Understanding of Large Far Eastern Organizational Cultures in approaches to New Product Development Process: *Designing* versus *Controlling*

Hyunwook Hwangbo[1], Dr Emmanuel Tsekleves[2]

[1]h.hwangbo@lancaster.ac.uk
[2]e.tsekleves@lancaster.ac.uk
All at Lancaster Institute for the Contemporary Arts, Lancaster University, Bailrigg, Lancaster, LA1 4YW, UK

This paper explores how approaches to new product design can differ nationally when examining large organizational cultures between the East and the West, especially looking at different approaches in the context of 'openness'. Currently, approaches to new product development in digital landscape have shifted to evolutionary perspectives, which embrace an 'open' context in the design process – *'designing'*, rather than single hierarchical and closed strategy for efficiency- *'controlling'*. However, successful large Far Eastern organizations in consumer electronics and telecommunication products have achieved maximized sales profits by focusing on effective new product strategies. This paper proposes a conceptual framework to understand '*designing*'- driven organizational cultures, based on gaining an understanding of the Eastern Asian organizational cultures in their New Product Development (NPD) process. This is developed through a number of case studies on organizational cultures in NPD process in Eastern Asian consumer electronics and telecommunication companies. This paper highlights that NPD process in Far Eastern Asia's organizational cultures have been underlined in single hierarchical organizational cultures resulting in engineered product design under '*controlling*', rather than '*designing*'.

1. Introduction

Earlier organization approaches were shaped efficiently by reducing 'uncertainty' in the market. This was achieved by maximizing production in process (Thompson, 1965). Organization has thus aimed to achieve new opportunities with new products (Boland & Collopy, 2004). In terms of this, product design has been concerned with organizational managerial issues (Simon, 1996). Product design thus represents a major competitive element of manifestations of organization as a tangible asset (Karjalainen, 2003).

However, the current literature on digital product design such as smart devices – iPhone, iPad, kindle, Galaxy series etc.- focuses on digital innovation, and new design approaches to digital innovation that entails 'openness' encompassing diverse organizations and communities, where active human participation resides – i.e. *generativitiy* (Yoo, et al., 2010; Krippendorff, 2011). In fact, digital technology helps shift product design from a single fixed product boundary- modular architecture-, into a fluid product boundary that has diverse meanings by design participants and the basic functionality of the product can be expanded, across a layered modular architecture consisting of several layers: physical devices, networks, services, and contents (Benkler, 2006; Yoo, et al., 2010). Digital innovation is thus referred to as the combinations of digital and physical components to produce novel products, embracing a conception of 'product'. This digital product design, based on a layered modular architecture, is shaped through *digital product platform* that enables to build ecosystems for multisided market. Based on the digital product platform, diverse organizations can participate to offer their novel components– e.g. applications and hardware - to build the platform (Yoo, et al., 2010). This competitive landscape between participants for digital product platform resulting in a digital product can be referred to as *digital landscape*. In this sense, a boundary of organizations that design a product is also extended from homogeneous groups within an organization or a relevant industry, into heterogeneous communities beyond a fixed industry

(Yoo, et al., 2010). In terms of this, the concept of '*designing*' that embraces openness is introduced in the digital landscape. *Designing* refers to the ongoing action to complete, mediate and structure as outcomes in incompleteness, in response to continually changing ill-defined problematic situations (Garud, et al., 2008), based on the conception of duality of structure (Giddens, 1979). It corresponds to the concept of innovation, entailing surrounding environment in holistic approaches, which the technological development of an invention is combined with the market introduction of that invention to end-users through adoption and diffusion (Abernathy & Clark, 1985).

However, traditional design principles and logic of organization structures are based on reductionist approach, and so they must be revisited for use within the digital landscape (Yoo, et al., 2010; Yoo, 2010). Earlier approaches to product design in theories and practices have paid much attention to the physical aspects, such as design as styling and looks in traditional design principles (Karjalainen & Snelders, 2010; Person, et al., 2008; Monö, 1997) with little consideration of complicated organizational design process.

However, the concepts of organization have been evolved to open-natural models encompassing an environment in a holistic approach, from a rational system that adheres to a single hierarchical organization structure (Scott, 1998; McKelvey, 1982). In terms of this, recently, dilemmatic aspects of openness are often addressed in organization and product design. In modularity theory product designed through multiple participants – e.g. consumer involvement- could accomplish 'really new product design' with 'fabrication' and 'designing' based on new learning derived from multiple participants' unique needs (Ulrich, 1991; Duray, et al., 2000). This could result in innovation impacting on macro-level changes (new and heterogeneous sets of technology, market and technology) (Garcia & Calantone, 2002).

However, the openness implies tension to ambiguities, uncertainties and risks, due to the nature of innovative and complicated modular industries. This has been discussed in innovation and platform strategy theories in terms of tensions between flexibility for innovativeness and inflexibility for efficiency (Hlavacek & Thompson, 1973; Amabile, et al., 1996) ; paradoxes of corporate governance between control and collaborative approaches (Sundaramurthy & Lewis, 2003); interdependent and contradictory relationship between changes and stability on change of organizational system (Farjoun, 2010); paradoxical relationship between control and *generativity* of innovation in digital ecosystem (Eaton, et al., 2011).

In relation to this, how openness for designing can be implemented in organization, are broadly discussed with focus on possibility of open design of tangible objects in organizations (Raasch & Balka, 2009);challenges of open innovation to organizational culture (Vareska van de Vrande, et al., 2009) and multinational large organization (Mortara & Minshall, 2011); and barriers of open innovation in specific country case: China (Savitskaya, et al., 2010). It all infers to whether certain types of organizational grounding can embrace *'designing'*.

Based on this, this paper aims at discussing the organizational cultures for *'designing'* in NPD process by employing cross-cultural approaches between the East and the West. Although there are significant differences of strategic decisions in NPD process between Eastern Asian organizations and Western ones (Lee, et al., 2000; Nakata & Sivakumar., 1996; Song & Parry, 1997) it has been little addressed regarding open vs. closed approaches in the digital landscape. This paper therefore aims to understand organizational cultures for *designing* in the digital landscape with significantly different organizational cultures in the East. The understanding is developed through the development of a conceptual research framework with four dimensions (Figure 1): (1) Factors of decision-making in NPD Process; (2) Tangible organizational system: IT technology as internal communication tool; (3) Reflection of organization in product platform; (4) Supporting Organizational Cultures.

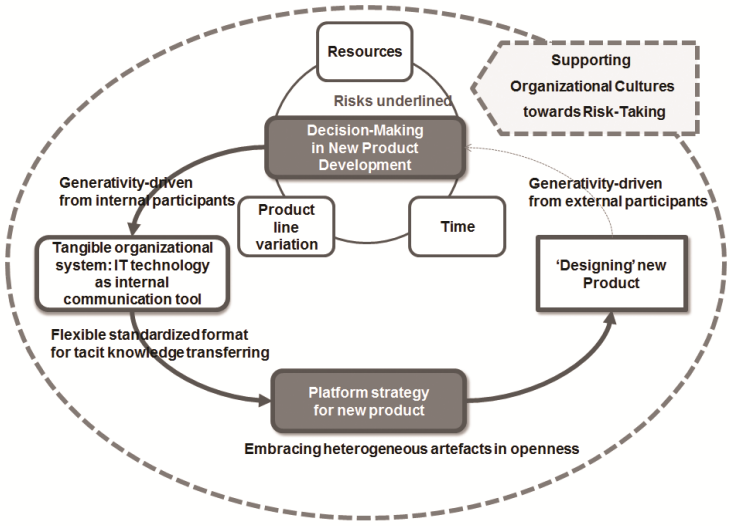

Figure 1 Conceptual Research Framework: Organisational Culture for 'Designing' in New Product Development Process

2. Conceptual Research Framework for '*Designing*' New Product in Cross-Cultural Study

2.1 Factors of Organizational Decision Making in NPD

Unlike the notion of *'designing'*, projects in an organization are carried out with complex and political concerns about budget, schedules, and technical capabilities (N.Baker, et al., 1988). A NPD project is thus inferred to as risk, uncertainty and anxiety, especially, in terms of the financial aspects and schedule (O.McMahon, 1967; Hollins & Hollins, 1991). The factors influencing decision making in NPD have been thus often discussed in relations between resources, time and product line variation (L.Urban & R.Hauser, 1980; Nishiguchi, 1996; C.Abegglen & George Stalk, 1985). This has been addressed in many empirical studies: Resources input (Cost), time to market and Product line variation with following reasons (e.g. Ulrich & Pearson, 1998; Person, et al., 2008; Karjalainen, 2003 ; Putsis Jr & Bayus., 2001).

Resources (cost)

Seeking opportunities to launch NPD project are started with concerns on realities of management and manufacturing in detail across the overall development process: e.g. product specification, operating conditions, resource allocation, financial attractiveness and market assessments or payback period and company policy etc., (Pugh, 1991; Cooper, et al., 2005). In terms of this, matters of resources infer two aspects: (1) input for supportive technology; (2) cost for better opportunities for market leadership. A certain amount of cost represents the level of technology input in accomplishing new product design and encouragement of competitive entry for long-term profitability of an organization (L.Urban & R.Hauser, 1980). In industrial design, cost is seen as a key feature to conclude product design: the quality of product design (the aesthetic and ergonomic characteristics) (Ulrich & Pearson, 1998). In doing so, an organization can consider the expansion of opportunities through product variation in product portfolio with less-resources for maximized profits (Person, et al., 2008).

For that reason the data in NPD often shapes a premature decision, as concluding the overall 'cost' and 'complexity' of the product at an early development phase in order to reduce sunken cost in following phases (Cooper, et al., 2005; Hollins & Hollins, 1991). Therefore, the amount of cost involved in NPD process is inferred not only as yielding opportunities, but also concerns about risks derived from spending costs.

Time

In relation to issues of resource, matters of time in NPD process represent two aspects in organization: (1) time to respond to market; (2) time for ideation in the development process, shown contradictory relations.

First, in strategic senses, rapid response with better-qualified product design can enable to meet market needs, so it yields positive sales outcomes (Person, et al., 2008). On the other hand, in the design process, sufficient time is necessary for affluent ideation for enough incubation time, which can create the own brand identity and design language in new product design (Karjalainen, 2003).

However, the product development process is carried out in traditional principles of product life cycle- introduction, growth, maturity, and decline- (Ulrich & Eppinger, 2012). Therefore, a new product design should be launched or re-aligned before the decline phases to seek new opportunities (Urban & Hauser, 1980) with multiple organization capabilities, such as effective communication within internal organization, simplified process, and common platform for modular approaches (Abegglen & George Stalk, 1985; Nishiguchi, 1996). Therefore, despite the burden of increasing cost and pressure of tight time scheduling, the organization should control 'time' to launch new product for creating better competitive opportunities.

Product line variation

In order to maximize the market opportunities, , new product is either designed or expanded by using either the existing knowledge and solutions or new needs and solutions that have not been addressed (Ulrich & Eppinger, 2012). This is reflected in the product lines variation in the NPD process. Product line extension has been seen as positive effect for increasing financial revenues based on a sharing product platform (Kekre & Srinivasan, 1990; Urban & Hauser, 1980) Thus, traditional decision-making for physical product variation has been aimed at reinforcing clearer product identity based on historical continuity of a product design (Monö, 1997). However, this product line extension is also inferred to as incremental pressures from internal and external organizations because it yields increasing costs and supervision for preserving higher quality product across the product line in internal organizations (Abegglen & George Stalk, 1985); continuous external pressures to meet increasing consumer needs (Putsis Jr & Bayus., 2001).

However, a digital product as a whole is differently addressed and has different meaning for each user. This is because such product affords customer customization and personalization. So that the end product is formed through the addition of content and services in each layer supported by the physical device, which are constructed by diverse participants and users beyond one organization's control (Yoo, et al., 2010). And it is based on loosely coupled industry ecosystem or platform embracing evolutionary aspects (Gawer, 2009). This illustrates that NPD principles should be reconsidered beyond an internal organizational mind-set.

2.2 Tangible organizational system for Decision Making in NPD

Organizations employ bureaucratic formalization tools for precise information transferring in order to reduce incremental risks during projects (Hofstede, et al., 2010). In this sense novelty in product design should be

concerned with the bureaucratic formalization within managerial issues because the more novelty is meant the incremental uncertainties reside, which have never been dealt with or acquired before in existing solutions in existing systems (Duray, et al., 2000; Sanchez, 1996). Thus the types of formalization could be differently shown between controlling- one way communication- and enabling- two ways communications - in *designing* systems depending upon organizations. This is the reason why organizations have different perceptions to the uncertainties within efficiency-driven managerial contexts (Adler & Borys, 1996).

In terms of this, modern organizations employ corporate IT infrastructures to transfer and leverage members' *tacit* knowledge across diverse members with the standardized format as an effective communication tool (Nonaka, 1994). This also contributes to effective NPD process (Akgun, et al., 2006). This represents the *generativity* capability of organization in a design project; because an organization could manage heterogeneous knowledge sources emerging across diverse communities participating in a project, by providing an open space for collaborative dialogues between participants (Boland, et al., 2007; Choi, et al., 2010).

However, the corporate IT infrastructure is not easily employed for digital product design in NPD process, because earlier single governance tends not to be changed and coordinated with the decentralized organization mechanism for digital product design (Yoo, et al., 2010). It is illustrated that although IT infrastructure of large organization can offer flexibility of transferring information in NPD physically, the effectiveness in actual projects could still be questionable in the actual decision-making of NPD process (Choi, et al., 2010).

2.3 Organization in designing, and reflection in product platform

In actual consumer electronics product development process, building a product platform can be a reflection of how product is designed by an organization through an organization's decision making across the development process. From a terminology perspective, 'platform' refers to a design, a concept, an idea, which is served as a pattern or model to explain concept of complex products and systems of production for engineering design (Baldwin & Woodard, 2009), and in industrial design product platform refers to 'the set of assets shared across a set of products' (Ulrich & Eppinger, 2012).

In fact, a product is designed and manifested by modular logic of an organization aiming to achieve its best functional purposes of the products' own interfaces through shared complex hierarchical structure of these(Yoo, et al., 2010; Schilling, 2000). So decisions regarding product platform development are made through significant firm's technology capabilities and efforts either for the new or the derivatives of the product design (Ulrich & Eppinger, 2012).

However, the concept of platform itself has dilemmatic aspects, between *open* and *controlling*. Product platform can be tailored within a certain architecture that enables the subparts or the architecture itself to be functioned interdependently – i.e. a core, its components and the interfaces between them. But the relationship between components should be governed by a set of stable constraints or design rules for functioning (Baldwin & Woodard, 2009). In doing so, in digital products the definition of product becomes varied, from one product as a whole, into varied concepts within the ecosystem; e.g. in the relevant ecosystem concept, a component could be a product and a product could be a platform (Adomavicius, et al., 2008). On the other hand, an organization should control the evolutionary aspects in the platform because involving external participants for evolving the platform in openness can provide access to sensitive internal organizational matters – e.g. a confidential intellectual property related to significant technology (Chesbrough, 2003).

For those reasons, platform leadership in industries represents whether an organization can embrace those uncertainties of product technology, relationships between external complementors and internal organization and organizational culture in a holistic manner or reductionist one (A.Cusumano & Gawer, 2002, p53). Most of the earlier approaches to platform strategy in NPD have however addressed in the reductionist perspectives. In these a focus has been placed on efficient design with enhanced flexibility in product architecture (Gawer, 2009) with little consideration for the complicated bureaucratic process in manufacturing, procurement, and distribution (see Meyer & Lehnerd, 1997). However, the current digital product platform is based on loosely assembled ecosystems between internal and external participants, requiring whole industrial outlook in evolutionary perspectives covering industry ecosystems across heterogeneous types of products and industries

2.4 Supporting Organizational Cultures reflected in Structuring and in Designing

In organizational theory, an organization culture has been addressed in terms of organization structure, which encompasses the core ideology of an organization, the traditions and beliefs in achieving the collective goal of rationale - based organization structure (Mintzberg, 2005; Scott & Davis, 2007). Thus, the visual and invisible artefacts that an organization has achieved implicitly reflect the organizational culture in their technology, product design, artistic creations, style and so on (van Aken, 2007; Schein, 2010). In this context, Hofstede scrutinized relations between national culture and organizational cultures in work practices through international survey in quantitative approach, with key four dimensions: *power distance; degree of individualist vs. collectivist; degree of masculine vs. feminine; uncertainty avoidance*, and two extended dimensions: *long-term versus short-term orientation; indulgence vs. restraint* (Hofstede, et al., 2010). His survey presents two significant implications on organizational culture study. Firstly, the study focuses on relations between hierarchical structures of organizations and organizational cultures, which result in system: i.e. bureaucracy:

desirability of centralization, controlling, formalization, and planning etc. Secondly, Hofstede noted significant differences in organizational cultures between the East and West.

Following this, much empirical studies on product design have been taken into account different approaches in NPD process between the East and West with replications of Hofstede's epistemological and methodological approach (e.g., Lee, et al., 2000; Nakata & K. Sivakumar, 1996 ; Song & Parry, 1997).

Overall, all above factors can lead to assumptions on relations between product design and different nationalities. Countries that have achieved high - tech value - oriented and marketing-driven multifunctional product design may be related to tight controlling organizational cultures in *designing* new product to reduce risks from internal and external organizations.

3. Research Setting

This paper is an exploratory study in the first stage of case study approach (Langrish, 1993). For in-depth understanding of NPD in different organizations in different countries, this study employs a qualitative approach to set up a conceptual research framework for the theme presented thus far. . This is aimed to cover limitations of the quantitative Hofstede's survey which has little considered in-depth consideration about organization members (Spector, et al., 2001).

In this stage, an email interview method has been chosen to cover sensitive organizational issues and distance issues for providing better cross-cultural study (Meho, 2006). The data was collected from project-based organizations specializing in NPD. A design project-based organization can be used as research domain in design studies: organizational design in architecture design (e.g. Yoo, et al., 2006) and design consultancies in cross-cultural study (Bruce & Docherty, 1993), because it has multiple interactions with different types of communities across inside and outside the organization (Ulrich & Eppinger, 2012).

The questionnaire was developed based on the proposed conceptual research framework with open-ended and semi-structured questions. Nineteen email interviews including Skype calls were conducted with twelve interviewees between Sep 2012 to Oct 2013 from two design professional groups to maximize analogical approaches (Romme, 2003; Yin, 2004): (1) a set of design professionals who work at large global consumer electronics or telecommunication companies (n=7) in NPD fields: Engineering Design, Industrial Design, Marketing, and Design Research, working at South Korea, Japan, USA and Singapore - based consumer electronics and telecommunication companies ; (2) a set of product design consultants (n=5) specialized in Innovation strategy, Service Design, Engineering Design, Design, Marketing, and Sales, who have worked for Eastern-based clients and Western ones in the UK, the USA, and Singapore were selected. All respondents are over a senior level at their organizations: client group (avg. over 5 years' experience); design consult group (avg. over 18 years). Through the interviews, common cases that respondents noted were selected (Table 1). This will be useful to elaborate a range of cases that will be studied in following research.

4. Reflection: Actual understanding of Organizational Culture in *Designing*

4.1 Elements for Design-Centered Organization – Issues of Underlined Risks in Organization

This research addresses elements of design - centered organization first, and the factors contrast actual NPD process to draw underlined significances in NPD process in large organization. It is found that an organization for *designing* is characterized as risk-taking attitudes by embracing failure, with less- hierarchy organization structure. This organization can enable to help individual member's new idea implement to new solution, and the organization can quickly respond to the risks with new and multiple solution - organizational agility- in response to the dynamics of market (Figure 2). Thus, *designing* in organization can be inferred to as organizational attitudes towards risk-taking and it can lead to different types of

	Year of founding	Country	Total Employees	Sales (£ M) 1-Year Sales	Net Income	Industry (Primary Industry)
				1-Year Sales Growth	1-Year Net Income Growth	
A	1969	South Korea	90,700	£116,509.17M (in 2012)	£13,432.42M (in 2012)	Consumer electronics (Memory Chip & Module Manufacturing)
				32.43%	83.42%	
B	1997	China	78,402	£7,463.72M (in 2013)	£134.69M (in 2013)	Telecommunication (Wireless Telecommunications Equipment)
				(7.68%)	-	
C	1935	Japan	293,742	£50,946.59M (in 2013)	(£5,261.70M) (in 2013)	Consumer Electronics Manufacturing
				(18.74%)	-	
D	1962	USA	-	-	-	Personal Computer Manufacturing
				(3%)	-	

Table 1 Selected Cases Profile (hoovers, 2014)

organizational cultures resulting in different organizational structures in *designing*.

> *Cultures may cascade organization structures to control them and the cultures including risk taking and problem-solving […] environment may facilitate creating and problem- solving with take-for-granted higher risk taking (Design consultant 1)*

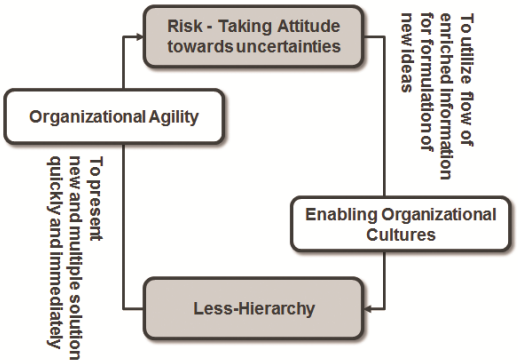

Figure 2 Elements of Design-Centred Organization

This is reflected in the characteristics of a tangible organizational system: IT infrastructure, which incremental anxiety and risks are underlined by confidentiality issues : (1) inflexibility of IT infra sharing system due to issues of confidentiality; and the confidentiality causing (2) another formalization for precise decision-making. Although IT infrastructures are generally employed across functional groups in NPD process with such as ClearCase, SAP or ORACLE, Siemens NX for managing and coordinating a wide range of information emerged from inside and outside organizations, IT system are seen as inflexibility.

> *On a team level, we came up with an idea of using Google as an 'unofficial' central sharing gateway[…] This is NOT recommended by the company for the confidentiality reason but we all know this is far more flexible […] (UX designer at a Singaporean Telecommunication company)*

Accordingly, the confidentiality issues tend to cause diverse formalization ways in some organizations during NPD projects: respecting senior and experienced personnel's opinions, documentation, personal contacts and presentation, rather than use of IT infrastructure.

> *These knowledge and information is normally kept within the department as it's very confidential. When necessary people make face to face presentations to other department (A Design Project Lead at 'C' company)*

It is all inferred that in actual NPD process organization is often laid in incremental ambiguity of development projects and sensitive risks, and this could determine varied formalized formats within an organization.

4.2 Different Decision-Making in NPD in the East – Different Attitude towards Risk Taking

In the actual decision making of the NPD process, actual organization's concerns about incremental risks are emerged from manufacturing and managerial issues in *budget control*. This is explicitly seen as a significant decision-making attitude; *tighter time scheduling for ideation; controlling a wide range of product variation for market achievement*, under *hierarchy of organization* affected by organizational culture (Figure 3).

Firstly, all inputs of resources in NPD are associated with reality of managerial issues on manufacturing and complicated production lines; expansion of production line followed by managerial issues; reducing cost for maximizing profits. Next, NPD process in large organization is often carried out in 'tighter time scheduling' in response to competitive market situations. Thus, sufficient ideation time for new design idea is not easily allowed, so general projects tend to pay attention to current market situations. Thirdly, in order to chase a market situation a wide range of product line extension, based on existing product line, is broadly utilized in NPD process in consumer electronics and telecommunication; often for a wide range of 'targeted' consumer segmentations with minor changes or revisions of physical aspects of product design. Or it should be already considered due to nature of a product itself – e.g. consideration of scalability and expandability in software systems and nature of electronic product systems.

Based on this, the actual strategic decision-making in NPD could be affected by the shape of the organization hierarchy and, influenced by the organizational cultures. That could be differently seen in the Eastern-based organization where stronger bureaucratic hierarchy resides when compared to Western ones: Top-down hierarchy; Collective decision-making; Engineering mind-set; and Execution driven (Figure 3).

Firstly, Eastern Asia-based organizations show a tendency to rely on top-down and collective decision-making in design projects, and so decisions made by their boss and other members' agreement is one way process.

> *Asian companies have very strong 'top down' cultures mixed with excessive respect for hierarchy and consensus (Design Consultant 2)*

Next, Eastern organizations tend to pay attention to tangible execution for engineering, rather than intangible conceptual ideation.

> *Generally western companies are happy to buy into an idea early on and make a selection based on the idea/concept rather than the execution. Asian clients have difficulty with this and often confuse the idea with the execution (Design Consultant 3)*

Those tendencies can be examined in actual organizational attitudes reflected in NPD process in large Eastern Asian companies. Eastern Asian based organizations may be much underlined in vertical hierarchy of organization causing avoidance of risk-taking

& obsession of precision, one-way communication and collective particularism during design project.

Secondly, in fact, different perceptions to designers' level can be illustrated and much intrinsic vertical hierarchy can exist in such organizations. Respondents working at a South Korean - based 'A' company and Japanese - based 'C' describes as 'subordinates' characterized as 'the disposable' and 'belongings' of an organization, rather than design professionals.

Japanese companies tend to think it's natural that all employees should devote themselves to the company for the whole life (A Design Project Lead at 'C' company)

Thirdly, attitudes towards documentation reflect a different degree of avoidance of risk and obsession with precision under controlling (see Hofstede et al., 2010 p.315). On one hand, documentation is necessity/ fundamental/ requirement, due to nature of unprecedented design projects that need to keep up with the precision in NPD project. On the other hand, documentation is seen as an unnecessary or routine task. Although in NPD process documentation is aimed at scientific verification tools in work practices during complicated design projects, the verification is sometimes seen as an obsession with precision, leading to unnecessary documentation for every uncertain situation in Asian companies.

Often, we should generate numerous versions of documentation although the contents are almost similar among them (An assistant Manager at 'A' company)

A Japanese company once asked us to deliver 2D 'pictures' of our 3D data because their process did not allow for ID in 3D (Design Consultant 2)

Fourthly, one-communication way system exists in NPD process in the Eastern Asian organization that can affect the presentation of new ideas within their group. It is found that there is tighter supervision - evaluation of new ideas, tighter time scheduling in ideation - and senior level's closed mindset affected by their engineering underlined background, which restrain the presentation of new ideas, causing viable, tangible and precise decisions.

Broadly Asian companies are more engineering led (their history) (Design Consultant 3).

Design is a new field to many companies in Singapore […] Companies are typically stronger in engineering or marketing (Design Consultant 5)

Lastly, the cooperation characteristics may be also affected by the different degrees of hierarchy in the NPD process: collective particularism in organization. In general, cooperation for new product design is necessary for open-collaboration across all project participants: design, software, hardware, marketing, planning, verification etc., with a set of constructive feedbacks. However, limited resources and tighter time scheduling and supervision in Asian organizations could cause collective particularism between relevant groups and it resists coming up new ideas for new product design.

Each group has own projects and should cope with the jobs that were already given. So new project that could cause extra works can be naturally resisted (an UX designer at 'A' company)

It is all presumably inferred that in Eastern Asian organizations' higher degree of hierarchy - top-down and collective decision- making - could be reflected in higher expectation about viability, feasibility and stronger precision-centered solutions with engineering-based mind-set. And also it could cause the tendency to avoid criticism from senior level or other members, and so it can cause to concentrate on viable execution with inflexible or tighter formalization activities for precise decision-making, rather than conceptual and new ideas implying incremental ambiguities and ill-defined progression.

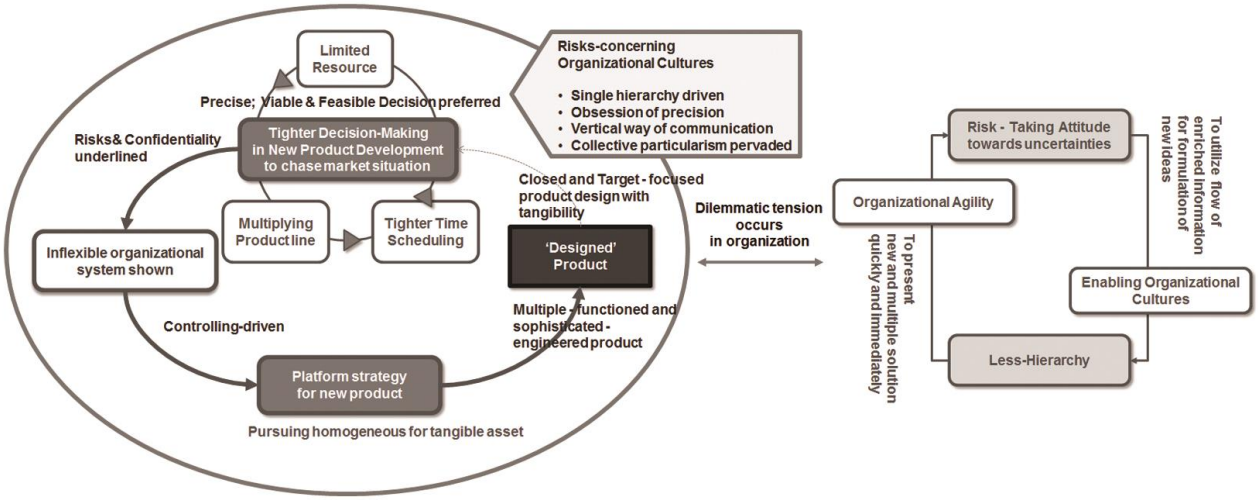

Figure 3 Controlling-Driven Organizational Culture in Designing, found in the Eastern Asian organizations

4.3 Possibility of different approaches to platform strategy, due to underlining risks

Despite organizational efforts to design new product, there could be different approaches to overall product system depending on how an organization looks at future market where incremental uncertainties reside in NPD process and this could cause different approaches depending upon organizational cultures. The distinguishable tendencies can be found in platform strategy at an earlier stage of NPD process in the East. It is revealed that there are major differences of approaches to product platform in organizations in two aspects, in terms of types of compatibility with heterogeneous products: *compatibility with homogeneous products among relevant tangible products; compatibility of products entailing the heterogeneous across tangible and intangible product*. This can stand for whether an organization views future market in a holistic perspective at an earlier phase.

Although all organizations make efforts to approach to futuristic and new product during NPD projects the approaches to product system differ considerably in Eastern Asian Organizations and shows tendencies to focus on visible and tangible outcomes with existing assets.

> *[From the 'B' company] [design] strategy was driven more by comparison with others, not as a route to provide clear differentiation [...] our design strategy had to 'work' across many product types (Design Consultant 3)*

This is also found in design projects across product platform in one successful South Korean - based company: the 'A' company. Although they attempt to look at future focused products (e.g., 5-10 years out) the actual NPD process employed for the approaches to future products were limited focusing solely on existing and tangible products. For instance, in component level of NPD process – Application Processor (AP) chips[1] design projects at 'A' company was undertaken for the extension of the product system within relevant products – mobile devices- with a two year out future prediction. In User Experience (UX) design level at the A company, the projects were also undertaken for sharing contents between those 'mobile devices'. But the mobile devices infer to 'physical devices' only in layered modular architecture (see Yoo, et al., 2010, p727). New product development projects at the A company may be thus focused on homogenous physical device level, from components to UX design. On the other hand, a respondent working as UX designer in 'D' company a USA - based computer electronics manufacturer, which the AP chips are supplied by the A company, stated that building ecosystem for integration of service and product solutions has been undertaken, which are heterogeneous types of artefacts.

This can be exemplified by looking at the organizational point of view for service software placed in the physical products, which are heterogeneous relations between intangible and physical artefacts. Building a digital product platform with service software should be well aligned with complicated other heterogeneous platforms supported by the capability of the physical devices (see Yoo, et al., 2010). However, despite noticeable achievement of the A company in market the holistic approach across the product system is not easy without supporting organizational grounding - e.g. leadership and history.

> *South Korea may be a follower of the software [ecosystem] industry […] The company 'A' might also significantly consider it with the long-term roadmap for building the ecosystem by putting their efforts. But designing software [ecosystem] might not be easy […]. To do so, the visionary leader as well as the grounding is necessarily required (A former UX designer at 'A' company)*

Overall, different organizational cultures resulting in different structures of organization can even affect the whole product system that can be determined by overall ecosystem; because of different strategic decisions on 'open' for 'heterogeneous' and 'closed' for 'homogeneous' (Figure 3). Eastern Asian organizational cultures in consumer electronics and telecommunication sectors can efficiently optimize more tangible and viable execution for better hardware design, based on existing engineering, manufacturing and market-focused strategy. And it could lead to the development of a product platform for homogeneous products – precise engineered-hardware products; it could be possible due to tighter controlling that stem from distinctive Eastern Asian organizational culture. The tightness can be however seen as a stronger controlling in organization and product design, due to the nature of the complicated modular and layered digital product and the open ecosystem where incremental ambiguities reside.

5. Conclusions

This paper explored how '*designing*' is implemented in an organization based on a conceptual framework, by looking at different types of organizational cultures in large East Asian company cases. This could help provide an understanding of the dilemmatic meaning of *designing* in digital landscape through contradiction between *designing* and *controlling* in actual organization; whether a new product is a result of '*designing*' in an evolutionary perspective, or 'controlling' - designed in reductionist for efficiency in an organization. This paper illustrates '*designing*' in four aspects.

Firstly, incremental risks and uncertainties in complicated digital ecosystem are overwhelmed across

[1] An application processor (AP) is a system on a chip (SoC) designed to support applications running in a mobile operating system environment. It provides a self-contained operating environment that delivers all system capabilities needed to support a device's applications, including memory management, graphics processing and multimedia decoding. A wide variety of mobile devices contain AP chips, including feature phones, smartphones, tablets, eReaders, netbooks, automotive navigation devices and gaming consoles.

organizations due to the nature of the complexity, and so organizational attitudes toward risks-taking may be much stressed in NPD decision-making. This could be furthermore much affected by the organizational culture with regards to whether the organization can wisely embrace '*designing*' in a holistic manner.

Next, types of hierarchy in organizational structure and product design can be affected by organizational attitudes towards risks-taking due to nature of bureaucratic organizational attitudes, and it could cause to develop different types of product systems reflected in product platform toward novelty – either for heterogeneous with holistic approaches or homogeneous products in reductionist approaches.

Thirdly, *designing* a new product with emergent complexity can result in much dilemmatic concerns, due to much tighter controlling, depending upon organizational cultures. Although *designing* is underlined in less-hierarchical structures and enabling cultures for *generativtity*, controlling is required in response to where complicated ambiguities in designing and multiple external participants reside. It could be possible to cause much dilemmatic concerns between tighter controlling in single organization hierarchy and 'designing'.

Lastly, studies on '*designing*' in digital landscape should be investigated in national level due to its complicated natures in relation to complicated web of industries in large ecosystem, supportive cultures and infrastructure for technology development under national grounding (e.g., IfM, 2009, Kao, 2009). The proposed conceptual research framework can contribute to exemplifying how national cultures can impact on *'designing'* in organizations in a complicated digital landscape.

This study would be further expanded through the integration of additional multiple data from diverse research domains based on the conceptual framework. It will be elaborated through comparison and contradiction between intrinsic organizational cultures affected by national cultures and actual artefacts - organizational structures and product design. There is a continuing need for crystallizing how *'designing'* is evolved through given organization grounding in response to the unprecedented digital landscape whilst gaining understanding of different organizational and national cultures.

6. References

A.Cusumano, M. & Gawer, A., 2002. The Elements of Platfrom Leadership. *MIT Sloan Managment Review*, Issue Spring, pp. 51-58.

Abegglen, J. & George Stalk, J., 1985. *Kaisha:The Japanese corporation*. 1st ed. s.l.:BasicBooks.

Adomavicius, G., Bockstedt, J. C., Gupta, A. & Kauffman, R. J., 2008. Makaing sense of technology trends in the information technology landscape:A design science approach. *MISQuarterly*, 32(4), pp. 779-810.

Akgun, A. E., Byrne, J. C. & Keskin, H. &. L. G. S., 2006. Transactive memory system in new product development teams. *Engineering Management, IEEE Transactions*, 53(1), pp. 95-111.

Amabile, T. M. et al., 1996. Assessing the Work Environment for Creativity. *The Academy of Management Journal*, 39(5), pp. 1154-1184.

Baldwin, C. Y. & Woodard, C., 2009. The architecture of platforms: a unified view. In: A. Gawer, ed. *Platforms, Markets and Innovation* . s.l.:Edward Elagar , pp. 19-44.

Benkler, Y., 2006. *The wealth of networks: How social production transforms markets and freedom*. s.l.:Yale University Press.

Boland, J. R. J., Lyytinen, K. & Yoo, Y., 2007. Wakes of Innovation in Project Networks: The Case of Digital 3-D Reprentations in Architecture, Engineering and Construction. *Organization Science*, 18(4), pp. 631-647.

Boland, R. J. & Collopy, F., 2004. Design Matters for Management. In: R. J.Boland & F. Collopy, eds. *Managing as Desigining*. s.l.:Stanford University Press, pp. 3-18.

Bruce, M. & Docherty, C., 1993. It's all oin a relationship: a comparative study of client-design consultant relationships. *Design Studies*, 14(4), p. 422.

C.Abegglen, J. & George Stalk, J., 1985. *Kaisha:The Japanese corporation*. s.l.:BasicBooks.

Chesbrough, H. W., 2003. *Open innovation: The new imperative for creating and profiting from technology*. s.l.: Harvard Business Press.

Choi, S. Y., Lee, H. & Yoo, Y., 2010. The impact of information technolgy and transactive memery systems on knowledge sharing, application, and team performace:A field study. *MIS Quarterly*, 34(4), pp. 855-870.

Clark, K. B., 1985. The interaction of design hierarchies and market concepts in technological evolution. *Reserch Policy*, July, 14(5), p. 235–251.

Cooper, R., Aouad, G., AngelaLee & Wu, S., 2005. *Process Management in Design and Construction*. s.l.:Blackwell Publishing Ltd.

Cusumano, M. A. & Gawer, A., 2002. The Elements of Platfrom Leadership. *MIT Sloan Managment Review*, Issue Spring, pp. 51-58.

Duray, R., Ward, P. T., Milligan, G. W. & Berry, W. L., 2000. Approaches to mass customization: configurations and empirical validation. *Journal of Operations Managemen*, Volume 18, pp. 605-625.

Eaton, B., Elaluf-Calderwood, S., Sorensen, C. & Yoo, Y., 2011. *Dynamic Structures of Control and Generativity in Digital Ecosystem Service Innovation:The Cases of the Apple and Google Mobile App Stores*, London: Department of Management Information Systems and Innovation Group London School of Economics and Political Science.

Farjoun, M., 2010. Beyond dualism: stability and change as a duality. *Academy of managment review*, 35(2), pp. 202-225.

Garcia, R. & Calantone, R., 2002. A Citical look at technical innovation typology and innovativeness terminology:a literature review. *Product innovation management*, Volume 19, pp. 110-132.

Garud, R., Jain, S. & Tuertscher, P., 2008. Incomplete by Design and Designing for Incompleteness. *Organization studies*, Volume 29, pp. 351-371.

Gassmann, O., Enkel, E. & Chesbrough, H., 2010. The future of open innovation. *R&D managment*, 40(3), pp. 1-9.

Gawer, A., 2009. Platform dynamics and strategies:from products to services. In: A. Gawer, ed. *Platforms, Markets and Innovation*. s.l.:Edward Elgar Publishing, pp. 45-76.

Giddens, A., 1979. *Central problems in social theory:Action, structure, and contradiction in social analysis*. Berkeley, CA:: University of California Press.

Hlavacek, J. D. & Thompson, V. A., 1973. Bureaucracy and New Product Innovation. *The Academy of Management Journal* , 16(3), pp. 361-371.

Hofstede, G., 1994. The Business of international business is

culture. *International business review,* 3(1), pp. 1-14.

Hofstede, G., Hofsede, G. J. & Minkov, M., 2010. *Cultures and Organizations:Software of the mind*. s.l.:McGraw-Hill.

Hollins, G. & Hollins, B., 1991. *Total Design: Managing the design process in the service sector*. s.l.:Pitman Publishing.

Hoovers, 2014. *Hoovers*. [Online] Available at: hoovers.com [Accessed 16 Mar 2014].

IfM, T., 2009. *How to implrement open innovation :Lessons from studying large multinational companies,* s.l.: University of Cambirige.

Kao, J., 2009. Tapping the World's Innovation Hot Spots. *Harvard Business Review,* March.pp. 109-114.

Karjalainen, T.-M., 2003 . *Strategic design language-transforming brand identity into product design elements*. Brussels, the 10th International Product Development Management Conference.

Karjalainen, T.-M. & Snelders, D., 2010. Designing Visual Recognition for the Brand. *Journal of Product Innovation Management,* 27(1), pp. 6-22.

Kekre, S. & Srinivasan, K., 1990. Broader product line: a necessity to achieve success?. *Management Science,* 36(10), pp. 1216-1232..

Krippendorff, K., 2011. Principles of Design and a Trajectory of Artificiality. *Product innovation management,* Volume 28, pp. 411-418.

Krogh, G. v. & Hippel, E. v., 2006. The Promise of Research on Open Source Software. *Management Science,* 52(7), pp. 975-983.

L.Urban, G. & R.Hauser, J., 1980. *Design and Marketing of New Products*. s.l.:Prentice-Hall .

Langrish, J., 1993. Case studies as a biological research process. *Design Studies,* 14(4), pp. 357-364.

Lee, J., Lee, J. & Souder, 2000. Differences of organizational characteristics in new product development: cross-cultural comparison of Korea and the US. *Technovation ,* Volume 20, pp. 497-508.

Mckelvey, B., 1982. *Organizational systematics-taxanomy, evolution, classification*. London: University of California Press,Ltd.

Meho, L. I., 2006. E-Mail Interviewing in Qualitative Research:A Methodological Discussion. *Journal of the Americal Society for information science and technology ,* 57(10), p. 1284–1295.

Mintzberg, H., 2005. The Five Basic Parts of the Organization. In: J. M.Shafritz, J. OTT & Y. S. Jang, eds. *Classics of Organization Theory*. Boston,MA: Thomson Higher Education, pp. 219-230.

Monö, R., 1997. *Design for Product Understaning; The Asethecis of Design from a Semiotic Approach*. Stockholm: Liber.

Mortara, L. & Minshall, T., 2011. How do large multiple compaies implement open innovation?. *Technovation,* Volume 31, pp. 586-597.

N.Baker, B., Murphy, D. C. & Fisher, D., 1988. Factors Affecting Project Success. In: *Project Management Handbook*. 2nd Edition ed. s.l.:John Wiley & Sons, pp. 902-919.

Nakata, C. & Sivakumar., K., 1996. National culture and new product development: An integrative review. *The Journal of Marketing*, Volume 60, pp. 61-72.

Nishiguchi, T., 1996. *Managing Poroduct Development*. s.l.:Oxford University Press.

Nonaka, I., 1994. A Dynamic Theory of Organizational Knowledge Creation. *Organization Science,* 5(1), pp. 14-37.

O.McMahon, H., 1967. Management of Innovation. In: *Uncertainty in Research, Management, and New Product Development*. Massachusetts(Cambridge): Reinhold Publishing Corporation, pp. 1-10.

Person, O., Schoormans, J. & Snelders, D., 2008. Should new products look similar or different?The influence of the market environment on strategic product styling. *Design Studies,* 29(1), pp. 30-48..

Pugh, S., 1991. *Total Design: Integrated Methods For Successful Product Engineering*. s.l.:Addison-Wesley .

Putsis Jr, W. P. & Bayus., B. L., 2001. An empirical analysis of firms' product line decisions. *Journal of Marketing Research,* 38(1), pp. 110-118.

Raasch, C. H. & Balka, K., 2009. On the open design of tangible goods. *R&D Management,* Volume 39, pp. 382-393.

Romme, A. G. L., 2003. Making difference:organization as design. *Organization science,* Volume 14, pp. 558-573.

Sanchez, R., 1996. Strategic Product creation:Managin new interations of technology,markets,and organizations. *European management journal*, 14(2), pp. 121-138.

Savitskaya, I., Salmi, P. & Torkkeli, M., 2010. Barriers to Open Innovation: Case China. *Jounal of Technology Management of Innovation*, 5(4), pp. 10-21.

Schein, E. H., 2010. *Organizational Culture and Leadership*. s.l.:John Wiley & Sons.

Schilling, M. A., 2000. Toward a General Modular Systems Theory and Its Application to Interfirm Product Modularity. *The Academy of Management Review,* April, 25(2), pp. 312-334.

Scott, W., 1998. *Organizations: Rational, Natural, and Open Systems*. 4th ed. s.l.:Prentice Hall.

Scott, W. & F.Davis, G., 2007. *Organizations and Organizing:Rational, National, and Open Sysem Perspectives*. International ed. s.l.:Pearson Education.

Simon, H. A., 1996. *The sciences of the artificial*. 3rd ed. s.l.:The MIT press.

Song, X. M. & Parry, M. E., 1997. A cross-national comparative study of new product development processes: Japan and the United States. *The Journal of Marketing,* Volume 61, pp. 1-18.

Spector, P. E., L.Cooper, C. & Spark, K., 2001. An Internation Study of the Psychometric Properties of the Hofstede Values Survey Module 1994: A Comparison of Individual and Country/Province Level Results.. *Applied Psychology:An International Review*, 50(2), p. 269–281.

Sundaramurthy, C. & Lewis, M., 2003. Control and collaboration: paradoxes of governance. *Academy of management review ,* 28(3), pp. 397-415.

Thompson, V., 1965. Bureaucracy and Innovation. *Administrative science quarterly,* June.pp. 1-20.

Ulrich, K. T. & Eppinger, D. S., 2012. *Product design and development*. s.l.:McGraw Hill.

Ulrich, K. T. K., 1991. *Fundamentals of product modularity*. Atlanta: ASME Winter Annual Meeting Sym- posium on Issues in DesignrManufacturing Integration.

Ulrich, K. T. & Pearson, S., 1998. Assessing the importance of design throguh product archaeology. *Management Science,* Volume 44, pp. 352-369.

Urban, G. & Hauser, J., 1980. *Design and Marketing of New Products*. 1st ed. s.l.:Prentice-Hall.

van Aken, J. E., 2007. Design Science and Organization Development Interventions. *Applied Behavioral Science,* 43(1), pp. 67-88.

Vareska van de Vrande, V., P.J.de Jong, J. & Vanhaverbekec, W., 2009. Open innovationinSMEs:Trends,motivesandmanagementchallenges. *Technovation,* Volume 29, pp. 423-437.

Yin, R. K., 2004. *Case Study Research: Design and Methods*. California: Sage Publications.

Yoo, Y., Henfridsson, O. & Lyytinen, K., 2010. The New Organizing Logic of Digital Innovation: An Agenda for

Information Systmes Research. *Information Systmes Research,* 21(4), pp. 724-735.

Yoo, Y., J.Boland, R., & Lyytinen, K. (2006). From Organization Design to Organization Designing. *Organization Science , 17* (2), 215-229.