A Multimedia Tool for Apparel Design

A. Chanaka, P. Srichandr, and J. Kajornchaiyakul

***Abstract*—Small and medium sized apparel producers are facing increasingly fierce competition and need to employ modern tools to improve their operations to survive. This paper describes a multimedia design tool that could help such producers improve their design capability and speed. The design of such tool is based on a design knowledge repository concept in which relevant design data, information, and knowledge are stored in 'Libraries' and can be accessed with ease. The tool can be used by novice designers and/or owners who have minimal design knowledge and experience. The tool can be upgraded continually and easily due to the modular architecture design. The capability of the tool is described and the implications discussed.**

***Index Terms*—Apparel design, design tool, apparel industry.**

I. Introduction

Apparel industry worldwide is facing increasingly fierce competition as a result of the ever changing competitive environment including low cost products form emerging economies, globalization, free trade agreements and many others. Manufacturers resort to various competitive strategies and weapons to stay alive; low cost, product differentiation, design, speed, services are among the strategies popularly employed. For some manufacturers, only certain strategies are appropriate as other socioeconomic factors render some strategies ineffective. Low cost, for example, is not an effective strategy for high-waged economies [1] .

Given the situation that the apparel market is now a " buyer's market " rather than "seller's market," and that this is to remain so for some time to come, design and speed strategies are increasingly popular and seem to be quite successful for apparel manufacturers [2]. Fashion changes rapidly. Manufacturers must be able to design and produce fashion items very quickly to have a chance, if not, the window of opportunity is gone, for good [1].

This is bad news for small manufacturers who have limited resources. Good designers are hard to find good knowledge about customers' needs and fashion trends is essential if the design is to be effective, and some research or data gathering efforts have to be made in order to gain such information and knowledge. These are formidable tasks for small and medium sized manufacturers. Some kind of 'design tool' that can help apparel producers perform the above mentioned tasks easily and cheaply would be great benefits. Competitiveness of these firms can be improved and sustained in the long run. This is the ultimate goal of this work.

In the future ahead, the competitive advantages can be derived from differentiated products and technologies that can bring new products to market faster than others [1] . The needs of each customer have to be emphasized. And the manufacturing of products in accordance with those needs becomes an important goal of any company.

The first step for manufacturing the products according to the needs of customers is the couture or designing step. A number of companies realize that shorten the time in responding to customer's needs is important. Accordingly, computer technology has been used for helping product designers meet specific personal demand because it reduces the time in product designing, leading to better competitiveness .

Fast response, which is the ultimate aim in a ready to wear fashion industry, can be achieved through; 1) An ability to design and change the catalogue of clothes quickly as well as the ability to shape and repeat the pattern of clothes. 2) An ability to create quality designs and make prototypes. 3) An ability to simulate a scene or a background that represents the occasion that the apparels are to be worn. The aim is to assess whether they fit the occasion or not. 4) An ability to alter the patterns, colors, and other features of the apparels on the spot in order to find the most satisfactory ones [3]. An ability to design and change the catalogue of clothes quickly expressed through the clothes they are wearing. The elements of the clothing language are shape, color, texture that reflect different personalities and moods of the wearers such as happiness, excitement, anger, hatred, sadness, shock [4].

There are many tools that have been developed to improve the productivity and competitiveness of firms in apparel industry. Some tools are designed to facilitate apparel designs, some are for coordinating and facilitating rapid manufacturing, some are designed to help both design and manufacturing of apparel products. The C-DESIGN FASHION CAD Software, developed by Zara for fashion design, is capable for both designing and making draft of prototype models and can lay a model in a shop or a showroom, including the patterns alteration and putting the patterns together as a complete product [5]. The 3D Runway Designer Software by Optitex Company can be used by designers to illustrate the patterns and for the retail customers to visualize the picture of finished products. Each and every pattern can be changed and modified until the customer is satisfied. The software can also be used to manage other activities such as pricing and other time consuming matters [6]. The fashion design software developed by PhP Edraw Max is specifically aimed at female fashion with plenty of

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patterns in the library including manikins, hats, coat suits, buttons, various models of shoes, changeable color of dresses, changeable skin and hair colors of manikins, and accessories for fashion and manikin designs [7]. The Kaledo Apparel Design Software is a software which was created for fashion designers for enhancing creativity process and improve fashion development efficiency, including pointing out fashion trends and colors for each season [8].

The objective of this work is to develop a multimedia design tool for small and medium apparel producers in Thailand, particularly those producing Thai silk apparels.

II. Methodology

The approach we used in the design and development of this apparel design tool was the customer-centered approach. We strongly believe that understanding the customers and their needs is critical for the development of the design tool, and for any products for that matter. Having defined our target market, which is small and medium sized apparel producers in Thailand, we identified the needs of the customers by in-depth interviews. We chose in-depth interview methodology in the belief that such approach would yield better insights into the needs and the minds of the customers compared with other approaches such as surveys and focus groups.

All of the interviews were conducted "informally" in a sense that no formal protocol was observed. Key interview questions were prepared in advance, however. Each interview was immediately followed by a visit to the facility of the interviewee. All the interviews were recorded and key points regarding the needs and problems of the interviewees were noted.

Once the needs of the customers were identified, the next step was to set the specification of the tool to be developed. We tried to reflect the needs of the customers in the specifications as much as possible although, admittedly, some parts of the specifications were based on our own insights and ideas. In this work, we treated the specification as a 'living document' which can be adjusted and improved when additional information and knowledge indicated the need to change.

The tool in the form of a computer program was then designed based on the needs of target market and the specifications mentioned above. There are two requirements that the tool 'must meet' ; users with minimum design knowledge must be able to use the tool to design a wide variety of apparels effectively, and the tool can be upgraded continuously so that new data and information on fashion trends and other relevant matters can be made up to date. As a result, the key design concepts are that the tool must be highly user-friendly and it must also be highly modular so that upgrading can be made continually.

The computer program was then written and coded. Prototype program was 'beta tested' periodically to see the responses of target customers. Improvements of the program were carried out continually after the tests and/or when new data and information were obtained.

III. Results

A. The Customers Picture

From the interview and visits to the premises of small and medium size apparel producers in Thailand, the 'picture' of the customers can be constructed. It must be pointed out, however, that there were differences among those customers such as their backgrounds, the types of apparels they produced, and the markets they served. Nonetheless, there were common characteristics that could be identified and used for our design tool development purpose.

The majority of the producers served both local and international markets. International markets for Thai silk apparels include Japan, the USA, the EU, and ASEAN countries. Most of the firms employed traditional approaches to the design of apparels: the designer produced rough thumbnail sketches of design concepts followed by rendering and the production of control drawings. The use of computer-aided tool in design was virtually nonexistent. Design ideas were generated mostly in-house by designers and/or owners although ideas were also taken from fashion magazines or similar sources. Customers' needs and requirements were seldom taken into account except when the apparels were specifically ordered and tailor-made.

There were several problems that these producers experienced three of which were particularly relevant. First, really good design ideas were hard to come by. Generating ideas was limited by the fact that this was performed by only one or a few people. And what were thought to be good ideas did not come out to be good as expected because the final products did not do too well in the marketplace. Moreover, really good and experienced designers were difficult to find and rather expensive. Second, the traditional design process presently employed was rather slow. It took some time from ideas to prototype resulting in low 'design productivity'. This meant that only a limited number of new models could be designed and manufactured within a certain period of time, thus missing possible market opportunity. Furthermore, slow design could mean that the producers missed the window opportunity altogether. Third, all the producers realized that to be successful they must design and manufacture the apparels that meet the customers' needs and tastes. However, making it happen in practice was no easy task. Identifying and capturing customers' needs and tastes were difficult, and incorporating such needs and tastes in apparel design was even more difficult.

B. The Tool

Based on the 'customers picture' described above, a multimedia tool was designed and developed in the form of a computer program. We realized that the customers' picture was far from complete but it was useful from the tool development perspective nonetheless. The key design requirements for the tool were; first it must meet the needs of our target customers reasonably well and, second it could be upgraded on a continual basis.

In order to meet such design requirements, the modular architecture was employed in the design of the program. Modular architecture design would enable the inclusion of additional subprograms in future updates. Updating or

modifications of existing subprograms could also be carried out with relative ease. Modular design would also meet the needs of the producers better as one could choose whatever subprograms that served one's needs at the moment. When more subprograms are available, more needs can be served. The tool therefore consisted of a main program and several subprograms; each subprogram performed a specific function.

Individual subprogram was designed to be a repository of relevant data, information, and knowledge in certain dimension that are important to apparel design. The aim is to help designers and producers access relevant data, information, and knowledge as quickly as possible. Design possibilities could be explored rapidly and design decisions could be made within a short time, thus improving design productivity. Novice designers and manufacturers would be able to perform design activities as effective as expert designers once individual subprograms are fully developed.

At present, there are 4 subprograms in our tool; model building subprogram, select-what-you-like subprogram, mix-and-match subprogram, and scene subprogram. The model building subprogram enables designers to create approximate models of the customers. Such models are used to test whether selected apparels fit well and how they will look when particular apparels are worn. Several features of the models can be altered in order to create the models that are as close to target customers as possible. These include face shapes, hair styles and hair colours, body shapes, and skin colours. Models can be created fairly quickly. Users simply select various features from the library.

The select-what-you-like subprogram contains a library of 'ready-made' designs of apparels typically use in various occasions. These include attires and dresses for official engagements, social outings, parties, as well as clothings for office workers and leisure wear. A variety of colors, textures, and patterns of the apparels can be selected.

The mix-and-match subprogram enables users to create designs from apparel 'parts' stored in the library. Numerous designs can therefore be created by selecting, mixing, and matching these 'parts.'

The scene subprogram is use to create or simulate the scenes, the occasions, and the locations that the apparels are to be worn. Examples of such scenes include the office, the party, official engagements, showrooms, living rooms. The scenes can be created simply by clicking those stored in the library. The aim is to see whether selected designs are appropriate and look good for the occasions.

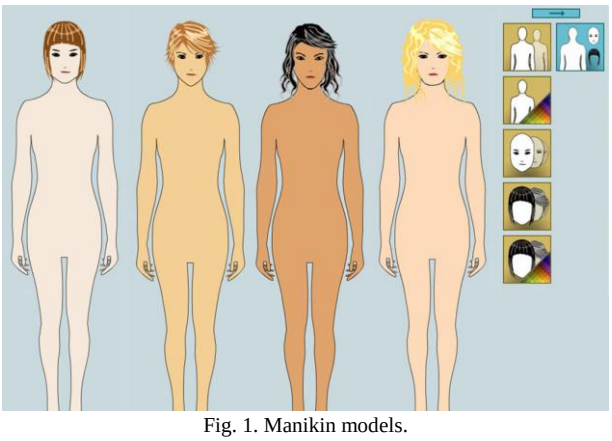

Fig. 1. Manikin models.

The outputs of all these subprograms are graphical displays on the monitor. The displays of the designs can be viewed by all the people involved including the customers. Examples of the output of these subprograms are illustrated in Fig. 1-Fig. 4.

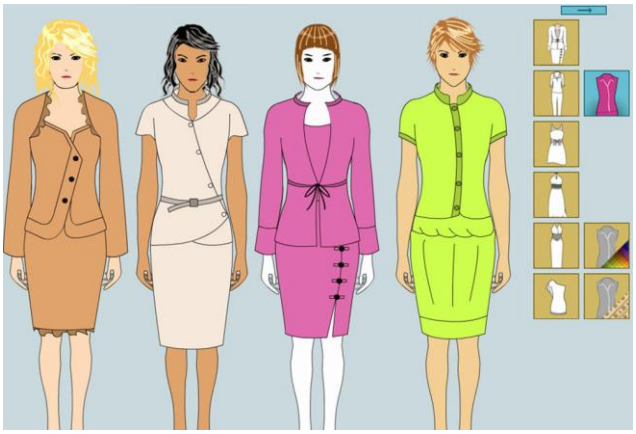

Fig. 2. Select-what-you-like apparels.

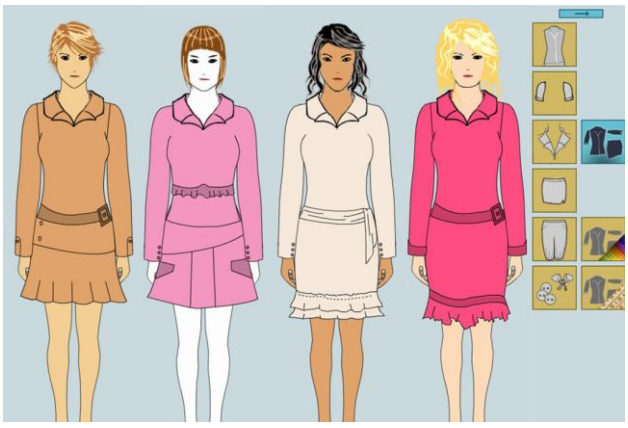

Fig. 3. Mix-and-match apparels.

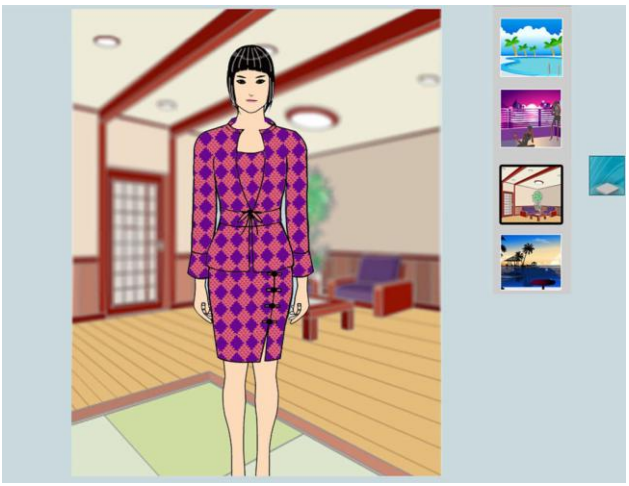

Fig. 4. Scence and background

IV. Discussion

As the competition in apparel industry become increasingly fierce and global, manufactures need to adjust their competitive strategies to stay alive. Apparel designs play a crucial role in improving competitiveness of apparel producers. Some kinds of design tools are necessary to improve design capabilities of local Thai producers who are

mostly small and medium sized enterprises. The multimedia apparel design tool developed in this work provides at least part of the solution in improving competitiveness of these firms.

The tool would first of all increase 'design productivity' reducing the idea-to-prototype time considerably compared with traditional design process. The time from ideas to prototypes is particularly important for fashion items which change rapidly.

The tool would also ameliorate the lack of good and experienced designers, a very common problem for small and medium sized firms. Relevant information could also be accessed using the tool. This would help the producer get up-to-date data and information such as design trends, needs of customers from various sources in various parts of the world. The customers also benefit from the tool as they can access numerous possible designs stored in the library. The customers can even design the apparels themselves so that specific needs and tastes of individual customers can be catered for.

The database and relevant information are rather limited at present. Addition of data and information can, however, be performed with ease due to the modular architecture of the tool. More subprograms can be added to cater for diverse needs of customers. Information about the cultures and tastes of oversea customers can be added. Knowledge of expert designers can be codified and added to the tool on a continual basis. When the tool is fully developed, it could enhance the capability of novice designer and local apparel producers considerably.

V. Conclusion

A multimedia tool for apparel design is developed. The tool serves the needs of small and medium sized apparel producers in many fronts. These include improving design productivity, reductive the time from ideas to prototypes (hence time-to-market), mitigating lack of experienced designers problem, improving access to relevant information, all of which are critical to the competitiveness and survival of the enterprises. The tool is designed in such a way that the data base and information can be improved continually to meet the diverse and changing needs of the customers. Although the data and information are limited at present, additions of relevant data can be accomplished easily. The tool is expected to be very useful and beneficial to apparel producers, particularly small and medium-sized ones, in Thailand and in other countries.

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