MANAGING AESTHETICS AS OPEN INNOVATION PRACTICE

(The case study of color and design choice for designed technical products)

Master’s Thesis in Logistics and Innovation Management

Sadia Jabeen

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Abstract
The purpose of this study is to explore and elaborate how firms are managing aesthetic with color and design choice as open innovation practice and explore its applicability in various sectors. Two research questions are addressed:

- How is aesthetics with color and design choices managed by firms using open innovation practices?
- Can aesthetics with color and design choices be managed as open innovation practices for all kinds of technical designed products?

The study is based on a case study combined with survey method which constitutes a combination of quantitative and qualitative research for conducting productive research. In order to analyze and explain the case study as open innovation practice for designed technical products, the 4P model of innovation, open innovation model, product design process, digital prototyping and virtual customer environment are used. The survey was used for analyzing the question on generalization for all other designed technical products.

The study shows that some mobile firms are using “theme creator”, software for themes that is used for inside aesthetics of designed technical products with customer collaboration and participation. Sony Ericsson is one firm that is establishing activities for outlook aesthetics and inside aesthetics with color and design choice for its designed technical product (mobile). These activities are interpreted as open innovation practices conducted in virtual customer environment by Sony Ericsson. The survey result shows the customer’s willingness for participation and customer’s demand for the change in color and design of designed technical products by their own choice. When combining the case study and survey results it is concluded that color and design choice is required to improve aesthetics for designed technical products.

Terms used: Innovation, innovation management, open innovation, product design, designed products, digital prototyping, aesthetics, color choice, design choice and virtual customer environment.
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1. Introduction

Few years ago a new concept of open innovation was introduced by Henry Chesbrough that turned the table of all business worlds. The concept of open innovation describes that open innovation is the use of goal-directed “inflows and outflows of knowledge” to “speed up the internal innovation and extend the markets for external use of innovation” (Henry, Chesbrough 2006). All Major companies, research centers and even innovation centers of universities have warmly welcomed this concept. The core concept of open innovation is to share and negotiate all used and unused ideas and technologies from one firm or resource to other firm or resource for more productivity. The “open innovation” concept is rapidly adopted by firms for getting competitive advantage and getting more “values creation and value capture” (ibid.). Firms are managing open innovation for their product, services and strategies according to standards in their innovation centers or departments. Open innovation deals with R&D departments as an “open system” (ibid.). Almost all major & developing firms have established their R&D departments to meet the market demands regarding creativity and innovation. There is tough competition between all major or developing firms to increase their market share for innovation management. Firms have also managed open innovation in the area of product design for sharing ideas with other resources and customers for better product design. Every type of product is influenced by innovative and creative touch. Product design itself is a vast field; it basically has several steps, phases or stages involved in it from mind to market travel. Firms are using digital software very frequently for the purpose of time and cost saving for their product design. As open innovation is also blended with open source procedures for software development (ibid.), firms are spinning their product design process around it. The aesthetic part of technical product in product designing process is being managed with fixed colors. Specific companies are managing aesthetics for technical products with color and design choices as open innovation practice but for “designed products”.

2. Literature review

Innovation is concerned with three main themes for ideas; ideas generating, ideas selecting and ideas implementing (John Bessant and et al, 2007 page 10). “Resources (people, equipment, knowledge, money, etc.)” and organizational capabilities are two key factors of innovation success (ibid).

Innovation can be successfully managed due to understanding of what we try to manage, how to adopt and configure it for going on, what, why and when to accomplish and letting it in practice (ibid).

Co-creation is a strategy used for mutual coordination of firm-customer value in business or in market. Value is co-created by the customer and the firm. Customer’s satisfaction can no longer be based on yes/no choice or what firm provides (C. K. Prahalad and et al 2004). This concept at first was used by C. K. Prahalad and et al in 2004 in Harvard business School article and further in their book. This term was used for involving customers in product design in early 2000s. Customer co-creation is more focused by designers rather than focusing on only product and service design as a business (Sam Lucente, 2006). Many authors wrote about customer collaboration and involvement after more innovations due to the concept of co-creation. “Open Innovation” concept by Henry Chesbrough is one of them (Henry Chesbrough, 2006). Open innovation is a paradigm that presumes that firms or firms “should” use and exchange external and internal ideas and “internal and external paths” to market (Henry Chesbrough, 2006). Open innovation provides “the domain of open source software” (ibid) that led towards technology
sharing and software sharing for creativity and ideas. This idea sharing can be for Product design as value creation “for which the internet and relevant software tools enable collaborative production across time and space” (ibid). Now firms are managing open innovation as part of innovation management. Firms are managing open innovation in every aspect of innovation management even related to product design. Product design process deals idea generation, concept development, manufacturing, testing and implementation of a physical object or service. Product design is a process of product design making, modeling the design, prototype development; developmental testing for new or existing products. Aesthetics is used to beautify any object or structure by the use of color, design or style. I have focused on color and design choices in aesthetic part of designed technical products for describing open innovation practices. “Technical activity and aesthetic activity constitute two fundamental modes of the praxis, discernible yet not always distinct, and often interdependent”. In new stone age even pottery was made with the combination of aesthetics and making process but today “the problem of industrial aesthetics” raised as “in its own manner does the potter conceive his vase in the same sense as an engineer determines a bridge or an automobile”(Mikel Dufrenne, 1964). Two aspects are open for consideration; aesthetic and technical or engineering design for product designs (Mikel Dufrenne, 1964). Design and manufacturing technology for products has boosted quickly during previous 20 years. For today and for future “the main issue will be the transition of responsibilities between engineers, as prototype engineers become far more involved with the design development. This will be similar for design engineers who become far more involved with digital prototyping” (“Strategic Direction”, 2003). A combination of aesthetics and technical aspect for product design give us “an aesthetic dimension to consumer goods” (Bernard Cova and et al, 2002). Production of images is turned by prioritized activities of many corporations instead of focusing on the production of material objects (Peter Dobers and et al, 2005). “The development of commercially viable new products requires that technological and market possibilities are linked effectively in the product’s design”. The commercial success of a new product depends on how well the product’s design meets customer needs” (Rothwell et al, 1974; Lilien & Yoon, 1988), (Deborah Dougherty 1992). An effective product design necessitates the technological and market aspects with collaboration of consumers (Deborah Dougherty 1992) but the aesthetic part of technical products is being ignored in product design. Infect industrial product appearance has an influence on product performance and price. There is need to pay attention on aesthetics of technical products because attention given to product aesthetics have a reward in the form of sales performance. “The impact of product appearance affects people in different organizational functions, across a range of technical orientations (ibid.). A gap is found that as “the appearance of a product influences consumer product choice” (Marielle E.H.Creusen and et al), the aesthetic part by the reference of multiple colors choice and multiple varieties of outlook design for technical products with customer collaboration is being ignored in product design process. Specific colors are used. Technical products are being aesthetisized but with fixed colors black, grey, silver, white and off white for technical products. Customers and users do not have the chance to directly share their color and design choices for aesthetisizing the products. Only specific firms are aesthetisizing their technical designed products while sharing creative ideas with color choice for aesthetic part of technical product for already “designed technical products”. I have focused on color and design choice for aesthetic part of technical products because color and design are used for all products. There is need to highlight the specific firm’s practices of open innovation as a base for more software development for color and design choice for other technical products. “Design is the most powerful tool” (Gary W. Meyer, 2000) for product design. Design “can be categorized as a goal-oriented, constrained, decision making, exploration and learning activity”
(John S. Gero, 1990) for product design. Colors are used for attractive design in product design. Colors motivate and attract the customer’s interest and further enhance the “appeal powers for products” (Debby Funk et al, 2006). Colors have emotional impact on customers and users of the products. Designs are used “to market faster and at lower cost” for products (Stefan Thomke, 2001). Design makes older competitors instantly obsolete and makes later competitors to follow it (Peter H. Bloch, 1995). The color choice and outlook design features of a product are focused in product conceptual stage, and then processed in other stages of product design by setting prototypes relevant to it. These prototypes are then tested and product is sent to manufacturing. Color choice and Design prototypes are “used to represent design” (John S. Gero, 1990) in product design process. The route to the “perfect” design is now through digital prototyping; defined as a computer model that can be processed and manipulated in exactly the same way as a physical model (Brain Rooks, 1998).

Firms are engaging product design process with inside resources of the firm as well as outside resources in all stages of product design or redesign process by sharing creative ideas in open innovation by digital prototyping. But for designed products few firms are managing design creativity with color and design choice for aesthetic part of designed technical product in open innovation. More involvement in color and design leads towards more creativity (Linda Candy et al) and innovation for products. Different interfaces (Face book etc.) and networks are used to share creative ideas but as text. For visualized sharing of color and design choice specifically for “designed product” is not commonly being practiced by every firm. Designers “view and interact with the digital prototype using a variety of interfaces”, including different software. Digital prototyping is a major and effective tool for shortening the product lead time. Decisions on design changes and improvements are made in minutes and hours rather than the days and weeks. Digital design prototyping helps to “boost capacity for experimenting with alternative design concepts”, (Stefan Thomke, 2001) for product design. It is considered as “backbone of product development” process (Stefan Thomke, 2001).

In this way they are providing visualize digital prototyping solutions for creativity sharing to aesthetisizing the products in open innovation by their own made software with customer for the look and feel of the product. The reason of it is that “the visual appearance of the phone had a positive effect on performance, leading to reduced task completion times for the attractive model” (Andreas Sonderegger, Juergen Sauer, 2010). That is why through “Theme creator” and by providing virtual customer environment these firms have involved and invited customers and users of product to choose color and design of their own choice. Through theme creator technical products are being aesthetisized while visualizing them in open innovation.

A gap as few theoretical works for managing aesthetics in open innovation practices is found. To address these gaps in the literature, it is required to conduct a research so that other firms could get benefit by firm’s experience or ideas for more open innovation practices. As Henry Chesbrough also explains about the need for future research required for open innovations:

“An important area of future research is thus to understand the incentives within the firm for generating the new discoveries and inventions that will supply the ’seed corn’ for future innovation activities” (Henry Chesbrough, 2006).

2.1. **Theory gap summary**

These gaps while reviewing the literature were found as the base for research.

1. Few theoretical descriptions are found for managing aesthetic in open innovation with color and design choices for designed technical products.

2. Gap is discovered that should all other technical “designed products” also manage aesthetics in open innovation with color and design choices.
3. Purpose
The purpose of this study is to explore and elaborate how firms are managing aesthetic with color and design choice as open innovation practice. It will be analyzed that should all other technical “designed products” also manage aesthetics in open innovation with color and design choices.

4. Research Questions
1. How is aesthetics with color and design choices managed by firms using open innovation practices?
2. Can aesthetics with color and design choices be managed as open innovation practices for all kinds of technical designed products?

5. Methodology

5.1. Research
Research means what is searched before; research it for finding the facts and theories for present and future use. Or what exists before finding it, exploring it, and providing the ways for discoveries and innovations for present and future. Research is basically a way for finding the correct direction of accurate knowledge and facts, either scientific or theoretical. Research is a way to find new facts and directions for any discipline or knowledge”. “Research is a scientific inquiry” (Heritage Dictionary). According to business dictionary “Research is for discovering facts according to specific criteria and standard” (Business Dictionary). Research methodology provides the best ways to solve the Phenomenon or to test the hypothesis. “The research design provides planning or a framework for data collection and its analysis” (AvPervez N and et al). Research is a combination of experience and reasoning, “deductive reasoning, inductive reasoning, deductive and inductive reasoning”, with correction while using scientific methods” (Walliman, N., 2001).

5.2. Nature of research---objectivist or subjectivist approach
Nature of research depends on the purpose of research that which one approach is involved and is related to hypothesis. Because statement of hypothesis directs which approach is related and required for research, both are significant. Actually these are philosophical standpoints that directs which might be suitable way for our research (ibid.).

Subjectivist approach: The philosophical base of subjectivist is idealism. Purposeful relationship and finding their result for actions are used in research. Qualitative methods are used (ibid.).

Objectivist approach: The philosophic base of Objectivist is realism. Experimental and semi experimental validation of theories are used for research. Quantitative and mathematical models are used as methodology for research (ibid.).

Couple of both:
Although it is difficult to join both approaches at one place but I will prefer couple of both as “It is probably difficult to combine the two approaches in one study, unless the intention is to provide two completely different perspectives of the research problem, or the research problem
divides itself into very different sub-problems each of which demands a different approach”. And the “Combination would be more productive” (ibid.).

Approach used for this proposed study is subjectivist and objectivistic having qualitative and quantitative blends for conducting productive research.

**Subjectivist approach for qualitative research** is being employed through an exploratory case study method for this research. Qualitative research searches the answers how and why questions (Saunders et al., 2003) and the answers searching for these questions let us to use a case study for our proposed study. Exploratory research based case study method is used for this proposed study. Objectivist approach for quantitative research is being employed by combining survey with case study for this research.

The explanation about exploratory research and exploratory case study used for this research is explained below:

### 5.3. Exploratory research

Exploratory research is used to explore the hidden phenomena that are not discovered for research. In exploratory research “research problems may be more or less understood. There is no reason not to use available a priori information as the detective does, so too may the researcher have suspects and this is often the case” proposed for any area of study. Skills required for exploratory research are “ability to observe, get information, and construct explanation that is theorizing” (AvPervez N and et al). For this proposed research work as research problem is more or less understood so available a priori information as a detective is being suspected by the case study. The abilities to observe, getting information and constructing explanation are being used for compiling this research.

### 5.4. Case study

“The case study is the method used where phenomena is not clear from its context. Case study method is used as a choice where the studied phenomenon is not promptly distinct from its context. Such studied phenomenon can be a project or program in an evaluation study. This can be applied also where sometimes the definition of the studied phenomenon is problematic, as for deciding when the “activity started or ended” (Yin, 1982), (Yin et al, 1979). Case study method is an essential part of research for management and social sciences, business, organizational issues, education, international affairs, technology development and research on social problems (Yin 1994 cited by Sylvie Chetty, 1996).

As the phenomenon of this research is not clear from its context, the case study method is used as a choice. This research work is an evaluation study where phenomenon is problematic and needed to explain by case study.

### 5.5. Exploratory case study

“An exploratory case study (whether based on single or multiple cases) is aimed at defining the questions and hypotheses of subsequent study (not necessarily a case study or at determining the feasibility of the desired research procedures”. “Specifying what is being explored when you are doing exploratory case studies” (Yin, 1981 c.Yin1982; Yin et al., 1979)”. In this type of case study “field work and data collection are undertaken prior to the final definition of study questions and hypotheses” (Yin, 1981 c.Yin1982; Yin et al., 1979)”. “An illustrative use of the exploratory case study occurred as part of a study on how innovations in urban services become reutilized (Yin, 1981 c.Yin1982; Yin et al., 1979)”. For this research
field work as survey and data collection as case study and other information are undertaken prior to the final definition of study questions and hypothesis of this research.

5.6. **Case study combined with survey**

Case Study combined with survey will be used for validity, generalizability and reliability for the use of aesthetics with color and design choice for other designed technical products in open innovation. Attewell and Rule (1991) highlight the importance of survey combined with case study as “Complementarity between survey and fieldwork approaches”, are stating that "each is incomplete without the other" (Gable, G.G., 1994).

“By combining survey techniques with exploratory case study research, we can combine quantitative and qualitative data for a better understanding…. such multidimensional understanding is necessary as a foundation for ongoing longitudinal studies and hypotheses generation” (Simpson Poon and et al, 1998). “Yet, research designs that extensively integrate both fields work (e.g. case studies) and survey research is rare”. Gable, Guy G. (1994) has described and articulated the usage of combined case study with survey method by a research example for showing its worth as this combination was not appreciated well before. So, for conducting more productive research exploratory case study is combined with survey method for finding an exploring the facts for studied phenomenon for this research. Snowball sampling that is used for gathering data from acquaintances or hidden population which are hard for researcher to get is being employed for conducting survey. (Goodman, L.A. 1961)

5.7. **Sources of data**

5.7.1. **Primary source of data**

Primary sources are sources of data that can be get directly, assorted observation or data gained by measuring the phenomena in the real world, un molested by any intermediary representative. (Walliman, N., 2001). “Data from primary sources can be in the inanimate form of instrumental readings, results of counting and measuring, physical artifacts etc., or in the animate form such as reports of direct observations of events or conditions, or recordings of experiences by those involved” For research reliability, legitimacy and authenticity primary sources are sources used as the “defense of the quality of the sources” in research (ibid).

For proposed study results collected from survey data will be considered as primary source of data.

5.7.2. **Secondary sources of data**

Secondary sources are sources of data that is interpreted and is not gained from direct sources. The commonly used secondary sources for data collection are “writings in books, newspaper reports, articles and other publications”. Secondary sources are not original sources and “do not have a direct physical relationship to the event being studied”. They are usually having no reliability due to errors when information is being transferred from one person to other.

“However, they can be valuable in their own right in providing a partial commentary on the events by revealing the different viewpoints and cultural/social background of the sources” (ibid).

Secondary source of data from books, article Journals, internet resources, organizational information resources and firm’s original websites are being used for proposed study.
5.8. **Validity**
Validity for a research depends upon the true data used and exact generalizations made through experiments with controlled variables. “The quality of data gained from true experimental design should genuinely reflect the influence of the controlled variables and should enable generalizations to be made beyond the immediate experimental situation” (ibid). The validity of the case study as open innovation practices will be determined according to open innovation paradigm.

5.9. **Reliability**
Reliability deals with the concern that can study be repeated with same outcomes and findings (Yin, 2003). For this research work as open innovation paradigm is a mental model of innovation, exploratory case studies that proves its practices as open innovation practices according to open innovation model will show same results and findings. The reliability can be possible to some extent by using same survey but with possible outcomes and findings.

5.10. **Generalizability**
For Generalizability “research reveals a similar pattern of events in a number of empirical Studies”. It can be an outcome of several empirical studies and can be directly measurable. Generalizability depends on if the outcome of research can be “valid relationships between the particular cases investigated by researcher and the general situation in the world at large” (Walliman, N., 2001). For generalizability of exploratory case study a survey is being conducted.

6. **Theoretical Framework**

6.1. **Innovation and innovation management**
Innovation has three main themes:
- Generating new ideas
- Selecting the good ones
- Implementing them

Success of innovation depends on resources (people, equipment, knowledge, money etc) and the capabilities to manage them in organizations.

For successful management of innovation Bessant and Tidd (2005) suggest:
- Understand “what” is being tried to manage
- Understand the “how” related to creating conditions to make it out.
- Understand the what, why and when related to innovation activities for setting strategies
- Understand that it is a running objective by establishing a dynamic capability

Concern and interest of firms for innovation is described as below (Bessant and Tidd, 2005):

**P&G**: “We are continuing to drive P&G business with breakthrough innovations and excellent in market execution. This Positions….P&G to deliver its growth Objectives in fiscal years 2007
and beyond (A.G. LafLey, Chairman, President and CEO, Procter and Gamble, reporting on 5 years of sustained growth) (ibid.)

**CEO:** General electronics: “We are measuring GE’s top leaders on how imaginative they are the ones who have the courage to find new ideas, lend teams to discover better ideas and lead people to take more educated risks (J. Immelt, Chairman and CEO, General Electric) (ibid.).

**Microsoft:** “we are always saying to ourselves….we have to innovate. We have got to come up with that breakthrough (Bill Gates, Microsoft) (ibid.).

**Apple:** “Innovation distinguishes between a leader and a follower (Steve Jobs, Apple).

**CEO, John Deere:** “John Deere’s ability to keep inventing new products that are useful to customer is still the key to the firm’s growth (Robert Lane, CEO John Deere) (Bessant and Tidd, 2005) (ibid.).

Mobile phones, PDAs, and other devices are revolutionized by exploiting radical breakthrough in technology (ibid.).

### 6.1.1. 4P model of innovation

Four dimensions of change in innovation as 4P’s of innovation by Bessant and Tidd are:

**Product innovation:** Changes in the things (products/services) which an organization offers;

**Process innovation:** Changes in the ways in which things (products/services) are created and delivered;

**Position innovation:** Changes in the context in which the products/service are introduced;

**Paradigm innovation:** Changes that are in underlying mental models frame what the organization does” (ibid.).

![Figure 1.4P model of innovation (ibid.)](image-url)
6.1.2. **Paradigm innovation**
Paradigm innovation involves with the in changes mental models. Paradigm innovation can be sparked off by “new technologies, the emergence of new markets with different value expectations, new legal rules of the game, new environmental conditions (climate change, energy crises)”, (Bessant and Tidd, 2005) the emergence of internet technologies, new software developments, nanotechnology and genetic engineering etc.

6.2. **Open innovation paradigm**
Open innovation paradigm is a “paradigm innovation”. It is related to change in the mental model as from “closed innovation model” to” open innovation model” (Chesbrough Henry, 2006). The “Open Innovation paradigm can be understood as the antithesis of the traditional vertical integration model where internal research and development (R&D) activities lead to internally developed products that are then distributed by the firm” (ibid.). “If pressed to express its definition in a single sentence, Open Innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively” (ibid.).

6.2.1. **Definition**
“Open innovation open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectfully” (ibid.). Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and external and internal paths to market, as they look to advance their technology. “Open innovation assumes that internal ideas can also be taken to market through external channels, outside the current businesses of the firm, to generate additional values” (ibid.). The open innovation paradigm deals with R&D as open innovation system. Open innovation proposes that valuable ideas can “come from inside or outside the firm and can go to the market from inside and outside the firm as well” (ibid.). This approach values external ideas and external paths to market providing equal importance as is given to internal ideas and internal paths to market before (ibid.).

6.2.2. **Open innovation for software developments**
“Open innovation is sometimes conflated with open source methodologies for software development. There are some concepts that are shared between the two, such as the idea of greater external sources of information to create value” (ibid.).

6.2.3. **Model of open innovation management**
Business models should have two core functions: it can create value, and can capture a portion of that value. This function required the firm can yield a new product and service from a series of activities (from raw materials through to the final customers), the second function has a requirement of establishing of a unique resource, asset or position within that series of activities in which the firms get a competitive advantage (ibid.).

6.2.3.1. **Closed model**
In this model ideas come from science and technology and through the funnel of R&D as new products are turned to markets. This is basically a classic technology push model.
6.2.3.2. **Open innovation model**

In this model, ideas come from inside and outside for new. Current and other markets through licensing or spin-off processes. This model is open for idea coming in and coming out. The examples are of IBM, Intel, and P&G. One firm creates a new idea but does not make it into practice, the firm sells the idea to any other organization, which can make better use of it. To get the most out of this new system of innovation, firms must open their business models by finding new ideas from external parts and allowing unused internal technologies to flow to the outside (ibid.).

6.2.3.3. **The difference between two models**

The differences between both models are that the forces of choosing open business models—rising cost and shorter times are the two internal differences why firms adopt open innovation in innovation. It is prevailing in many industries that rising the cost of technology development. This factor implies that only big firms can get bigger, with someone else falling behind. But there is another force we should care about: the shortening life cycles of new products. For instance, Ravinder Zutshi (the top manager of Samsung in India) said the life cycle of any electronic product is shorter than 12 months now. As a result of both forces—rising research
and development costs and shorter product life cycles, firms found it more difficult to only invest in innovation. Open business models can do effects on the two factors. It affects the cost problem by leveraging external research and development resources to save time and money in the innovation process. The open business models also help the firm revenue (ibid.). The firms which are following it are: P&G, KRAFT, GOOGLE, IBM, ITEL and 3M. The firms who are using open model are getting more benefits by reducing the **R&D cost** (ibid.).

**6.3. Aesthetics with design and color choice**

*Aesthetic is a* philosophical term used for the beauty, art and taste with the appreciation of creative activities of beauty. Aesthetics with creativity produces wonders of art and beauty in products.

**Design** is a concise decision making process of information (idea) and implementation with tangible (products) and intangible (service) result (Bettina Von Stamm, 2008). “Design is, for instance, defined by the Swedish Industrial Design Foundation as ‘a process of developing purposeful and innovative solutions that embody functional and aesthetic demands based on the needs of the intended user. Design is applied in the development of goods, services, processes, messages and environments’” (www.svid.se1). “Good design is about looking at everyday things with new eyes and working out and how they can be made better” (James Dysson, 1999). The design is used to make product attractive by “look and appearance” (Peter Dobers and et al, 2005).

**Colors:**

For outlook design of products color plays an important role for making products attractive and appealing. Computerized color pallets are used for outlook product design.RGB and CMY color modes are used for outlook design of products in product designing software. Colors make product more appealing. Colors create “corporate images in customer’s mind for products” (Thomas J. Madden and et al, 2000). Colors also affect customer perception about product and quality of product. (F.J Francis, 2000). Firms focused on customer’s attitude, life style and passion oriented products from 1980s (Adams, 2004) till now. Customers like to choose products according to their own color choice.

**Managing aesthetics in Open Innovation:** with color and design choices has significance important for innovation in products design for making attractive and appealing products. Innovation is managed with collaboration of team work. Leadership role is to provide a creative environment where all members can share their creative views and ideas without fear of acceptation (Joe Violette). Management should check difference in people ideas (Debbe Kennedy). Management should engage people at all levels (Dhruva Trivedy), (Jim Heskett, 2007). For being an innovative organization there is need to understand the “design of an efficient new product development process” rather than just stating the vision and strategy only. In fact “five key areas” are required in organization for innovation.

- Strategy and vision
- Leadership style of organization
- Process and activities
- Support by the tools and offerings of HR department
- Physical work environment, collaboration with people (Bettina Von Stamm, 2008).
The ability to innovate is required for getting competitive advantage for an organization. “An organization can innovate by improving existing products, services, or processes or by generating new products, services, or processes. It is a significant challenge to achieve successful and repeated organizational innovation (Slawsby and et al, 2007).

6.4. Product design/product design process
Product design is a travel from concept to market. Product design is implicated with effective and efficient idea generation and exploitation through a process with the outcome of new product. Product design is a process having different stages. Initial stage of product design involves with idea generation concerning with imagination, observation and research. Need based generation of ideas for solving the problems, for following the trends, for product with specific varieties are being focused in initial stage of Product Design. Design solutions are made at middle stage according to user needs, concept development, forming exploration, ergonomics, prototyping, materials and technology use. Final stage in product design process is related to marketing for selling the product by client based or user based (Morris, R., 2009).

In product design process art, science and technology is combined for making products (ibid.).
“Prototypes are the first model on which others are modeled” (John S. Gero, 1990). Prototypes are basically form, instance of something that could be serve as example, basis, or standard for other things of the same category (Autodesk Firm).

Prototyping can be:
- digital
- high-tech
- low-fidelity

Categories of prototype are:
- Proof of principles prototype: used to test some aspects for proposed product design without simulation, visualization and choice of material
- Form study prototype: used to find out the basic size, look and feel of a product without exact simulation and visualization of product
- Visual prototype: used for aesthetic and simulation of product outlook and appearance with color, surface or texture for the target product.
- Functional prototype: used as practical for simulation of final design, aesthetics, material and functionality of target product design.

Categories of “experience prototyping” can be divided as:
- those that test the "role" of an artifact,
- those that test its "look and feel"
- Those that test its “implementation” (www.wikipedia.com).

6.4.2. Digital prototyping
Digital prototyping is computerized based prototyping used at every stage of production from conceptual design to manufacturing. Through digital prototyping products can be design, visualize and simulate digitally by saving cost and time (Autodesk firm news, 2010).

6.5. Digital prototyping software used for product design
Software is used for product design process for saving cost and time at all stages. The software of Autodesk Firm is being used for product design. Latest version of software for product design process is Autodesk 2010, which has all stages of product design process at one place with digital prototyping solution. We can design, visualize and simulate all stages of product design through this software. Through digital prototyping software manufacturer can design, visualize and simulate the product at every stage of product development form conceptual design and engineering through manufacturing and marketing (ibid.). Firms can get more innovative products to market faster and can provide better services to client to compete effectively with time and cost saving. More solutions for digital prototyping are available for product design like 3D, CAD, Auto CAD series of software alias design, and sketch book pro2010 etc. (ibid.). For telecommunication industries “innovative model-based design and 2D and 3D mapping and management tools redefine the integration of design—improving efficiency, response, and time and customer satisfaction” (ibid.). Digital prototyping software used in telecommunication industries provided for product design by Autodesk Firm is:
I. AutoCAD Map 3D
II. Autodesk Design Review
III. Autodesk Collaborative Project Management
IV. Auto Guide Enterprise
7. **Description/Overview/Results/findings**

The Sony Ericsson is being focused for studying the case.

7.1. **Sony Ericsson firm: vision**

Sony Ericsson as a joint venture was established in October 2001 (www.sonyericsson.com). The vision of Sony Ericsson is to “become the communication entertainment brand”. Sony Ericsson has the vision to provide inspiration for people to do much than to mere communication. It says, “We enable everyone to create and participate in entertainment experiences…that blur the lines between communication and entertainment” (www.sonyericsson.com). The vision of Sony Ericsson is to focus on these areas:

7.1.1. **Sustainability**
- Conscious design
- Ethics
- Energy
- Recycling
- Health
- Community Involvement (ibid.).

7.1.2. **Careers**
- “Employing and retaining” innovative people
- Providing the environment people need to flourish
- Providing applying opportunity to join its “valued team” and for advancement of career (ibid.).

7.1.3. **Press Room**
- Providing Browsing and searching facility for its latest press releases, images and video libraries, archive
- Providing facility to receive news releases “via email” (ibid.).

7.2. **Firm profile**

In 2001 the telecommunication firm Ericsson and consumer electronics firm Sony Corporation formed Sony Ericsson Mobile Communication (ibid.). Ericsson and Sony have equal shares in Sony Ericsson; the newly formed firm launched its first product in March 2002. Sony Ericsson offers a wide range of products globally making best use of latest mobile communication technologies i.e. 2G/3G platforms both for mobile operators and end users. Sony Ericsson handsets are blend of latest technology with innovative applications for music, communication and entertainment. It also provides mobile multimedia devices and accessories (ibid.).

7.3. **Sony Ericsson’s strategy for innovation**

For innovation Sony Ericsson is providing communication facilities with entertainment. Its vision about innovation is “to be Communication Entertainment brand that enables anyone to create and participate in unique entertainment experience” (ibid.).
7.4. **Sony Ericsson’s strategy for open innovation**

Sony Ericsson provides open innovation opportunity to customer and other companies. It provides free opportunity to listen and share the ideas as it says “if your firm has an innovative product or service that could be part of our vision and products, we want to hear from you” (Industry Collaboration Team; Corporate Technology Office) (ibid.).

**Sony Ericsson strategy’s for Design innovation**

For Sony Ericsson Firm design is for good looking products. “It is integrated into every step of the process-intelligent features, user-friendly applications, and innovative materials and, of course, attractive visual appearance Design is the essential differentiator when comparing mobile communications products” (www.sonyericsson.com)

Sony Ericsson focuses on these aspects for making attractive designs (ibid.).

- Design could trigger all the senses of customer
- Could communicate both rationally/intellectually and emotionally
- Focusing on logical thinking
- Keeping “usability” as a fundamental factor in design
- Making innovative and explorative designs for appealing to emotions
- “Fashion, market and consumer product and technology trends are continuously monitored” (ibid.).
- Industrial designer working with human interface designers, color and material designers and graphic designers as “they inspire, influence and are reflected in all elements of our design. From the birth of an idea until the launch of the product, designers participate all the way” (ibid.).
- **Industrial designer**: are developing the underlying shape of the product
- **Human interface designers**: are for choosing graphical themes, icons and wallpaper for the screens.
- **Color and material designers**: work with the texture, materials and colors (ibid.).
- **Graphic designers**: creating graphical material and working for packaging (ibid.).
- A lot of designers working on every project (ibid.).
- All designers are part of a team who “collaborate to break new ground in design” (ibid.).

“We aim to be always a half-step ahead of the consumer, so that they can relate to our ideas and be inspired by them” (ibid).

7.5. **Sony Ericsson managing open innovation practices**

Sony Ericsson is managing open innovation by Sony Ericsson developer world, Labs, under “community “tab on Sony Ericsson website. More than 287 idea sharing sources like Face book and twitter etc. It has opportunity to view latest news of Sony Ericsson by adding to “sign up for news” tab on Sony Ericsson website. It has “press resources” tab also for sharing and viewing news and ideas. For technology innovation Sony Ericsson also works with new suppliers through a process. It sells millions of phones worldwide. It also provides full support not only for queries but also sharing creativity with innovation and creative ideas with customers. It provides “play now tab” for customers to share their creativity for games, applications, music, ringtones, themes, wallpapers by providing relevant software facility for downloading and working with it. It also conducts survey for knowing customers opinions (ibid.).
7.6. Case studies for aesthetics of designed technical product

Case studies:
Case studies of Sony Ericsson are being described within two directions.
   a. Sony Ericsson: Managing aesthetics with color choice and design creativity for inside the designed technical product.
   b. Sony Ericsson: Managing aesthetics with color choice and design creativity for outlook of the designed technical product.

The case here is being described by the use of visualized work done for aesthetics with color choice and design creativity for designed products in open innovation as open innovation practice.

7.6.1. Sony Ericsson: Managing aesthetics with creativity for inside the designed technical product.

“Sony Ericsson Themes Creator to Easily Create Sony Ericsson Themes”, this is news reported by “techblissonline.com” on April 28, 2009 by Sony Ericsson while stating these details about software and its use (www.techblissonline.com). Firm is offering color and design choices in open innovation through theme creator (software) for inside aesthetics of designed technical product; mobile. The purpose of this software is to create themes for aesthetics that is used inside the mobile making it more attractive and user friendly. The firms which are using theme creator are:
   a. I phone
   b. Nokia
   c. Sonny Ericsson
   d. Samsung

Case study of Sony Ericsson is being described for inside aesthetics with color choice and design creativity of technical design product mobile. Sony Ericsson is managing color and design creativity for technical product mobile by using digital software named Theme Creator. Software used for it is theme creator. “The Sony Ericsson Themes Creator tool is a “composer” that allows you to personalize the look and feel of any Sony Ericsson mobile phone by quickly creating great-looking themes based on existing components such as color palettes, sound files, image files or animations” (www.sonyericsson-com). Slogan used for it are :“Spice your mobile”, “Want to make your phone your own: try our theme creator” (www.techblissonline.com/sony-ericsson-themes-creator).

Customer can resize, zoom and crop the image with the latest Themes Creator. It has built in image editor that gives customer more control. Customers can play with colors:
It provides endless possibilities of color choice by color wheel for customer for their designs. Customer can pick their own choice based colors. Customers can pick every color by pick color tool from any image they like.

Sony Ericsson also manages visualized guidance within steps for customers as how to use that theme creator. Step by step guidance for customers is as below:

**step1:** “Take a picture with your phone”, (ibid.).

**step2:** “Hook your phone up to your PC or Mac via USB or Bluetooth”, (ibid.).

**step3:** “Transfer your picture to Themes Creator and choose one of the background screens”, (ibid.).

**Step4:** “Pick a color automatically - or find your own”, (ibid.).

**Step5:** “Settle on your style”, (ibid.).

**Step6:** “Export the final theme back to your phone”, (ibid.).

It Validate the design weather it is valid or not like prototype testing before saving and publishing. The work done by customers is organized by categories on official website of Sony Ericsson under “play now” tab. Some themes are free and some have their price to buy. Customer’s chosen colors and designs as themes for inside use of mobile are (ibid.).
**Figure 10.** Themes created by customers

*Themes classified as “Genre” are* (ibid.):  

<table>
<thead>
<tr>
<th>Christmas</th>
<th>Halloween</th>
<th>Animals</th>
<th>Animated</th>
<th>Art &amp; Design</th>
<th>Artists &amp; Celebrities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia</td>
<td>Auto &amp; Vehicles &amp; Autumn</td>
<td>Bling &amp; Cool Stuff</td>
<td>Cartoons</td>
<td>Chinese Year</td>
<td></td>
</tr>
<tr>
<td>Cute</td>
<td>Daily Doses</td>
<td>Disney</td>
<td>Easter</td>
<td>Fantasy &amp; Sci-Fi</td>
<td>Flag</td>
</tr>
<tr>
<td>Flash Themes</td>
<td>Flower &amp; Butterflies &amp; Fun</td>
<td>Logos &amp; Brands</td>
<td>Love</td>
<td>Movie &amp; TV</td>
<td></td>
</tr>
<tr>
<td>Music</td>
<td>Nature</td>
<td>New Year</td>
<td>Oktoberfest</td>
<td>Other</td>
<td>Scary</td>
</tr>
<tr>
<td>Signals &amp; Symbols</td>
<td>Sony Ericsson</td>
<td>Spiritual</td>
<td>Sport</td>
<td>Spring</td>
<td>Summer</td>
</tr>
<tr>
<td>Thanksgiving</td>
<td>The Greeks</td>
<td>The Goob</td>
<td>Themes plus</td>
<td>Urban</td>
<td>Valentine’s Day</td>
</tr>
<tr>
<td>Winter</td>
<td>Zodiac</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Genre

*Ten most popular Themes are* (ibid.):  

<table>
<thead>
<tr>
<th>England</th>
<th>Butterfly Cherry</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Footballs</td>
<td>Pink Flower</td>
</tr>
<tr>
<td>Zebra Heart</td>
<td>Tom and Jerry</td>
</tr>
<tr>
<td>Matrix Hand</td>
<td>Muttley</td>
</tr>
<tr>
<td>Neon Cherries</td>
<td>Sparkles</td>
</tr>
</tbody>
</table>

Table 2. Most popular themes
Ten Free Available Items are (ibid.).

<table>
<thead>
<tr>
<th>Country</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>Shattered Glass</td>
</tr>
<tr>
<td>Mini Theme!</td>
<td>Walkman</td>
</tr>
<tr>
<td>Violos</td>
<td>Spain</td>
</tr>
<tr>
<td>Pianos</td>
<td>Italy</td>
</tr>
<tr>
<td>Brazil</td>
<td>Flats</td>
</tr>
</tbody>
</table>

Table 3. Ten Free Available Items

This opportunity is provided for participants from UK, Chinese Mainland (AW), Chinese but Simsun from China and Asia Pacific Only.

7.6.2. Sony Ericsson: Managing aesthetics with creativity for outside/outlook/cover the designed technical product.

Case study for outlook aesthetics with color choice and design creativity for technical product is as below:

Sony Ericsson used the slogan for campaign designing for starting the color choice and design creativity for aesthetics of designed technical product mobile as: “I love to color my life………”create your cover”. It was made for open innovation practice. Sony Ericsson has managed the offering of color and design choice for one mobile W508. (www.sonyericsson.com/mine)

![Figure 11. Mini website (Mine) Sony Ericsson (ibid.)](image)

The firm has provided a template in virtual environment for customers to change the color and design of mobile cover by their own choice. Template provided for color and design creativity is shown below (ibid.).
Customers were also provided the opportunity to upload an image for outlook design for aesthetics of this technical product mobile (ibid.).

Sony Ericsson had conducted a contest between the customers with prize of headphone for winning customer. A lot of customers participated from all selected countries with great zeal. This contest is ended now. Next contest will start later. Some samples of customer’s sent designs and the winner design are given below (ibid.):

The customers still have opportunity to choose the color and design of technical product “mobile” in a virtual customer environment by their own choice. On the mini website of Sony Ericsson; customers have opportunity to have a space for making a cover for mobile by being login to that site. Customer can send their chosen color and design to Sony Ericsson firm and Sony Ericsson firm can send them W508 with their own designed cover for technical product, mobile (ibid.).

For bying the w508 with customer’s own designed outlook or cover, customer has to go to other link, which is the link of “style up cover” website licensed by Sony Ericsson. Licensing for open innovation is also been arranged in open innovation practice (ibid.).
Choosing color and design for mobile skin, outlook or cover provides design ideas sharing opportunity not only between firm to customer but between customer to customer also (ibid.).

Sony Ericsson provides opportunity for customers to share any kind of ideas sharing with it. Customers can watch the previous designs; latest designs least popular and most popular designs (ibid.).

Gallery result sorted by other country’s rating is still disabled. It shows the work needs to be done and it is in process yet. But the sorting of color and design choices for anesthetizing the technical product is available to “compare” the selected design form given list of countries (ibid.).

Countries that are provided opportunity for opinions and comparison by voting for selected design are given below. There are 48 entries found on per page (ibid.).
Figure 20. Global and countries wise participation for comparing the designed cover

<table>
<thead>
<tr>
<th>Countries</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. América Central</td>
<td>2. Denmark</td>
</tr>
<tr>
<td>3. Belgium</td>
<td>4. Finland</td>
</tr>
<tr>
<td>5. El Salvador</td>
<td>6. Germany</td>
</tr>
<tr>
<td>7. Bolivia</td>
<td>8. Indonesia</td>
</tr>
<tr>
<td>9. Chile</td>
<td>10. Italy</td>
</tr>
<tr>
<td>11. Colombia</td>
<td>12. Middle Eastern</td>
</tr>
<tr>
<td>15. Hungary</td>
<td>16. Russia</td>
</tr>
<tr>
<td>17. Peru</td>
<td>18. Slovakia</td>
</tr>
<tr>
<td>19. Paraguay</td>
<td>20. Spain</td>
</tr>
<tr>
<td>21. Uruguay</td>
<td>22. Sweden</td>
</tr>
<tr>
<td>23. Venezuela</td>
<td>24. Thailand</td>
</tr>
<tr>
<td>25. Brazil</td>
<td>26. Ukraine</td>
</tr>
<tr>
<td>27. Australia</td>
<td>28. China</td>
</tr>
<tr>
<td>29. Bulgaria</td>
<td>30. Japan</td>
</tr>
<tr>
<td>31. Czech Republic</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Global and countries wise participation (ibid)

7.6.3. “Styleupcover-Licensed with by Sony Ericsson”

“Style up cover” is licensed by Sony Ericsson as “sub costume” title on linked website. The selected designs are kept there for sale. Some most popular designs samples from “Styleupcover” website are (ibid.):

![Sample images of various designs](image)

Figure 21. Themes selected for sale

Genre based classification based e.g., nature, abstract, Seasons, textual, human expression faces, pattern design, texture designs, scary images or designs, car tonic images or designs, animals, birds, flowers, children, females. Most used colors: grey, Pink, Purple, red, for designed outlook/skin/cover is not available yet on websites like of themes.
7.7. Aesthetics for other Technical Products

Should aesthetics with color and design choices be managed in open innovation through digital software and virtual customer environment for all “designed technical products?” an online survey was taken for answering this question.

The survey included 28 questions. Snow ball sampling technique was used to get responses for proposed survey questions. Youngsters from age 18 to 35 were selected as a sample from population of people including males and females. Questions were about showing the customer choice and interest for changing the color and design for aesthetisizing the other technical products. Survey also identified respondent’s choice and preference for colors and designs. Survey highlighted the need of aesthetics for other technical products with color and design choices. The responses of survey show respondent’s satisfaction or dissatisfaction for all existing designed technical products. Respondents were asked about whether they like to change the color and design of their choice in a software and virtual customer environment.

Survey result description:
The survey results indicate that aesthetics in open innovation should be managed with color and design choice for designed technical products. Numerical description of survey result with percentage of data is being described by graphs. Respondent’s responses shown in survey for in use colors for the technical products are:

![Color in Use for Technical Products](image)

Figure 22. Color in use for technical products

Respondent’s response shown in survey for being undecided, agree, strongly agree, disagree, and strongly disagree for changing the color and design of designed technical products are:
Respondent’s response shown in survey for their preferable colors for changing the color and design of designed technical products are:

![Pie chart showing color choice for technical products](image)

**Figure 24.** Survey results related to color choice for technical products

Respondent’s response shown in survey for preferable designs for changing the color and design of designed technical products are:
Respondent’s response shown in survey for their interest in participation for changing the color and design of designed technical products are:

Figure 25. Survey results related to design preferences

Customers Interest for Participation in Color Choice and Design Creativity

Figure 26. Customer interest in participation in color and design creativity

Respondent’s response shown in survey for their interest in participation of virtual customer environment for changing the color and design of designed technical products are:
8. Analysis/discussion

8.1. Analysis related to question no.1

8.1.1. Open Innovation paradigm---innovation paradigm
Multiple dimensions are being used for analyzing the case. Sony Ericsson’s work for aesthetisizing the technical product with color and design choice is a practice of open innovation. Open innovation is a paradigm; (Henry, Chesbrough, 2006) a paradigm innovation that is a mental model. Sony Ericsson’s practice for open innovation paradigm is the activity and practice of innovation at large and comprehensive level by the reference of 4P model of innovation. According to 4 P model, “open innovation paradigm”, is “paradigm innovation”. “Product or service innovation” is the innovation of themes and covers or outlook designs made for mobile, selling and sending those customers created themes and outlook designs to customers. Position is a change of work environment by the collaboration and participation of customers in virtual customer environment. Process is as virtual customer environment for mobile created by Sony Ericsson by the use of theme creator and virtual templates provided for color and design change for outlook of mobile. This activity of Sony Ericsson is ultimately the activity of innovation having open innovation as paradigm innovation for mental model.
8.1.2. **Open innovation practice-analysis with open innovation model**

Open innovation practice-analysis is being explained under the paradigm of open innovation model, where internal technology used is “mobile”, external technology used as “software and virtual templates” by the firm itself. For research and development, software and virtual template with mini website were made for development for color and design choice sharing with customer. Technology Insourcing was established with the software adobe Kuler for colors by “Themes Creator” and “virtual template” provided for color and design change in virtual customer environment by Sony Ericsson. For licensing “Styleupcover” (Sub costume) firm has been licensed by Sony Ericsson for sale and making the covers for mobiles changed by customer’s choice. This Style up cover, Sub Costume Firm also offers to other firms who wished to change the covers for other gadgets like laptops etc. (www.styleupcover.com) when all these internal, external and in sourcing technology is spined-off. Sony Ericsson mini website for cover aesthetics was established through customer’s ideas sharing. For themes a new tab with multiple changes was made on Sony Ericsson website as the outcome of “new” and “other” in open innovation model. For sale and making of outlook covers Styleupcover Firm is also considered as “other” firm while explaining open innovation model. “Current market” is Customer’s creativity sharing for color and design choice for themes and outlook covers and their selling and keeping on websites, mini and main websites of Sony Ericsson. In this Way this activity is being conducted as open innovation practice.
**8.1.3. Product Design vs. Designed Products** *(Analysis with product design model)*

Product design process is a comprehensive process form idea generating to manufacturing and marketing of product. For product redesigning this process is revised with specific software used for specific products. For “designed products” the software used is theme creator and virtual design templates used for changing the outlook covers. This activity is not comprehensive as product design process is. This activity is as the activity of product design’s initial stage that is “idea generation” with imagination but for themes used inside the products and covers used outside the products for modification of existing designed technical product, mobile. Prototyping related to mid stage of product design process is also similar with modification process of designed products. Themes are tested at the backend before saving as prototype, if they are publishable then they can be saved and if they are not publishable the software denies saving it. Software used for product designing process show visualized form of all stages including prototyping. Software used for designed product aesthetics changes also show visualized form of color and design changes made. This prototype is related to look and feel of the product for prototyping techniques used to test aspect of design ideas.
Product design process combines art, technology and science. Activities and process for designed products combine art as color and design choices, technology and science as software development and virtual customer and customer.

The mobile firms named Sony Ericsson, Nokia and Samsung are sharing customer color and design choice for aesthetics used but for inside the mobile product for making themes by their own made themes creator software. Only Sony Ericsson is the firm that is providing an opportunity to customers to share their creativity for color and design choice for aesthetisizing the outlook of designed mobile. In this way two ways for aesthetics with color and design choices are used in open innovation for designed technical products; inside aesthetics and outside aesthetics of mobile. These firms are using their own made software for aesthetics used inside of products that is called theme creator, and providing a digital environment or virtual customer environment by providing a platform for customers to share their color and design choices for aesthetisizing the outlook design of designed products. This platform still does not have any term or name entitled yet.

8.1.4. **Cost factor for implementation**
As the cost of the product is always considered at design stage in product design process and any further change in the design for improvement of designed products can affect the product cost (Brain Rooks, 1998). The cost factor while implementing this software as open innovation practice for outlook design provides us direction for future research work.
8.1.5. The classification of designs
Changes made for outlook cover designs are still in process on the mini website of Sony Ericsson. Categorization of themes has been made on Sony Ericsson main website under themes tab.

8.1.6. Title for virtual template
Virtual Template provided for color and design change has not title yet as “theme creator” software has. The data provided on mini website about customers participation needed to be more organized by sorting designs according to specific categories. More countries should have this opportunity for global customer participation in open innovation practices. Work done by customers also provides design samples as design prototypes for new products also.

8.2. Analysis related to question no.2
Scientific analysis based on survey is explained below:

- In survey question related to already in use colors for the technical products, the most widely used color for technical products is Black (58.06%), the second most widely used color is White (22.58%), percentage of use for other colors are Silver (9.68%), Grey (6.45%), and Offwhite (3.23). Interesting part of the survey is that nobody said that technical products are available in Red, Purple, Ornage, Blue, Golden, Cyan, Green, Yellow, Brown, Golden, Magenta and in other colors.
- The survey results suggests that majority of the customers i.e. 70% (customers percentage who strongly agree with the concept is 6.67% & customers percentage who agree with the concept is 63.33%) are in favor of changing the color and design of existing products. Whereas 20% of the customer is undecided, 3.33% disagree and 6.67% strongly disagree.
- Variety of color choices for technical products have been chosen by the customers in the survey, black color has emerged as the most favorite as 19.35% customers have chosen this for their technical products. White is chosen by 16.13%, Silver by 16.13%, Blue by 12.90%, Purple by 9.68%, Other colors by 6.45%, Brown by 3.23%, Offwhite 9.68% and Green by 3.22%. Nobody chosen Grey, Ornage, Golden, Cyan, and Magenta for the purpose.
- The results about the design preferences in the survey shows that Abstract is the most favorite with 34.38% people voting in favor of it. Pattern design was chosen by 15.66%, Zodiac by 3.12%, Symbolic by 9.38%, Slogan by 3.12%, Self Picture by 6.25%, Nature by 15.63%, and Logo by 12.50%. There was zero selection for picture based designs (Star, Event, Bird, Animal and the sign pattern).
- The survey results show that the customers have keen interest towards participation in the color and design creativity process. 81.25% customers are willing to participate in the event and only 18.75% said no.
- The customers are keen to participate in the color and design creativity through virtual environment. A large number of customers i.e. 90.62% said that they will participate in the program and only 9.38% said “No”.

Survey combined with exploratory case study of Sony Ericsson provide us good picture of productive research. The results give us directions to conduct more open innovation practices in terms of color and design choices for all other designed technical products as have been done for mobile. The survey results shows dissatisfaction of customers about the color and design
choice of designed technical products and their willingness to participate in open innovation practice for other designed technical products.

9. Conclusion

By the use of selected sources of data and selected research methodology these conclusions are made.

Although firms using inside aesthetics by theme creator are I phone, Nokia, Samsung and Sony Ericsson for designed technical product mobile but as open innovation practice Sony Ericsson case is selected. Sony Ericsson is also conducting open innovation practice for aesthetizing the outlook design of technical product (mobile). Sony Ericsson is sharing color and design choice as open innovation practice through digital software (theme creator) and by providing virtual template. Open innovation is an innovation paradigm by the reference of 4P innovation model. Technology in sourcing is being managed and used for external ideas sharing with customers for color and design choice. Licensing with other firm for selling and making outlook cover by Sony Ericsson is also made. New software development as theme creator and virtual customer template for color and design choice are made. Theme creator software and virtual templates used for color change provides visualized prototyping before publishing the themes and making the outlook cover for mobiles. This open innovation practice is for designed and existing products that are available in market. Virtual customer environment is created for customer participation for open innovation practice. Customers have participated from every selected country with great zeal on Sony Ericsson website; main and mini websites. Customer color and design choice can provide a huge source for new product design and redesign as well. Customer’s participation shows their entire desire to have a good look and feel for the product which they are using. Survey results and analysis conducted for other designed technical products show the customers willingness and customer desire for participation in virtual customer environment for aesthetics with color choice and design creativity for designed technical products. The result also show that how much customers are dissatisfied with the look and feel of existing and in use technical products and they are using them for usage purpose only.

It is concluded that for other designed technical products, software and virtual templates for aesthetics with color and design choice should also be made by relevant firms as Sony Ericsson Firm has made. It is concluded that customer demands to change the aesthetic part of technical products. Customers like to participate in virtual customer environment for changing color choice and design creativity. The conclusion made opens the door for more future open innovation practices and for more software developments.
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# Appendix A

**Aesthetics for Designed Technical Products**

Survey about customer choice and preference for aesthetics of technical products

1. Do you like to change the color and outlook design of any technical product which you use?
   - [ ] Yes
   - [x] No

2. Do you like to change the color and outlook design of your microwave by your own choice?
   - [ ] Yes
   - [x] No

3. Do you like to change the color and outlook design of your refrigerator by your own choice?
   - [ ] Yes
   - [x] No

4. Do you like to change the color and outlook design of your laptop by your own choice?
   - [ ] Yes
   - [x] No

5. Do you like to change the color and outlook design of your PC (desktop computer) by your own choice?
   - [ ] Yes
   - [x] No

6. Do you like to change the color and outlook design of your mobile by your own choice?
   - [ ] Yes
   - [x] No

7. Do you like to change the color and design of your stereosystem by your own choice?
   - [ ] Yes
   - [x] No
8. Do you like to change the color and outlook design of your air conditioner by your own choice?  
[ ] Yes  
[ ] No

9. Do you like to change the color and outlook design of your calculator by your own choice?  
[ ] Yes  
[ ] No

10. Do you like to change the color and outlook design of your home lights by your own choice?  
[ ] Yes  
[ ] No

11. Do you like to change the color and outlook design of your microwave oven by your own choice?  
[ ] Yes  
[ ] No

12. Do you like to change the color and outlook design of your sandwich maker by your own choice?  
[ ] Yes  
[ ] No

13. Do you like to change the color and outlook design of your telephone by your own choice?  
[ ] Yes  
[ ] No

14. Do you like to change the color and outlook design of your TV by your own choice?  
[ ] Yes  
[ ] No

15. Do you like to change the color and outlook design of your LCD by your own choice?  
[ ] Yes  
[ ] No
16. Do you like to change the color and outlook design of your hair dryer by your own choice?
- Yes
- No

17. Do you like to change the color and outlook design of your iron stick by your own choice?
- Yes
- No

18. Do you like to change the color and outlook design of your electric toothbrush by your own choice?
- Yes
- No

19. Do you like to change the color and outlook design of your CD player by your own choice?
- Yes
- No

20. Do you like to change the color and outlook design of your DVD player by your own choice?
- Yes
- No

21. Do you like to change the color and outlook design of your vacuum cleaner by your own choice?
- Yes
- No

22. Do you like to change the color and outlook design of your juicer/blender by your own choice?
- Yes
- No

23. Do you like to change the color and outlook design of your toaster by your own choice?
- Yes
- No
24. Which color most of the technical products have?

- Grey
- Black
- Silver
- White
- Off white
- Grey
- Red
- Green
- Yellow
- Blue
- Orange
- Purple
- Cyan
- Brown
- Golden
- Magenta
- Other colors

25. Which color you like most to have for technical products which you use?

- Grey
- Black
- Green
- Brown
- Other colors
- Golden
- Red
- Cyan
- Silver
- Orange
- Off white
26. In your opinion should the color and design of technical products be changed?

- Strongly Disagree
- Disagree
- Undecided
- Agree
- Strongly Agree

27. Which type of design you like for your chosen technical products?

- symbolic
- abstract
- design based on pattern
- design based on picture of your own
- design based on picture of nature
- design based on picture of animal
- design based on picture of bird
- design based on zodiac sign
- design based on picture of any star
- design based on picture of an event
- design based on any sign
- design based on logo
- design based on a slogan
28. Do you like to have an opportunity to change the color and outlook design of technical products which you use by easy instructions based digital software in a virtual environment provided by the companies.

- Yes
- No
### Page 1. Color choice and Design Creativity for Designed Technical Products

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24. Which color most of the technical products have?

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Number of respondents: 32
Number of respondents who skipped this question: 1

25. Which color you like most to have for technical products which you use?

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<td>0.00%</td>
<td>0</td>
</tr>
<tr>
<td>Blue</td>
<td>12.90%</td>
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</tr>
<tr>
<td>Orange</td>
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<tr>
<td>Purple</td>
<td>9.68%</td>
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</tr>
<tr>
<td>Cyan</td>
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<td>0</td>
</tr>
<tr>
<td>Brown</td>
<td>3.23%</td>
<td>1</td>
</tr>
<tr>
<td>Golden</td>
<td>0.00%</td>
<td>0</td>
</tr>
<tr>
<td>Mauve</td>
<td>0.00%</td>
<td>0</td>
</tr>
<tr>
<td>other colors</td>
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</table>

Number of respondents: 31
Number of respondents who skipped this question: 2
26. In your opinion should the color and design of technical products be changed?

<table>
<thead>
<tr>
<th>Opinions</th>
<th>% of Respondents</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
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<tr>
<td>Disagree</td>
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<tr>
<td>Undecided</td>
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<tr>
<td>Agree</td>
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<td>19</td>
</tr>
<tr>
<td>Strongly Agree</td>
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<td>2</td>
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</table>

Number of respondents: 30
Number of respondents who skipped this question: 3

27. Which type of design you like for your chosen technical products?

<table>
<thead>
<tr>
<th>Types of Design</th>
<th>% of Respondents</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbolic</td>
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<tr>
<td>Abstract</td>
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<tr>
<td>Design based on pattern</td>
<td>15.63%</td>
<td>5</td>
</tr>
<tr>
<td>Design based on picture of your own</td>
<td>6.25%</td>
<td>2</td>
</tr>
<tr>
<td>Design based on picture of nature</td>
<td>15.63%</td>
<td>5</td>
</tr>
<tr>
<td>Design based on picture of animal</td>
<td>0.00%</td>
<td>0</td>
</tr>
<tr>
<td>Design based on picture of bird</td>
<td>0.00%</td>
<td>0</td>
</tr>
<tr>
<td>Design based on zodiac sign</td>
<td>3.13%</td>
<td>1</td>
</tr>
<tr>
<td>Design based on picture of any star</td>
<td>0.00%</td>
<td>0</td>
</tr>
<tr>
<td>Design based on picture of an event</td>
<td>0.00%</td>
<td>0</td>
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<tr>
<td>Design based on any sign</td>
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</tr>
<tr>
<td>Design based on logo</td>
<td>3.13%</td>
<td>1</td>
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</tbody>
</table>

Number of respondents: 32
Number of respondents who skipped this question: 1

28. Do you like to have an opportunity to change the color and outlook design of technical products which you use by easy instructions based digital software in a virtual environment provided by the companies.

<table>
<thead>
<tr>
<th>Options</th>
<th>% of Respondents</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
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</tr>
<tr>
<td>No</td>
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Number of respondents: 32
Number of respondents who skipped this question: 1