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STRATEGIC DESIGN AS A DRIVER FOR NEW THINKING AND PRACTICE IN CORE BUSINESS FUNCTIONS

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Abstract. This paper discusses how design can be used strategically to push the boundaries and come up with new thinking and practice in four core business functions, namely branding, strategic management, organizational policy and innovation development. The paper reviews literatures in relevant fields and examines four case studies. In all cases, the problematic situations will be explained, followed by the design research processes and the proposed solutions. Based on the analysis of all cases, the way in which design could be used to overcome existing boundaries and introduce new ideas can be categorized into three aspects. Firstly, design thinking provides a useful approach for examining problematic situations in a holistic way. Secondly, creative thinking, which is an integral part of design, helps solve problems and create solutions to current practices. Finally, the human-centered nature of design ensures that outcomes match different stakeholders' requirements, which could help speed up the acceptance process.

1. Introduction

To celebrate the first edition of the New Design Ideas journal, this paper aims to explore how design could be used strategically to push the boundaries and come up with new thinking and practice in four core business functions, namely branding, strategic management, organizational policy and innovation development. The paper will begin by discussing how design has currently been used to generate positive contributions to these four core functions. Next, it will explore how common practices within these four core areas could be challenged and advanced further. A number of case studies will be presented to illustrate key points that's strategic use of design could lead to the new thinking and practice in branding, strategic management, organizational policy and innovation development.

Design has long been recognized as a powerful strategic tool that could make positive contributions to organizations (Kotler and Rath, 1984). According to the Design Council, UK (2012) *"for every £1 businesses invest in design, they can expect over £20 increased revenues, over £4 increase in net operating profit and over £5 in increased exports."* A similar survey was conducted by the Danish Design Centre (2003). They found that Danish companies which used design generated greater revenue, had higher exports as percentage of sales and developed more employment opportunities. Holland and Lam (2014) noted that design could make significant contributions to an organization at all levels. At the operational level, design could be used to enhance product/service quality, reduce manufacturing costs and increase

customer satisfaction. At the business/tactical level, design could be used to differentiate products/services, strengthen brand positions and open up new markets. At the strategic level, design could be used to identity new opportunities for innovation, create aspirational visions, develop distinctive brands and value propositions, as well as nurture creative environments within the organization. In fact, all key business activities were inseparably linked to design. For example, Borja de Mozota (2003) identified a number of business objectives which instigated demand for design contributions (see Table 1).

Table 1. The Business Triggers of Design

Business Objectives	Design Demand
To start a company	Logo
To be a design leader	Global design
To launch a new product or a store	Concept development and NPD
To launch a brand	Name development and graphic design
To increase market share	Web and package design
To regain market share	Redesign
To diversify into a new market	Product design or brand extension
To improve R&D policy	Concept development

Source: Borja de Mozota2003

It was observed that while many organizations simply use design as a *'tool'* or a *'process'* to generate outcomes (e.g. a new brand identity, a new product/service and a new marketing campaign), innovative organizations, e.g. IDEO, Google and Unilever, constantly use design to advance their ways of thinking and improve their practices. Moreover, they frequently incorporate emerging practices, e.g. crowd sourcing, into their practices – see Open IDEO (https://openideo.com/) and The Unilever Foundry (https://foundry.unilever.com/) for examples.

Shani and Docherty (2003) pointed out that organizations should adopt a continuous learning approach in order to sustain and grow in the increasingly complex and uncertain market environment. The continuous learning approach could help the organization remain adaptive and responsive to emerging business conditions. The authors argue that *"design"* can be used as a tool to restructure a company to become a learning organization. This is because design thinking excels at contextualizing the issues, identifying real problems/opportunities, providing creative and practical solutions and implementing outcomes.

It can be seen that design has already been used strategically to support various functions within an organization and address many businesses objectives. The recognition of strategic value of design provides good opportunities for design disciplines to make contributions to the areas that they have not previously worked with. However, in order to increase their impact, the way in which design disciplines contribute to core business functions, namely branding, management, organizational policy and innovation development, could be constantly advanced and developed further. In the following section, the new thinking and practices generated through design will be properly discussed. This will form a basis for further exploration of how design could be used strategically to address contemporary issues in the wider context beyond the organizational level.

2.   Background Research

This section will explore interrelationships between design and the four core business functions, as well as investigate how the strategic use of design has driven changes in terms of thinking and practices in these four core areas.

2.1. Design as a Driver for Change in Branding

The role of design has expanded from delivering tangible aspects of a brand (e.g. logo and other visual communication materials) to covering all key aspects of brand – ranging from its core value right through to all its touchpoints. This expanded role of design probably reflects the change in customer expectations.

Norton (2003) observed that, in the 1980s, the demands from consumers emphasized on quality of products and services. Subsequently, companies focused their strategies on creating a strong brand image in order to build trust and differentiate themselves. Design was mainly used to inject *'personality'* into products and services. In 1990s, consumer demands moved towards experiences. As a result, the successful brand strategies in this era tended to concentrated on brand experience. The role of design was expanded to cover key touchpoints that contributed to overall brand experience, e.g. retail design. From 2000s onward, customers have been seeking *'meaningful'* brand experiences. Hence, brand strategies are now focusing on brand truth – authenticity, relevance and honesty have become main criteria for choosing and/or purchasing a brand.

This situation provides great opportunities for design to be applied more strategically and meaningfully to create authentic experiences for customers. Consequently, several branding models developed during 2000s display strong connections with design. For example, Gobé (2001) proposed the Emotional Branding model which includes *'sensorial experience'* as one of the key elements. Lindstrom (2005) developed the idea of sensorial experience further and recommended the Sensory Branding model, which encouraged brands to use design to build stronger connections with customers through all five senses. The idea of creating stronger connections was investigated by Roberts (2005), who proposed the Lovemark concept, which suggested that companies use design to go beyond brand loyalty and develop real love of their brands. It can be seen that design has now become essential part of the brands. Many branding theories and practices from 2010 onwards pushed the boundary even further. Several models argued that design should lead the whole branding process. For instance, the work from Roscam Abbing's (2010) suggested that human-centered design should be a key driver for branding strategy and innovation development. According to the author, both design thinking and the design process are fundamental to the development of brand core value and brand strategies.

The change in relationships between design and branding also reflects the change in education. While branding strategy as a subject area traditionally was taught in business schools, nowadays there are many interesting branding strategy programs developed and delivered by design schools –for example: MA Design and Branding Strategy, Brunel University London; MA Brands, Communication and Culture, Goldsmiths, University of London; MA Graphic Branding and Identity, London College of Communication; and MDes Luxury Brand Management Innovation, Ravensbourne University. In most courses, design thinking and the design process are placed at the heart of branding strategy. It can be seen that design has increasingly expanded its role

in branding and has recently been perceived as a key driver for changes in brand. The more holistic contributions from design have helped the brand stay relevant to the changing demands and deliver meaningful and authentic experiences to customers.

2.2. Design as a Driver for Change in Strategic Management

The idea of using design to come up with new thinking and new practices in strategic management is not new. Since the late 1990s, Lester, Piore and Malek (1998) observed that there were many good practices' general managers that could learn from design disciplines. According to their study, the management of organizations could be categorized into two approaches: analytical and interpretative. While the analytical approach (which reflects the *'traditional'* management perspective) seeks to fully understand the environment and analyze market conditions before planning and executing a course of action, the interpretative approach (which perceives management as an open-end process where end results are not rigidly predetermined), suggests that managers should constantly interpret the situation and adapt their strategies and course of action accordingly. Although the analytical approach, which focuses on addressing well-defined problems and business objectives, might still be relevant for relatively static markets, the interpretative approach is probably more suitable to the fast-changing markets. In order to keep up with the change, regular dialogues with key stakeholders (e.g. customers, suppliers, and partners) are required. In this way, managers can identify and respond to emerging issues promptly, positively, and effectively. The authors pointed out that the interpretative approach is similar to the way in which design disciplines think and work. Hence, there are a number of useful practices that managers can learn from design disciplines. The similar study carried out by Boland and Collopy (2004), which compared the management process with the design process, also identified a number of design practices that could be applied to help organizations adapt to changes more effectively.

Design disciplines are generally good at dealing with uncertainty, since they have been trained to be flexible and responsive to the change (e.g. emerging customer demands, new technologies, changes in regulations, and new products/services from competitors). Moreover, all design projects and activities require inputs from various disciplines. Thus, building good work relationships and maintaining regular dialogues with all key stakeholders are common practice. Cross (1982) described this way of thinking and practice as the *'designerly way of knowing'*. According to Cross, design disciplines are good at tackling ill-defined problems, since their mode of problem-solving is *'solution-focused'* and their mode of thinking is *'constructive'*. As a result, nowadays many leading business schools, which train the next generation of business managers, place design thinking and practices at the heart of their trainings. For example, Roger Martin, the Dean of Rotman School of Management, University of Toronto, (2004) stated that: *"Business people don't need to understand designers better: they need to be designers. They need to think and work like designers, have attitudes like designers, and learn to evaluate each other as designers do."* As a result, the Business Design studio is now an integral part of the Rotman School of Management. Another similar example is the d. school at Stanford University (https://dschool.stanford.edu/), which introduces design thinking to business managers. It can be seen that design thinking and the design process can help advance the thinking and practices in strategic management further.

2.3. Design as a Driver for Change in Organizational Policy

Since design has a great influence on business competitiveness and is increasingly seen as a key tool and a driver of innovation, making a critical contribution to enhancing economic growth, businesses now much more readily consider using design strategically to achieve their business goals through increasing competitiveness (Brown, 2009; Martin, 2009) and enhancing and prolonging innovations. Therefore now it has been a common knowledge that effective design thinking convergence in strategic business management needs corporate policy, which guides the infusion of design both in new product development (NPD) and in the management of the business itself through nurturing and promoting design thinking in a whole company, i.e. corporate design policy will encourage businesses to design-led innovation in their companies.

Design-led innovation is regarded as a key driver to thrive in the increasingly competitive and complex global market and aiming to influence the whole company through design thinking's prominent voice in the decision-making process, and in vision and strategy planning (Na and Choi, 2012). Therefore the importance of innovation and design as a company's *'function'* are well recognized by many companies but existing research indicates that the utilization of design is very limited to both the strategic and operational levels of businesses. Many businesses hope to make *'meaning-changing'* or *'world-leading'* innovation but it is not easy to nurture without a whole-company approach to design (Na and Choi, 2012). However, it is expected that the corporate design policy encourages the use of design as a strategic tool for business management, from corporate strategy formulation through to the operating levels, encouraging continuous innovation for the businesses.

Corporate design policy is micro-level development in individual companies whilst national design policy is macro-level development aimed at enhancing national competitiveness and economic growth that involves the government and the entire industry sector. Wheelen and Hunger (2002) claimed that a corporate policy as *"a broad guideline for decision making that links the formulation of strategy and its implementation"*, is therefore used by businesses to ensure that employees throughout the company make decisions and take actions to support the corporation's mission, objectives and strategies. A design policy at corporate level, as with business policy, is part of the standing plan along with regulations, procedures and processes linked to single-use planning, such as programs and budget (Na and Choi, 2012).

Some international companies including Apple, Fiat and Alessi (Veganti 2009) have used design thinking in their businesses (Brown 2009; Martin 2009) and made a great success in the market. We can see that they have all embraced design at the organizational level and their CEOs such as Steve Jobs, former CEO of Apple, showed a great interest in and awareness of design. However it could be arguable if a CEO's interest would be enough to make the whole company more innovative? A more systematic approach to fully utilizing design thinking across the business requires design to be at corporate policy level to increase the chance of success and reduce the risk of irrational decision-making (Na and Choi, 2012). This indicates that business managers should develop a good understanding of the wider context of design in their companies in order to achieve the great innovation potential and make appropriate decisions.

2.4. Design as a Driver for Change in Innovation Development

Design used to be perceived as part of innovation development (Cooper, 1993; Ulrich and Eppinger, 2003). Nowadays, several experts argued that design disciplines should lead the innovation development due to their human-centered approach (Brown, 2009; Best 2010 and Lockwood, 2009). Over the past few decades, the innovation development process has changed from the linear sequential technology-push approach to a more human-centered agile model (Trott, 2008). A number of characteristics of design thinking and design process (e.g. convergent and divergent thinking, holistic and collaborative approach, and the iterative development process) have already been incorporated into the innovation development process. Some experts urged design disciplines to push the boundary even further – not only bringing their design thinking and design skills to lead the innovation development process, but change the whole thinking and practices around innovation development to become more design-led. For example, IDEO's developed the Human-centred Design Toolkit (2009), which explained that the innovation development process should begin with desirability followed by feasibility and viability. This toolkit helps change developers thoughts to a certain degree, as it gets them to begin the innovation development process with people and their needs (desirability) rather than available technologies (feasibility) and economic benefits (viability). IDEO also developed the Human-centred Design process which includes three stages:

- **H**ear – gather stories from people via field study
- **C**reate – work with people to identify opportunities, solutions and prototypes.
- **D**eliver – turn ideas into solutions through suitable implementations.

It can be seen that the process begins with people and make good use of design skills (e.g. prototyping) throughout. Vergantiis another expert that urges design disciplines to push the boundary further. His design-driven innovation approach encourages developers to challenge the norms/status quo and create new meanings through design (Verganti, 2008) – see the work from Alessi which redefined the meanings and product-user relationships of kitchenware as an example. Acklin (2010) developed the design-driven innovation approach further by connecting design management with innovation management. The author argued that in order to make a good use of design-driven innovation, design and design management must be well established in a company. At the fundamental level, the company must have a certain degree of understanding of design and design management and recognize its value. At the next level, the company should apply design to address problems and business objectives. Finally, the design management should be implemented in a sustainable manner. For Acklin, innovation management and design management should go hand in hand (ibid). For example, design leadership (which focuses on setting visions and strategic directions) and design research should be employed at the front end of the innovation development process to support idea generation, while design management (which concentrates on coordinating design activities according to the strategic directions) should be applied to support the implementation of the idea at the back end of the innovation development process. Evidently, design thinking and the design process are not only an integral part of innovation development, but also could be used to advance the thinking and practices further.

3.   Case Studies

This paper aims to discuss how design could be used strategically to push the boundary and come up with new thinking and practice in four core business functions, namely branding, strategic management, organizational policy and innovation development. The discussions will be based around four case studies carried out by master students of MA Design Strategy and Innovation, MA Design and Branding Strategy, and PhD Design Management, Brunel University London, UK. All cases will include the descriptions of problems, how design (especially design thinking) was strategically applied to push the boundary and come up with new thinking and practice. The four case studies will be critically analyzed and compared to extract key lessons learned. Finally, the practical recommendations on how to use design strategically in these four core business areas will be drawn.

3.1. Case Study 1: Grass-root City Branding through Public Art Participation
(Zalesskaya, 2012)

This case study was chosen to demonstrate how design could be used to strategically to push the boundary and come up with new thinking and practice in branding. To show how design could be used to address contemporary issues in the wider context beyond the organizational level, this case study focused on city branding. The city branding concept is rooted in place marketing where marketing tools and techniques were applied to help cities and countries compete for investment and tourism (Ward, 1998 and Kotler *et al*, 1999). Due to its origin, city branding is often perceived as ways to boost the economy rather than fulfilling aspirations of citizens. The lack of contributions from the local community could lead to a *"disconnection"* between people and the place (Kavaratizis and Ashworth, 2008). As the concept of collaborative or cooperative design has become widely adopted in the public sector as a means to improve the quality and effectiveness of policies, strengthen a sense of belonging and citizenship, and promote a democratic approach, the importance of residents' participation in city branding has recently increased (Anholt, 2007). Aitken and Campelo (2011) argued that a bottom-up process and a participatory approach should be integral parts of city branding. If the local community is given an opportunity to co-create the brand of the city, the result will be more authentic and sustainable. They suggested that the process should start with an in-depth understanding of people's relationships and connections with each other and a place. In this way, people can be properly engaged and have a strong sense of ownership.

Landry (2000) observed that, in the post-industrial economy, cities need to strengthen their capacity for creativity and innovation in order to cope with challenges of globalization. Public art is considered one alternative way to enhance the creative image of the city. Good use of public art could also enhance financial interest, cultural tourism and property value (Selwood, 1992; Miles, 1997). Increasingly, people wanted to have their say about the appearance of their local surroundings (Lam *et al*, 2011) and, thus, would welcome an opportunity to participate in the process of commissioning public art. This situation provides a possibility to get people involved in creating public art, which, in turn, gradually shapes up the image of their areas. This idea fits well with the placemaking concept, which is a bottom-up approach that empowers and engages people in the development process of public spaces (Project for Public Spaces, 2012).

From their perspective, the process of building a city is perceived as 'organic'. Small projects, such as public art, could steadily contribute the overall brand image.

In this project, one genre of public art, *"street art"*, was chosen as a main focus. In order to develop a new city branding practice through public art participation, design thinking was employed to examine the current situations and develop new ideas. Three research methods, namely semi-structured interviews, observations and online surveys, were carried out with key stakeholders (namely street artist, the public audience and relevant experts).

All street artists that took part in the interviews stated that most street artists do want to paint on the street legally. Hence they welcomed the idea of collaborating with local communities and local authorities. The interviews with the public audience encountered both negative (16.7%) and positive (83.3%) comments regarding street art and the idea of using community-led street art projects as a means to develop a city image. While some interviewees perceived street art as evidence of the open-mindedness of the local governments, some believed that street art were not removed because of the lack of funding. Most experts agreed that the idea of using community-led street art projects as a mean to democratize the city branding process and develop the city image in a bottom-up manner has a strong potential. It was pointed out street art is not suitable for every area. Most experts suggested that street art could help areas that do not have a rich history and heritage cultures develop its identity (see Shoreditch, London for an example). Since street art is rather different from contemporary art displaying in galleries – people can see it on a daily basis, the main challenge is making sure that the artistic work appeals to diverse groups of people. To get people involved in both art participation and bottom-up city branding process, the whole engagement must be relevant, appealing and worthwhile. The Favela Painting project in Brazil, which used street art as a means to enhance the image of Vila Cruzeiro (Rio de Janeiro's most notorious slum) was a success from the placemaking perspective as it empowered local residents and promoted the co-creation between artists and local youth.

Since city branding is about working with what it already has (Gilmore, 2001), an incremental evolution is more appropriate than a radical change. Subsequently, a four-step guide for city branding through public art participation was proposed.

1. Set mutual goals that all key stakeholders agree upon
2. Identify areas that street art could make a significant difference.
3. Organize community-led street art projects to enhance target areas. This practice should be perceived as a means to continually develop the creative culture within the city. People are expected to take a leading role throughout the whole process. The final outcome must result from a collaboration of all parties and receive support from diverse groups.
4. Assess the impact of public art participation on the brand image of the city in an on-going basis. The regular monitoring will allow key decision makers to keep track of all progress in terms of the city image improvement and impacts of community-led projects.

Since it is unrealistic to expect everyone to actively engage in the process, it is crucial to allow the active members of the community to shine and do not leave passive members feeling left out. In this case, active members could play the role of an initiator or a co-developer who create the final design with other stakeholders and artists. Passive members could voice their opinions by commenting on the challenges proposed and/or voting for the designs that they like or dislike. In this way, people could gradually take

control of the appearance of their areas and the ownership of the city brand and city image.

3.2. Case Study 2: Using Strategic Design to Improve Bogotá's Public Transport System *(Giraldo, 2014)*

This case study demonstrated how design could be used strategically to change the management of public services which were generally provider-centric to become more user-centric. Bogotá, Colombia's capital city, was ranked one in the world's worst for traffic jams (CNN Español, 2017)**.** Moreover, the country saw an increase of new cars by more than 200,000 per years (Bogotá environmental observatory, 2013). In order to reduce the demand for private cars and encourage people to use more public transport services, a public transportation system called SITP was introduced in 2012. The aspiration was to make the public transportation services a desirable choice for all groups of people, as the former mayor of Bogotá stated that *"an advanced city is not one where even the poor use cars, but rather one where even the rich use public transport" (Peñalosa, 2013).* The system comprised of several fleets of new and refurbished buses operated in different zones to cover the whole city. It was observed that while the routes appeared to cover the entire city, the system map was not well presented and caused a lot of confusion. Subsequently, the message to the public heavily focused on how to use it properly rather than convince them they should use the services.

To gain better understanding of the problems in order to come with a suitable strategy for SITP, the researcher employed a human-centered design approach to investigate the issues. A number of research tools commonly employed in the service design field were chosen for this study, such as emotional maps, user diaries, service safari, case studies of public transportation systems in other countries, semi-structured interviews with key stakeholders (such SITP management team) and the questionnaire survey with carefully selected service users (60 participants in total from diverse backgrounds – some of which used SITP services regularly and some did not). According to survey results, 60% of respondents understood how SITP's system worked and knew how to use it. Nevertheless, 40% of participants reported that they were aware of its existence, but did not know how to use its services. Around half the participants (53%) were satisfied with SITP system. However, nearly half of respondents (47%) were dissatisfied. Most problems appeared to be caused by poor information design. For example, 46% of participants found the route maps to be impractical. 81% of respondents had problems with the route information at bus stops. The emotional maps and user diaries carried out with six commuters also confirmed that the main problems were caused by poor information design, especially route maps. While people were generally satisfied with bus services on the main routes, they rarely used the feeder bus services that connected smaller roads to the main roads. Participants reported that they prefer to walk or hire a taxi/pedicab rather than using feeder bus services. This situation suggested that perhaps the routes of the feeder bus services and/or information needed rethinking to match people's requirements.

The poor route planning and information design which caused confusion among passengers might be because of the lack of design inputs within the SITP management team. The interview results demonstrated that design decisions (such as route maps and other route information) were made by non-designers. This practice where design activities are carried out *"by people who are not designers and are not aware that they*

are participating in design activity" is what Gorb and Dumas (1987) describe as *"silent design"*. The insufficient contributions from suitable design disciplines might explain the lack of holistic examination and human-centered approach. The case studies revealed that public transportations in the other countries (such as Transport for London: TfL and Transports metropolitans Barcelona: TMB) saw design as an integral part of the system. The information design (e.g. route maps and signage) was carried out by professional design disciplines. Comprehensive design guidelines were issued to their suppliers and made available to the public. Despite having a complex system comprising of underground trains, buses (operated by different private companies), boats and trams, passengers were generally satisfied with TfL services (Transport for London, 2013). The interviews with experts in the relevant fields, such a service design specialist, a director of customer experience of public transportation services and a communication and visual designer, suggested that SITP system should start by understanding commuters; behavioral patterns and use them as a basis for system design, service design and graphic communication design.

The researcher concluded that the complexity of the system and the lack of clarity in terms of connections prevented many people from using SITP services. It was suggested that the structure of the SITP system could be simplified to make it easier to understand. For example, the system currently divided different operating zones into urban, supplementary and special. The survey showed that people did not understand the rationale behind the zoning and found the classification unnecessary. By clearly presenting the main routes in the city center and showing better connections between the main routes and feeder bus services, the whole system could be much easier to understand. At present, each route was presented separately at the bus stop. By including information that was currently missing, such as the bus timetables and the connection maps, people could plan their journeys better. This might convince people to use feeder bus services rather than taxis and/or other options. It can be seen that good use of design could be used to tackle management issues and come up with practical solutions on how to improve the whole system to be more user-friendly and practical.

3.3. Case Study 3: The Future of Manufacturing: Developing corporate-level Design Policy for UK Innovative Manufacturing *(Na and Choi, 2012)*

This case study discussed how to create a rationale for a corporate-level design policy, which encourages design-led innovation, to enable UK innovative manufacturing to reassert the UK's competitiveness. The UK government started the 'Make it in Great Britain' initiative(BIS, 2011), which aims to transform the old image of manufacturing and promote UK manufacturing's earlier successes and has been encouraging innovative manufacturing development, such as creating research centres, where innovation is a key driver for creating and sustaining the competitive advantage. However, it has been found that a general lack of design utilisation in UK manufacturing (Cox, 2015 and NESTA, 2008) although extensive innovation can be difficult to achieve without design implementation throughout the whole company. While design is regarded as bringing out the best in a company, it is expected that corporate-level design policy will encourage manufacturing companies to embrace both technology-led innovation and design-led innovation. For innovative manufacturing companies which are more receptive to innovation, albeit technical and often passive (incremental) innovation, it will generate a stream of design-led innovation alongside technological innovation, enabling them to flourish more efficiently, and holistically

exploiting their market potential; designers' creativity and innovation will be both better translated into products and reduce the cost of manufacturing better quality products, thereby generating higher profits through a well-developed/implemented corporate design policy.

Design should be used as a strategic business tool by adopting design thinking to enabling companies to create 'breakthroughs that move the world forward' (Martin, 2009) and meaning through design-driven innovation (Verganti, 2009). Its advantage is the delivery of innovation not only in the product or service, but in corporate culture, which encourages creativity and innovation. Brown (2009) also describes design thinking in a more practical sense as creating a harmonious balance between three competing constraints within a company: feasibility, viability and desirability. Design thinking therefore influences both the internal organization in the management of businesses, and helps create products that can be competitive in the complex, rapidly changing market. This research suggests that most manufacturing companies see design as an important contributor for innovative manufacturing however, the UK manufacturing sector spends 91.7 per cent of its design resources on technical design, using it for technical and engineering aspects of creating products and services, but only 2.2 per cent is spent on user design, 4.5 per cent on promotional design and 1.5 per cent on identity design (Livesey and Moultries, 2009). The BIS questionnaire survey results(2010) also demonstrate that design is used in the development and production stage of a new product in the manufacturing value chain. Additionally, manufacturing interviewees commented, "… everyone in the company does something to do with design…".This indicates that the majority of other manufacturers see design as an operational (technical) aspect of manufacturing, not a holistic part of the overall business.

Verganti (2009) states that the innovative influence of the expanding role of design, explaining that companies which only use technology-led innovation have limited competitiveness. Companies embracing both technology and design-led innovation can create the unique meaning that separates them from their competitors. The product can thus stay competitive longer and have higher sales volume. If design is only used at operational level as a technical function for production in new product development, as in the case of many UK manufacturing firms, the chance of maximizing competitiveness by embracing true innovation potential will be lost. Design-driven innovation and design thinking are especially relevant to UK manufacturing, because the research has identified current advantages in technological innovation and capabilities for UK manufacturing on the global stage. It is therefore clear that fully utilizing design in manufacturing companies would have benefits in surviving hostile competition and thriving in the future, and with an appropriate corporate-level design policy, the UK manufacturing companies, especially the non-innovative manufacturing firms, will embrace the importance of design at operations level, encouraging design-led innovation throughout the company in conjunction with technology-led innovation.

Despite current studies of design policies at national level (Amir, 2004; Aranaga, 2005; Choi, Cooper, Lim, & Evans, 2011; Hytönen & Heikkinen, 2003), there is still little research into design policy, let alone a corporate-level design policy. Therefore, this study would be a good case study to understand the role of design in manufacturing and design-led innovation and the rationale for corporate-level design policy especially for UK manufacturing.

3.4. Case Study 4: Using Strategic Design to Boost Innovation among Female Entrepreneurs in Saudi Arabia (Alkhaldi, 2017)

This case study illustrated how design could be used strategically to create suitable climates for innovation. It shows that design could be used not only in the innovation development process, but also as a means to overcome existing barriers and help innovation flourish. Saudi Arabia recently experienced an economic crisis due to the decline of oil prices in 2014 and 2015(Clements, 2017). The country saw innovation as a means to overcome the economic challenges (Nereim, Carey and Fattah, 2017). Subsequently, the government introduced *'Saudi Arabia Vision 2030'* in 2016 (Saikia, 2017; Henderson, 2017). The main aim was to diversify the sources of income, support start-up businesses and empower women by increasing their participation in the commercial sector (Rashad, 2016; Elsayed and Elmulthum, 2017). This idea was consider a major reform in terms of women's right, which was culturally and socially sensitive in Saudi Arabia (Sager, 2017). In fact, females in Saudi Arabia have already been successful in the commercial sector. According to Al-Sayedah Khadijah Bint Khuwailid Businesswomen's Center, 63 percent of women in Saudi Arabia ran successful businesses, however, most of which were unregistered (Aziz, 2017). In order to promote innovation among female entrepreneurs, practical as well as emotional support was required. This case study focused on the support for female entrepreneurs engaging in tangible product developments, since they appeared to face more challenges than those operating in service-based or digital-based sectors. For example, in order to get funding from the government, their product ideas must be fully developed (e.g. having a prototype and a business model).

Saudi Arabia has nine fabrication laboratories (FabLabs) across the country. These small workshops provided digital fabrication facilities and prototyping services (e.g. 3D-printing) and could play important roles in supporting the Vision 2030. The current services were well received. For example, the annual reports of FabLab Dhahran in 2016 and 2017 showed that the number of visitors increased from 7,121 in 2015 to 11,746 in 2016. However, it was acknowledged that the participation of female entrepreneurs was still low (less than 20%). To help FabLabs overcome poor participation among female entrepreneurs, the researcher adopted a human-centered approach to investigate the current situation. A number of qualitative research methods (e.g. participant observation, case study, online questionnaire survey, semi-structured interview and customer journey map), were employed to engage with key stakeholders (e.g. male and female entrepreneurs, frontline staff at the FabLabs, experts in relevant fields and senior management).

The results revealed that poor practices occurred throughout the whole customer journey. The results of the interviews (with 3 female entrepreneurs and 2 male entrepreneurs) and the survey (with 575 respondents; 423 female participants; 152 male participants) showed that most entrepreneurs were not aware of FabLabs and their services. For example, 74% of survey respondents have never heard of FabLabs. The customer journey map conducted with female entrepreneurs showed a lower satisfaction level in most stages when compared with scores given by male counterparts. The lower scores were due to practical reasons (e.g. female visitors could use the facilities two days per week while male visitors could use the services four days per week) as well as emotional issues (e.g. locating the FabLabs in a male university campus made it less welcoming to female entrepreneurs). The case studies conducted with FabLabsin other

countries, e.g. Spain, Philippines and the UK, showed that design (e.g. environmental design and service design) played an important role in engaging with entrepreneurs. For instance, the creative atmosphere of FabLab Barcelona encouraged entrepreneurs to come visit the lab even though their ideas were not fully formalized. By engaging entrepreneurs at the early stage of the product development process, the FabLab could support them in solving many difficult issues, which could prevent them from materializing their product ideas. On the contrary, FabLabs in Saudi Arabia gave a *'digital manufacturing'* vibe, which discouraged a number of entrepreneurs from approaching them at the early stage. Visitors were expected to have CAD models of their products, which was difficult to achieve without technical knowledge and design engineering skills. The researcher concluded that the narrow focus of FabLabs in Saudi Arabia prevented them from offering holistic support for entrepreneurs who engage in product innovation.

As a result, the researcher applied design thinking to come up with a new position for FabLabs in Saudi Arabia and transformation strategy to expand its existing services and support. It was recommended that they should position themselves like a one stop shop, where entrepreneurs could get help on essential things, such as financial support, business and legal advice and product development support. The FabLabs were not required to provide all the support in-house, but they should be able to signpost entrepreneurs to the right directions. Positioning themselves like a one stop shop could encourage entrepreneurs to come at the early stage of their product developments. Getting help early might lead to higher chances of success. A new communication strategy was also proposed, since the study showed the lack of awareness among the general public. For example, the FabLabs should identify successful female entrepreneurs to be their ambassadors. This could help raise awareness, inspire potential entrepreneurs, and build connections with female entrepreneurs. Moreover, good use of social media (e.g. daily blogs sharing exciting activities at the FabLabs, success stories, and interesting businesses that work with the FabLabs) could help build connections. This is an important step towards creating the sense of trust, empathy and belonging, which could lead to successful business collaborations in the future.

4.   Conclusion

The literature review and four case studies discussed in this paper show how design could be used strategically to push the boundary and come up with new thinking and practice. Based on all cases, the way in which design was used strategically to overcome existing boundaries and introduce new ideas can be grouped into three aspects. Firstly, design, especially design thinking, could be used as a means to examine the problematic situations. The divergent thinking helped the researchers to examine the situations thoroughly from multiple perspectives and the convergent thinking enabled them to identify the root(s) of the problems and key areas for future improvement. Design research tools had proven to be useful in gathering in-depth information and insights from all key stakeholders. Tools, such as emotional maps and user diaries, enabled the researcher to gain in-depth information and explore emotional issues (e.g. social and cultural barriers) from all key stakeholders. Secondly, creative thinking, which is an integral part of design, enabled the researchers to solve problems, overcome current barriers, challenges existing practices and coming up with new ideas. The solutions in all cases were considered holistic, since they addressed various aspects in

an integrated manner. Lastly, the human-centered nature of design ensures that solutions were developed from multiple perspectives of different stakeholders. In this way, the solutions are likely to be accepted by all stakeholders. This could speed up the process of introducing new ideas and practices to organizations or the general public. To conclude, design provides more than a tool for generating tangible solutions (such as new products and brands). It could be used to challenge existing boundaries and come up with new practices in core business functions (such as branding, strategic management, organizational policy, and innovation development) as well as tackle wider contemporary issues in the boarder context beyond the organizational level.

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