Multi CIDP: a New Strategy for Customer Satisfaction Optimization

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Abstract: Customer satisfaction has become a key element in business strategy and placed at the top of the priority list of almost every company. Optimum satisfaction can be obtained only if customers get what exactly they want without compromising any requirements. Proposed in this study is a new concept of multi CIDP (Customer Involvement Decoupling Point) to increase customer satisfaction by enabling customers to flexibly enter in various points along the value chain to define their desired product specifications according to their individual preferences. Multi CIDP can be seen as a screening process to cluster customers based on their needs and preferences. It allows manufacturers to capture a wider market by opening maximum possible channel for customers to involve in value creation so that they are no longer only searching for goods but they can also, when necessary, involve in production cycle to specify their own design. Involving customer in production cycle is not a simple task as it will influence the product development process which is an interdisciplinary activity requiring contribution from nearly all the functions of a firm. In order to ensure the viability of the proposed concept, a web-based multi CIDP system has been developed to implement the concept. Its front-end user interface and back-end database management system were constructed. Based on the observation and survey evaluation, there are clear indications for the proposed concept's applicability and its ability to give a significant improvement in customer satisfaction.

Key words: Customer satisfaction, decoupling point, customer involvement, CIDP

1. Introduction

Basically, customers spend their money not simply because of the product itself, but more likely because of the value within it. The value may come from many sources, including physical value and emotional value. While physical value is related to the experience of using the product and usually obtained from the quality of behavioral (functional and kinesthetic) or visceral design, emotional value is about the feeling of satisfaction resulting from emotion rather than realism when owning or displaying the product [1].

Product design and development process aims to provide value of products that satisfy customer requirements. The approach used by manufacturer is dynamically adjusted depending on many factors for example: technology limitation, type of product, market competition and customer profile. In the early stage of mass production era, when the market competition was very low, customer needs were very less getting attention by manufacturer. Product development was mainly based on the technology push system, where the design was based on the

limitation of the technology (manufacturer-oriented mass production). Customer requirement was also not so high since low cost was the most consideration. Later on, when customer requirements and market competition become higher as well as the technology is becoming more advanced, manufacturers move from manufacturer-oriented to customer-oriented.

The participation of customers in value creation is emphasized in mass customization era. Customers are allowed to take proactive role in their needs and can negotiate to meet their requirements. Mass customization, which is usually coupled with the term of "personalization", allows companies to penetrate new niche markets and capture customers whose special or personal needs could not be fulfilled by standard products. However, in order to avoid over-customization, the demand for customization should be precisely estimated while the level of customer involvement and the production efficiency should be carefully balanced. The managerial approach includes modularization and postponement technique [2]. While postponement tries to obtain efficiency from a process design perspective, modularization tries to attain it from a product design point of view [3]. Postponement principle is to delay some of the value adding activities until the customer order arrives.

The degree of customization depends on the position of customer involvement decoupling point (CIDP). As the position of CIDP in the value chain moves upstream, the degree of customization is likely to increase as customers would have the possibility to involve in creating product at earlier stages. The position of CIDP may not only influence the level of customization but also the response time. If it is at the end of the production process (i.e. closer to the customer), shorter delivery times can be expected. Accordingly, if it is placed upstream in the value chain, longer response time could be assumed.

This paper presents a new concept proposition of multi CIDP to improve satisfaction of every customer by enabling customers to flexibly enter in various points along the value chain to define their desired product specifications according to their individual preferences. Three main issues are addressed including (1) new trend of customer involvement in value creation, (2) how multi CIDP system works and (3) practical example of concept implementation.

2. Customer Involvement in Value Creation

A study showed that about 10-40 percent of the customers engage in modifying mass produced products to meet their specific requirements after purchasing [4]. This group of customers is willing to pay additional cost and to wait for a while to get their product modified [5]. Hence, it can be seen as good opportunity for manufacturer to offer before-purchase modification by involving customers in production stage. In order to adopt the concept of customer involvement in specifying their own product, it is important for manufacturers to analyze the significant of additional values that will be generated. The higher the value gained the higher the possibility to success will be. Based on a comprehensive observation on successful story of customer involvement in value creation, there are several additional values that customers look for, including: better product fitness [6], feeling of accomplishment [7], uniqueness [8], self-expression of personal identity [9], and source of memory. The first is related to physical value, while the rest are all related to the emotional value.

There are many companies accommodate customer involvement in value creation, in terms of mass customization (which are so-called as "configurators"). In the early year of 2013, The Configurator Database Project (www.configurator-database.com) which was started in 2007 listed more than 900 international web-based

product configurators categorized in 16 different industries including apparel, house & garden, food, accessories, paper & office, mixed products, sports equipment, kids & babies, electronics & media, automobile & vehicles, footwear, unusual products, beauty & health, entertainment, pets and industrial goods. The most popular industry with the highest number of configurators can be found in apparel with 163 listed entries followed by house & garden, food and accessories (figure 1).

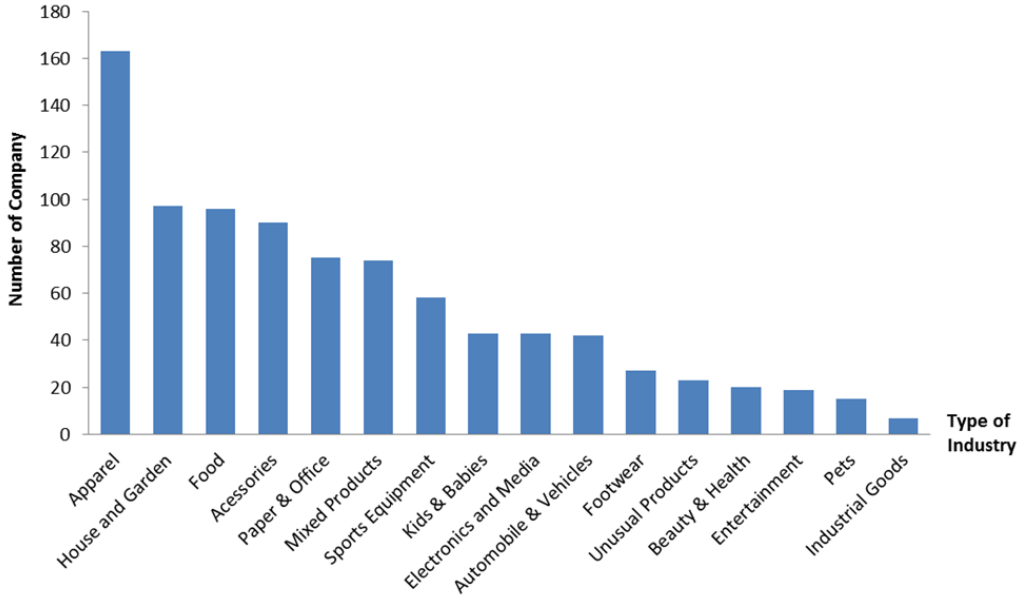

Figure1. Type of web-based product configurators listed in the Configurator Database

By observing what those companies offer to customers, the degree of mass customization can be categorized into 3 types i.e. skin personalization, physical mix and match customization as well as virtual mix and match customization. This categorization is based on the position of decouple point where the postponement principle is applied. Skin personalization offers customer to involve in creating final skin of product (skinning process). In this system, the product has been manufactured while the differentiation is postponed by letting customer to personalize it by adding emotional value such as self-elected name, word, number or picture. For example, Kleenex (www.mykleenextissue.com) offers customer possibility to decorate the skin of tissue box by adding photos and frames, artwork and decorations, text and message as well as background color using online system. The similar type of this product can be found in custom mugs, shirts, binders, photo frame, cap, etc. The postponed adding value activities are usually related to printing or embroidering process.

Mix and match customization, which is the most popular and also called as configuration design, allows customer to involve in configuring final product from predefined available parts or sub-assemblies, typically by using a configurator system. Modular system is usually adopted to design and develop this type of mass customized products. Based on the state of its components, mix and match customization can be categorized into two types; physical and virtual, which both can be done by using online or offline system. Physical mix and match happens when all components have been pre-designed and physically pre-produced to provide fast response. No inventory for final product but for components is needed as assembly process is postponed until customers complete their selection. However, since the components are made according to forecast demands, this method is very risky as not all components will be selected by customers. Hence, setting its optimum solution space will

determine the success of the company. Figure 2 shows one of the implementation examples of this concept in automobile industry. Similar products from this category can be found in personal computer industry, furniture, cereals, etc.

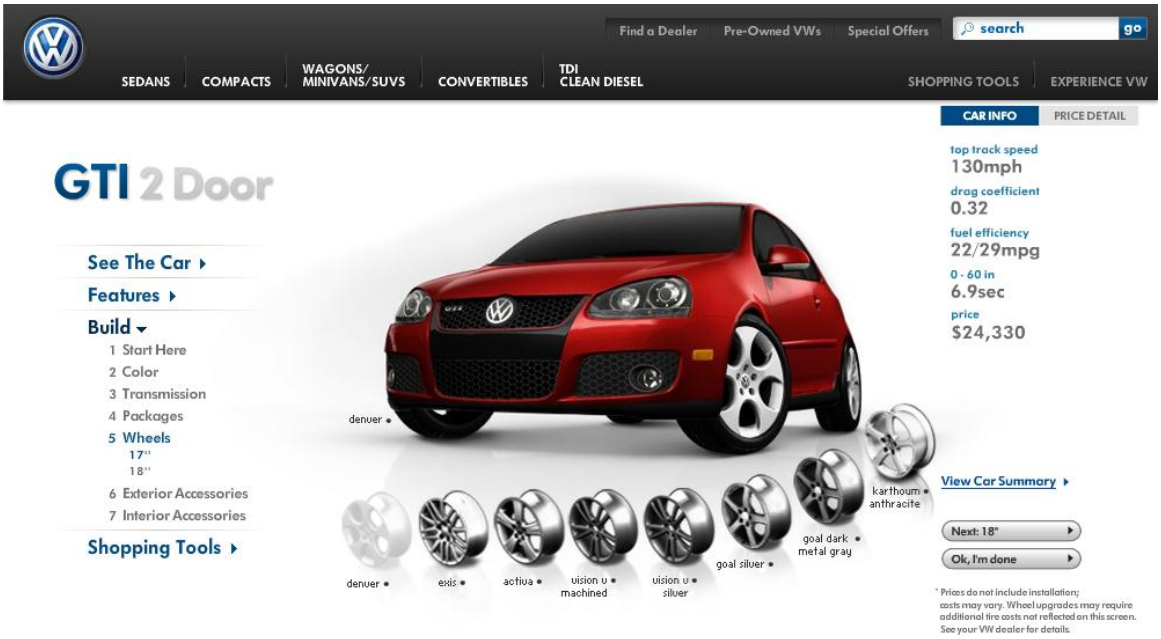

Figure2. Example of mix and match customization in automobile industry

On the other hand, virtual mix and match happens when manufacturer only provide virtual components for customers to select and the physical ones will be made after the order is confirmed. This means manufacturing process is postponed until customer defines the product specifications. In order to shorten delivery time and avoid difficulties in manufacturing preparation (setup), manufacturers allow customers to use the available predefined shapes, patterns and colors only to form a virtual design of product. Hence, this type of customization is more or less similar to the aforementioned physical mix and match where all the designs are predefined by designers and customers are only allowed to configure product based on those predefined patterns. The only difference is this customization does not only postpone the assembly process but also manufacturing processes until customer order come. This replaces the limited physical inventory by unlimited virtual inventory which will significantly reduce the cost. As a consequence, the response time will be longer due to its made-by-order system. In customized clothing industry, for example, customers are allowed to select the style (collar, cuff, pocket, placket, button, etc) change the fabric (material, color, and motif), to personalize brand, and to adjust the size. When customers have finished the customization process, manufacturer will start to cut raw material and then stitch the shirt accordingly. Hence, there is no risk of overstock finished product but managing the response time will be the most challenging task in this system. The other examples can also be found in jewelry industry, furniture, cake decoration, etc.

Researches related to customer involvement in value creation mostly fall in the mix and match customization including family based design (FBD), product family architecture (PFA), modularization, generic component and product platform [10,11,12,13] along with product configuration optimization [14,15]. In addition, the approaches of metaheuristic and genetic algorithms for common platform selection have been explored [16] while extending

mass customization's value network has also been investigated [17]. To accommodate the customers in collaborative design process, Yang, et.al [18] proposed the concept of customer-oriented virtual factory system so that the collaborative activities will not only happen among internal company members (i.e. managers, engineers, designers, marketers, salesperson, etc.) but extended to the external company's customers.

Review on product design and development shows that there is a tendency to paradigm shift of customer's role in design; from passive audience in the era of mass production into active player in current age of mass customization and personalization. As a consequence, the paradigm of collaborative design has shifted from "closed collaboration" (in which the collaboration is taking place just within the boundary of manufacturer) to "open co-creation" (cooperation between manufacturer and customers or users). The role of customers in defining their own product specifications seems to be more emphasized by manufacturers as the position of customer involvement decoupling point have been moved upstream in the value chain. Hence the paradigm of design for customer (DFC) has been shifted to a new paradigm of design by customer (DBC).

3. Multi CIDP: a New Strategy for Customer Satisfaction Optimization

3.1 Concept

Customer satisfaction can be increased by reducing the gap between what customer really needs (customer requirements) and what manufacturer can provide (product specifications). Optimum satisfaction can be obtained only if customers get what exactly they want without compromising any requirements. Involving customer in value creation seems to be a promising way to increase customer satisfaction. However, it is important to note that treating customers having different individual personal needs by using a standard product is not recommended as it will result in low satisfaction. It is not a good idea either to fulfill mass customers' standard needs by a personalized product as it will lead to the problem of cost and delay. Hence, a possible maximum number of channels (a multi customer involvement decoupling point - multi CIDP) should be provided for customers in defining product specifications to meet their individual requirements. Figure 3 shows the positions of CIDPs in the product value creation in order to ensure that manufacturers are able to satisfy a wider market.

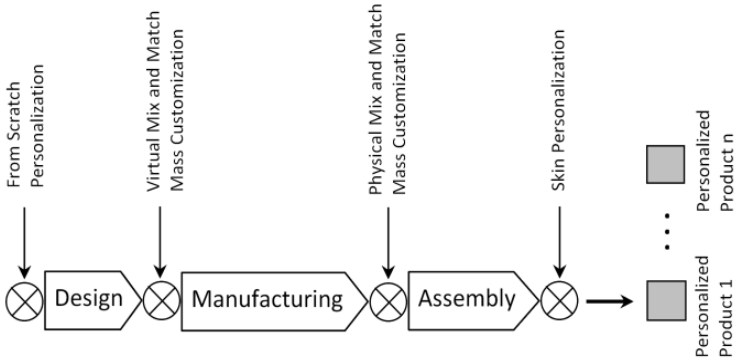

Figure3. Points of customer involvement in multi CIDP system

Unlike in mass customization, the approach of multi CIDP enables customers to enter in various points flexibly along the value chain to define their desired product specifications according to their individual preferences. Multi CIDP can be seen as a screening process to cluster customers based on their needs and preferences. It allows

manufacturers to capture a wider market as this system can accommodate the customers of standard products, mass customized products and personalized products. Some customers whose requirements are fit to what professional designers have visualized can easily get what they want in the form of standard products in a short of time, while some who may need to adjust the product specification can use configuration tool in mass customization environment to get one of its variety. Last but not least, customers whose requirements do not match with the available product variety still have possibility to order them by using design tools provided by manufacturers. This strategy is expected to give maximum satisfaction to all customers and reduce the manufacturing complexity as only particular customers will be served individually.

Multi CIDP is a co-creation system between customers and manufacturer where customers contribute in defining product specifications while manufacturer provides goods and tools to help them easily establish their desired specifications. Depended mainly on the type of product and customer preference, the degree of customer involvement will vary from passive involvement (e.g. only giving voice of customer) to active involvement (e.g. skinning personalization, mix and match, modification or even real designing process from scratch) before purchase. Hence, multi CIDP concept puts on customers the most significant role in defining final product specifications while shifts manufacturer responsibility from designing products to designing a system that enables customers to involve in value creation.

3.2 Implementation

In order to implement the concept in the real application, a web-based multi CIDP system has been developed. WampServer, a package to develop web application under Windows environment, has been used as it is an open source project to create web applications that comes with Apache web server, PHP scripting language and a MySQL database. A free photo editing software for Windows; Paint.NET, and a free 3D modeling software; Google SketchUp, have been utilized to generate all image designs. This web-based system composes of three main modules for user interface, main database, and buffer database.

The main database is for storing all data about products (variety of predefined configurations, parts and their price), customer profiles (user name, password and personal information i.e. name, gender, address, email, phone, etc), and customer activities (order, save, upload, comments, inquiry, etc). The main idea is to monitor customers' preference and their activities on specifying their products' specifications to meet their individual needs and to use the information to optimize the solution space. For often retrieved data (e.g., frequently selected parts and frequently selected configurations), they are placed in buffer database for ease to access. Figure 4 illustrates the general flow of data to support this multi CIDP strategy. Database accessibility is depended upon the level of user (i.e. administrators, login users, guests).

The homepage is illustrated in Figure 5 where table clock is used as example. The system allows manufacturer to display and update the collection of finished products, and components, and to monitor customers' preferences and their selection activities. It also allows customers to browse through available ready-made products, under "collection" option (Figure 6a), to mix and match components, under "customize" option (Figure 6b), and to personalize their designs from scratch with provided design tools, under "design by you" option (Figure 6c). These multi channels have been made to ensure that product specifications can be adjusted according to individual customer preference.

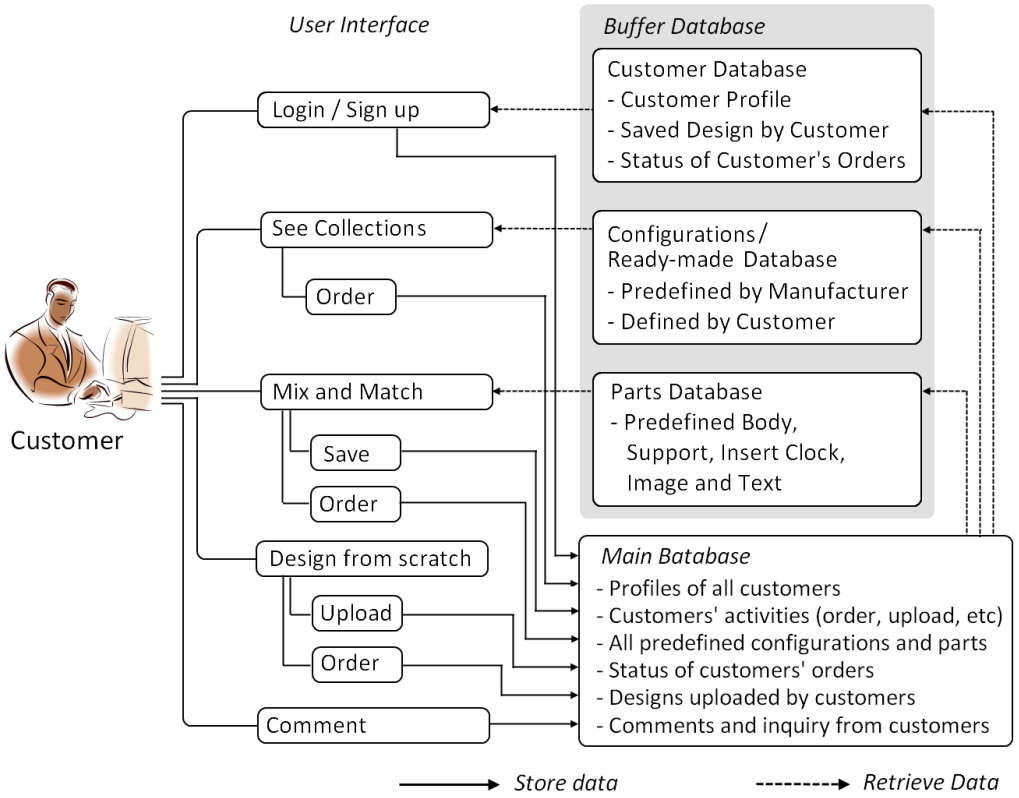

Figure 4. The general flow of data to support the multi CIDP strategy

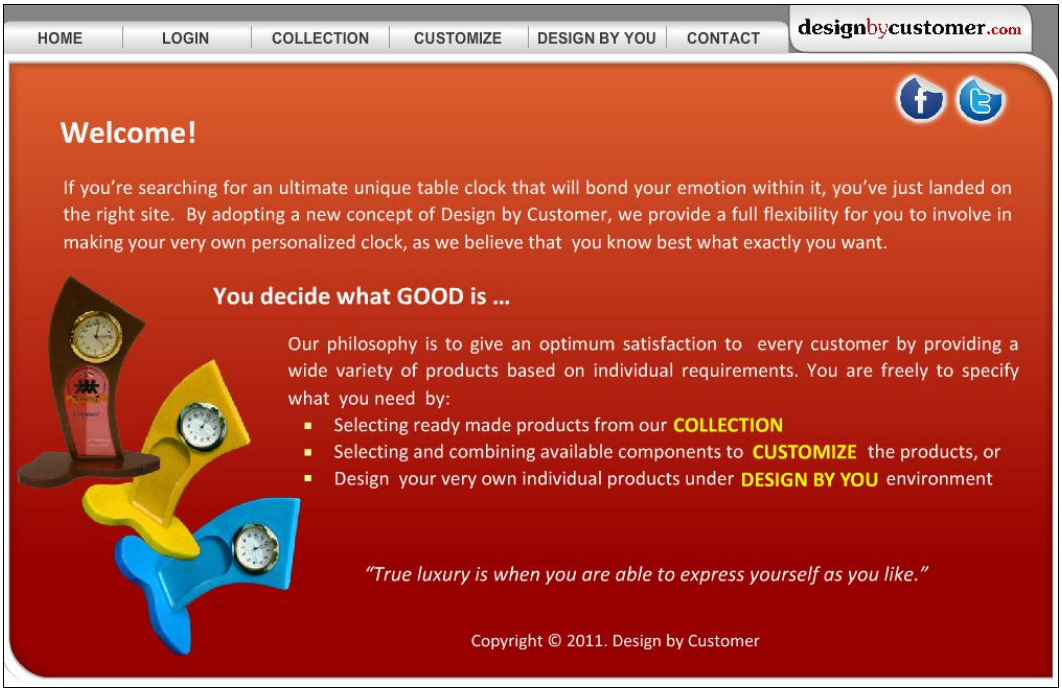

Figure 5. The front page of a developed web-based user interface for multi CIDP system

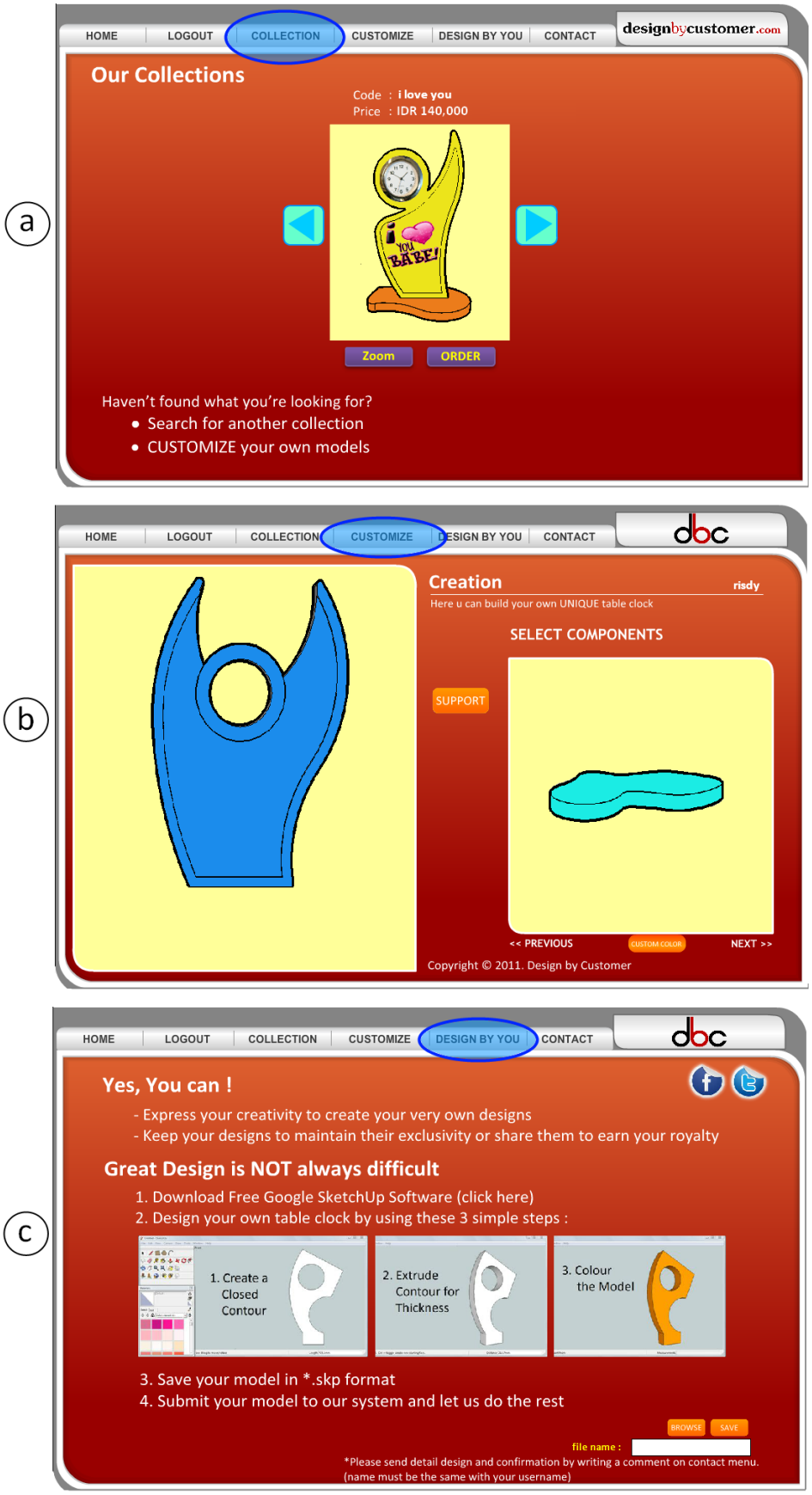

Figure 6. Three channels for customer involvement (a) a collection of ready-made products, (b) Components for mix and match and (c) Design from scratch

3.3 Evaluation

In order to offer multi CIDP, the flexibility level of each building element should be evaluated. For this purpose, the product attribute analysis explained in the previous chapter was carried out. Four building elements (i.e. body, support, insert clock as well as image and text) and seven product attributes that customers may focus on (i.e. accuracy, ease to read, ease to adjust, ease to change battery, stability, uniqueness and beauty) were identified in the analysis. Figure 7 depicts how the product and its attributes formed.

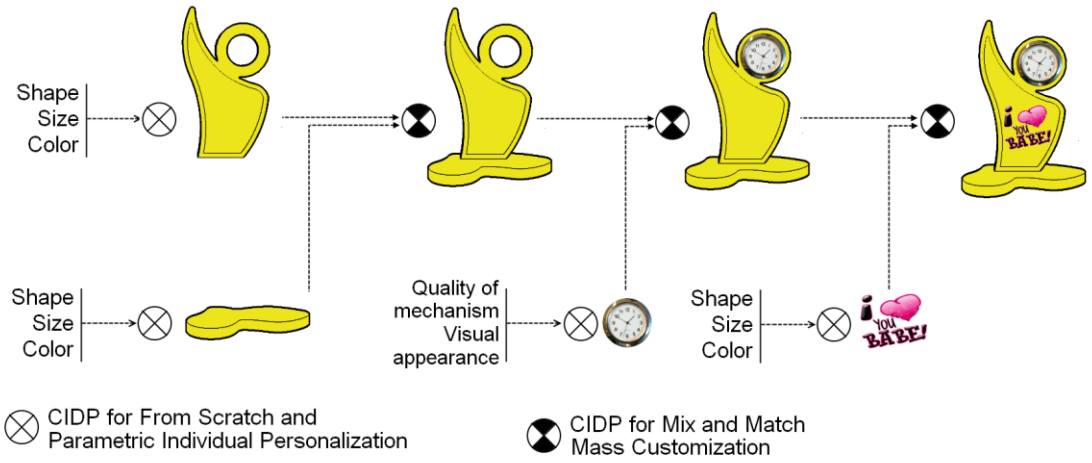

Figure 7. The formation of table clock and its attributes for multi CIDP system

To set the solution space for the web-based multi CIDP system, initial variety of parts and predefined configurations were designed. A tool for customers to design the product by themselves was also provided. The initial solution space consisted of 5 models of ready-made table clocks, 120 types of body (10 models in 12 colors), 120 types of support (10 models in 12 colors), 10 types of insert clock and 5 types of image and text. Hence, there were 120 x 120 x10 x 5 = 720,000 possible combinations provided for customers to choose. With the introduction of design tools, the solution space could be considered infinity.

In order to examine the system, two computers were used as local host where the WampServer was installed. A total of 66 respondents were signed up to the system and involved in the experiment. They were briefed about the multi CIDP concept and then asked to utilize the tool to specify one to five table clocks of their preference. Even though it was only for simulation, some customers were interested to make real orders. The database recorded all their activities of inputting data, saving or ordering designs, uploading files as well as making comments and inquiries. The data could then be imported and used later for analysis. According to the database, it was identified that respondents had made 26 selections on ready-made table clock, configured 254 customized designs and uploaded 4 new designs. It was observed that most of respondents were not interested to choose available image and text as they wanted to have their own design. The distribution of the selections can be found in Figure 8.

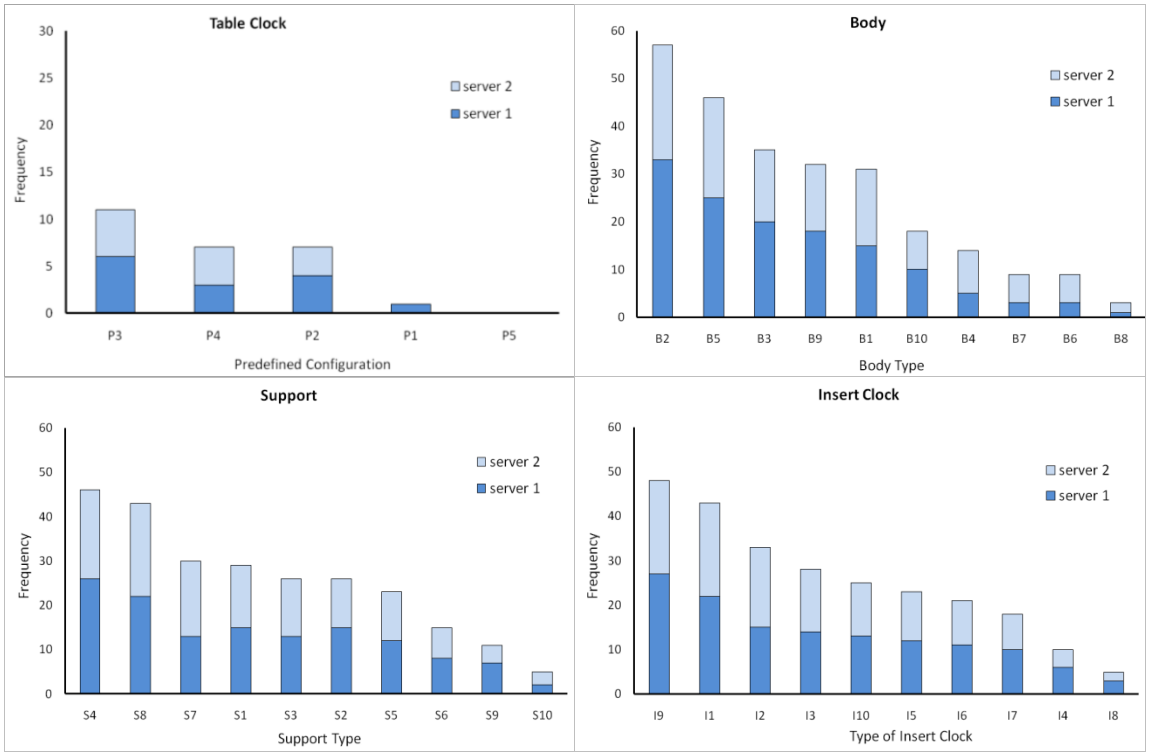

Figure 8. The distribution of crowd selections on multi CIDP environment

4. Conclusions

A new strategy of multi CIDP to optimize customer satisfaction has been discussed. A web based product configurator for resin based table clock has been developed and tested in order to investigate its practical implementation. A real interaction between customers and manufacturer by using multi CIDP interface and how the system works, have been successfully demonstrated. Based on the evaluation, the proposed concept seems to be applicable and potential to give a significant effect on customer satisfaction improvement. However, as the new concept is to give a room for customers to adjust product specifications in order to meet their requirements before purchase it is very important for manufacturers to carefully analyze their products in order to set the flexibility level so that it will not result in manufacturing complexity problems.

5. Acknowledgement

The author thanks to the Directorate General of Higher Education, Ministry of National Education Indonesia, Islamic University of Indonesia and A-Cube Research Group of Asian Institute of Technology Thailand for their valuable supports. This paper is a preliminary study as a part of the research supported by Islamic University of Indonesia under the contract Number : 655.e/Rek/30/BPA/III/2013.

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