Collaboration and exchange between “Craftsman” and “Designer”: Symbiosis towards Product Innovation.

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Abstract: In this article, we argue that articulated craft knowledge may have significant potential for technological innovation when combined with design knowledge in situations where craftsmen and designers collaborate in industry. Having as the subject matter of this research, we elicited three features of craft that can possibly contribute to NPD. These are “risk taking”, “holistic approach in practice” and “prototyping” transferred as knowledge production, knowledge application and knowledge diffusion to the innovation process. Through this topic, we search for NPD cases that craftsmen and designers collaborate in industry. In conclusion, the cases in this article ending with a product that finds a place in the market correspond with “knowledge application” stage of the innovation process. Although knowledge application and knowledge diffusion stages resulted in a product, knowledge production stage is also significant in terms of the potential use of knowledge in the future obtained from collaborative work of craftsmanship.

Keywords: Craft, New Product Development, Innovation, Industrial Design, Craft Knowledge

Introduction

This paper aims to define features of crafts which helps to create a possible innovation environment through the collaboration and exchange between “craftsman” and “designer” and the level of this contribution corresponds to in the innovation literature.

Crafts have been explored from different perspectives such as aesthetic expression, creativity, skill, quality, technology, sociology and several more with the help of social and cultural theories (McCullough, 1997; Sennett, 2008; Risatti, 2007; Adamson, 2007; Niedderer & Townsend, 2014). These perspectives enable the craftsmanship to take place in many interdisciplinary studies and at the same time increases the academic interest in crafts studies.

In the studies of 20th and 21st centuries, crafts have been generally related to “making” an artefact where craftsman is also responsible for problem solving, creating and other judgements taken through the process (Niedderer, 2009). Since design is based on these practices, it is possible to come across many cases in which new products are reached through collaborations in the fields of design and crafts.

In the examples given in this study, there are three major ways in which the crafts contribution to innovation...
is realized: the knowledge of the craftsman was transferred, the craftsman-designer led a process together, or craftsman becomes the person who provides the inspiration for the innovation through crafts knowledge. This knowledge that craftsman use is called tacit knowledge which is learned throughout the experience (Ray, 2009) and which is “transferred through action” (Polanyi 1967; Schön 1983). Due to this knowledge is transferred through action, collaborative work is influential in terms of transferring this knowledge to a new product (Yair and others, 2001, KPMG, 2016). As a matter of fact, it may not always be easy to trace such a collaborative work and bring into view because of tacit knowledge itself.

In the new product development process, the contribution of the industrial design to the product development is more visible than crafts area. This is caused by both education and the connection of product designer with the mass production and industry. For this reason, examining the design and craftsmanship processes has been used as a method for reaching out to an output that can help us classify and analyze the artisan’s contribution to innovation. To be able to do this, the processes of design and craftsmanship are compared, by taking advantage of design which is more connected to mass production than craftsmanship.

The craftsmanship process ends with a finished object which is called an artefact. However, the designer does not create a finished object every time. Mostly design process ends with sketches, prototypes and concepts. According to Sennett (2008), this is the main difference between craftsman and designer. The other differences between craft and design processes can be seen in the table that summarized from Risatti (2007).

Table 1: Craft and Design Differences (Risatti, 2007)

|                  | Craftsman                      | Designer                                    |
|------------------|--------------------------------|---------------------------------------------|
| **Product**      | Singular, handmade, unique object | Identical Objects, mass production          |
| **Material**     | Engages with material in the process of giving it form | Understands the properties of materials and material-production method relation |
| **Process**      | Dialogical/ dialectical process (This process includes both idea-concepts and form-concepts in the hand through making activity.) | Conceptualization of form is separated between designing stage and making stage. |
| **Prototype**    | Prototype is the artefact       | “Prototype” may be made to test design and production possibilities |
Based on this table, the designer carries out the process up to the final stage of the product together with other employees in mass production. However, the craftsman is dominating the process who decides the result of a unique product by a holistic approach. This holistic approach also includes undertaking a responsibility for creativity on its own (Yair and others, 2001). In the studies of Pye (1995), he explains this “responsibility for creativity” with the concept of risk taking and states that “the quality of the result is continually at risk during the process of making” carried out by the artisan. Furthermore, while the designer may prefer to create a prototype for better understanding of the product in three dimensions, the prototype for the craftsman is the product itself at the same time. This supports holistic approach in practice of craftsmanship and creates an environment for collaborative work for innovation (Valentine, 2013).

With this comparison, it became more visible to reach the specifications of craftsmanship which helps us to understand how the contribution of crafts to the new product development can be possible. Having as the subject matter of this research, by the help of Table 1: “Craft and Design Differences” (Risatti, 2007) we elicited three features of craft that can be possibly contributed to product innovation in NPD. These are “risk taking” through material and production process innovation, “holistic approach in practice” and “prototyping”.

The obtained cases in this study also have a contribution in defining these properties. In July 2016, KPMG published a report called “Innovation through craft: Opportunities for growth” with commissioning partners The Crafts Council (UK), University of Brighton and KTN (the Knowledge Transfer Network). The case studies in this report are mainly based on cross-sector collaboration between craftsman and partner firms. Some of the examples included in this report have also been examined in this article. According to this report, “craft skills and knowledge have a strong economic impact and significant potential to drive further growth and innovation in other sectors” (KPMG, 2016).

In the second section, three features of craft that can be possibly contributed to product innovation in NPD are mentioned in more detail through cases.

1. Features of Craft contributing to Product Innovation

1.1 Risk Taking

As mentioned before in his studies about the process of craft, Pye (1995) says “the quality of the result is continually at risk during the process of making.” What is the meaning of this risk of quality? It can be clarified with Pye’s (1995) definition of craftsmanship, which would be “craftsmanship is workmanship using any kind of technique or apparatus, in which the quality of the result is not predetermined, but depends on the judgment, dexterity and care which the maker exercises as he works”. As it may have been seen from this definition, craftsmanship is based on an individual creative effort and working which cares about the process of making and creating the ultimate artefact by the judgments. To better understand how this risk taking and creativity affects the innovation process through collaboration of craftsman, it would be useful to see how this risk taking is handled on the collaborative cases. The given cases illustrate this risk taking and creativity process with innovation where crafts knowledge provides inputs on materials or production methods.

For instance, a new synthetic meniscus tissue is developed by Sarat Babu, the founder of Betatype, for using in the repair of a torn or damaged meniscus in the medical sector in collaboration with Imperial College London (KPMG,2016). Sarat Babu is a designer and engineer who uses microkinetics by creating microscopic forms which transform itself to another structure easily by a physical activity
Sarat took advantage of materials with searching hand-making techniques (KPMG, 2016). In this case, a knowledge of a hand making technique is used in a cross-sector in order to reach creativity and innovation (KPMG, 2016).

Second case study that is the subject of this feature, in 2010, Nokia’s color, materials and design team (CMD) in London organized craft-collaboration to make a research on materials and forms for the phones of future (Wagner, 2010). CMD team worked with jewelry designer Jo Hayes Ward, glass artist Heather Gillespie and silversmith Esther Lord (Wagner, 2010). Esther Lord created many card and metal prototypes for the Nokia company to search different surface finishing for the new phones. As a second stage, her techniques of making these prototypes are transferred to Nokia’s CAD modelling tools (Wagner, 2010). Through this transfer, Nokia gained a knowledge about the interaction of the CAD tools with the material and the limits of the forms arising from the manufacturing method (Wagner, 2010). Nokia company reaches this new knowledge about material, form and production methods for the innovation through the artisans’ risk taking and creativity features.

At the case of 5 MY Chair from the company Coalesse, design department of Coalesse works with craftsmen who have an expertise on carbon fiber and design the LessThanfive chair as a result of this collaboration (Hamilton, 2016). This chair weighs 2268 grams and it can hold 136 kg grams (Hamilton, 2016). That is because of carbon fiber material (Hamilton, 2016).

Design Director of Coalesse, John Hamilton, says “The new manufacturing process builds in plenty of handwork. It is hand built and hand finished. It looks like it just popped out of a mold, but it is hand crafted in almost every dimension starting with the digital design and ending up with the final product” (Hamilton, 2016). Hamilton believes that modern crafts serve a knowledge and process that combines materials and methods together in order to create a combination of mass production elements and handwork (Hamilton, 2016).

These three cases, with the help of hand making and experiments through material, include an experiential process that may fail at the end (Sennett, 2007). These crafting efforts with the probability of failure involve a risk taking for the final artefact. In these cases, performing an experimental process or utilizing the knowledge generated by the craftsman, provides the possibility of reaching new products and innovation (Schwalbe, 2010).

1.2 Holistic Approach in Practice

As mentioned before the knowledge that craftsman use is “the capacity to know something that has been learned in the course of experience” Ray (2009) which is called tacit knowledge (Polanyi 1967; Schön 1983). According to Høgseth (2012) this capacity to know something includes two terms: “knowing what” and “knowing how”. “Knowing what” is related to the craftsman’s technical skill and physical acting through making. “Knowing how” contains knowledge and experience related to material selection, using of tools, creating a form and choosing the proper making method.

All this knowing and making decisions causes a holistic approach for craftsman and in the case of using this holistic approach to develop a new product, the knowledge of craftsmanship has sometimes been transferred to a product with a technological innovation and sometimes with aesthetic purposes.

At the case of the “Home Bakery”, product developers of Osaka-based Matsushita Electric Company (Panasonic) were working on a new home bread-making machine. (Nonaka and Takeuchi, 1995).

However, they were having a problem with the machine on kneading dough correctly (Nonaka and
Takeuchi, 1995). The surface of the bread was overcooked before the inside of the bread cooked (Nonaka and Takeuchi, 1995). Software developer Ikuko Tanaka observed a baker in order to understand the kneading technique for a couple of months. One year later, Tanaka found a solution to the kneading dough problem and added more special ribs inside the machine. These ribs allow the machine to transfer baker's stretching technique to the machine (Nonaka and Takeuchi, 1995). Finally, a craftsman assisted an engineer and baker's holistic approach in practice related to the kneading and stretching informed formal knowledge and find a place in machine through an engineer (Nonaka and Takeuchi, 1995).

In another case, traditional cheese making process which involves holistic craft knowledge is used as a part of imperfect design Project in Netherlands by Studio Makkink & Bey. (“Cheese Maker”, 2014). The traditional cheese maker is a combining of different handmade parts, every part has its function, which you can make homemade cheese in (“Cheese Maker”, 2014). Studio Makkink & Bey believes that in the next years, designers will transmit this knowledge through new products and they made this research to understand the craftsman better through the parts of the traditional cheese making method (“Cheese Maker”, 2014).

Another collaboration case from the report of KPMG (2016) is a weaver and textile artist Ptolemy Mann’s collaboration with Johnson Tiles. Ptolemy Mann is a textile artist and designer who has an expertise on color and pattern which comes from her colored hand-woven designs and studies (KPMG, 2016). She worked in a collaboration with Johson Tiles, an UK tile company, to create a ceramic surface for the walls of Bathrooms at the Contemporary Applied Arts (CAA) Gallery in London through her color and pattern understanding in the case of holistic approach in practice (KPMG, 2016).

As seen in the cases of “Home Bakery”, cheese maker and Ptolemy Mann’s collaboration by her understanding of color and pattern with Johnson Tiles, knowledge of craftsmanship has been transferred to a product or a product idea. In the case of using this holistic approach to develop a new product, the knowledge of craftsmanship has sometimes been transferred to a product with a technological innovation and sometimes with aesthetic purposes. These two ways of collaboration contain a significant input for the development of new products.

1.3 Prototyping

Prototyping is another feature that creates an appropriate climate for NPD through the collaboration of craftsman and designer. In the design process designers create prototypes for testing new materials, methods and technology to bring ideas to life before these ideas are manufactured. According to Valentine (2013) designers approach to prototype as a tool for solving the problem and expressing their projects. Prototypes can be used for finding new ideas, creating a form or structure and communicating through this structure (Valentine, 2013). Especially while participants from different disciplines working together through a three-dimensional model, this prototype strengths the communication between participants. This can make it easier to share ideas and make them more understandable. As pointed out the differences between the craftsman and the designer, the artefact is the prototype itself created by the craftsman (Risatti, 2007). Niedderer (2009) examined the possible relationship between the production of these artefacts and the production of tacit knowledge in research. She described the forms of knowledge generation through the production of artefacts. This study informs us about the relation of the tacit knowledge of the craftsman with the prototype making process. Niedderer (2009) classified usage of artefact production as follows:

- “Artefact production to test or improve the use of a specific method or technology
Artefact production to test the use of new material and its opportunities
Artefacts may be produced as a part of creative exploration to develop a new understanding of an object or concept, etc;
Artefact production as a means to analyze and understand complex concepts

As mentioned in this classification the aims for artefact production supports the scope of innovation that Schumpeter (2010) listed as “new products, processes, raw materials, management methods and markets”. Making an artefact allows us to perform tests on these issues to generate new knowledge and it creates a climate for NPD.

At the case of Glass artist Matt Durran, the surgical research department of the Royal Free Hospital works in a collaboration with Glass artist Matt Durran for the molding of noses created from glass material (“The Appliance of Science”, 2011). At this research, polymer is the material to create a structure in order to connect with cartilage cells (“The Appliance of Science”, 2011). At the same time, polymer has the ability to get a reaction with several materials. This property of the polymer causes a difficulty to use in a mold. According to the Ph.D. researcher Lola Oseni who works in a collaboration with Matt Durran, glass is the right material with using polymer for molding in this project (“The Appliance of Science”, 2011). Matt Durran makes the glass molds of noses and these molds are filled with the polymer and used to form a nose with a help of bio-reactor (“The Appliance of Science”, 2011). In this case, glass artist is a key factor with its material expertness and creates the prototype of a surgical research.

In the case of “LessThanFive chair”, can be seen also under the “risk taking” topic, design department of Coalesse created this chair with a collaborative work of craftsmen. During the prototyping stage and the production stage craftsmen worked with designers and transferred their knowledge about carbon fiber to the project (Hamilton, 2016).

2. Discussion and Further Research

Today, competitive advantages of firms mainly refer to continuous innovation and new product development. Schumpeter (2010) listed the scope of innovation as “new products, processes, raw materials, management methods and markets”. This article is more particularly concerned with new products, new processes and new materials from these forms. The common point of the cases presented in this paper is providing a contribution to innovation, however, these contributions occur at different levels. To understand the contribution levels of these cases on a more meaningful basis, innovation literature and information transfer processes should be examined especially in the literature of innovation. By defining these levels within the innovation literature, it is thought that the contribution of the craftsman will become more understandable.

Almost all of the examples given in this study seem to be consulted with the knowledge of a craftsman outside the firm. Knowledge transfer from the external environment of the firm is a source as well as research for innovation and technology transfer to develop new products or new processes (Grabara, Pachura, Modrak & Bunaciu, 2011). Roper, Du & Love (2008) reviewed the steps in the innovation process of this knowledge transfer and defined these steps as the acquisition of knowledge, the return of this knowledge to the product, and the subsequent widespread use of the knowledge.
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Similar to these three activities, a transformative cycle is created with the help of Schumpeter’s economic theories (OECD 2005: 29). This cycle can be seen as “knowledge and innovation” cycle which provides an information about transferred knowledge and the contribution level of this knowledge in the innovation cycle. This cycle involves three stages. These are: “(1) knowledge production—creating and producing new knowledge and ideas; (2) knowledge application – applying new knowledge to practical situations in commercial and social terms; and (3) knowledge diffusion and absorption – adoption of this applied knowledge its adaptation in use” (Cutler & Company 2008: 17).

As mentioned the framework of innovation above, knowledge production stage in innovation process needs creativity and problem-solving factors. One of the most important elements in the development of new products is to find a solution to a problem or to try to make life easier with a creative way. In order to reach this knowledge, the craft and design as areas of creative sectors have a high potential for innovation and new products (Öberg and others, 2014). In addition to this, recent studies on craft collaboration and innovation are promising in Japan and UK (Yamashita & Nakamori, 2009; Woolley, 2011).

In table 3, case studies of this article are presented under the title of three features of contributions: “risk taking”, “holistic approach in practice” and “prototyping”.

Figure 9. The Framework of innovation (Cutler and Company 2008: 17)
Table 3: Craftsmen and designers collaboration work and its features for the innovation process.

| Company, Designer or Craftsman | Product | Method | Features for Contribution | Innovation Process |
|--------------------------------|---------|--------|---------------------------|--------------------|
| Matsushita Electric (Panasonic, Japan) | “Home Bakery” Bread making machine | A master baker’s tacit knowledge was made explicit | Risk Taking (through manufacturing process) | Knowledge Application |
| | | | Holistic Approach in Practice | Knowledge Diffusion |
| Nokia (Finland) | Hi-tech phones for future production. | Craft-collaboration that experiments with materials, processes and form to inform the design of hi-tech phones for future production. | Risk Taking (through material innovation) | Knowledge Production |
| | | | Prototyping | |
| Studio Makkink&Bey (Netherlands) | “Say Cheese” Cheese Maker | Traditional cheese making process as holistic craft knowledge transferred specialized knowledge of a cheese maker to make homemade cheese | Holistic Approach in Practice (Through tacit knowledge transfer) | Knowledge Production |
| Matt Durran (Craftsman, UK) | “Face Saving” | The collaboration of a glass artist and the surgical research department of Royal Free Hospital for nose prototypes. | Prototyping | Knowledge Production |
| | | | | Knowledge Application |
| Michael Young (Designer) Coalesse (Furniture Company) | 5MY Chair | Light Material and Prototyping | Risk Taking (through material innovation and manufacturing process) | Knowledge Production |
| | | | | Knowledge Application |
| Betatype (Company) Sarat Babu | Synthetic meniscus tissue | Collaborative work to developed synthetic meniscus tissue for use in the repair of damaged meniscus. | Risk Taking (Through material innovation) | Knowledge Application |
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Johnson Tiles (Company)
Ptolemy Mann (A weaver and textile artist) ‘Prismatic’ range tiles

| By Mann’s understanding of color and pattern, developed through weaving, could translate into product design. |
| Holistic Approach in Practice |
| Knowledge Production |
| Knowledge Application |

In conclusion, with these cases, craftsmen contribute to NPD with the “risk taking”, “holistic approach in practice” and “prototyping” features. At the last column of this table, we state a matching between the process of innovation and the craftsmen contribution level through knowledge transfer by the help of the framework of innovation of Cutler and Company (2008). Crafts knowledge which is created or transferred through these cases corresponds to different stages in the innovation process.

In some cases, the contribution of craftsman and designer stands only at the “knowledge production” level. For instance, the collaboration of Nokia with the craftsmen gained Nokia to discover surfaces with different materials to understand the interaction between CAD tools and limits of the forms. This kind of collaboration caused Nokia to think of the possibilities of materials, forms and possibilities for design.

Most of the cases in this article ending with a product that finds a place in the market correspond with “knowledge application” stage of innovation process or in some of the cases; collaborative work completes the whole framework and corresponds with the “knowledge diffusion” stage. Both ways are significant for the application of knowledge that comes through the collaboration of designer and craftsman. Although knowledge application and knowledge diffusion stages resulted in a product, knowledge production stage is also significant in terms of the potential use of this knowledge in the future by the firms to reach innovation.

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