or any combination of these reasons. (Neap and Celik 1999).

To better understand activities, needs, and expectation of customers with respect to shopping activities, we are observing behaviors of customers online and in store, and there is a number of interesting and innovative phenomena that is worth to investigate.

It is important to point out that, very often, the criteria adopted to evaluate a product employed by the producer can differ from those adopted by customers; sellers and sale services play an important role to understand and fill the gap between the different perspective driving the evaluation of quality. To this purpose, we can refer to the important distinction between “value creation” and “value capture” (Bowman

and Ambrosini 2000) value is created by organizational members, value capture is determined by the perceived power relationships between various stakeholders. In other words, customers assess the overall value of a product on the perceptions of what is given and what is received (Zeithaml 1991).

3. Evolution of shopping behaviors and services

The arrival of internet increased the number of channels through which people can buy a product, actually offering an alternative to market places and giving to consumers the access to an almost unlimited variety of products, so enabling the diversification of the purchase processes (Arnold and Reynolds 2003) (Morales et al. 2005). Nowadays the shopping process is a complex and sophisticated experience involving customers in a number of different processes such as getting information, understanding values, comparing solutions, framing needs, managing social activities related to goods, influencing trends and so on. Due to the diffusion of mobile technologies, these processes involve both physical locations (retail stores), the virtual market in the web and social networks.

In the past, internet-based shopping experience used to take place in private environments, such as domestic or office spaces. People purchasing products through their laptop or desktop had wider choice of products and sellers but, at the same time, all social were substantially absent (Schaefer and VanTine 2010). This isolationism can be identified as one of the main causes of the ROPO, Research Online Purchase Offline, phenomenon; indeed, people found a way to use the potentialities of the online shopping - by using the web as a giant catalogue of products – but they decided to purchase offline, in traditional stores, the products selected online. This phenomenon, named *web-rooming*, can be related to the will of people access both the advantages of the web, together with those of the physical world such as social dynamics and material interaction with products.

With the spreading of smart mobile devices, the shopping experience changed again, because we are no longer tight to desktop computers, and we can access to information everywhere at anytime. The mobile technologies modify the boundaries between the physical world and the web, and actually create overlapping and hybrid experiences. As a consequence, the online shopping processes moves from indoor to possibly any locations, and this opportunity gave birth to *showrooming*, i.e. Try Offline, Purchase Online (IBM 2014). The physical stores become a showroom where products can be watched, touched, tested, selected; they are a physical catalogue while the shopping experience is then completed online (Burke 2002). Smart devices are tools to access digital media inside the shop in order to memorize and to catalogue goods in order to facilitate the subsequent purchase online. Furthermore, they allow social interaction within the shopping activity. Between others, we report here an interesting case study documenting the emerging of new spontaneous retail phenomena supported by mobile devices. It refers to the activity of some Chinese buyers in Milan, Italy. The commercial offer of fashion product in Italy and in China is quite different and some Italian brands, selling their products in both countries, offer pieces of clothes that differ from the point of view of tissue (materials, pattern, colors), shape and style. Some Chinese buyers developed a service of “buying at a distance” based on the following actions: they enter a luxury store, choose some suits and wear them in the dressing room; as they do so, they use mobile devices to share on the web their fitting test in the dressing room, snapping selfies, or making videos. They also photograph labels and tags with prices and details, and send these data via WeChat (Weixin) to customers in China. When the remote customer is satisfied, the local buyer receives a real time payment through WeChat or via Alipay, concludes the purchase and payment in the shop and ships the products via couriers. These phenomena and others document the ferment of new activities related to commerce and supported by mobile digital services. These phenomena can be convenient for customers but also for

producers since they represent a way to broad the market potentialities; they are much convenient for brands that have their own shops and evaluate the growth of markets in a global vision, while could produce problems to local shops, if not adequately managed. On the other hand, these new forms of intermediation will have some consequences on styling visions and fashion design strategies, since it appears as evident that buyers at a distance consider as a value the opportunity to buy products that are available only in a market different from their domestic one. The above reported system is an opportunity of income for young Chinese students in Italy. In China, these buyers are named *wēi shāng* – people that have a mini business - a type of business that make us to reflect on how social needs, global markets and major platforms can be used by people to create grass-roots entrepreneurship (Serra 2016).



Fig. 1 Screenshot from the site TaoBao

4. Digital services for retail and opportunities of social innovation in local environments

The creation of services for selling online products that the user needs to feel, touch, try (such as clothing but not only), poses research questions related to the understanding of how we can support people so they can explore and perceive the quality and establish a physical relationship with the product itself (Burke 2002). In the interaction with goods, a number of different cognitive and emotional processes take place simultaneously, some of which are conscious while most are performed through rapid and automatic exploration and non conscious strategies of evaluation. Each physical interaction – with a product or with the surrounding environment - is a source of sensorial stimuli, an opportunity of experiential knowledge and of valuable active engagement for customers. On the other hand, when customers physically interact with material goods, sellers have the opportunity to show and bring to evidence some quality characteristics of products that cannot be easily described in terms of words or images. This is true for any kind of product, from books to clothes, from cars to photo-cameras.

In this paper, we focus our attention on little local shops, and on those selling artisanal products. Artisanal products have characteristics that depend on materials and on fabrication processes; the visual appearances and performances of these products are often variable in time and from a specimen to the other. In our investigation in Milan, we observed that in artisanal shops, i.e. in those shops that sells unique specimen often handcrafted and sometimes produced in place, the perceived quality of the products (crafts) strongly depends on their “artisanal” nature and the perception of its value significantly depends on the social dynamics within the store itself. We investigated this through observations in stores

and interviews with sellers. In artisanal stores, direct social relationships between customers and sellers influence the sense of authenticity with respect to people and products. This is related to a diffused value:

“The demand for authenticity—the honest or the real—is one of the most powerful movements in contemporary life, influencing our moral outlook, political views, and consumer behavior.”

(Potter A 2010)

The artisanal products are produced by artisans, either completely by hand or with the help of hand-tools and even mechanical means, as long as the direct manual contribution of the artisan remains the most substantial component of the finished product; even when artisans make quantities of the same design, no two pieces are ever exactly alike. An artisanal product is something made by a person who makes artsy things that are ‘beyond a craft’ that they create an ‘economic moment’ where that thing can be rare/unique/limited. Their special nature derives from their distinctive features, which can be utilitarian, aesthetic, artistic, creative, culturally attached, decorative, functional, traditional, and religiously and socially symbolic and significant. So the artisanal product it’s very full of value that came from: the craftsman that create the product, the material that he used to realize the product and also from the context in which the craftsman operates. Through the direct interaction with the producer or seller, a customer can build a system of trust and shared values based on the quality of human empathy, that is translated into trust and appreciation with respect to material qualities of the product itself.

“In advanced consumer economies, consumers are buying on the basis of their interpretation of the product and its story” (Glenn R. Carroll, Balázs Kovács 2013)

So artisanal products have a story to tell that represent the value itself and quality, intended as in the above, becomes the prevailing purchasing criterion.

5. Preparing the ground for co-design of new service paradigms

Every retail process is the outcome of a complex system involving a number of different stakeholders: from producers of raw to manufactures, from distributors to traders, from city planners to local inhabitants. In some cases, little shops are also the production space of the artisan/vendors and in Milan a growing number of these activities are appearing in several areas of the town, revealing a renewed vibrancy of the social and economic small scale entrepreneurship that should be sustained and promoted. In our ethnographic research, we learned that in traditional retail system, vendors play a very important role enabling the information flow from the final consumers to the producers and therefore they can have a very valuable role inspiring innovation. The design of new retail services should consider all the variable and stakeholders of the system in order to investigate the opportunities to generate value in the amplest sense.

In the following of this paper, we will describe some results obtained in a design workshop aimed to the design of digital services for little shops in Milan. The workshop was organized at the School of Design at Politecnico di Milano with the students of the first level master degree in Communication Design and it involved around 40 students.

The design context was via Canonica in Milan. Via Canonica is a street in a central area of the town hosting several little stores and boutiques, some of which owned by artisans working in place. From the architectural point of view, the area is quite a hybrid district, with a number of new buildings and some popular old condos still maintaining the pre-war appearance. On the other hand, Via Canonica can also be considered as a “place in between” since it is located between other more famous and glamorous areas,

and is not a touristic place. In the past, some initiatives aimed to build some sort of local brand identity or a common communication strategy failed and did not rally the participation of retailers and other stakeholders. For these reasons, the Canonica district seems to be an interesting lab where we can investigate social local phenomena that are related to traditional retail services, and where we can experiment innovative services. During the workshop, all design activities were accompanied by ethnographic analysis to investigate needs, motivation factors, wishes and values of buyers in different retail fields, collecting interviews with manufactures and traders.

The involvement of Design university students in the generation of innovative concepts of products and services has a long tradition: educational labs taken as a base of speculation in design theories have been the object of controversial discussions. In our case, the involvement of students born in the digital world (Reisenwitz and Iyer 2009) is indeed more relevant as we need a new generation of designers capable to include the technical solutions in their proposals. In the studio lab, the brief demanded a visual project for the district identity, a mobile application or a web-based service aimed to support the exchange of value between the local stakeholders and to create a different kind of cultural relationship between customers and the retailers. We also required video-scenarios to sustain effective communication of the service concepts and enable co-design in multicultural environments (Pillan, Spadafora, and Vitali 2014). The design strategy aims to create services based on the integration of physical and virtual spaces, acting on the borders of the online and the off-line experiences. This approach focuses on both digital and analogue factors of experience as a continuous, so to create a multichannel communication path between the stakeholders and merge different flows of value exchange; from the traditional paradigms business-to-business and business-to-consumer, we move toward a full range of possibilities involving manufacturers, vendors and final customers also considered as a source of value. The outcomes of the workshop provided the tools to enable some further design activities aimed to discuss scenarios with some representative stakeholders of the environment and social system revolving around via Canonica. It is important to point out that in our approach, technology based services should be produced in a co-design process involving stakeholders and the new paradigm of services generated in the workshop are considered just a preliminary step aimed to prepare the ground for co-design activities, and to provide concrete examples to discuss, also building a common language shared by stakeholders and designers.

Through the analysis of the outcomes of the workshop, we could extract a number of insights useful in our research, part of which are summarized here in the following. Via Canonica is really a “place in between”, i.e. a place where various typologies of stores and very different people (in cultural, economical, ethnic senses) coexist, and it can be considered as representative of a number of urban environments that are experiencing changes without a development plan. It is an interstice between more visible realities, and a “border line” between old and new, (old retail and new branded stores), a place where novel phenomena coexist and have the room to grow. It emerged that variety is perceived as a value and an opportunity to live and work adopting a favorite personal lifestyle.

The existence of a variety of shops, each one with a specific identity, some referring to tradition and some new, play an important role in defining the collective identity of the area, offering a character of authenticity and uniqueness to the whole environment, so contributing to generate a sense of belonging and a pride of being and working there.

On the other hand, the real value of the district is in the sum of individual local identities that mainly manifest themselves also through the presence of the variety of shops and other professional initiatives. In most cases, the external appearance of shops is not noticeable or glamorous, and most buildings appear just as “normal” urban residences. This “normality” is perceived as a value by inhabitants and vendors. For most of the interviewed people, the main goal is the maintenance of the existing state, and the

opportunity to continue a business mostly based on a reputation based on quality of products and processes.

Probably, a proposal of collective communication and local brand doesn't meet the consensus of the local stakeholders since local stakeholders seems to be more interested in maintaining their individual identity rather than in being part of an organized system.

With respect to digital services to communicate the existence of shops (and of local products, business activities and artisanal production locations) and improve the service offered to customers, our workshop demonstrated that it is possible to design a wide variety of services capable to give new value to the local offer through the organization of events, and through the use of multimedia solutions to document and explain the local and diffuses cultural heritage. As we had previously deducted from research based on case study analysis, in Via Canonica the quality of social interaction is a basic and important factor influencing the customer experience. Digital communication can enable new and richer dialog between local stakeholders and between them and the other players of the production/distribution system, but new services should be developed with a "soft hand", without perturbing the individual needs in terms of independence and identity.

The most promising direction toward which address future efforts in the design of digital services to support local retail seems to hinge on the dialogue between inhabitants around quality of products/quality of life issues. This result will drive our future efforts.

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Intangibles para el proceso de diseño en el marco de la sociedad del conocimiento

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Resumen

Hoy vivimos en la llamada “sociedad del conocimiento”, la cual ha generado grandes transformaciones en el quehacer empresarial. Las empresas han pasado de un sistema productivo, basado en factores materiales, a un sistema económico constituido por factores cognitivos, creativos e informativos que contribuyen cada vez más a la riqueza de las empresas. En este contexto, el objetivo del artículo es identificar las nuevas formas de conocimiento que transforman, específicamente, la dimensión empresarial y su vinculación con los componentes intangibles, cuyo tratamiento se convierte en insumos del proceso de diseño. Para su desarrollo, se optó por una investigación descriptiva de la literatura existente, que permita crear un estado del arte para conocer qué aspectos se han investigado y cuales permanecen ignorados. En este sentido, se pudo evidenciar que el mayor reto para las empresas es la gestión apropiada del conocimiento, con el que se alcance un posicionamiento competitivo y asegure su supervivencia. La disciplina de diseño desempeña un papel estratégico en la consecución de este objetivo, pues, bajo una visión sistémica, realiza la función transformadora de buscar nuevas estrategias, que le permitan identificar y mejorar la gestión de los intangibles empresariales, con la clara intención de innovar y optimizar el diseño de lo tangible.

Palabras clave: sociedad del conocimiento; intangibles empresariales; proceso de diseño; diseño estratégico, innovación.

Abstract

Nowadays we live in what is called the "knowledge society" which has generated great transformations in business activity. Companies have gone from a material based production system, to a knowledge based productive system, where creative and information related factors are contributing increasingly to the wealth building of businesses. In this context, the objective of this article is to identify new forms of knowledge that can transform this business dimension and its relationship to the intangible components, such treatment becomes an important input in the design process. For its development, we chose a descriptive research of existing literature, allowing to create a state of the art in order to know what aspects have been investigated and which remain unknown. It became evident that the biggest challenge for companies is proper knowledge

management, thereby achieve a competitive position and ensure its survival. The design discipline plays a starring role in achieving this objective, therefore, under a systemic, performs the transformative role of new strategies, allowing him to identify and improve management of business intangibles, with the clear intention to innovate and optimize the design of the tangible.

Keywords: *knowledge society; business intangibles; design process; innovation.*

1. Introducción

El paso del tiempo, ha marcado históricamente transformaciones que han afectado a todo tipo de empresas, sean estas pequeñas, medianas o grandes. Los historiadores han agrupados estas transformaciones en tres sociedades: la Agrícola, la Industrial y la del Conocimiento, también identificada con los términos: “Sociedad Post-industrial”(Bell,1991), “Sociedad de la Información”, “Sociedad Red” o “Los Flujos” (Castells, 1999). Por lo que resulta necesario realizar una rápida mirada del pasado, para visualizar el hoy.

La sociedad agrícola. Es la más larga de la historia, fue una etapa dominante a través de la cual el ser humano lograba su subsistencia y desarrollo, se cuenta sus inicios desde que el hombre está en la tierra, hasta finales del siglo XIX. (Giner de la Fuente & Gil Estallo, 2014).

La Sociedad industrial.- Surgió a mediados del siglo XVIII como consecuencia de la revolución Industrial iniciada en Inglaterra, se extendió por Europa y en o corto plazo al resto del mundo. La productividad fue el valor más deseado, cada individuo era considerado un engranaje del sistema que producía la mayor cantidad de mercancía posible en el menor tiempo posible. Esto represento grande movimientos migratorios, del campo a la ciudad que es dónde se concentraron las fábricas, el sociólogo Marx enfoca el trabajo del obrero como “El trabajo externo, el trabajo en que el hombre se enajena, es un trabajo de auto sacrificio, de ascetismo” (Marx, 1844).

La sociedad de conocimiento, tiene sus orígenes en los años noventa cuando se analizaron los cambios en las sociedades industriales, surgió el término sociedad post-industrial, introducido por el sociólogo Daniel Bell(1973; 2001), “este tipo de sociedad está orientado hacia el progreso tecnológico y la evaluación de la tecnología y se caracteriza por la creación de una nueva tecnología intelectual como base de los procesos de decisión” (Bell, 1991, pág. 53). Esta es la sociedad de la globalización y las Tics, y en ella nos encontramos hoy.

El sociólogo Manuel Castells, centra sus estudios en analizar las afectaciones de esta nueva sociedad desde varias ópticas: los movimientos sociales urbanos, el surgimiento de la sociedad en red, y el rol de las ciudades en la economía basada en información. Sostiene que “debido a que la materialidad de nuestra existencia está hecha de flujos y/o de resistencias a estos flujos basados en la comunidad, la representación de los valores e intereses en nuestras sociedades ya no se estructura sobre la base del trabajo, sino que se expresa en términos de un mensaje simbólico, los flujos no son sólo un elemento de la organización social, son la expresión de los procesos que dominan nuestra vida económica, política y simbólica” (Castells, 1999). Estas afirmaciones, permiten visualizar claramente que la sociedad se transforma a través de sus diversas dimensiones: cultural, económico/empresarial, la planificación espacial y la tecnológica, proporcionando modelos globales con múltiples interconexiones. El presente artículo tiene como contexto específicamente las transformaciones ocurridas en la dimensión empresarial, a lo que surge los cuestionamientos : ¿qué cambios experimentan las empresas?, ¿qué relación tiene estos

cambios con la presencia o generación de activos intangibles? y ¿en que contribuye la inminente presencia de los intangibles, con el trabajo de los profesionales del área de diseño?

La presente investigación pretende dar contestación a cada una de las preguntas planteadas, para lo cual su objetivo es identificar las nuevas formas de conocimiento que transforman, específicamente, la dimensión empresarial y su vinculación con los componentes intangibles, cuyo tratamiento se convierte en insumos del proceso de diseño.

2. Antecedentes teóricos.

2.1 La sociedad del conocimiento y su impacto en las empresas.

Drucker en su libro “La era de la discontinuidad” da origen al término “la sociedad del conocimiento”, es reconocido como padre y mentor conjunto con Fritz Machlup (Drucker, 1969). El ganador del premio Nobel de Economía en 1987, Robert Solow, fue uno de los primeros en señalar la importancia del conocimiento en el crecimiento económico, expresando que este es una función de capital, trabajo y conocimiento, sus estudios sobre esta temática, fueron la base para otorgarle el Premio Nobel. Sus estudios incluían análisis numéricos sobre el crecimiento económico de Estados Unidos en la primera mitad del siglo XX, en la que se evidenciaba un residuo inexplicable, que no es el resultado del incremento de los factores de capital y trabajo. La parte no explicada se denominó “residual de Solow”, que correspondía a algo más, al progreso técnico, como lo llamó Solow, o simplemente conocimiento. (Corrado, Hulten, & Sichel, 2004).

Este conocimiento, está transformando radicalmente las economías, los mercados y la estructura de la industria, los productos y servicios, los puestos de trabajo y los mercados laborales (Drucker, 1969). Las antiguas tradiciones a nivel empresarial se han visto gravemente afectadas, Idris Moote menciona que “las empresas están sufriendo una gran turbulencia cultural constante con afectación directa sobre reputación, crecimiento y rentabilidad” (Mootee, 2014, pág. 3). Calleja (2001), señala que “las empresas como organizaciones humanas con objetivos de creación de riqueza y bienestar, están afectadas por el crecimiento de la complejidad y deben establecer mecanismos para tenerla en cuenta y moverse con éxito en un entorno más interdependiente”. Por otra parte Morán y Brightman afirman que las empresas deben “renovar continuamente de dirección, estructura y capacidades de la organización para servir a las necesidades siempre cambiantes de los clientes externos e internos” (Moran & Brightman, 2001, pág. 115), lo que lleva a pensar que las empresas se enfrentan a una gran incertidumbre.

Estos acontecimientos, han originado numerosas investigaciones a nivel mundial, bajo el enfoque de identificar las causas y posibles soluciones a las transformaciones empresariales. Aguilá y Monguet desarrollaron una metodología para guiar la evolución desde modelos de negocio obsoletos a modelos propios del siglo XXI, ellos exponen un esquema analítico para la reconstruir la oferta del producto y servicio (Aguilá & Monguet, 2010). Los autores Giner de la Fuente & Gil Estallo, en cambio se enfocan en “estudiar como las TIC están cambiando de forma radical la división de trabajo dentro de las empresas y con ello enviando a la basura los paradigmas de la gestión de la empresa” (Giner de la Fuente & Gil Estallo, 2014). Moote, propone una metodología sobre como insertar en la empresa moderna un nuevo conjunto de instrumentos basados en el Design Thinking, que permita una nueva oleada de colaboración, visión y aprendizaje, destinados a mejorar la toma de decisiones (Mootee, 2014). Los autores Anargyros & Loeb, en su obra ¿Y si ponemos los relojes de nuevo a cero?, ofrecen una visión particular desde el Diseño de las transformaciones empresariales: “repensar el presente desde diferentes puntos de vista ofreciendo estímulos para darse cuenta de futuros posibles, el futuro no existe, pero con el fin de desarrollar hipótesis del futuro, hay que mirar más de cerca la actualidad, la zona cero” (Anargyros & Loeb, 1998). La mayoría de estos estudios tienen como punto de partida, que la empresa tome conciencia de la situación, a través de la identificación de las fuerzas externas a las que están sometidas actualmente. El presente artículo ha tomado de base las fuerzas externas analizadas por los autores Aguilá y Monguet, a saber:

- Globalización, partiendo de un mercado local o regional, se ha evolucionado a los internacionales y a mundiales, alcanzables gracias a la presencia de la tecnología, la internet rompió todas las barreras físicas y territoriales. Tanto las ventas como, las tareas deben

realizarse bajo una visión planetaria. Los ciclos económicos están fuertemente caracterizados por la mundialización.

- La sostenibilidad del planeta, la crisis de los recursos naturales, es más urgente que la económica y empeora cada vez más a medida que aumenta la población, y no hay que olvidar el reconocimiento de los derechos de las minorías.
- La innovación tecnológica, no solo la informática y las comunicaciones, la bioingeniería, los nuevos materiales, la nanotecnología están provocando continuamente revoluciones en los mercados.
- Demografía, grandes migraciones procedentes principalmente de países en desarrollo, hacia países desarrollados, generan cambios en la cultura y costumbres occidentales, los cuales poseen en su mayoría bajas tasas de natalidad.
- La saturación de oferta de productos, la eminente necesidad de reformular la oferta de los mercados, considerando una diferenciación que asegure la supervivencia en el mercado.
- La necesidad cambiante de los usuarios, lo que fomenta la co-creación con los clientes, esto generará elementos de confianza mutuos.

2.2 Los intangibles empresariales.

La intangibilidad²⁵ se manifiesta en las dificultades de medir, tocar y manipular, el término “activos intangibles”, es definido por distintos organismos internacionales como la FASB (Financial Accounting Standards Board) en los Estados Unidos o el ASB (Accounting Standards Board) en el Reino Unido, y por la Norma Internacional de Contabilidad NIC 38²⁶, en forma similar (Cañibano & Gisbert, 2005) como: “identificable, de carácter no monetario y sin apariencia física” (NIC 38, 2004, párrafo 8). La importancia de medir los activos intangibles dentro de las organizaciones modernas radica en que estos representan un recurso crucial para la sostenibilidad de los beneficios económicos en el largo plazo.

Desde la década de 1990 viene creciendo la inquietud sobre la necesidad de analizar y medir los diferentes tipos de activos intangibles para incluirlos en los estados financieros de las empresas. Este ha sido el propósito de numerosas investigaciones, desde variadas perspectivas: la contable, el capital intelectual, medida de desempeño y la valoración financiera. Para citar solo un ejemplo, el artículo “Study on the measurement of intangible assets and associated reporting practices”, detalla 23 métodos de medición de activos intangibles. (European Commission, 2003). Por otra parte, la empresa Ocean Tomo con sede en Chicago, Estados Unidos, realizó un estudio que media el peso de los componentes tangibles e intangibles en el valor de mercado, a una muestra de 500 empresas que componen el índice S&P500. El período de observación fue de 35 años, en él se evidenció un cambio drástico en la proporción de los componentes que soportan el valor de mercado de las empresas, al pasar del 83% tangible vs. el 17% intangible en el año 1975, a una inversión de la proporción, con un 20% tangible vs. un 80% intangible en 2010 (Torres, 2014).

Otra contribución influyente sobre el crecimiento y valoración de activos intangibles lo dan Carol Corrado, Charles Hulten y Daniel Sichel (en su momento investigadores del Federal Reserve Board y de la University of Maryland), identificada como CHS, la que se ha convertido en la metodología estándar en la literatura económica actual. Esta considera que los gastos que se realizan las empresas en diseño, marketing, formación del personal o mejoras organizativas, son tan importantes como los gastos en I+D (Corrado, Hulten, & Sichel, 2004). Esta metodología ha sido utilizada por otros centros de investigación, tal como el proyecto INTAN-Invest [www.intan-invest.net], aplicada para calcular la inversión en intangible de un grupo de países europeos. Los autores han continuado con sus investigaciones y sus trabajos propiciaron la creación de organizaciones como Innodrive,

²⁵ Intangible: adj. Que no debe o no puede tocarse. Diccionario de la Lengua Española. Real Academia Española. vigésima primera edición, 1992

²⁶ El objetivo de esta Norma es prescribir el tratamiento contable de los activos intangibles, especifica los criterios que permiten reconocer un activo intangible y también especifica cómo determinar el importe en libros de los activos intangibles

establecida bajo los auspicios de la Comunidad Europea, quien ha financiado numerosos estudios para entender cabalmente la importancia de los activos intangibles en la sociedad del conocimiento.

La metodología CHS, identifico y clasifico en tres grupos a los activos intangibles, que le permiten realizar su respectiva cuantificación: **Información computarizada** (software y bases de datos); **Propiedad científica y creativa** (I&D, exploración minera, derechos de autor y costos de licencia, desarrollo de productos, diseño y otros gastos de investigación); **Competencias económicas** (valor de marca, capital humano, estructura organizativa, modelo de negocios) (Corrado, Hulten, & Sichel, 2004, pág. 40).

3. Metodología.

La metodología aplicada en este artículo, fue realizar una revisión descriptiva de la literatura existente sobre la afectación del conocimiento en el quehacer empresarial y su vinculación con los intangibles empresariales. Para la localización de los documentos bibliográficos se utilizaron varias fuentes documentales. La búsqueda se realizó utilizando los descriptores: sociedad del conocimiento, intangibles empresariales y proceso de diseño. Otro criterio de validación fue considerar publicaciones en español o inglés, en las que se hayan obtenidos resultados debidamente respaldados, con información obtenida de un proceso metódico de investigación.

4. Resultados.

Luego del análisis de la bibliografía recogida, sobre el nivel de afectación que realiza la presente sociedad del conocimiento, a la dimensión empresarial. Se evidencio que esta, trastorna principalmente el modelo de negocio de la empresa, lo que conlleva a una redefinición de su estructura organizacional y ocupacional, y por ende un cambio radical en sus procesos. Entre las fuerzas externas que originan el cambio en el modelo de negocio se encuentran: la globalización, la innovación tecnológica, la sostenibilidad del planeta, la demografía, saturación de oferta de productos y servicios y la necesidad cambiante de los usuarios.



Fig 1. El ciclo de afectación en la dimensión empresarial, causada por la sociedad del conocimiento. Fuente : Los autores.

Estos elementos externos impactan sobre la empresa, obligandola a reemplantearse su oferta desde una visión interna, esto ha dado origen al crecimiento y valoración de los activos intangibles, Drucker considerado el mayor filósofo de la administración del siglo XXI, menciona que “la empresa debe enfocarse específicamente en la complejidad de los activos intangibles, pues es aquí donde está su mayor crecimiento, para lograr una ventaja competitiva sostenible, y en esencia un conocimiento productivo” (Drucker, El management del siglo XXI, 2000). La identificación de cuáles son los intangibles empresariales, resultantes de la gestión del conocimiento ha tenido muchas opiniones, también numerosas metodologías que permiten su medición e incorporación en los estados financieros (explicación detallada en antecedentes teóricos). El presente artículo ha tomado de base la metodología CHS, la que clasifica en tres grupos a los activos intangibles: Información computarizada, Propiedad científica y creativa y Competencias económicas (Corrado, Hulten, & Sichel, 2004, pág. 40). Para efectos de medición, esta se descompone en 9 indicadores.

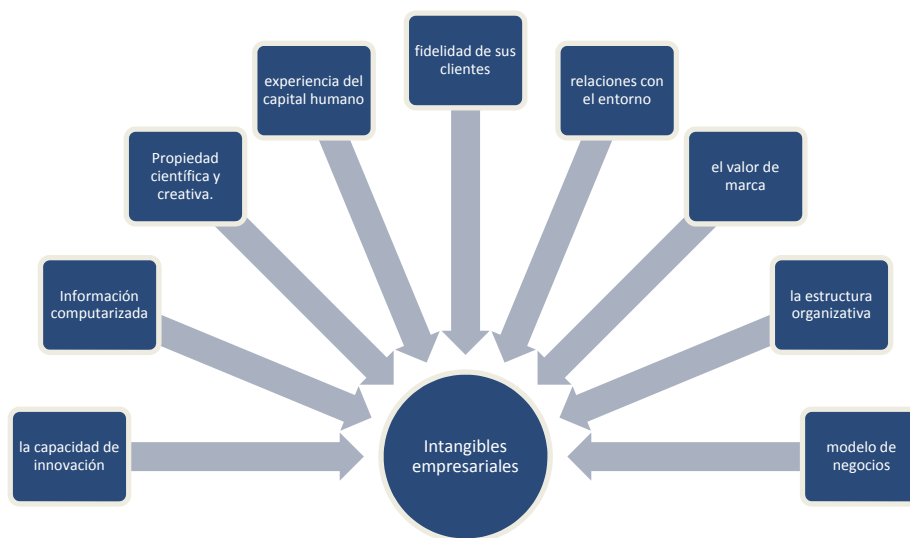


Fig. 2. Los intangibles empresariales. Fuente : Los autores.

Potenciar estos intangibles es la nueva estrategia empresarial, a la que deben estar alineados todos los procesos, incluyendo el de Diseño. El Diseño desde la óptica de proceso, esta presente desde las fases de detección de oportunidades y análisis de las necesidades del Mercado, hasta las fases de comercialización del producto. En este intervalo confluyen campos de actividad tan diversos como marketing, ingeniería, sistemas de información, etc. Este proceso desde una óptica sistémica, tal como lo describe el Modelo de Diseño Concurrente de Hernandis, especifica que “las Variables de Entrada (VE) dadas desde el sistema exterior influyen los aspectos a considerar en el diseño, aportando valores cualitativos o cuantitativos que actúan sobre el Sistema” (Hernandis, 2010). Sería necesario entonces que estas VE, contemplen las variables internas de los intangibles empresariales. Esto nos coloca en un nuevo escenario, la inminente necesidad de observar y estudiar desde la perspectiva de Sistemas, los intangibles empresariales en el proceso de diseño, tal como lo menciona Evers “mientras los conocimientos aumentan con gran rapidez, el saber de lo que no sabemos aumenta con velocidad aún más vertiginosa”. (H. D. Evers 2000. p. 8). En este contexto, se ha encontrado algunos esfuerzos desarrollados por investigadores que buscan optimizar el proceso de diseño como función transformadora, captando la intangibilidad empresarial: Donald Norman y Roberto Verganti; Alessandro Deserti y Francesca Rizzo; Francesco Zurlo y Cabirio Cautela y David Aaker.

4.1. Capacidad de Innovación

Donald A. Norman²⁷, uno de los originadores del diseño centrado en el usuario -HCD (por sus siglas en inglés human-centered design)” y Roberto Verganti un estudioso de la gestión de la innovación tecnológica. Utilizan de base a las teorías establecidas en el campo de la innovación y la investigación científica / tecnológica, que distinguen la innovación radical e incremental, básica y la investigación aplicada, analizan muchos casos en las que el diseño impulsa a la innovación, llegando a una conclusión. “Una innovación radical surge sin ningún tipo de investigación de diseño o análisis formal de las necesidades de una sociedad o sector en particular, surgen impulsado por los cambios tecnológicos” (Norman & Verganti, 2014, pág. 84), citan un ejemplo reciente tales como Facebook, twitter y las redes sociales, surgieron simplemente porque sus inventores pensaron que eran cosas interesantes para probar. Generalmente una innovación radical genera una disrupción. Norman no pudo encontrar ningún ejemplo de innovación radical que resultó del proceso diseño centrado en el usuario. Una vez que la innovación radical se había desarrollado, sin embargo, el diseño centrado en el usuario (HCD) fue invaluable como una manera de mejorar el producto. La mejora de sus ejemplos es que Google, Facebook y Twitter se han modificado a sí mismos desde su introducción inicial (Norman & Verganti, 2014, pág. 79).

4.2. Estructura Organizativa

Alessandro Deserti²⁸, investigador en el área de gestión del diseño, e innovación a través del diseño. Francesca Rizzo²⁹, investigador en el área de diseño de servicios y diseño participativo, realizan una investigación, que se centra en explorar la idea de que el diseño de nuevos productos podría traer cambios inesperados en la cultura de una empresa, ya que su desarrollo puede generar contradicciones entre la cultura actual y la que se necesita para poner en práctica la innovación. Los autores proponen una perspectiva de abajo hacia arriba en el cambio organizacional, vinculándola a la observación de casos reales y la situacionalidad de la práctica del diseño y la cultura como un valor posible, en contraste con la idea de modelos y técnicas que supuestamente pueden ser aplicado en cualquier contexto y situación. Por esta razón, los autores critican el cambio de arriba hacia abajo desde el punto de vista de gestión y pensamiento de diseño; como inadecuados para hacer frente a los cambios e innovación. Esta investigación también realiza un aportación sobre el tema que el producto o servicio, a ser desarrollado no debe únicamente considerar en su fase inicial las necesidades externas de los clientes, sino este debe poder transmitir la cultura de la empresa (Deserti & Rizzo, 2014, pág. 37).

4.3. Tecnología

Francesco Zurlo³⁰ y Cabirio Cautela³¹, proponen que el diseñador debe saber escuchar las narrativas empresariales en el rol de intérprete-lector, para luego poner en acción una contra-narración animada por la forma y la lógica del proceso creativo, cuyos resultados se expresan como conceptos y prototipos, proceso que cambiaría de acuerdo a los diversos contextos productivos. Dan una amplia explicación

²⁷ Donald Norman cofundó el Nielsen Norman Group, consultoría dedicada a la usabilidad, profesor emérito de la Universidad de California, San Diego (UCSD), tanto en Ciencia Cognitiva y Psicología. Asesor empresarial y organizaciones como el Instituto de Diseño de Chicago y ex Vicepresidente de Tecnología Avanzada de Apple. Sus últimos estudios están enfocados en cómo se conjugan las emociones y diseño en el uso de los productos, tema desarrollado en su libro “emotional design”.

²⁸ Alessandro Deserti, profesor del Politécnico de Milano, departamento de Diseño, Investigó las nuevas funciones de diseño dentro de las empresas, instituciones y entornos sociales, ha publicado libros, ensayos, artículos en revistas y actas de congresos internacionales.

²⁹ Francesca Rizzo, profesora adjunto en la Universidad de Bolonia, Departamento de Arquitectura, imparte clases de Diseño Industrial. Ella trabajó en diferentes proyectos de investigación europeos y nacionales en el campo de Diseño de Interacción y Diseño del Servicio. Es autor de numerosos artículos publicados en las actas de congresos (DPPI , HCI , IASDR , PD ; DRS) y revistas (Codesign , Tecnología y Cognición , Comunicación de la ACM).

³⁰ Francesco Zurlo, catedrático en el Politécnico de Milán, Director del Master en Diseño Estratégico .Ha sido el director general de Polidesign - 2004-2008. Fue galardonado con el 'Golden Compass 2001 (el premio de diseño más prestigiosos de Italia). Ha publicado más de 40 artículos, entre ellos seis artículos en revistas internacionales sobre cuestiones de diseño e innovación y publicado seis libros.

³¹ Cabirio Cautela, profesor asistente del Politécnico de Milán, Phd en Business Management. Ha sido visitante invitado en Stanford University – CDR (Center for Design Research) en el 2012. Sus Investigaciones giran sobre el rol estratégico del Diseño, el manejo de procesos de diseño. Es co-director del master en Strategic Design.

teórica documentada acerca de lo significa “las narrativas³² del negocio“ creadas por las empresas, según (Czarniawska, 1997), que demuestran que pueden ser usadas en sus relaciones con los diseñadores. En su metodología propuesta establecen que existen dos variantes: el mercado y la tecnología, con sus respectivas opciones de elección, viejo y lo nuevo, crea cuatro campos narrativos diferentes, como se muestra en la Figura 3: la narrativa de explotación, la tecno-narrativa, el relato centrado en el usuario y el exploratorio. Los autores quieren llegar a determinar y principalmente a dotar a los diseñadores, el camino a seguir dependiendo de lo que transmita la narrativa empresarial, viéndole desde una óptica sistémica, se podría indicar que identifica claramente variables, que servirán para alimentar la primera etapa del proceso de diseño (ver tabla 1) (Zurlo & Cautela, 2014).

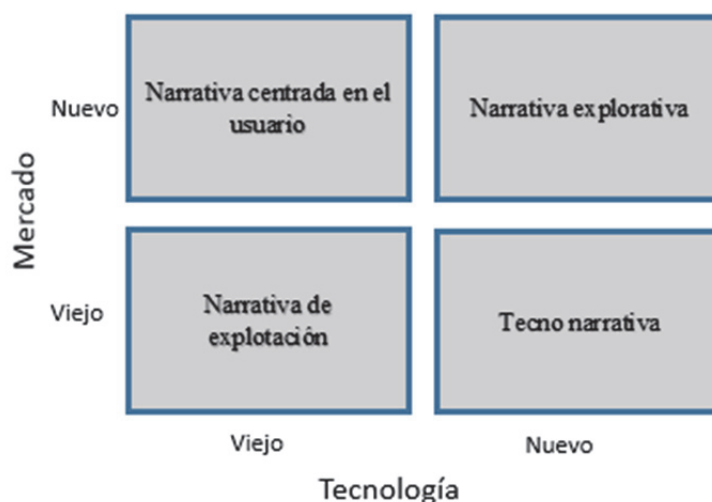


Fig. 3 Las narrativas empresariales. Fuente : DesignIssues: Volume 30, Number 1 Winter (2014).

Tabla 1. Las Narrativas empresariales versus los factores que promueven el proceso de diseño.

Narrativas empresariales versus estrategias de diseño				
	Narrativa de explotación	Tecno-narrativa	Narrativa centrado en el usuario	Narrativa explorativa
Orientación del Diseño.	Reconfiguración de estilos	Búsqueda de nuevas aplicaciones	1.1.1. Explotación de tecnología en nuevos mercados	1.1.2. Innovación del modelo del sistema/negocios.
Fuentes de creatividad	Tendencias extra-sectoriales /estímulo	1.1.3. Futurología 1.1.4. Patrones cognitivos de los usuarios	1.1.5. Evolución de signos relacionados a productos, espacios y contenidos	1.1.6. Perspectivas del sistema de las partes interesadas

Fuente : DesignIssues: Volume 30, Number 1 Winter (2014)

³² Narrativa, se considera una parcela de eventos secuenciales e interconectados con un comienzo, una conclusión y una estructura básica (Fisher, 1935, pág. 74)

Valor de Marca, David Aaker³³, se ha destacado en el mundo del Branding por estudiar y analizar en profundidad la marca y todos los aspectos relacionados con ella, desde la óptica disciplinar del marketing. Aaker considera “el valor de marca como una combinación de conocimiento, lealtad y asociaciones de marca, que se suman para proporcionar valor a un producto o servicio” (Aaker D. , 1996). El autor afirma que el primer paso que hay que dar, para iniciar la gestión de la marca, es desarrollar una *identidad de marca*, que es un conjunto único de asociaciones que se vinculan a lo que la marca pretende representar. La identidad de marca, para Aaker según su modelo es un conjunto de 12 elementos que caen bajo cuatro perspectivas: Marca como producto, Marca como organización, Marca como persona y Marca como símbolo. Su aportación genera alteración en el campo investigativo, lo que da inicio a numerosos estudios relacionados, es así que su hija Jennifer Aaker identifica que para construir una identidad hay que considerar tres dimensiones: “la *Personalidad* que construye la marca al comunicar, el discurso de todo lo que tiene que decir y las expresiones que deberá utilizar para que puedan ser captados” (Aaker J. , 1997).

La personalidad de marca se constituye en un componente intangible de la marca, y es definido por su autora “como el conjunto de características humanas asociadas a una marca” (Aaker J. , 1997), bajo este contexto se crea un modelo que permite medir la personalidad de la marca. En el proceso de creación se utilizó 37 marcas en diversas categorías, lo que le permitió detectar 114 rasgos que las describen. El resultado final de este estudio desarrollado en Estados Unidos, presenta un instrumento para medir la personalidad de marca que consta de quince rasgos y cinco dimensiones: sinceridad (práctico, honesto, sano, alegre); emocionante (atrevido, animado, imaginativo, actualizado); competencia (confiable, inteligente, exitoso); sofisticado (clase superior, encantador); rudeza (abierto, resistente). La personalidad de la marca es un componente indispensable a ser considerado en el proceso de diseño, si se visualiza este proceso desde una óptica sistémica, se da la fase de análisis, en la que se debe llegar a la conceptualización del tangible resultante, el mismo que debe tener impregnado la esencia de la marca empresarial.

5. Conclusiones

Como protagonistas de la sociedad del conocimiento, se puede apreciar la evolución de las dinámicas sociales, empresariales y culturales que surgen ante la inminente influencia de las innovaciones tecnológicas. El área de diseño no está alejado de esta influencia, muy por el contrario el diseño ha sido movido progresivamente desde los objetos tangibles (donde su enfoque central era su valor de uso), hacia los aspectos vinculados a la intangibilidad: la experiencia de compra, la dinámica de acceso del producto, su disponibilidad y su nivel de innovación, los que a más del uso, se han constituido en los elementos diferenciadores que crean valor para los usuarios. La integración entre los componentes tangibles e intangibles se ha convertido en un área importante de estudio para el diseño.

Al realizar un recorrido bibliográfico sobre la inclusión de los intangibles empresariales en el proceso de diseño, se pudo evidenciar que es realmente escasa la información, la mayoría de los resultados se concentran en estudiar necesidades, preferencias e intereses del consumidor, reconocidas como variables externas a la empresa, sin considerar las variables internas originadas por los intangibles empresariales. Se ha podido identificar un total de 9 intangibles empresariales, que pueden ser medidos y registrados en los estados financieros por el área contable.

La integración de estos componentes intangibles en el proceso de diseño bajo una visión sistémica, hace necesario que el diseñador adquiera nuevas destrezas. En el rol de intérprete de las narrativas empresariales requerirá necesariamente conocer términos y conceptos administrativos. En el rol de interlocutor de la cultura organizacional, conformada por valores, normas y creencias, visualizada como personalidad de marca, deberá tener nociones de psicología. El desarrollo de la capacidad de Innovación, un intangible de gran potencial en la empresa, pone al diseñador en otro rol, debe ser un futurólogo, que explote al máximo su capacidad creativa. La sostenibilidad del planeta, exigirá que el diseñador comprenda su compromiso por el medio ambiente, por lo que deberá tener nociones de esto también. Hay más variables a considerar dentro del proceso y mucho que investigar aún, este análisis es solo un

³³ David Aaker, es profesor emérito de ET Grether de Estrategia de Marketing de la Escuela de Negocios Haas. Es consultor de marketing y autor de más de 100 artículos y unos 15 libros sobre marca. Es considerado uno de los líderes mundiales en su especialidad asesorando empresas de Estados Unidos, Japón y Europa. Es Vicepresidente de la consultora Prophet Management Team.

pequeño aporte al estado del arte de los intangibles empresariales en la sociedad del conocimiento y su implicación en el proceso del diseño.

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Caso Garittea, del campo al campus: Creación del diseño de la identidad visual de una organización a través del trabajo colaborativo entre comunidades campesinas y la academia.

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Resumen

Se presenta la experiencia de articulación entre academia, ONG y asociaciones campesinas, alrededor del desarrollo de capacidades para la comercialización de productos de café, en el marco del diseño colaborativo y participativo, que permite avanzar en la construcción de canales de economía solidaria y comercio justo. Garittea es una empresa social que disminuye la intermediación comercial, defiende los ingresos de los pequeños caficultores y genera procesos de empoderamiento en las comunidades campesinas; es una marca creada para el fortalecimiento de las relaciones campo-ciudad, el desarrollo sostenible, el impulso del trabajo interdisciplinario y colaborativo, elementos esenciales en la creación de la identidad y el diseño de comunicación visual de una organización. Villafañe (2008) afirma que la identidad corporativa es el “ser” de la empresa, su esencia, concepto que se toma como referencia y pone de manifiesto la importancia del trabajo colectivo en la creación de la identidad en las organizaciones.

Este estudio deja ver los modos de participación e intervención de los distintos actores y áreas del conocimiento en los procesos de diseño y gestión de una organización, generando el posicionamiento y la visibilización del carácter de una comunidad productiva. La identidad de Garittea parte de una visión integradora articulada con perspectiva de la triple hélice (Etzkowitz et al. 2000) donde empresas, universidades y otras organizaciones se encuentran para trabajar con un compromiso colaborativo.

Los actores del proceso se definen a través de una triada, compuesta por la empresa, (socios de Garittea): la Asociación de Pequeños Caficultores de La Marina, la Asociación de Caficultores Orgánicos de Colombia y el Instituto Mayor Campesino, quienes han aportado su know-how y la experiencia de sus procesos de creación de nuevos productos; un equipo de I+D+i (profesores y gestores), quienes han incorporado sus metodologías y herramientas a través de la interdisciplinariedad en saberes como el mercadeo, la ingeniería, la economía, la psicología y el diseño, aplicando entre otros recursos, modelos

sistémicos de formulación por objetivos para apoyar los procesos creativos y la gestión del diseño; los diseñadores (estudiantes), quienes han trabajado en la creación de la identidad de Garittea a través de un equipo integral, dando como resultado la creación de la identidad corporativa e identidad visual de Garittea.

Palabras clave: *Identidad visual corporativa, entornos colaborativos, diseño participativo campo – ciudad, sistémica.*

Abstract

This paper presents the joint work experience between academics, ONGs, and farmer's associations, about the development of capabilities for the marketing of coffee products, in the framework of collaborative and participative design, that allows the progress in the construction of solidary economic channels and fair trade. Garittea is a social entrepreneurship that lowers commercial intermediation, defends the income of small coffee producers, and creates empowerment processes in the rural communities; Garittea is a brand created for strengthening rural-urban relations, sustainable development, the promotion of interdisciplinary and collaborative work, essential elements in the creation of business identity and the design of an organization visual communication. Villafañe (2008) states that corporate identity is the "being" of a company, its essence, a concept that is taken as a reference and highlights the importance of collective work in the creation of identity of organizations.

This study reveals the several ways of participation and involvement of different actors and areas of knowledge in the processes of design and management of an organization, that creates positioning and visibility of the character of a productive community. The identity of Garittea departs from an integrated vision, articulated with triple helix perspective (Etzkowitz et al. 2000) where companies, universities, and other organizations are willing to work jointly with a collaborative commitment.

The actors in the process are defined by a triad, the firm (Garittea shareholders): the Association of Small Coffee Growers of La Marina, the Association of Colombian Organic Coffee Growers and the Instituto Mayor Campesino, who have contributed with their know-how and experience in the processes of creating new products; a team of I+D + i (teachers and administrators), who have incorporated their methodologies and tools through interdisciplinary knowledge in areas such as marketing, engineering, economics, psychology, and design, using among other resources, systemic models of formulation by objectives to support the creative process and the design management; and, finally, the designers (the students), who have worked on creating Garittea's identity through an integrated team, resulting in the creation of corporate identity and visual identity of Garittea.

Keywords: *corporate visual identity, collaborative environments, rural-urban participative design, systemic.*

1. La experiencia. Actores y tensiones

“Profesor, no nos interesan sus planteamientos de un negocio que se fundamenta en la lógica del mercado, para nosotros la vida se mueve en la construcción de posibilidades de encuentro y cooperación...” Líder campesino (2014)

Ubicar el contexto de la experiencia creativa asociada al proyecto del café, implica re-leer un proceso construido conjuntamente, entre académicos, funcionarios de una ONG y líderes campesinos. Volver una y otra vez sobre la experiencia de encuentro que hemos construido, ha permitido constatar las distintas tensiones sobre las que se ha establecido la construcción de un proyecto denominado *Garittea, del campo al campus*. Tensiones que bien vale la pena explicitar cuando abordamos el encuentro desde dos lógicas: el valor de los emprendimientos medido por las ganancias, el empleo que genera, la acumulación y la aplicación de modelos previamente establecidos, que marcan resultados “éxitos” en el mercado; y la concepción de los proyectos productivos generadores de encuentros, posibilidades, recreación de la cultura, cuidado de la naturaleza y compromiso con la vida. En palabras de Albarracín (2009, p. 19) “quizás ese es el punto más conflictivo de una aproximación de este tipo de iniciativas, ya que su correcta lectura precisa el deslizamiento de un terreno claramente definido por la materialidad del dinero, las mercancías, la acumulación, a otro, fangoso e inhóspito y acechado por el fantasma de un concepto tan vago como el del capital cultural”

Pareciera que esta dinámica social que se establece entre los saberes hegemónicos y los saberes populares, no termina de transformarse; García Canclini (1990, p. 221) lo ha señalado desde hace más de dos décadas, cuando menciona: “el avance económico moderno no implica eliminar las fuerzas productivas que no sirven directamente a su expansión si esas fuerzas cohesionan a un sector numeroso, aún satisfacen necesidades sectoriales o las de una reproducción equilibrada del sistema. A la inversa y complementariamente, la reproducción de las tradiciones no exige cerrarse a la modernización”.

De igual manera, García-Canclini hace referencia a una serie de estudios en América Latina (México y Ecuador), que ponen en evidencia que las dinámicas económicas, políticas y sociales perpetúan la discriminación y desigualdad de oportunidades para los grupos étnicos y campesinos para acceder a bienes económicos, a educación media y superior pertinente y de calidad, y a nuevas tecnologías; entonces, ¿cuáles son los caminos que deben recorrer comunidades indígenas, afro, campesinas para mantener las tradiciones, participar de la vida urbana y de las reglas comerciales modernas?

En esta perspectiva, la integración de algunos grupos tradicionales con la modernidad ha implicado, como lo menciona García-Canclini (1990, Págs 222-223), una consolidación del sujeto político y social. Es evidente que existen múltiples maneras de construcción de vínculos entre lo tradicional y lo moderno, lo popular y lo culto, lo local y lo extranjero; así como las clases hegemónicas ajustan sus saberes, al mismo tiempo, “las clases populares adoptan sus saberes y hábitos tradicionales”. Sin mayor conflicto, entonces plantea García Canclini, la importancia de los cruces culturales y la reestructuración de los vínculos, especialmente, en las nuevas generaciones, más expuestas al mundo globalizado. Allí, el diseño tiene la oportunidad de jugar un papel de gran importancia en este tipo de procesos.

Si bien los planteamientos de García Canclini se realizan en función del arte versus las artesanías, para el caso que nos ocupa nos enfrenta a reflexiones similares aunque más adaptadas a las lógicas y saberes de los habitantes de las urbes versus los habitantes de la zona rural, específicamente, de los campesinos con sus cosmovisiones, luchas y resistencias. Precisamente estos saberes que provienen de la memoria común y cotidiana, y brotan de la dimensión social sensible, se configuran como proyectos estéticos pues proponen modos de hacer, maneras de habitar o circular, formas de interacción que invitan a la elaboración conjunta de sentido.

Ya Michel De Certeau (2006) , lo señala: “la práctica cotidiana es relativa a las relaciones de fuerza que estructuran el campo social como el campo del conocimiento”. De igual manera, De Certeau propone abordar la cultura, en función de objetivos y relaciones, apropiando informaciones, seleccionando y ordenando, bajo la consideración de tres aspectos: estético, polémico y ético.

En efecto, De Certeau, (2006. p. 263) afirma:

“En sí misma, la cultura no es la información, sino su tratamiento mediante una serie de operaciones en función de objetivos y relaciones sociales. Un primer aspecto de estas operaciones es estético: una práctica cotidiana abre un espacio propio en un orden impuesto, como lo hace la acción poética que pliega a su deseo al uso de la lengua común, en un nuevo uso transformador. Un segundo aspecto es polémico: la práctica cotidiana es relativa a las relaciones de fuerza que estructuran el campo social como el campo del conocimiento. Apropiarse informaciones, ponerlas en serie, editarlas a su gusto, es cobrar poder sobre un conocimiento y dar vuelta, de esa forma, a la puesta de imposición de lo ya hecho y ya organizado. Equivale a trazar, con estas operaciones apenas decibles, apenas nombrables, su propio camino en la resistencia del sistema social. Un último aspecto es el ético: la práctica cotidiana restaura con paciencia y tenacidad un espacio de juego, un intervalo de libertad, una resistencia a la imposición (de un modelo, de un sistema o de un orden): poder hacer es tomar distancias, defender la autonomía de algo propio”.

En el mismo sentido, el geógrafo Milton Santos, explica cómo la globalización es espacio de flujos diversos: hegemónicos, hegemonizados, rápidos y lentos; los flujos conforman verticalidades y horizontalidades que se entretajan en distintas direcciones. Las horizontalidades se componen de las acciones cotidianas de individuos o instituciones, que responden al ejercicio de existencias solidarias, son lugares que propician relaciones sociales y que fundan lazos solidarios de ciudadanía; las verticalidades son acciones hegemónicas, son elementos perturbadores que intentan traspasar las lógicas de aquellas horizontalidades que se construyen a sí mismas, desde la confianza, desde los afectos, desde la posibilidad de erigirse como actores sociales colectivos, que se empoderan a partir de sus relaciones. Para Santos (2000), entonces, los cambios vendrán de abajo, desde el territorio, el trabajo y lo cotidiano, a partir de una toma de conciencia de los efectos excluyentes y la retoma de la solidaridad como fundamento de las relaciones sociales. Así, la horizontalidad que se teje desde el espacio-tiempo, desde lo rural y lo urbano, permite el surgimiento de lo político que se fortalece en la dimensión social y sensible de la multiplicidad de actores.

En este contexto, el desarrollo del proyecto *Garittea* ha estado dinamizado por la interacción de tres actores: el Instituto Mayor Campesino- IMCA-, la Universidad Javeriana Cali y las asociaciones de campesinos- la Asociación de Pequeños Caficultores de La Marina ASOPECAM, la Asociación de Caficultores Orgánicos de Colombia ACOC; todos estos sectores, han intercambiado perspectivas, lo mismo que intereses y afectos, para definir el alcance del proyecto y los modos de su realización, que suponen procesos de construcción y deconstrucción, continuos, como lo hemos mencionado anteriormente.

Ahora bien, esta iniciativa se enmarca en varias plataformas de articulación:

1. La más evidente está referida al trabajo colectivo entre comunidades campesinas, funcionarios de la ONG y académicos. Perspectiva que evidencia el intercambio, interdisciplinar (ingenieros, administradores, diseñadores de la comunicación visual, arquitectos, abogados), y de saberes populares y académicos, “facilitando el aprovechamiento de recursos y promoviendo la interrelación con otras disciplinas actores y saberes”(Gil, J. 2009, p.31).
2. Otra lectura podría ampliarse a las diferentes redes donde cada uno de estos actores participa y genera procesos colectivos, pues “las redes no remiten solamente a una forma de operar, sino

que suponen nexos conceptuales y espacios de complicidad que trascienden la mera mecánica administrativa” (Gil, J., 2009, pág.31). Situación que nutre el proceso emprendido, como bien lo plantea Yudice (Citado por Javier Gil, (2009) p. 31) “las redes aportan un minucioso trabajo de articulación del cual no son capaces las instituciones modernas. Entra además en espacios a donde no llegan las instituciones...se permitiría que el protagonismo de la acción cultural provenga de la sociedad civil misma”.³⁴

3. Por su parte la Universidad, identifica en esta alianza la posibilidad de crear un “laboratorio vivo”, que impacte directamente el compromiso de docentes y la formación de estudiantes en la perspectiva de su compromiso social, tal como reza su Misión: “la creación y el desarrollo de conocimiento y de cultura en una perspectiva crítica e innovadora, para el logro de una sociedad justa, sostenible, incluyente, democrática, solidaria y respetuosa de la dignidad humana.”³⁵

El derrotero que se ha establecido está en función de integrar dos ejes: la perspectiva campo-ciudad alrededor de un proyecto de economía solidaria y comercio justo en el campus universitario, y explicitar las diferentes formas del trabajo articulado academia, ONG, en este caso el IMCA, y comunidades campesinas. Y además, la perspectiva de la construcción sostenible, en tanto el espacio donde funcionará la tienda de café corresponde a la Casa Alero, casa que obtuvo varios premios, entre ellos el primer lugar en la categoría en Ingeniería y Construcción y Balance Energético, en la competencia mundial del Solar Decathlon Latin American and Caribbean 2015. Esta edificación completa el ciclo del laboratorio vivo que se quiere crear, facilitando mayor apropiación de una propuesta económica de construcción sostenible, éticamente responsable, portadora de solidaridad conjunta y por tanto, promotora de esperanzas.

De esta manera, la Asociación de Pequeños Caficultores de La Marina ASOPECAM, la Asociación de Caficultores Orgánicos de Colombia ACOC, el Instituto Mayor Campesino IMCA y la Universidad Javeriana Cali, vienen trabajando en la construcción de una empresa social que bajo los principios de la economía solidaria, contribuye a eliminar la intermediación comercial, a defender los ingresos de los pequeños productores de café, para potenciar capacidades en las comunidades campesinas, a través de la comercialización directa al consumidor final y la compra de café a un precio justo, impactando el proceso formativo de los estudiantes javerianos, potenciando, además, la construcción de un modelo de consumo ético y sostenible, en la comunidad educativa.

El canal que permitirá que estos objetivos sociales y formativos puedan cumplirse, se materializará en la tienda especializada de café en el campus universitario denominada *Garittea del campo al campus*, la cual generará un espacio de creación de posibilidades y de gestión de productos propios del mundo campesino y del encuentro híbrido entre las culturas rurales y urbanas.

La comercialización del café, está dada en la creación de posibles y nuevas formas de encuentro entre la ciudad y el mundo rural, entre los jóvenes universitarios y los campesinos, entre los modelos de gestión y la creación, alrededor del fortalecimiento de valores. En palabras de Javier Gil, este espacio de la tienda *Garittea* puede ser una invitación “a producir lo nuevo, a generar nuevas relaciones con la economía, la

³⁴ A manera de ejemplo, el Instituto Mayor Campesino junto con otros Centros Sociales orientados por la Compañía de Jesús en Iberoamérica, comparten la misión de acompañar a las personas empobrecidas en su articulación social, política y económica, para que recuperen el control sobre los procesos de desarrollo y mejoren sus condiciones de vida, se han unido y han creado la **comunidad de aprendizaje COMPARTE**. Con la orientación de la Comunidad COMPARTE y bajo la metodología participativa de lectura estratégica del territorio se ha identificado la producción y comercialización directa de cafés especiales como un proyecto económico-productivo, que de acuerdo con las potencialidades y retos de la región centro del Valle del Cauca, puede generar una remuneración justa e incrementar los ingresos de las familias campesinas de esta zona del Valle.

³⁵ Consejo Directivo Universitario. Acuerdo N° 576. Abril 26 de 2013.

política, la educación, la vivencia del tiempo y del trabajo, la relación con las comunicaciones; tal vez implica nuevas maneras de estar juntos y de construir comunidades” (pág. 28)

En su fase inicial, este proyecto favorece la condición social de 61 familias campesinas ubicadas en la zona centro del Valle del Cauca, Colombia, con la visión de integrar en el mediano plazo otras organizaciones campesinas e indígenas para que circulen sus productos de origen a través de este canal de comercialización solidario. Al mismo tiempo, el proyecto genera impacto académico con la oferta de espacios curriculares, como trabajos de grado e investigaciones que continúen desarrollándose alrededor de los ejes articuladores siguientes: consumo responsable, economía solidaria y comercio justo en la perspectiva del fortalecimiento de relaciones culturales campo-ciudad.

2. Requerimientos de diseño

El proyecto *Garittea del campo al campus*, tuvo hacia 2014 su primera intervención por parte de estudiantes de la Carrera de Diseño de Comunicación Visual de la Pontificia Universidad Javeriana Cali, y la necesidad se centró principalmente en la definición de un nombre (*naming*) y el desarrollo de un logotipo que identificara esta iniciativa de trabajo ya que hasta mediados de 2014 ésta era conocida como *el proyecto del café*, y no evidenciaba las particularidades y valores de un planteamiento de estas características. Lo anterior se enmarcó en la necesidad de lograr un nivel de identificación del proyecto dentro de la comunidad académica de la Universidad, así como dentro de las comunidades campesinas, las ONG vinculadas a esta iniciativa y el público objetivo al cual se quería llegar en el futuro.

A partir de ello, se inició un proceso de formulación de estrategias de identificación que fuera de la mano con los criterios fundamentales del proyecto con el objetivo de comunicar (poner en común) una propuesta de trabajo colaborativo y participativo con criterios de sostenibilidad, justicia, economía solidaria, autonomía, naturaleza, diálogo de saberes, respeto al medio ambiente, comunidad, entre otros. De esta manera, los diseñadores en formación pusieron en juego sus competencias profesionales, las cuales, se asumieron desde el conocimiento y las capacidades enmarcadas en un saber hacer, un saber analizar, un saber actuar y un saber decidir en contexto.

El ejercicio se llevó a cabo inicialmente en la clase de *Diseño de Comunicación Visual*, aunque posteriormente participaron otras asignaturas, como *Identidad de la Marca en los Empaques*. Se partió de la estructuración de un brief que sirviera para conocer y estudiar todos los componentes iniciales necesarios para llevar a cabo el proyecto de diseño, tomando como base la definición de los siguientes puntos a partir de la metodología propuesta por Phillips (2004):

- a. Descripción general del proyecto
- b. Objetivos del proyecto
- c. Campo de intervención
- d. Contexto y antecedentes
- e. Audiencia objetivo
- f. Requerimientos de diseño
- g. Alcance de la propuesta
- h. Entregables

Antes de abordar la definición del brief, los estudiantes iniciaron sus indagaciones sobre el proyecto del café estudiando las cuatro dimensiones de la identificación institucional: *Realidad*, *Comunicación*, *Identidad* e *Imagen* (Chaves, 2001). El objetivo se centró en el conocimiento a detalle de las características y componentes básicos que defieran el proyecto, en el cual se pudieran observar las

dimensiones de este ente social cuya representación manifiesta el discurso de identidad de un sujeto diseñado.

Al aproximarse a la **Realidad** del proyecto (conjunto de rasgos y condiciones objetivas del ente social), se intentó dar respuesta a la pregunta *quién es el ente social*. Allí se estudiaron la modalidad organizativa del proyecto del café, su historia, su definición jurídica, sus componentes administrativos, su infraestructura de funcionamiento, entre otras. Los hallazgos permitieron observar un proyecto con una tendencia evolutiva, en el que se configuró un proceso en su dimensión operativa y en sus objetivos de trabajo a futuro.

Posteriormente se analizó la **Identidad** del proyecto, la cual está determinada como un fenómeno de la conciencia en respuesta a la pregunta de quién quiere ser el ente social. Este aspecto asumido como una forma de autorepresentación, se manifiesta por medio del conjunto de atributos asumidos como propios por el proyecto del café donde se hace evidente la filosofía del proyecto, sus principios de personalidad, sus ideales y sus valores como sujeto social.

A continuación, los estudiantes realizaron un estudio sobre la **Comunicación**, dimensión semiótica del proyecto (conjunto de mensajes efectivamente emitidos de manera consciente e inconsciente por parte del ente social). Allí, se analizaron los tipos de mensajes que el proyecto del café debe emitir con el fin de dar respuesta a las necesidades de comunicación de un proyecto de estas características (qué se quiere decir fue la pregunta orientadora). A partir de lo anterior, los estudiantes pensaron en los discursos a presentar, los medios a utilizar, así como en las múltiples audiencias que el proyecto debía considerar en la construcción de su identidad corporativa.

Finalmente, se trabajó en la **Imagen**, última dimensión dentro del esquema propuesto por Chaves (2001) en la construcción del registro público de los atributos identificatorios del proyecto del café. Así, se determinó la lectura y la interpretación que de ella hace la audiencia de modo intencional o espontáneo. Este punto definió lo que los diseñadores desean dejar en la mente del público objetivo del proyecto, aspecto vital y esencia en todo proyecto de identidad visual corporativa.

Teniendo como fundamento principal la información recopilada y construida sobre los cuatro dimensiones anteriores, se dio inicio al trabajo de construcción del brief, en el que fue esencial la participación de todos los actores del proyecto del café (comunidades de caficultores, ONG y academia). Las particularidades de cada una de las partes integrantes de este proyecto, se hicieron evidentes en las reuniones de trabajo del proyecto, expresando la manera en como cada grupo interpretaba las necesidades que debía dar respuesta el ejercicio de diseño. Los campesinos manifestaron su interés para que el proyecto de identidad corporativa acogiera el saber tradicional campesino, sus expresiones cotidianas, la riqueza natural de su entorno y diera cuenta además del proceso de producción del café. Por su parte, el Instituto Mayor Campesino abogó por un discurso de identidad que tuviera fortaleza desde el punto de vista comercial, sin dejar a un lado la representación del trabajo comunitario que caracteriza a esta iniciativa. La Universidad, manifestó su interés para que el proyecto diera cuenta del diálogo de saberes, así como de los múltiples públicos objetivos que se verían involucrados en una iniciativa como ésta.

Los objetivos del proyecto de diseño se enmarcaron en una primera fase, en la articulación de un nombre para esta experiencia de trabajo, bajo los requerimientos anotados anteriormente. Posteriormente, se debía desarrollar un logotipo que representara la diversidad y multiplicidad del proyecto del café, bajo criterios de recordación, claridad, legibilidad, autenticidad y versatilidad en su aplicación. De esta manera, la propuesta debía ser de fácil implementación en múltiples soportes, sustratos, tamaños y plataformas, ya fuera impresa o digital, ya que el proyecto implicaba múltiples necesidades comunicativas de acuerdo a sus intereses de proyección social y comercialización.

En lo atinente al campo de la intervención, la tarea a desarrollar se centró en el diseño de identidad corporativa, ya que el ejercicio en una primera fase se enmarcaría principalmente en este campo, aunque después se integraron otras áreas como envase y etiquetado, diseño publicitario, diseño de interacción, diseño de producto y diseño editorial, entre otros.

Posteriormente, se analizaron las características contextuales del proyecto con el fin de establecer de manera muy precisa el escenario de acción donde se llevaría a cabo el ejercicio. Se estudiaron en detalle las particularidades de cada una de las partes involucradas en el proyecto del café, sus principales características, sus aportes y nivel de participación en esta iniciativa, aspectos tratados con amplitud en el punto “La experiencia: actores y tensiones”.

Los estudiantes en este proceso de briefing realizaron un estudio detallado de referentes y proyectos similares, tanto a nivel nacional como internacional, construyendo un Benchmarking muy completo que sirvió para identificar fortalezas, debilidades y oportunidades de diseño que pudieran ser tenidas en cuenta al momento de llevar a cabo la intervención.

Uno de los aspectos fundamentales en el desarrollo del brief, fue el referido a la audiencia a la cual iría dirigida la propuesta. Este proyecto, al ser una iniciativa que se configurará y materializará a través de una cafetería en el campus universitario de la Pontificia Universidad Javeriana Cali, involucra a diversos públicos que circulan día a día por ella. Este punto pone en evidencia la diversidad de personas que deben ser tenidas en cuenta para el desarrollo del diseño de identidad para el proyecto del café, siendo éste uno de los mayores retos para la definición de requerimientos alrededor del *naming* y el posterior ejercicio de logotipia, así como de arquitectura de marca por parte de los estudiantes.

3. Modelo de encuentro de trabajo colaborativo y participativo para la creación de la identidad de Garittea.

En términos del sustento epistemológico del proyecto, destacan tres premisas fundamentales: la visión de trabajo en entornos colaborativos y principios de diseño participativo bajo un enfoque sistémico. Roncancio (2011) afirma que “un entorno colaborativo universidad – empresa es no sólo deseable sino una estrategia prometedora para promover el desarrollo humano, ambiental, económico y social para facilitar el desarrollo científico y la innovación y, especialmente, para asegurar mínimos de convivencia y cohesión social” (pág. 304). En términos de *Garittea*, en esta fase del proyecto se definieron los actores implicados y sus roles a través de una triada de participación, en la que cada uno de ellos aportó un valor significativo para el crecimiento y desarrollo del proyecto. La Universidad mediante el equipo de I+D+i (gestores y profesores) y los diseñadores (los estudiantes); y por su parte la organización con su *know-how* y una constante comunicación en torno a saberes necesarios para la creación de la identidad.



Fig. 1 Triada de trabajo colaborativo para la creación de la marca Garittea (Fuente: elaboración propia)

La perspectiva del trabajo en entornos colaborativos se basa en la propuesta de Leydesdorff (2000) y (Etzkowitz & Leydesdorff, 2000). La primera hélice de la triada reflejada en *la empresa/organización* (socios de Garittea), está conformada por la asociación de pequeños Agricultores de la Marina – ASOPECAM-, la Asociación de Caficultores Orgánicos de Colombia –ACOC- y el Instituto Mayor Campesino –IMCA-, los cuales han aportado el *know-how* y la experiencia en detalle en cuanto a sus procesos y el desarrollo de nuevos productos. Su figura como demandante del servicio en la creación de la identidad organizacional ha sido clave en la formulación del briefing y los requerimientos de diseño.

La segunda hélice estructurada por un equipo de I+D+i (profesores y gestores), todos pertenecientes a la Pontificia Universidad Javeriana Cali, los cuales y según la definición de Etzkowitz & Leydesdorff (2000), han sido puente creador del conocimiento con un papel estratégico fundamental para generar la relación de la empresa con el diseño, articulando el conocimiento de las personas involucradas y sus relaciones, apoyando la innovación en los procesos de creación de valor, e incorporando al propio tiempo sus metodologías y herramientas bajo un enfoque multidisciplinar. Saberes como el mercadeo, la ingeniería, la economía, la psicología, la arquitectura y el diseño, han sido recogidos en modelos sistémicos de formulación por objetivos para apoyar los procesos creativos y la gestión del diseño (de la información y el conocimiento, de responsabilidades y desarrollo de las actividades en el proceso).

Por último, la tercera hélice está representada en los diseñadores (estudiantes), de varias carreras de la Pontificia Universidad Javeriana Cali, aportando insumos conceptuales clave para un resultado obtenido, incluyendo los aspectos normativos y legislativos inherentes a los productos de la marca.

En términos del diseño participativo, destacan tres cualidades esenciales señaladas por autores como Kang *et. al.* (2015), relacionadas con la inclusión de los actores involucrados en todas las fases del proceso, el fomento del sentido de pertenencia y el *prototipado cooperativo*.

Los beneficios de este ejercicio participativo y colaborativo para la universidad se ven representados en la generación de conocimiento que luego podrá ser transmitido a generaciones siguientes de actores bajo unas estructuras dinámicas que centran el proceso en las personas.

4. Modelo sistémico de formulación por objetivos como herramienta para la creación y gestión de la Identidad de la marca Garittea

La compleja participación de los actores de Garittea en el proyecto de creación de identidad, requirió de un modelo para organizar y gestionar la información, variables y requerimientos, de tal forma que se pudiesen además evidenciar y trazar las rutas de toma de decisiones a través del proceso. Para ello se recurrió al modelo “*IdThink*” desarrollado por Demarchi *et al.* (2014), que se centra en la gestión del conocimiento inherente a los productos, servicios y procesos de las organizaciones. El “*IdThink*” a su vez, se asienta en el modelo sistémico de formulación por objetivos propuesto por Hernandis (1999). Se trabajaron los dos componentes marco del modelo: sistema de estudio (del modelo de producto) y sistema exterior, con sus respectivas variables de entrada y salida. El análisis del sistema exterior se llevó a cabo bajo el enfoque propuesto por Rosales, E. *et al.* (2015), a través de un mirador conceptual y seis componentes clave: la empresa/organización, conocer el contexto (análisis DAFO), conocer las personas, la competencia-referentes, explorando conceptos (perfil del consumidor ideal), benchmarking interno-externo y un panel semántico conceptual (moodboard). Este enfoque permite la externalización del conocimiento, y posteriormente hacerlo explícito, para favorecer el planteamiento y la formulación de los objetivos en el sistema de estudio.

Volviendo permanentemente sobre esta información, se permite el análisis, la descripción y la resolución de problemas, a los fines de realizar posteriores correcciones a desviaciones en la gestión del diseño. De igual forma, se facilitan los procesos de iteración y de validación durante las diferentes fases de *prototipado cooperativo*.

En el caso de Garittea, el primer paso fue determinar entre todos los actores, las claves asociadas a la creación de la identidad de una marca que permitiera mostrar la consolidación de un proyecto humano, honesto, justo, orgánico y solidario. Para los productores de café del Valle de Cauca el principal desafío que la marca debía transmitir, era el de darle valor a las riquezas que poseen en lo agroecológico y en lo cultural, además de hacer reconocimiento a la necesidad de fortalecer la cadena productiva, de manera que se pudiera llegar al consumidor final, aportando a su educación a través de la valoración del consumo de productos agroecológicos y la apreciación de la calidad del café producido bajo este modelo.

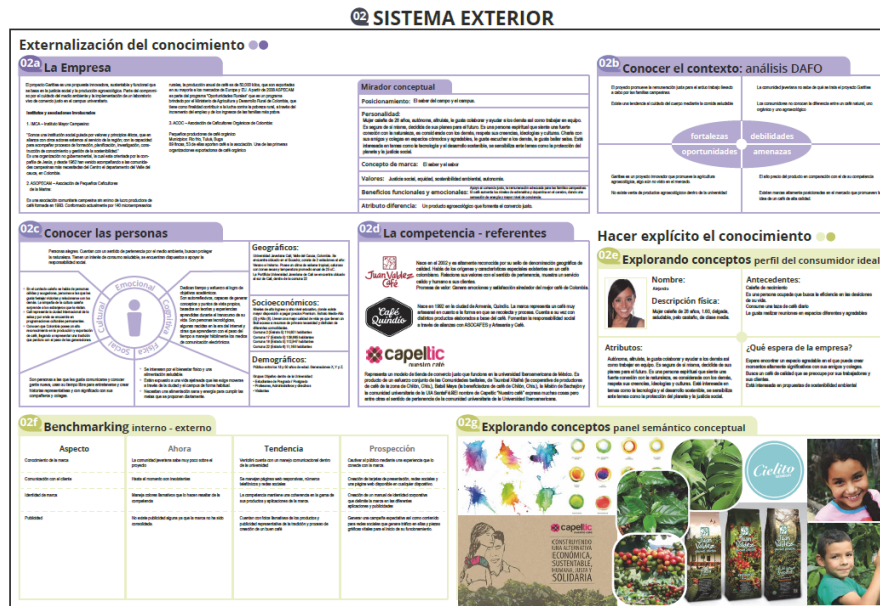


Fig 2: Análisis del sistema exterior proyecto Garittea.

En el primer componente del modelo, el sistema exterior fig 2, se recogió toda la información que afectaría al sistema de producto y en el caso de *Garittea*, toda la información necesaria para tomar decisiones en la creación de su identidad, los puntos fuertes que debían ser investigados así como los datos pertinentes para la empresa desde el mirador conceptual: posicionamiento, personalidad, concepto de marca, valores, beneficios funcionales y emocionales y atributos diferenciales. Se estudiaron igualmente la competencia y los referentes, incluyendo sus estrategias e identidad visual (imagen, tipografía, color y forma). Por otra parte, se estudió al usuario/consumidor desde un análisis de los factores humanos a través de las cinco dimensiones propuesta de Kumar (2013) y se analizó el contexto a través de un análisis DAFO. Por último se recurrió a un explorador de conceptos a través de un panel semántico conceptual que se emplea para descubrir asociaciones y percepciones construidas por los actores participantes del proyecto, a través de un moodboard de imágenes propias para inspirarse y dar personalidad al proceso creativo.

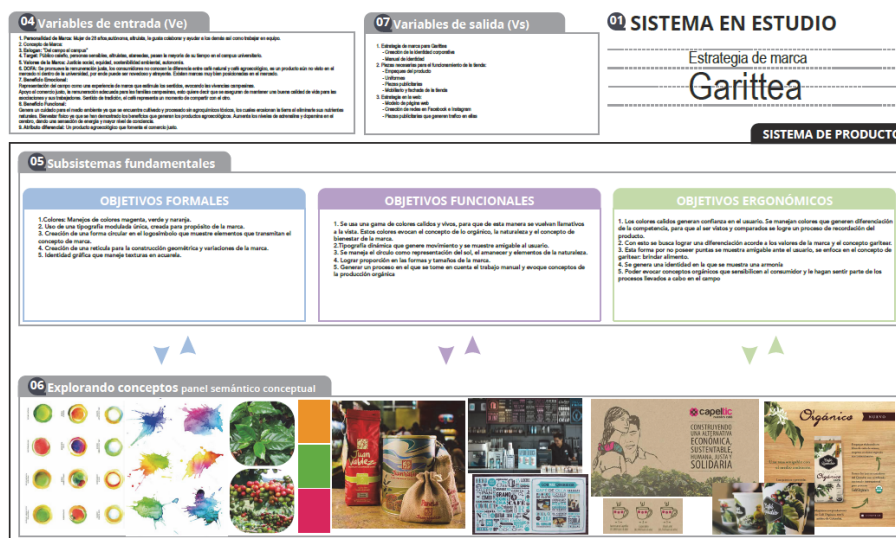


Fig 3: Análisis del sistema de producto proyecto Garittea.

En el segundo componente del modelo y con apoyo del ejercicio realizado en el sistema exterior, se realizó el análisis del sistema de estudio y del sistema de producto, en el que se establecieron las variables de entrada y de salida. Se volvió sobre el panel semántico conceptual y se definieron los objetivos *formales*, *funcionales* y *ergonómicos* de acuerdo a los criterios de Hernandis (1999) y Rosales *et al.* (2015). Los objetivos formales están relacionados con la satisfacción de los requerimientos estéticos de un producto (semiótica, forma, colores, texturas, tendencia, acabados, armonía, originalidad), los objetivos funcionales están asociados con proporcionar al producto la tecnología, adaptabilidad, transformación, conservación, uso, co-creación/configuración, y por su parte, los objetivos ergonómicos, se ocupan de la adecuación de los aspectos formales y funcionales al usuario (antropometría, percepción visual, aspectos cognitivos, afectivos y conductuales). Ver fig 3.

Como resultado de este proceso de creación fue una marca que refleja los valores, beneficios, misión y visión de la organización; su tipografía, simbolo visual, colores, slogan y el sistema gráfico rememora la labor diaria de las familias campesinas, el bienestar humano y la frescura de los rostros trabajadores, usando este último como elemento en el lenguaje gráfico de la marca. Para el distintivo el concepto manejado fue la agroecología evocando lo orgánico reflejado en una tipografía única e irreproducible (logotipo) y exaltando en el isotipo el propio nombre “garittea” que significa transportar alimento a la plantación para los recolectores de café. Ver fig 4.



Fig 4. Diseño de la Identidad Visual de Garittea.

5. Algunas reflexiones para seguir abordando

El desarrollo de un proyecto con las características que hemos enunciado, nos ubica en diferentes lugares que es necesario abordar desde la formación de diseñadores y profesionales en general. No queremos dejar pasar este ejercicio reflexivo sin compartir algunas ideas que nos han suscitado el encuentro e intercambio entre académicos, comunidades campesinas y funcionarios de una ONG.

- » El acto productivo del diseño implica la creación de nuevos actores, en tanto se hace obligatoria la lectura crítica del contexto que ayude a orientar la propuesta creativa y a capturar el sentido de lo no dicho, de lo profundo, de lo fundante. Surgen algunos interrogantes: ¿Cómo lograr esta perspectiva sociocultural y política en la formación de los profesionales y superar la mediación instrumental que lleva a la materialización de la demanda del cliente?, en esa lógica globalizada del cliente tiene la razón.
- » El lugar del usuario o consumidor. ¿Cómo lograr una interacción continua con el usuario para garantizar dinamismo y pertinencia en la creación de la marca? Esta y otras preguntas similares nos llevan a plantearnos la forma de cristalizar la promesa de valor del producto, seguramente la definición de la experiencia de marca exige una interacción permanente con el usuario, el consumidor final.
- » Entonces, se requiere diseñar estrategias que sean flexibles, que logren capturar la identidad de la marca como una constante de sentido, pero al mismo tiempo introduzcan elementos nuevos, frescos, que den cuenta de ese mundo circular en interdependencia que obedece a lo rural. Aquí el uso del espacio, sus formas de habitarlo, hacerlo propio tiene una connotación claramente articulada a la marca, a Garittea, donde el campo, la vida silvestre llega al campus universitario, a la ciudad.
- » La creación de la identidad de marca corresponde a concretar lo intangible, aquello que se fundamenta en los valores de la propuesta de negocio, de ahí que el valor del trabajo interdisciplinario y el intercambio de perspectivas y saberes se convierte en un detonador de colores, imágenes, formas y trazos, que logran dar cuenta del encuentro humano y territorial.

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Emotional Branding: emotions and feelings aroused by the design of the olfactory experience of consumption according to the ecosystem approach to communication.

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Abstract

This article discusses the recognition of semiotics experience and olfactory experienced by consumers in FARM brand's physical store environment, so that it can be achieved the goal of conceptualizing the consumer olfactory design experience within the environment aroma of the brand from the semiotic point of view and the ecosystem approach to communication. In this sense, the theoretical background involves studying and researching of languages, representations and aesthetic communication from an ecosystem perspective, according to authors Monteiro (2011) and Pereira (2012), Peirce's semiotics and the semiotics of culture, theory the affordances Gibson (1979) and Morin's complex thought (2008). The developed research is qualitative, empirical and exploratory nature, it has having been used in its methodology techniques by Moraes and Mont'Alvão (2010) as a basis for modeling FARM brand's communication ecosystem, as well as systematic observation Gil (2010) to collect data on the environment selected as analysis system target. The development of the research took place in the physical store of FARM brand, located in Shopping Manauara, placed in Manaus city, within the Graduate Program in Communication Sciences - PPGCCOM, from Federal University of Amazonas - UFAM. The main results can be mentioned the presentation of communication complexity of the brand studied through systematic analysis of their contact points and the subsequent location of the physical store environment and the aroma within this ecosystem, so that they can understand the process of management of intangible presence in the consumer experience organized with the aim and achieve the emotional and sensory consumer's memory.

Keywords: Communicative ecosystems, Emotional Branding, Olfactory Experience, Semiotics Experience.

1. Introducion

This article presents partial results of a research that aims to investigate the use of flavorings in physical stores and its relationship with the consumer experience presented by FARM brand and experienced by consumers. This strategy, which has been increasingly adopted by the market, is part of the work of the emotional branding, which aims to manage to touch points of a brand aimed at the communication of their identity to the consumer, arousing sensations and positive emotions leading to loyalty.

The adoption of this type of communication approach by brands was established as the traditional media such as advertisings and billboards have become cold elements that can no longer connect with the public. To meet the new needs of this group, companies had to propose to go beyond the production of goods, also producing pleasure, desires, emotions and new loves.

In order to communicate this new humanized, dynamic and emotional profile, you need to subtly achieve the perception of each individual and one of the means found to achieve the production of these intangible assets was adding to brand communication strategies that encourage all the sensory system of individuals. When entering the physical store of a brand, the consumer is not achieved only with low prices and quality, but also with colors, aromas, textures and flavors that communicate the brand style and invite you to let yourself be seduced by this world.

It is this complexity that arises behind the use of a flavored environment which this article aims to explore, as well as the feelings and emotions that technical and programmed process aims to awaken in individuals who participate in this interaction. Therefore, it has aimed to conceptualize the design of semiotics experience and consumer touchable with the brand environment of aroma from the semiotic point of view and the ecosystem approach to communication. Therefore, we will take the process of emotional branding as a communicational complex and hierarchical phenomenon, composed of various organized systems to work semiosis brand (sign) with your consumers (interpretant), and where the design appears as intangible manager and as a model agent of the brand identity.

Thus, it can be said that the problem addressed in this article is if the flavoring used by emotional traits in their physical stores, as a potentiator of the consumer experience, can be seen as a sign of its participant communication ecosystem. In order to find ways to understand the various layers in which this scent is involved, this project will take as object of study the Brazilian brand FARM and the environment of its physical store, located in the city of Manaus.

2. The brand according to the semiotic point of view and the ecosystem approach to communication.

For Charles S. Pierce, a sign is "anything that leads to something else (its interpretant) to refer to an object to which itself refers (its object) in the same way", which turns out to check the this imperfect and incomplete condition, being unable to be the object itself because of its representation of condition. (PIERCE, 2012, p. 74)

According to Lucy Niemeyer (2007), it is important to pay attention to the character of representation of signs, as well as to the fact of this being present, being in the place of something without being something itself. For the author, they are such features that allow the sign to assume mediation between a missing object and an interpreter who is present. It is from these characteristics of the sign that FARM brand will be understood, chosen as case study of this research.

According to Joan Costa (2011), a brand is a sign composed of smaller signs, organized in favor of a form of a containing picture a message to people with certain behavioral profiles. There is thus a semiotic system, composed of linguistic signs (brand name) and visual (symbol, colors, shapes, lines, icons).

According to Clotilde Perez, "brand is a symbolic connection between an organization, an offer and the world's consumption." (Perez, 2004, p. 10). Thus, it is understood that brand is mediation device, which establishes a relationship between the production system of a company and the consumer system through the production of meaning of their smaller signs, the management process that fits the design.

It is clear, therefore, the existence of different systems and processes of meaning that mediation established between the brand and the consumer. It is to understand this complexity that seeks aid in the ecosystem perspective of communication, which according to Pereira (2012), has to do with a new way of looking at communicative practices. Rather than isolating and simplifying the phenomena, the proposal challenges the researcher to seek an understanding of its objects that takes into account the complexity of the system of human and environmental relationships in which it is inserted.

Another important concept to understanding the studied brand semiotic communication process is the semiosis, which according to Irene Machado (2008), is the time where there is the transformation of information into a sign, and the generation and circulation of meaning, the construction of meaning fields and the creation of answerability circuits.

For Lopes and Pereira (2014), semiosis also helps understanding the communicational ecosystems by giving value to the movement that allows sign systems to establish a relationship. According to the authors, "semiosis is a process that involves cooperation between signs, which enables us to talk about the relationship and interaction between these signs in growth processes." (LOPES E PEREIRA, 2014, p. 154)

Returning to the effects caused by the sign, Niemeyer (2007) Santaella (2012) affirm that the nature of this effect is quite varied and may be a feeling, action or representation. For a long time, marketing, advertising, design and branding used the signs to lead the consumer to perform the purchase action, and despite the success for a long time, now, it was realized that the generation of feelings can be more beneficial, leading to a loyalty able to make the purchase action a routine.

Such sentimental loyalty has been explored and developed by various companies through two brand management processes called sensory branding and emotional branding, aimed at building a more emotional and sentimental relationship, and therefore less rational and impersonal, between the marks and consumers. Regarding the olfactory branding, this has received great support with quantitative research to ensure its efficiency. According to research carried out and presented by Lindstrom, "of all the senses, smell is by far the most persuasive" (LINDSTROM, p. 86, 2012). The author further states that, because of the visual and auditory stimuli to which we are subject, smell has become much more efficient with regards to capture memories.

However, despite its apparent effectiveness, only one olfactory branding action is not enough to cause the differentiation effect on the market, pursued by the brands that apply. You must create a rich system of consistent signs around the olfactory sign, so that it can stand out and fulfill its function through the relationship established with others. It is from this process, where the performance of design can be seen in most cases, you can achieve the construction of an identity through the consumption experience.

In this development process the consumer experience a brand aims to offer the desires and consumer wishes are taken into account at all stages. Therefore, there is the need to analyze not only the environment that is offered, as well as the effect of this on the perception of the individual to whom it is

intended. The concept of *affordance*, developed by James J. Gibson is a strengthening of the idea that individual and the environment are interconnected and cannot be analyzed separately, defended by the author throughout the development of his theory of perception ecology.

For Gibson, *affordances* are everything the environment offers the perception of an animal can serve their objectives and needs of beneficial or malevolent way, so that "the possibilities of the environment and the way of life of the animals go together inseparably" (GIBSON, 1986, p. 15).

Gibson draws attention to the fact that, with the technological development of all areas of our society, the man began to modify the environment so that it is able to provide *affordances* to facilitate his experience (paving streets, under surfaces safer and more efficient, electricity, heating, etc.). Thus, the human being is surrounded by artificial environments, often built to suit specific purposes. (Gibson, 1986)

Santos (2012) uses the theory of *affordances* together with Lotman's modeling concept to address environment processing space as a result of the design of action. According to the author, you can see that, through its management action, the design develops environments composed of a series relationship between different languages.

As for Irene Machado (2010), the concept of modeling used by Lotman in his studies on the understanding of semiotics of culture, is the expansion of sign systems in interaction. According to the author, through its interconnected actions these systems transform the space into an information environment, signic and complex, ready to be realized, appropriate and modified by individual contact.

Returning to Santos (2012), it can be seen that the spaces chosen to use the shops has shown a lot of *affordances* increasingly specified, thus modeled according to the communication needs of each brand, becoming in a separate and unique atmosphere in which with regard to brand communication purposes, but can often result in unexpected effects such as discomfort and repulsion.

In short, what was intended by the gathering of these concepts is to create a conceptual field that enables understanding the dynamics present in these artificial environment and modeled through the ecosystem approach, for this is available to study the resulting communication complexity of the individual's interaction with the environment that presents itself.

3. Methodology: the way to get to the understanding of this phenomenon.

Aiming to apply theoretical concepts previously presented so to build a methodology capable of supporting the study of semiotics experience established between the consumer and the FARM brand, selected methods and techniques will be described below.

3.1. Systemic modeling of the brand and the location of the physical store environment as the analysis target system

According to Moraes and Mont'Alvão (2010), the use of models in the analysis of a system is so to facilitate the study and, although the authors use such models as a guide towards the display of machines, it is noted that the intention of recognizing the characteristics of a system through these models shown appropriate for understanding planned to be reached about the communication ecosystem of the studied brand. Thus, it was made use of hierarchical ordering model operating system (Figure 1), according to the authors, seeking to position the target system according to their inclusion in other hierarchically superior systems is explicit even those contained systems within this target system.

In an effort to adapt the hierarchical ordering model operating system to study the contact points that make up the communication ecosystem of the brand, it also became based on the model developed by

Delano Rodrigues (2013), where the points are expressed by contacting which can be used by a tag to communicate their identity and establish a communication process with the consumer, as can be seen in figure 2.

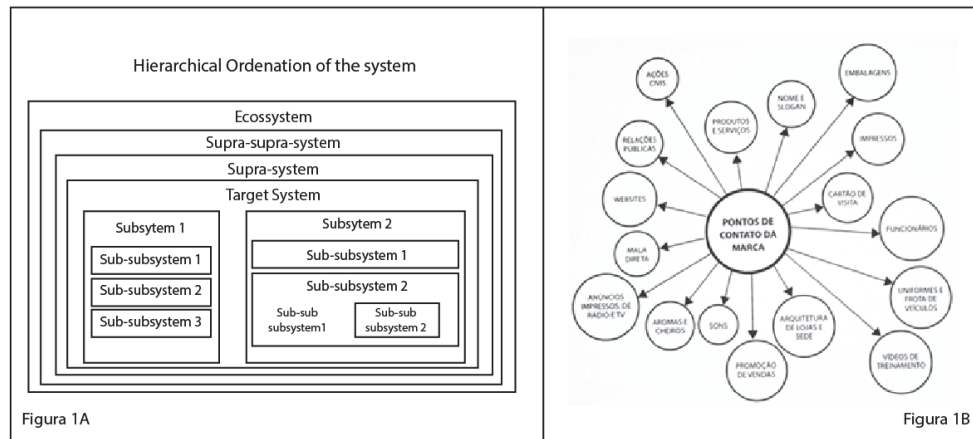


Fig. 1 1A - : hierarchical ordering model of operating system. Source: Moraes and Mont'Alvão 2010/

Fig. 1B Representation model of the contact points for communicating the identity of a brand. Source: Rodrigues, (2013)

With the combination of these two models, was expected to enable a deeper approach on each of these contact points, from de Moraes and Mont'Alvão model (2010), will be seen as supra-systems and systems that make up the ecosystem communicational brand.

3.2. Semiotic analysis of the target system

To compose the semiotic methodology of the analysis, it was proceeded with a systematic observation, assisted by photographic record, of FARM's physical store environment that is located in Manauara Shopping, in Manaus, state of Amazonas. According to Marconi and Lakatos (2010), this technique is so to use the perception from the sensory system to obtain certain aspects of reality through the examination of the facts or phenomena under study. For systematization of the collected data, it elaborated a table that was made the record of the present signs in accordance with the sense that it affects the environment.

We will continue now with the presentation of the communication ecosystem of the studied brand, to further proceed with the presentation of semiotic analysis developed on the physical store environment. However, it was first made an explanation of the characteristics that led to the choice of the FARM brand as the case of study.

4. FARM's communication ecosystem and analysis of the physical store environment as a target system

FARM was chosen as a case of study of this research for several reasons. Mainly because their emotional and sensory positioning to the consumer as well as the fact that they find themselves installed in Manaus just over a year, which put it in the new position, and at that time the most desired brand among the female audience, young and city leader of opinion. However, there were still other factors indicating that this would be the best choice for the goals of the research, which will be discussed below, along with the presentation of the brand profile.

FARM was born in Rio de Janeiro and began selling its products in 1997 in Babylon Feira Hype, street fair where many other Brazilian brands came from. In the beginning, production was handmade with hand-painted fabrics and many colorful *bodies*, a characteristic that has become a differentiator in a period of fashion prized by the industrial and the cold and dark tones. With the growing success within the show, it was noted that the colorful, sensual and printed Brazilian style in the brand products had a strong appeal for consumers. Thus, production was once spontaneous and departed the personal desires of the designer, began to set the main objective of the brand: to portray the style of Rio's life. In proposing to adopt this Rio and Brazilian identity, both in its textile production, as the lifestyle that seeks to sell the brand to win the domestic market and also draw the attention of the international market.

Regarding the image search pf brand communication, we can start by saying that, as well as in Rio de Janeiro, there is no winter. Although the temperature drops, there is room for a light dress and a little skin showing. Its pieces value the use of natural and fresh fabrics with bright and colorful prints and details in a handmade way, which matches perfectly with the college girl that goes to school in the morning and later passes on the beach before returning home, dresses up and leave again to meet friends in the bohemian neighborhood of Lapa.

Currently, to provide this customer experience and strengthening its Carioca identity, Brazilian, natural and colorful, FARM makes use of various touching points, from the concept stores of architecture, to the attention to online sales service and the use of a unique aroma, which is the focus of this work and that was the main element of motivation for the development of this research with the inclusion of a case study. Next, we will present the systemic modeling that exposes the operation of each of the points of contact identified in the communication ecosystem FARM brand.

4.1. Systemic modeling the brand and the location of the scent application

As it can be seen in the developed representation model (Picture 4), it was identified that the communicational ecosystem FARM brand consists of the following supra-system: the social networks, the product, the sale, the packaging, the actions and the employee. Among these, there is the sales supra-system, which is composed of two smaller systems, the E-farm, wich regards to online sales, and the physical store, which regards to points of physical sale which are spread throughout Brazil.

The functions that were observed by the researcher in the studied ecosystem were to: communicate the brand identity (its values, aesthetics and lifestyle that it brings), popularize the brand (strengthening and communication of your image to the public) , loyal customer (offering a positive shopping experience and leading consumers to buy other times), sales (organization and implementation of sales and actions aimed at increasing the number of sales) and product selling (offering spaces for the marketing of products).

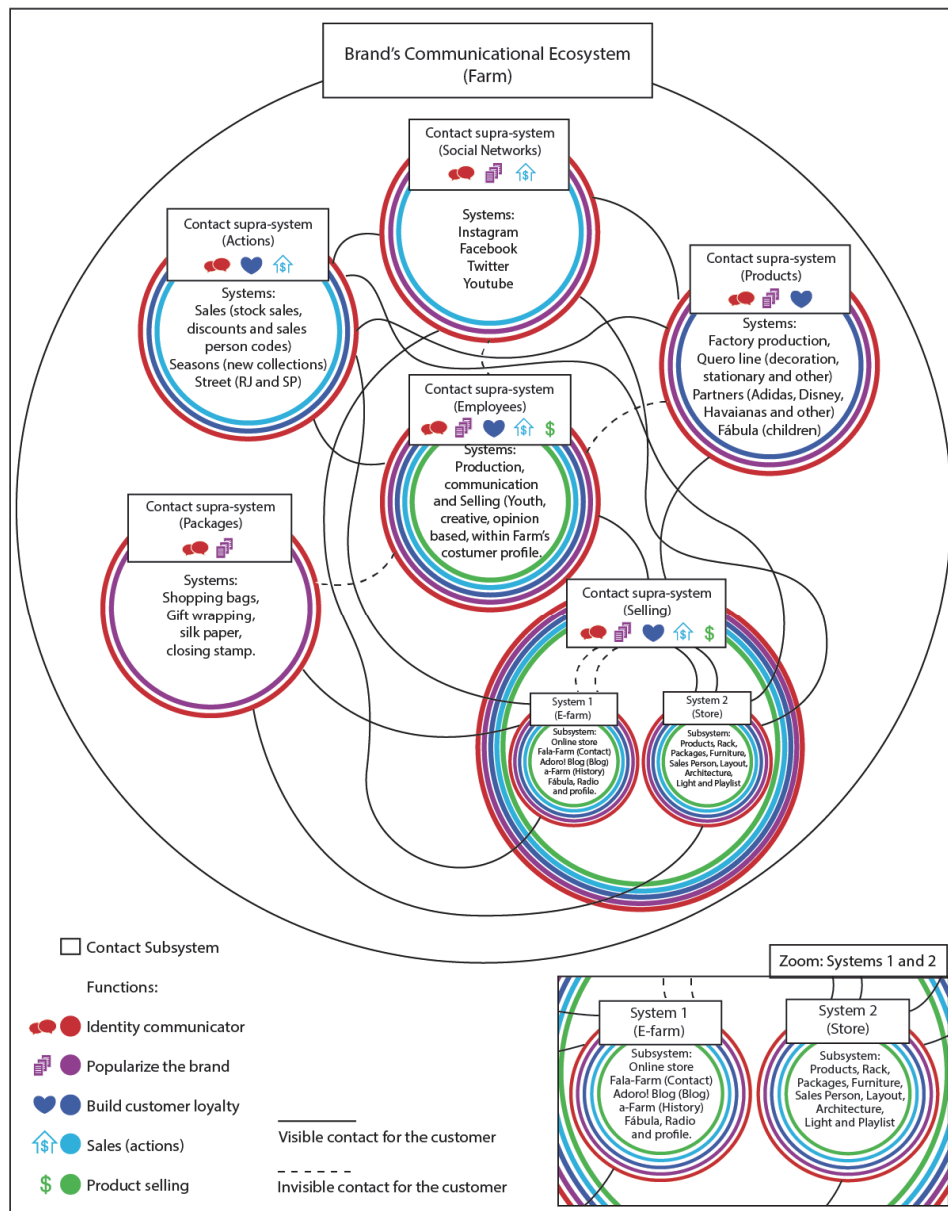


Fig. 2 FARM's ecosystem representation model communicational. Source: From the author's own production.

From the development of this model, it was possible to go into analysis of how the brand proceeds in each of these contact more systematic and objective way supra-systems. However, for this article, will only present the most important supra-systems to the understanding of the brand's performance mode, they are the products, employees and sales.

Starting with supra-systems contact product that meets the functions to communicate brand identity, popularize the brand and loyalty. It was also noted that its production is divided into products from the factory (clothing, footwear, accessories and lingerie), partnerships with other brands (Disney, Havaianas, Adidas, among others), the I-line (furniture, decoration, sports items, stationery, etc.) and Fábula (children's line).

These FARM's products, still in its beginning in Babylon Feira Hype, exerted a direct influence on the definition of identity that the brand would seek to convey in all its productive and commercial complex, so now is your strongest point of contact. The models and prints follow a standard aesthetic, strengthens the brand identity and serves as a basis for the development of activities of other points of contact. The use of signs that convey a style linked to nature as fish, flowers, fruits and animals typical of Brazil to reinforce the association of the brand with the carioca girl who loves to be close to nature. Thus, loose dresses and cotton gowns covered with embroidery and lace come to further strengthen the artisanal and natural image, as well as accessories that use wood, bone, rope and leather.

Regarding partnerships that FARM incorporated into its production over the years, there is the use of *Zé Carioca*, a Disney character, Havaianas are sold in the shop and on the site, and the international partnership established with sporting goods Adidas brand. Taking for example the case of Disney, it is interesting to note the exclusive use of the character *Zé Carioca*, a Brazilian parrot created by Disney in 1940 as a picture of Rio trickster, as an appeal childhood memory of consumers who had contact with the comic book character. This effort to occupy the daily life of his audience was already being contemplated by its line of furniture, stationery, decoration and sundries, called Quero. Along these lines, FARM print your prints on cushions, chairs, notebooks, mobile phone cases and even surfboards, skate and bike.

I emphasize, finally, sensory contact process that is through the brand's products. Attention should be paid to the fact that the materials described above can bring own peculiarities. The cotton fabrics such as rayon, and linen, have a more natural texture, which absorbs the touch and imparts a greater comfort than other synthetics. The same goes with leather and wood used. The colors of the prints also behave differently in each material, which stimulates the consumer point of view to make it recognize that certain style of stamping combined with a certain type of tissue, likely belonging to the FARM. Finally, you can also notice these olfactory stimuli in each piece of clothing sold by the brand. By applying this flavor in their products, even after leaving the store, or without even having gone there to shop, as in virtual consumer experience, the consumer is informed by the aroma that is applied to the piece, that the product really belongs to FARM.

Moving on to the analysis of supra-systems to one that involves the employees hired by the brand, it must meet the functions of communicating identity, popularize the brand image, build customer loyalty, promote increase in sales number to inform the customer of the ongoing actions, as well to sell the products. The constituents of these supra-systems systems are the production, communication and sale, the latter being engaged in consumer experience developed by the brand at the point of selling.

As specified in the representation of the communication ecosystem of the brand model, hiring its team prioritizes young people who fit the profile of consumption objectified by FARM, with fashion knowledge, design, architecture and self-respecting for comfort and a more natural style and alternative. Among the employees of the factory and communication, this approach creates a team that works with more motivation and pleasure to be producing something that really believe and identify. Regarding sales staff, the effect is similar: they have vendors that not only sell products but also use them inside and outside the workplace. This reveals that the sales team feel a desire to consume the items sold by brand similar to its consumers.

Another aspect to be noted in the saleswomen is an informal appearance, where the hair is always loose and natural, without the intervention of flat iron, brush or curling iron. The makeup is also little or no. Clothing and used as uniform shoes are the same as the collection is in progress, however, are not standardized and each seller chooses you prefer to use. Thus, it has been enhanced once again, the image of the girl who values the comfort and believes in its natural beauty, which ultimately creates an empathy between the consumer and the vendor during the time of consumption experience.

Finally, we have the sales supra-systems, which is composed of the E-farm systems, intended for online sales, and the Physical Stores, which takes the consumer experience and the primary contact with the scent used by the brand. Through these supra-systems caters to the functions to disclose the identity of the FARM, popularize their image with the public, customer loyalty, promote increase in sales and provide a space for the marketing of their products.

Regarding the E-farm system, this includes not only the subsystem's online store also subsystems a-Farm (History), adoro! (Blog), fala-Farm (a platform to send questions, suggestions, etc.), Radio and Fábula (Children's Line). It is noteworthy that the website design follows the same line of appeal to nature and handmade, so that we see the use of earth and warm tones such as beige and burnt brown, and embroidery and applied flowers pictures in the background.

Among the subsystems, I present adoro!, a blog maintained by the brand, which posts news of all kinds from programming tips for the weekend to interviews with Brazilian artists. In it there are also disclosed the actions promoted, launches and promotions planned for the coming days, also serving as registration platform all that the brand has done over the years. In this space, it is interesting to note how they are brought to the universe of the brand outside interests to the dynamics of consumption. Art, sport and music are placed with the intention to entertain, inform and add value to the brand image in its audience.

Regarding the system of physical store, this will be reviewed following further, so will reserve this space to introduce the objectives that the brand hopes to achieve through the consumption experience that has developed to the point of sale environment.

The environment of the physical store of a brand basic and primary objective is to offer the consumer a place to which he can go whenever you want to buy a particular product, a particular brand. Thus, the more a brand stores have, the more customers she will meet. However, currently, the success of a brand and the increase in sales also depends on the power of seduction that the space intended for consumption exerts on a given target audience. With this, the physical store should provide the consumer is a memorable consumer experience where it offers over the perception of these individuals is an environment to communicate and seduce to the lifestyle that the brand fold.

This system, as could be observed in other supra-systems also seek to promote an emotional and sensory appeal to the consumer. Textures, colors, patterns, sounds and unique aroma invite the body that there comes to get going the way and allow the brand to occupy a space in your memory. Thus, it is understood that more than a space intended for consumption, the environment of physical stores FARM brand provides well-being and pleasure to those who attend, either through the decoration, lighting, music or service, and the role of each of these subsystems selling point inside the consumer experience offered, which we will analyze below with the assistance of a semiotic methodology.

4.2. Target system analysis: physical store environment and modeling signs of the brand

From this moment on, we will start the target system semiotic analysis of this research: the environment of physical Store FARM brand. We will focus on the following point for the description of the main signs that operate in this environment modeling process, which aims to portray the brand identity and the lifestyle sold by it.

As is described in the model representation of the store environment (Picture 5), systematic observation was observed that the consumer becomes stimulated by four of his five senses: smell, hearing, touch and sight. This takes place initially through the aroma that is applied to both the clothes and the environment as a whole.

Regarding the visual stimulus, this is what is done by the greater amount of signs, beginning with the facade, where the visual identity and the adhesive with a standard that refers to a braided straw is-applied, and the organization of products on display. When entering the store, we have clothes, racks, mannequins, tables, benches and even an artificial tree.

Moving on to the signs for the auditory stimulus, which first caught the attention of the observer was standard playlist. However, from the second visit, it was noted that other sounds were also part of that environment, such as the speech of the sellers, the spontaneous conversations that leave both the consumers, as their own sales team and sounds from the drive the hangers on the metal structures of the racks.

Following to the stimulus exerted on the touch, as was observed by the researcher, this is mainly mediated by the textures of different fabrics used in the manufacture of clothing. Then it is noticed the textures of other natural materials, gifts in bags, shoes, accessories, hangers and shopping bag that is delivered to the consumer at the exit of the store.

Turning to complex functions that the environment includes through these stimuli, there is the mission of communicating the brand identity, given that this is the process that will be explored below, through the description of the meanings that these signs carry, which enable physical space that acts as a significant and surrounding environment.

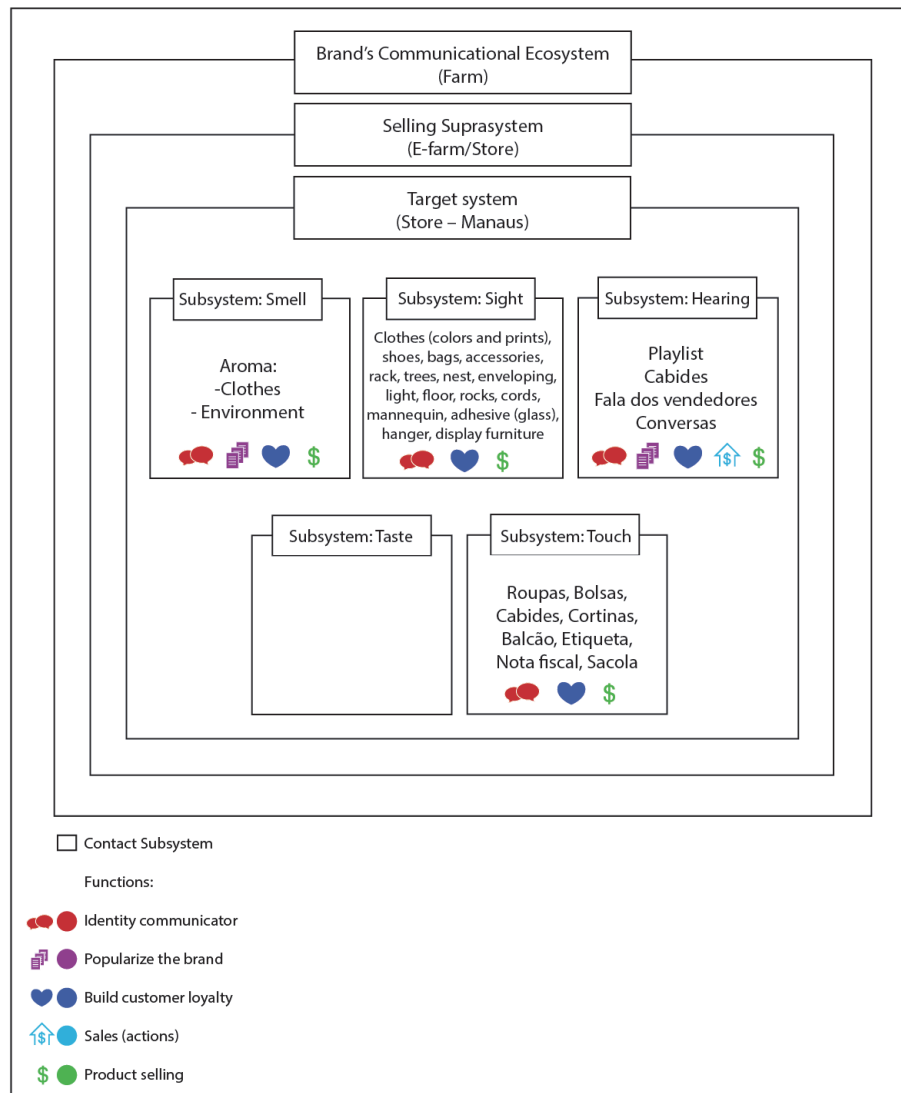


Fig. 3 Data representation model collected by systematic observation of FARM brand's store physical environment. Source: From the author's own production.

Moreover, now that the signs are already known are installed in the store environment, from this moment we will continue with the description of how this group of signs operates in the modeling of a significant environment, which is modeled by the identity and style life the FARM brand aims to communicate.

As discussed earlier, the FARM seeks to convey to the consumer, through the purchase experience, the summer feeling, beach, daylight, contact with nature and rest. Many other concepts could be related to carioca lifestyle that the brand sells, however, he followed up with them to make it possible to maintain certain objectivity. In Picture 6 we have a selection of some photographic records of signs that act on the consumers during consumer experience and will be analyzed below.

We will start the semiotic analysis of the photo 1 of the shop environment (Picture 6) of the front of the store, which highlight the adhesive applied on the glass, a sign that is twisted the straw chairs, which can also be observed at the background on photo 4. This braided, which initially was made with straw and therefore also carries the character of use of a natural material, in the 90s has become quite popular to be

applied also on plastic materials, so it was common to find them both in homes and in work environments. Thus, it notes that this is configured as a sign that turns to the concept of "contact with nature" and also stirs the memory of the consumer to recover the memories of childhood carries.

Moving on to the signs recorded in photo 2 of Picture 6, in it we see the presence of two floor finishes, the laminated wood and concrete gravel, as well as a pair of shoes and a purse. Regarding the concrete gravel, it is understood that this sign search mean the concepts of "beach" and "contact with nature" and, by association, also end up meaning the concepts of "summer" and "rest". It is important to pay attention to the fact that this relationship with nature only established because, when presenting in association with wood floors, concrete gravel out of industrial conceptual field to act creating the sand idea of the beach, stone waterfall and mountain views, garden and nature.

Following the analysis, on photos 3 of 6 is possible to verify the presence of several signs, among which highlight the adhesive applied on the wall of the mezzanine, with a green print sheets, the product displays furniture that resembles a tent fair and lighting design.

Starting with the adhesive, it is noted that this sign seeks to communicate the concept of "contact with nature", so that it reinforces the idea that nature is present in that environment. This idea is reinforced by the lighting project, which aims mainly to represent the concept of "daylight", but also reinforces the "contact with nature". Through photo 3 (Picture 6), you can see that the light sources attached to the iron structure lying on the shop ceiling were organized in different directions, with the intention of creating a more natural lighting and to imitate the spontaneity that the sunlight passes through the leaves of a tree, as you can see the reflection of the focus on the floor.

Regarding the furniture that seeks to mean the fair booth, we note that the intention in this case is to create an association between the store environment to the environment of the fairs where it is customary to find small entrepreneurs, differentiated products and small-scale of production. Redeems Thus, the shopping experience that occurred when the FARM was still a display of these fairs, through the idea that the exclusivity of yesteryear still exists. we should also pay attention to the fact that this type of furniture reinforces the concept of "rest" with a view to visiting these fairs is usually done on weekends and is seen as a time of leisure.

In photo number 4 of Picture 6, having already addressed the lighting project and the proposal of the adhesive applied on the glass, my description will focus on the action of the tree as a sign. This, which acts in the meaning of the concept of "contact with nature", as well as the adhesive described above, brings the feeling that nature is present in that environment, even by artificial means. Interestingly, the tree used is of no extraordinary realism, however, by allying with the other environmental signs, this sign is not enough to cause any estrangement by artificiality. This is mainly because the interest and judgment of the consumer not be returned to him but to the products displayed.

Reaching the mannequins description, registered in photo number 5 of Picture 6, it is interesting to note that, unlike light beige on mannequins we see in many stores, FARM's ones appear in a darker beige, as if sunburned, so as a girl who goes to the beach. Thus, it is understood that this sign has the function of communicating the concepts of "beach" and "summer" in the store environment through this different coloring, but also reinforces the connection of the brand with the Rio de Janeiro and with image one has of Rio's ever going to the beach and that is always with tanned body.

In photo number 6 (Picture 6), highlight the space record for parts that appears between the sequence of exposed clothing on the racks. In this case, highlight the shades applied to furniture. Always beiges and browns, furniture create a neutral space, which allows the color of the prints and the small details of each piece stand out. It is an opposition work and support: to bring elements with neutral colors and rustic

materials, which is in the center of the consumer's attention is clothing, its color and the delicacy of applied details. Moreover, the characteristics of the materials used, such as concrete chippings, wood, rope and the green of tree and adhesives, reinforce concepts mark search bring themselves and not are applied to all the parts which produces and sells.

Finally, we bring in photos 7 and 8 (Picture 6) some records of the dressing room. This presents simple and functional, with white walls, large mirror, front light and hooks to hang clothes. The connection to the store environment and the brand is established only by the curtain fabric and the wooden cube, which serves to support the clothes or as a seat. The white and empty space act as a background that highlights the part of the qualities of the body of the consumer who tries it on.



Fig. 4: Data representation model collected through photographic record of FARM brand's store physical environment. Source: From the author's own production.

Regarding the action of sound and olfactory signs observed during the visits, note that you cannot make photographic record of both, therefore I can only describe what I observed and recorded through notes in a field diary.

Starting with the sound signs, as it was mentioned earlier, the playlist varies according to the collection. Between visits, it was displayed the collection focused on the new years' festivities and holidays, with many white pieces and fluoride, from the more formal and elegant for the night, to shorts, body stockings and casual tops, representing summer and the beach. Thus, what could be heard was Brazilian music, artists like Caetano, Gilberto Gil and Alceu Valença. Although there were other less-known songs in the sequence of songs, it was noticed a clear link with the Brazilian northeast and the beach view and holiday.

Regarding other audible signs, from the second visit it was observed that these stimuli, such as speech of the attendants, the conversations among the other consumers who were in the store and the sound of

hangers passing the racks, these have proved more spontaneous and less programmed than the playlist. These signs, it is interesting to note that although these sounds are the result of an interaction with the other signs, and are not as controlled by the process of systematization and standardization of consumer experience developed by the brand, they are extremely important for the process identification as a time of purchase.

Finally, to complete this analysis of the physical store of the studied brand environment, we will describe the action of the aroma as a sign. Starting with the question of visual and sonority of the scent: they do not exist. This is a sign that only acts on the sense of smell, and cannot be seen or heard. However, the main advantage of application of this sign is that it extrapolates the spatiality of the store, acting on the perception of the consumer still outside the store. Serving as a store near the flag, the aroma also has the task of seducing the consumer. Upon awakening the memories of other pleasant moments of consumption where the scent was involved, there is a mobilization of the purchase desire.

Just as the physical store environment must communicate the concepts of "beach", "summer", "daylight", "contact with nature" and "rest" and the brand seeks to portray the lifestyle of Rio's girl, the aromatic bouquet developed to synthesize these conceptual fields, to show up the other cohesive contact supra-systems. At this point, it is emphasized that the knowledge of notes, chords and aromatic bases limits the description of this smell by the researcher. However, general considerations can also be woven, particularly as regards the overall impression that the aroma passes and concepts that the brand seeks to add to your image.

In striking projection and woody notes, the scent developed to communicate the identity objectified by FARM remembers the smell of natural elements and earth, like weeds, wood and cotton, also resembling the smell of jeans. Thus, the aroma of FARM communicates ownership ratio and retraction of the aesthetic present in nature that it provides, particularly through its textile production.

It is important to pay attention to the fact that the aroma developed for the brand is unique and therefore has no prior association with another object. Although try to recognize the essences that make up its aromatic bouquet, this process is much more difficult. It's not like the smell of chocolate, lavender or talc, it is simply FARM's scent. It is understood, therefore, that the other signs present in the store environment also act in the role to strengthen this association.

5. Recognition of FARM's aroma and the emotions aroused in the consumer experience

Considering what was describe, it can be concluded that the research presented involves issues of difficult treatment and evidence, to involve an investigation into the aroused feelings and emotions a sign that accesses a sense of the human sensory system still little explored in relation to stimulation aimed to promote sales and customer loyalty. However, in this sense, the adoption of a semiotic methodology probed to be able to direct the search not for the quantitative effort and common evidence of classical science, but for a presentation of the phenomenon from the researcher's point of view, the result of their own semiotic experience with the brand of choice for study.

Regarding the adoption of the ecosystem approach of communication, defended and used by researchers of the Graduate Program in Communication Sciences - PPGCCOM, from Federal University of Amazonas - UFAM, this proves to be interesting for this research also by proposing to add knowledge several areas for greater completeness in understanding the object of study, which will allow the researcher to grasp concepts and techniques of the different areas. Another point is its connection with the theory of complexity, which aims to examine the relations between the different organizational systems.

It is also believed that the use of semiotics of culture as a basis for the analysis of these relations, made it possible to understand the complex hierarchy that is established in the system of a brand, where systems larger model the order of smaller systems to a communicational goal common is reached. At this point, the sign of concepts, semiosis, culture systems and modeling will serve as a guide to the understanding of the elements to be studied, and the results from the design of action in the management of intangibles that motivated the development of this research.

Finally, there is the need to proceed with an interview with the group of consumers that is achieved by the brand in Manaus, so that the recognition of the aroused feelings and emotions in the consumer as a result of semiosis of the sign-brand and sign-flavor can be better understood from the survey descriptions about the expected and unexpected facts that face a modeled reality which is the selling environment designed for the FARM brand.

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