

Full Length Research Paper

An Exploratory Study on Product Development Processes and Models Adopted by Ghanaian Fashion Designers

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The study focused on exploring qualitatively the product development processes, Ghanaian fashion designers adopt in their design creation line. A sample of twenty-one (21) small and medium scale fashion designers was sampled using the purposive sampling technique. An interview and observation guides were the primary data collection instruments. The findings indicate that fashion designers adopt varying strategies and stages in developing products for clients without necessarily following standardized models; hence, a model was proposed by the researcher for adoption.

Key words: designers, fashion, garment production, model, product development.

INTRODUCTION

Every manufacturing business must adhere to a production schedule. In the fashion industry, production programmes are embodied a collective plan. The plan involves a wide range of actions that manufacturers engage in, thus, leading to effective product development. Several definitions for Product Development (PD) exist in the literature, and therefore, there is no generally accepted definition among researchers. Moretti (2017) defined it as “a business process that aims to transform data and technical possibilities into market opportunities and information, enabling and assisting product design development”. Slijepčević and Perčić (2019) also perceived the concept as “the transformation of a market

opportunity into a set of assumptions about the technology of the product for sale, in addition to being the main source of product and process quality”.

The Product Development Process (PDP) encompasses the entire process of bringing a new fashion product onto the market. The process aims to provide customer satisfaction whilst minimizing returns. Product development has become one of the most critical yet risky activities manufacturing companies perform (Papahristou and Bilalis, 2017).

Researchers in this domain have established and emphasized the need to employ a systematic Product Development Process and Model to achieve a higher

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success rate in product development (Silva and Rupasinghe, 2016). Although Product Development research is thought to have begun in the 1960s, it was not until the 1990s that effective Product Development procedures and models received substantial attention (Powell and Cassill, 2005). Designers employ several complex activities to deliver new products to the market. Some fashion houses have different stages for products to be developed. Papahristou and Bilalis (2017), for instance, identified five phases as against three macro phases presented by Capaldo and Henrique (2007). From the literature concerning the development of fashion products, basic steps such as research for the drafting of ideas, conceptual lines and preparation for production and the market can be identified in the process. Within each step are countless design and development activities carried out sequentially. Moretti (2017) and Burns et al. (2011) attributed this long-standing challenge to the complex nature of PDP technologies and procedures. However, the quality of Product Development Process (PDP) management which is closely linked to standardization process (Moretti, 2017), is of concern. Sujova et al. (2016) indicated that once the process becomes standardized, several designers can use it, and it is documented as a model. The formalization of the PDP management model integrates the activities of all major stakeholders in the entire production process. It appears that fashion manufacturing companies are becoming more open to product development approaches that define products based on what people need and create experiences for the consumer rather than simply designing products. Hence, practitioners and researchers have struggled over the years in terms to identify the best strategy that can be adopted to achieve, sustain and improve business performance (Antonelli and Fassio, 2016). Most fashion manufacturing industries are 'forced' to revise their product development practices to address this and trigger more competition. Thus, blending concepts, breaking concepts into sub-units and synthesizing this into new concepts. Hence, a review of how fashion designers in Ghana develop their products is deemed necessary to find answers to the following research questions:

- i) What activities constitute the Product Development Processes of the Ghanaian fashion designer?
- ii) Which model guides the production of fashion products among designers in Ghana?

LITERATURE REVIEW

The sections below review some generic product development models and discuss how they relate to the fashion industry. This eventually narrows into the next sub-section that reviews models specific to the fashion industry.

Generic product development models and their applicability in the fashion industry

Stage-gate system model

Many top manufacturing firms have developed their own product development processes with inspiration from the Stage-Gate System which was propounded by Robert Cooper. The Stage-Gate System Model offers conceptual and operational modes for taking a new product through from concept to launch (Cooper, 1990). Recent stage-gate systems facilitate parallel concurrent processing, improving flexibility and reducing unnecessary time lapses between the process stages (Fred, 2011). In the Stage-Gate System, the whole project is broken down into distinct stages, and evaluation criteria are set at the end of each part of the project (Silva and Rupasinghe, 2016). The evaluation criteria serve as the gate for the project's next stage. Systematic stage-gate processes act as a roadmap for defining and supporting each distinct stage of the entire process, beginning with launch (Högman and Johannesson, 2013; Cooper, 1994). Each stage features a "Go/Kill decision point or gate" intended for the projects to be quantitatively and qualitatively evaluated before moving on to the next stage.

The early generations of stage-gate processes, such as the "Phased Review Process", were very engineering-driven and addressed the product strictly on physical design and development (Silva and Rupasinghe, 2016). New generations' stage-gate systems treat each distinct stage as a cross-functional team effort; marketing and manufacturing involvement are considered an integral part of the product development process. The Stage Gate model promotes substantial business and marketing engagement and a thorough manufacturing assessment for a successful new product launch (Silva and Rupasinghe, 2016). Most of the conventional product development process models are sequential. The third-generation stage-gate system improved flexibility by having fuzzy gates that permitted conditional "Go" decisions depending on the situation. Process stages could be overlapped but focused on the resource availability in the organization. Subsequently, several improvements followed the typical stage-gate system. Stage-gate model embarks with open innovation concepts to promote more innovations. Manufacturing companies are becoming more open to product development approaches that define products based on what people need and create experiences for the consumer rather than simply designing products (Figure 1).

New product development model

More sequential New Product Development (NPD) models were published by Urban and Hauser (1980), Gruenwald (1992) and Himmelfarb (1992) in the early

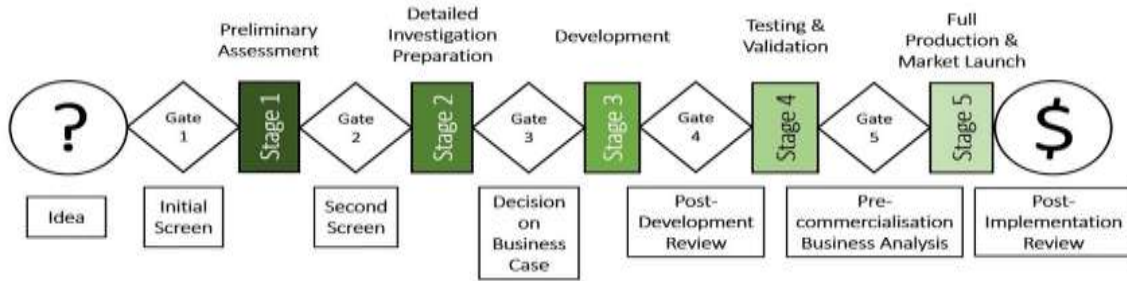


Figure 1. Stage-gate system model.
Source: Silva and Rupasinghe (2016).

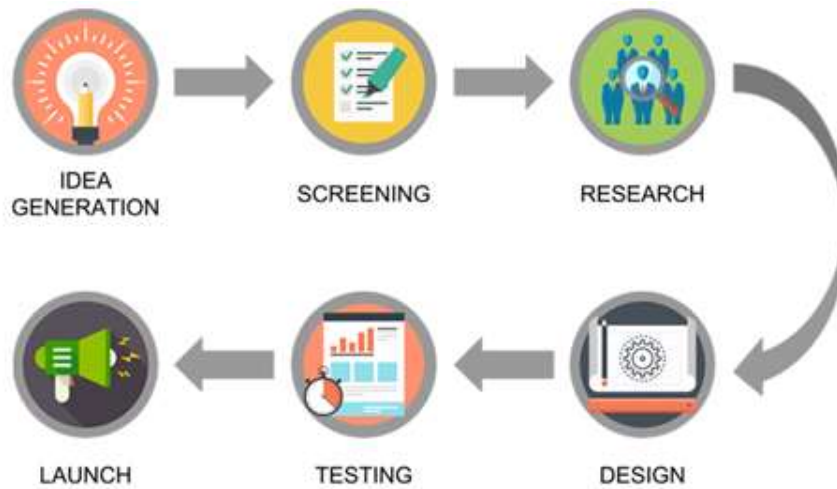


Figure 2. New product development model.
Source: Silva and Rupasinghe (2016).

stages of NPD, even though they were restricted to rationalizing the inter-related process activities of product design and development (Silva and Rupasinghe, 2016). These models helped identify the list of activities involved in the product development process unlike other models that did not feature current complicated product development processes. Early NPD process model development saw the publication of a number of sequential processes but such models were unable to accommodate the interconnected complex process (Gurbuz, 2018; McCarthy et al., 2006). Most of the sequential models consist of series of activities in NPD from the idea of “generation, market/ technical assessment, concept development, prototyping and ultimately finished testing” (Sujova et al., 2016) (Figure 2).

Parallel or concurrent product development process models

Subsequently, parallel or concurrent product development

process models were introduced to address some of the weaknesses in the earlier sequential processing models. In these concurrent models, the multiple departments involved in the product development execute their tasks simultaneously towards optimizing product development cycle time. A typical example is Erhorn and Stark (1994) integrated approach. Beyond this was the supplier integrated NPD model was propounded by Handfield et al. (1999). In their model, process flow was clearly emphasized and paved way for suppliers to be integrated into the series of stages (Silva and Rupasinghe, 2016). Thus making it possible for key suppliers’ capabilities and design expertise, performing of technology risk assessments and risk evaluations that enhance the success rate induced by supplier support (Figure 3).

New Product Design and Development Model (NPDD)

In 1999, Peters, A.J. and the research team came out with a generic model for New Product Design and Development (NPDD) for small-medium industries (Silva

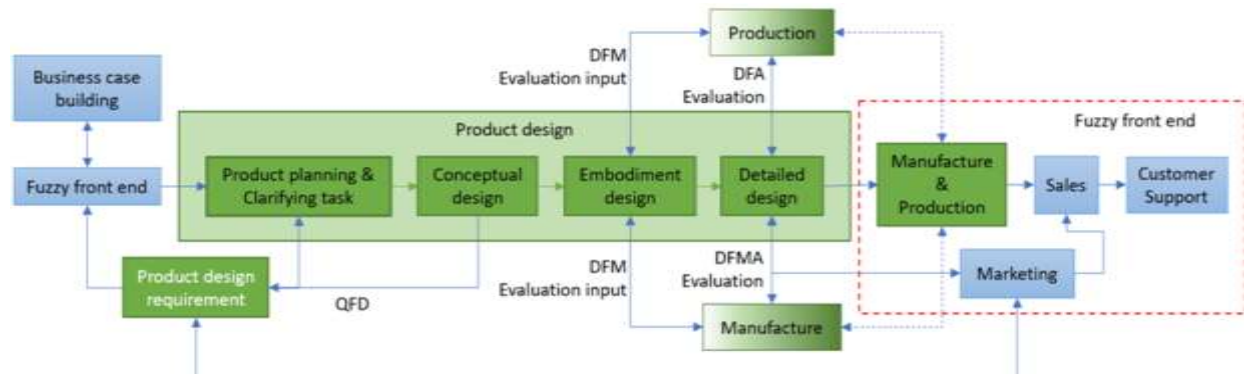


Figure 3. Concurrent product development process models. Source: Adopted from Duhovnik et al. (2009).

and Rupasinghe, 2016). This model is a detailed identification of activity of an NPDD process from design to delivery (Peters et al., 1999). The approach also encourages process iterations and flow of information, as captioned under "Facilitation Issues" (Silva and Rupasinghe, 2016). However, the model fails to clarify and describe how to process iterations are operated as well as stakeholders involvement in the information flow.

Quality Function Deployment (QFD) Methods

These methods offer visible connective approaches that seeks to consider the needs of the consumer throughout the processes (Bouchereau and Rowlands, 2000). Numerous NPD process models were designed using Quality Function Deployment (QFD) techniques in a variety of industries, including fashion industries (Silva and Rupasinghe, 2016). QFD is a method implemented to facilitate the development of marketable products with product attributes desired by the customer aimed at improving quality (Syreishchikova, 2021).

Open innovation model

Open Innovation principles emerged as an extended version of external collaborations, which have led to accelerated and enriched the New Product Design, Development and launch. The model assumes innovative approaches by integrating both internal and external ideas to solve problems within a firm (Parveen and Arslan, 2015). From a broader perspective, Open Innovation is defined as leveraging external sources of knowledge to drive internal growth. In this approach, active customer engagement is coordinated in new product development than conventional product development (Silva and Rupasinghe, 2016). The open innovation practices provide a normative guide for organizational growth by inspiring best practices from

external sources. Especially lead users may generate innovative ideas, and probably they have the potential to suggest feasible plans to end up with commercial products. However, there is a high risk when exposing new product strategies to external teams.

The electronic new product development model

The Electronic New Product Development (E-NPD) emerged from knowledge management concepts, and this model is intended to create core knowledge repositories and the information interdependency between all components of the value chain. In addition, the authors highlighted that successful product development projects need the participation of many experts from cross-functional departments with various knowledge domains. However, NPD is often described as a continuous learning process, and the knowledge management view emphasizes acquiring knowledge through learning processes. Further, Knowledge Innovation is explained as a core activity of NPD and knowledge acquisition, protection, integration, and dissemination are also explained as key directions of the model development. There were some directions for applications of electronic tools presented under the E-NPD model.

Virtual customer integration was initiated in the manufacturing of high-tech industries and transferred some techniques into the manufacturing of consumer goods. This technology has become popular among apparel designers and customers. Virtual customer integration is beyond web-based market approaches, and those models will absorb customers' knowledge and experience on products explicitly. Such customers' responses to virtual products will reduce NPD failures by early detecting the customers' acceptance of the final product. In combination with virtual reality (VR) and augmented reality (AR) technologies, the Web is the enabler for virtual customer integration. VR based

simulator involvement is proven advantageous and beneficial in many fields. The virtual New Product Development Team concept is also an emerging concept that will enhance the New Product Development by optimizing the human skill deployment. More of the functions are decentralized, no matter their physical placement, collaborated with their work with the support of novel electronic communication technologies in cost-effective ways.

Review of models in the area of fashion

In this part of the study, NPD models, which were inherently designed for the fashion industry, have been discussed. Although the apparel development process differs significantly from the other product development processes, some manufacturing firms have used generic models and concepts such as QFD in apparel product development (Mahmood and Kess, 2016). There are inherent qualities of apparel development that need to be considered when designing normative process models. In addition, during this reviewing process, other applications of NPD models are evaluated.

First, apparel products are designed as seasonal lines or groups of products rather than individual products. Second, several product lines produce within a year; hence, stages of the development process may overlap. Third, the strategy for developing any one product in the apparel line may differ from another product.

No-interval coherently phased product development model

Considering the above limitations, a conceptual model named, No-Interval Coherently Phased Product Development Model for apparel (NICPPD) was developed by delegating the responsibility of apparel product development among four functional divisions; Marketing, Merchandising, Design and Development, Production (Silva and Rupasinghe, 2016). The main model of NICPPD illustrates an overview of the six phases of the apparel product development process, and this is followed by the other six models, which elaborate an in-depth examination of each phase of the development process. This descriptive model did not show the customer integration, and that gap was filled by the development of the Proactive Product Development Integrating Consumer Requirements (PPDICR) Model by the same couple of researchers in 2005.

Proactive Product Development Integrating Consumer Requirements (PPDICR) model

The PPDICR model contributes to the theoretical

understanding of apparel product development and which avenues can be adopted to capture consumers' requirements. Effective use of this model will facilitate the development of a commercial product with an adaptation of a systematic method to capture consumers' needs. Apparently, eventual product success is determined by the level of acceptance by the end consumer. Customers' knowledge has become a valuable input in the innovation process as they have the expert knowledge in using it for a particular purpose over the years (Silva and Rupasinghe, 2016).

Functional, expressive, aesthetic (FEA) model

The functional, Expressive, Aesthetic (FEA) model can be used to identify end consumers' needs with respect to unique apparel design. Functional, expressive and aesthetic aspects are considered when assessing users' needs and wants.

The degree of influence of those factors will depend on the product category. The target consumer is at the core of the model. Culture determines the connectivity between the customer and the above factors, which need to be analyzed by the designer when designing customized apparel solutions. In a rapidly changing fashion environment (Chavan, 2018), culture will not be the factor to evaluate when acquiring their desires for apparel design. The three-stage design process consists of three main phases in product design and development (a) problem definition and research, (b) creative exploration, and (c) implementation (Silva and Rupasinghe, 2016). Labat and Sokolowski (1999) applied this model for a textile product design project. This model encourages creative exploration of new products and lends a measure of quality assurance of the novel products (Silva and Rupasinghe, 2016) (Figure 4).

The new product development process in the fashion industry

In the fashion industry, NPD is a dynamic process characterized by a high seasonal demand, which depends on the seasonal nature of fashion products (Mahmood and Kess, 2016). The entire NPD process runs at least two times per year, one time for each season and with short Time-To-Market (that is, 15 months in the apparel industry, 12 months in the leather industry). Several product revisions occur, with continuous interactions among designers, stylists and marketing functions (Paper et al., 2013).

Often during a single season, revisions and modifications are still happening when the final product is already on the shelves; this occurs to make some re-arrangements and re-alignments in accordance with customers' demand (e.g., change of colours for a model

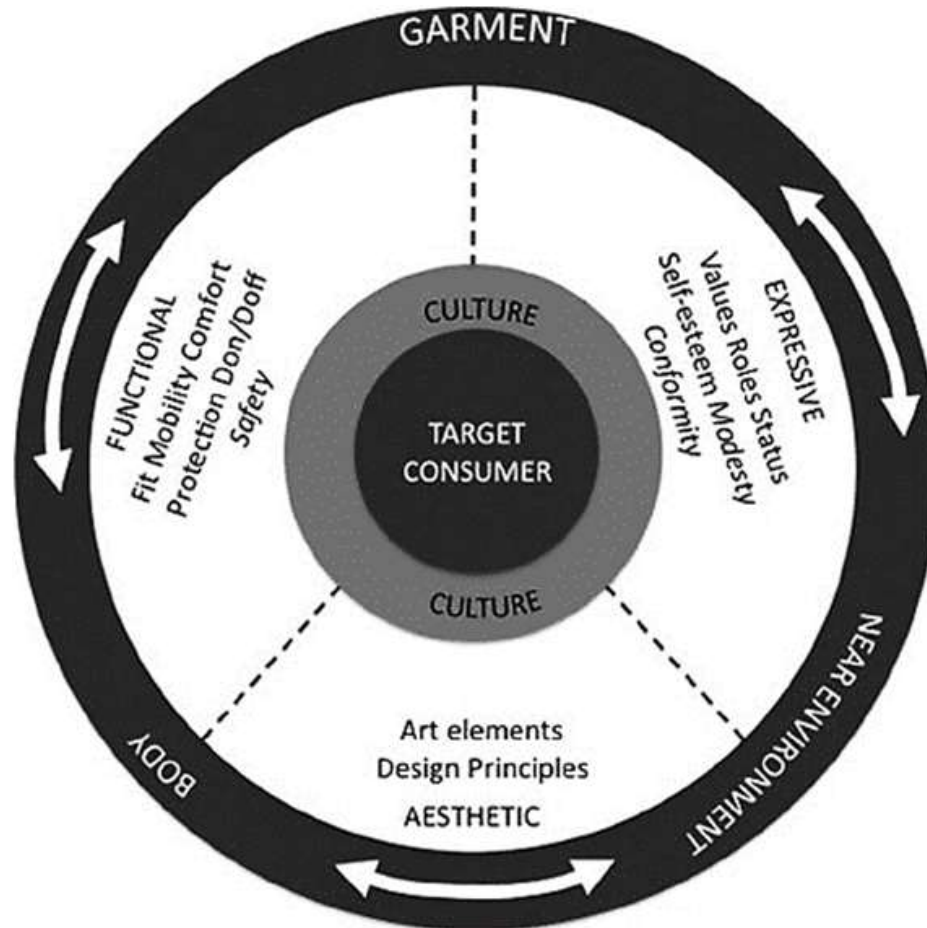


Figure 4. Functional expressive aesthetic model.
Source: Lamb and Kallal (1992).

in the apparel sector). In this context, as is described in the literature, NPD is a comprehensive process, which starts from (i) design, (ii) modelling/prototyping (to realize the demonstration products to be shown at the fashion fairs), (iii) detailed engineering, (iv) material sourcing and then ends with (v) production and distribution (Powell and Cassill, 2005).

The production phase usually lasts 3-4 months and starts when material sourcing is completed. The sourcing phase is very particular: its duration can change from 2 weeks up to two and a half months, depending on the duration of the commercial launch, which generally takes place at the same time, in conjunction with the fashion shows and fairs (e.g., the Pitti Florence fair, Milan and Paris fashion weeks, etc.). At the beginning of the sourcing phase, a provisional and generic order of raw material is submitted to the suppliers, while confirmation of the raw material quantity is given at the end of this phase, with a maximum gap of 20-30% from the provisional phase (Silva and Rupasinghe, 2016). During this very short period, as soon as the number of sold units is known for the current season, the company board

has to decide which products will be produced and which not; accordingly, the raw material to order needs to be defined (Paper et al., 2013).

During this period, most companies also had to finish the engineering phase: for example, in most cases, the generation of the final Bill of Material (BOM) took place when orders had already been launched. Once the company's decision is made, the creations of the BOM and the raw material purchase order have to be submitted quickly. Moreover, the decision of what has to be produced can change very rapidly during the period when fashion shows take place. In some companies, the engineering phase was completed for all the products before the beginning of the fashion fairs, permitting quick management of the sourcing activities (Paper et al., 2013).

METHODS

This survey adopted the qualitative research approach to gather and analyze data. Qualitative research focuses on fewer samples to gather more detailed and richer data (Cohen et al., 2007). The

Table 1. Fashion house categories and mode of operation.

Fashion house type (FHT)	Firm label	Number of workers	Mode of operation	
Small	FHT 2	1	Self-managed with 3 apprentices	
	FHT 3	1	Self-managed with 7 apprentices	
	FHT 5	1	Self-managed with 3 apprentices	
	FHT 6	1	Self-managed with 2 apprentices	
	FHT 7	1	Self-managed with 5 apprentice	
	FHT 8	1	Self-managed with 3 apprentices	
	FHT 9	1	Self-managed with 2 apprentices	
	FHT 10	1	Self-managed with 6 apprentices	
	FHT 12	1	Self-managed with 1 apprentice	
	FHT 13	1	Self-managed with 3 apprentices	
	FHT 14	1	Self-managed with 4 apprentices	
	FHT 15	1	Self-managed with 4 apprentices	
	FHT 16	1	Self-managed with 2 apprentices	
	FHT 17	1	Self-managed with 7 apprentices	
	FHT 18	1	Self-managed with 3 apprentices	
	FHT 19	1	Self-managed with 8 apprentices	
	FHT 20	1	Self-managed with 3 apprentices	
	FHT 21	1	Self-managed with 5 apprentices	
	FHT 22	1	Self-managed with 4 apprentices	
	Medium	FHT 1	2	Institutionally managed with casual workers
		FHT 4	5	Self-managed with 4 workers
		FHT 11	3	Self-managed with 2 workers
Total	21	29		

Source: Authors Fieldwork, 2022.

Table 2. Participants' responses on type of production.

Main findings

All participants produce on custom-based

Mass production is done at a specific time and on demand

Source: Authors Fieldwork, 2022.

population comprised Fashion Designers in Ghana. The purposive sampling technique was used to reach out to twenty-one (21) Fashion/Garment producers in the Central, Greater Accra, Ashanti and Ahafo Regions in Ghana. Interview and observation guides were the main instruments used to gather data. Data obtained were analyzed and discussed based on themes that emerged from the study.

RESULTS

Participants comprised eighteen (18) females and three (3) males whose ages ranged from 26-55 years. Their working experience ranges from 2 to 18 years. Participants' industries were categorized as Small and Medium production scales based on the number of employees and mode of operation. Details are presented

in Table 1.

Mode of production

Participants were also asked to indicate their production line. The results are summarized in Table 2. Participants generally indicated that they produce on custom-based. However, there were times when some designers produce in masses for specific groups on request.

Sampled responses:

"I mostly sew on custom-based, but once a while, I do produce for the masses on request which is usually for schools". (Participant 2)

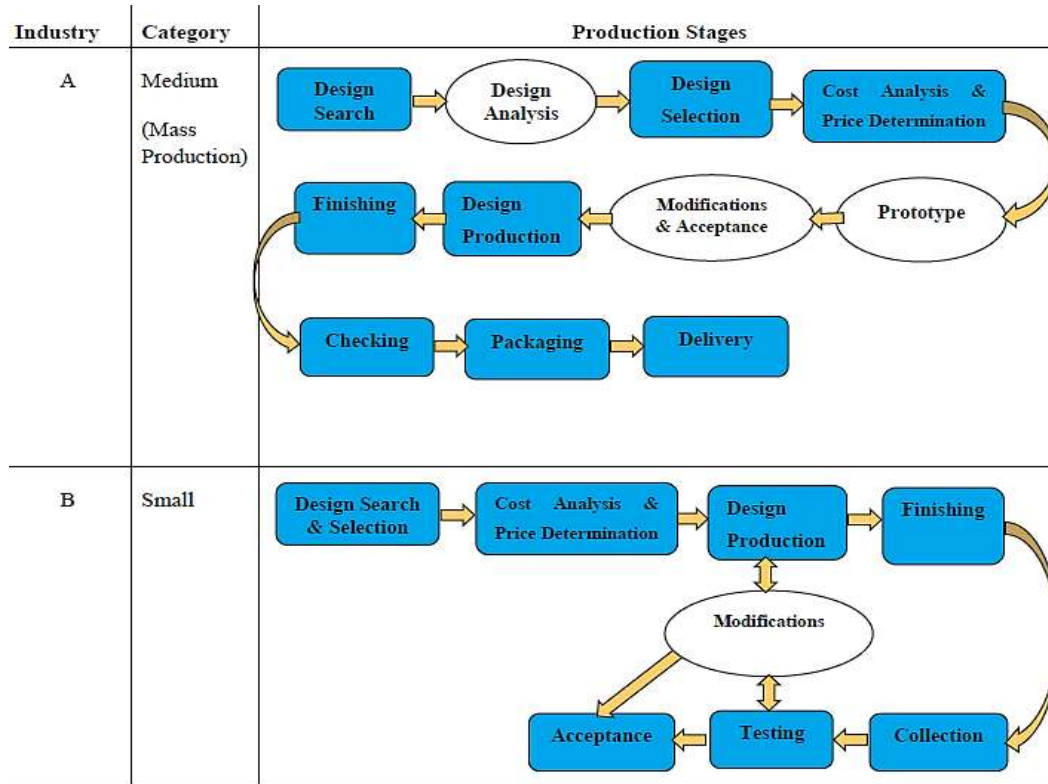


Figure 5. Product development stages designers adopt.
Source: Authors Fieldwork, 2022.

“I do custom-based sewing” (Participant 7)
“We sew on both custom-based and mass production. But most of the time is the custom-based that we produce more” (Participant 4).

Participant 1, however, had a different production line:

“The production centre does more of the mass production than the custom-based since the focus is to produce items in masses upon request”

Research question one: Which model guides the production of fashion products among designers in Ghana?

Participants were asked to indicate the kind of model they follow in designing products for their clients. The findings revealed that designers do not have a specific standardized guide they follow in designing. The researchers further observed their production process is to cross-check which of the internationally recognized models designers follows. The study observed that designers apply indicators from different models in their design creation and delivery. Sampled views from the participants are shared below:

Participant 5:

“I do not have any standard I follow. I create my designs based on the standard practices. When the customer selects her style of preference, then I check if the fabric will require special treatment. I do memory costing and charge the person. After full or partial payment, I measure the person and begin production. When the product is ready, I call or inform the owner to come for it”.

The result indicates that the participants have no exposure to standardized product development models but instead rely on processes that suit them best in their production line. This is evident as participants 2, 5, 6, 7, 9, 13, 16, 18 and 21 have similar views.

Research question two: What activities constitute Product Development Process of the Ghanaian fashion designer?

Product development processes of designers

The designers were asked to describe the stages they go through to develop the design from consumer requisition to delivery to validate what is observed. The participants’ views were summarized into general processes, and this is presented in Figure 5.

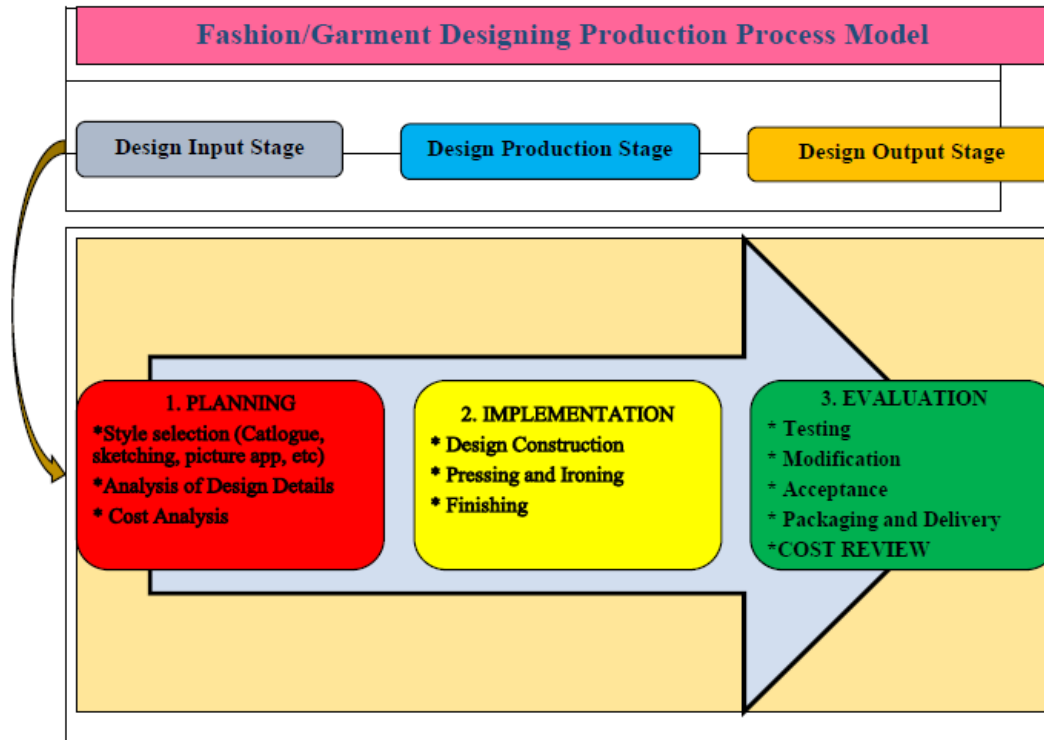


Figure 6. The red-gold-green fashion/garment production process model.
Source: Authors own construct (Fieldwork, 2022).

Figure 5 shows the indicators of the Product Development Processes small and medium scale designers in Ghana practice. Participants within the small-scale production shared similar processes. However, the participants who engage in mass production in the Medium Scale Production follow procedures that slightly differ from the custom-based production process. Sampled view from Participant 1 is shared below:

“What the Production Unit does after product requisition, the client is shown a sketch of the product, and then the design is analyzed. Upon initial acceptance, a budget is prepared for approval by the finance unit. The client is then given a copy of the sketch for acceptance and depositing of production cost into an account follows. After, the invoices are sought for the purchasing of the raw materials. Upon purchasing, a prototype is made for review and acceptance then, production begins. The sample(s) made are assessed at each stage to check for faults and corrections. At the end of the production, the final finish is given and the products are packaged for delivery to the client.”

Proposed product development model

After cursory review and analysis, the researchers

realized a gap in the standardized Models of the Product Development Process. Since the standardized model seems not applicable in the Ghanaian context, the researchers proposed a model captioned “Red-Gold-Green Fashion/Garment Production Process Model” for adoption and review. The model is presented in Figure 6.

DISCUSSION

This study explored and reviewed some Product Development models and processes fashion/garment designers in Ghana adopt. The results indicated that designers do not have standardized models that they follow; however, there were indications that some activities within standardized models are practiced by the Ghanaian Fashion Designers. The standardized models seem to have undergone several evolutions resulting in the refinement of Product Development Models over time. Models reviewed in this study have their own unique structures, which the Ghanaian designers adopt and adapt some stages for successful design creation. Successful businesses must be able to broaden their knowledge base and acquire new skills in an increasingly competitive global economy (Cooney, 2012).

The study revealed that fashion designers in Ghana rely mostly on clients’ description to come up with a new product. Additionally, most models reviewed have

focused on the product but not necessarily customer inputs. There also seems to be lack of clarity on innovation and flexibility on the adoption of the standardized models; the processes designers generally go through to complete projects for customers remain unchanged. This places such products and their introduction into the market at disadvantage since the acceptance level may be affected.

The Ghanaian Fashion Designers seem unaware of design models available. Instead, the designers follow their own pattern for creating new design which lacks documentation. The inability of the designers to create their own models has been attributed to lack of financial resources, structured product development and innovation processes (Fueglistaller, 2004), lack of understanding on design concepts (Moultrie et al., 2007) and lack of management of new knowledge and resource use (Acklin, 2013). The proposed model for the Ghanaian fashion designers has the potential to develop designers' creativity and minimize waste associated with the introduction of prototypes. However, the proposed model seeks to favour only the consumers who request for designs to be created. This generally implies that while standardized models aim at marketing specific products, the proposed model by the researchers aims at satisfying individual consumers' specifications.

Conclusion

Product design models are structures that serve as guide for production among several production units of which the fashion/garment production industries are not exempted. Although several models have been proposed for use in the fashion industries none of these standardized models truly reflect the Ghanaian fashion industries' production process.

The study concludes designers in Ghana may not have been exposed to such models and they rely mostly on the mode in which they are trained as designers. The adoption of standardized models in design creation by the Ghanaian Fashion Designers may be challenging since there seems to be gap with the target clients. Hence, this study recommends the proposed model for adoption and implementation by Fashion Designers in Ghana since its use reflects their creation line and it is manageable and flexible.

Recommendations

1. Further research is required to introduce and practice the proposed model from this study for an extended period to validate the effectiveness of the proposed interventions for the Ghanaian fashion designers.
2. A comprehensive review of Product Development Process in Ghana is required since recommended

models seem not to be applicable in the Ghanaian context.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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