New product development in the fast fashion industry: a case study in Vietnam

Duong Quang Hao, Ngoc-Hien Do, Duc Duy Nguyen

New product development in the fast fashion industry: a case study in Vietnam

Duong Quang Hao, Ngoc-Hien Do and Duc Duy Nguyen*

Department of Industrial Systems Engineering,
Ho Chi Minh City University of Technology (HCMUT),
268 Ly Thuong Kiet Street, District 10,
Ho Chi Minh City, Vietnam
and
Vietnam National University Ho Chi Minh City,
Linh Trung Ward, Thu Duc City,
Ho Chi Minh City, Vietnam
Email: dqhao.sdh221@hcmut.edu.vn
Email: hienise97@hcmut.edu.vn
Email: duy.nguyen@hcmut.edu.vn
*Corresponding author

Abstract: The proposed approach for new product development (NPD) is intended to enhance the competitive advantages of start-up businesses. The new products were mainly developed by doing competitor analysis and checking the opinion of customers. First, the top competitors of the companies are identified by the competitor profile matrix (CPM) method. Then, the best-selling items of the top competitors would be analysed to define the essential factors that the customers can favour. After that, the new product functions would be added by checking customers' feedback. Finally, the samples would be made for further improvement. The time required for the new product development process can be shortened, and the budget can be reduced significantly by doing competitor analysis. Besides, the risk of failure can also be decreased if the companies follow top-selling product characteristics. The proposed approach provides valuable insights about new product development in fast fashion companies regarding new product development strategies.

Keywords: new product development; NPD; customer surveys; competitor analysis; fashion industry; business strategy; Vietnam.

Biographical notes: Duong Quang Hao currently studies at Ho Chi Minh City University of Technology (HCMUT) – Vietnam National University (VNU), Vietnam, majoring in Industrial Engineering. He researches about product development and decision-making process.

Ngoc-Hien Do is an Associate Professor at the Department of Industrial Systems Engineering, Ho Chi Minh City University of Technology (HCMUT) – Vietnam National University (VNU), Vietnam. His research interests are operations research, logistics and supply chain.

Duc Duy Nguyen is a Lecturer at the Department of Industrial Systems Engineering, Ho Chi Minh City University of Technology (HCMUT) – Vietnam National University (VNU), Vietnam. He received his Doctoral degree in Engineering and Technology from Thammasat University, Thailand. He has done postdoctoral research on quantitative business analytics at LUT University, Finland. He developed and applied optimisation and machine learning methodologies to different engineering problems. His research interests are supply chain management, production systems, renewable energy management, and operations research.

1 Introduction

New product development (NPD) is a familiar term widely used in different industries such as tourism industry (Benur and Bramwell, 2015), mechanical industry (Albers et al., 2016), medical industry (Miller et al., 2020), F&B industry (López-Mas et al., 2022), to mention few. Marion and Fixson (2021) defined NPD as introducing a new product, method, or service. NPD is a process in which a product is designed and prepared for the sales department to utilise a market opportunity (Um and Kim, 2018). In a dynamic marketplace, organisations consider NPD to be the core of competitive strategy (Wu and Chen, 2021). On the other hand, Tyagi et al. (2015) claimed that product development is a broad field, including planning, design, creation, and marketing of a new product, becoming an essential factor in overcoming the competitors with main products with a longer development time. In general, new product development is a process to innovate and ensure a new value to increase the competitiveness of the firms in the market. The product development process is typically set up based on new ideas of related departments or to overcome the weaknesses of the company's current products.

In the last decades, the market has changed rapidly and continuously, increasing the importance of investing in the development and innovation of all companies (Rossi et al., 2012). The product innovation and development processes are crucial and essential for ensuring the survival of business companies Kumar et al. (2018). In addition, Distanont and Khongmalai (2020) proved innovation's irreplaceable role in enhancing the SME level's competitive advantages, especially in the frozen food industry. Distanont and Khongmalai (2020) also concluded that innovation or product development is becoming the strategic tool for enhancing business to gain competitive advantages among other competitors. As a result, product development is now playing an essential role in all enterprises' strategic plans. However, in the fashion industry, the success rate of NPD's project is relatively low because of the increased time and cost, difficulty in scheduling, and short product life cycles (Dewi et al., 2015).

This paper formulated a method to develop new products, mainly depending on competitor analysis and customer surveys. This method is especially suitable for products that become outdated rapidly or companies that want to expand into brand-new business areas. By identifying customers' needs and analysing competitors' current products, researchers and the product development department (R&D) shorten the time to develop new products to meet the market's current needs. A new product developed by this method is expected to leverage almost the existing strengths of competitors' products and have unique functions to solve customers' inconveniences.

The new approach is applied and verified by a case study of a start-up company in the fast fashion industry, where the business focuses on producing clothing quickly and inexpensively to meet the demands of current fashion trends (Bick et al., 2018). In this research, a new T-shirt collection can be planned by combining customer surveys and competitor analysis. According to Wardoyo and Walean (2022), customers prefer T-shirts from global fashion brands instead of local brands because of their quality and prestige, raising competitiveness. As a result, a start-up company may find it challenging to launch a completely new T-shirt collection to compete. Therefore, new T-shirt design development methods based on top competitor analysis and customer surveys can help researchers and R&D shorten the time to find the essential factors of best-selling items of successful local brands in the market and increase the competitiveness of the new brand in this fierce market. In the past, the importance of the benchmarking process, which encourages enterprises to learn from lead players in the market, has also been mentioned (Zailani et al., 2007).

The paper is organised as follows: Section 1 introduces the importance of the new product development process, a problem statement, and a motivation for this research. Section 2 provides a background. The methodology is provided in Section 3. Section 4 presents a case study of a fast fashion start-up company. Finally, Section 5 concludes the paper and future research.

2 Background

2.1 New product development applications

NPD projects have already been paid attention by researchers and industries. Depending on the scope of each project, different approaches were applied to develop new products in different areas. Benur and Bramwell (2015) analysed and researched tourism product development and product diversification to attract more tourists to a particular destination. In the mechanical area, Albers et al. (2016) developed a product development method called product generation engineering (PGE) and applied it to produce a dual mass flywheel (DMF). Albers argued that the first product generation often lacks essential factors to be successful in the market, and the PGE approach can upgrade the first product version to reach the necessary level of product maturity. With a different approach, Altuntas et al. (2019) adopted quality function deployment (QFD), a customer-oriented approach to develop an electric towing vehicle in the mechanical field. In the food and beverage (F&B) industry, Filieri (2013) successfully established an NPD project in a food company by collecting many customers' ideas, while Helmi (2019) improved the healthy drink product by analysing the failures of other NPD projects in the company. In the medical field, the NPD process can be more complicated, especially with products directly affecting human health, and clinical trials are required in the NPD process of medical products to ensure efficiency (Miller et al., 2020). Moreover, by deploying the same co-creation approach with customers, López-Mas et al. (2022) also proved the importance of customers' opinions in the beginning stage of the NPD process to develop new fish products in three different European countries. Overall, NPD projects in all fields begin with the ideas brainstorming stage. Although there are various ways to implement, the ideas for new products are typically inspired by customers' needs or the imperfection of the company's current product.

Focusing on the fashion industry, Bandinelli et al. (2013) investigated eight Italian companies' NPD processes and concluded that most of them started their NPD projects by studying from the market research, selecting proper features to apply, and finally making prototypes to test their ideas. Besides, a technical approach using 3D virtual prototyping was also suggested as a potential NPD tool in the fashion industry in the near future despite some obvious disadvantages (Papahristou and Bilalis, 2017). Moreover, the make-to-order concept to meet the needs of every customer and setting up a strategic alliance with a textile expert to develop signature fabric are two other approaches for developing denim fashion products in Indonesia fashion start-up companies, which are mentioned in research by Nurcahyo et al. (2018). Nevertheless, these two approaches necessitate significant financial investment and entail considerable risk, particularly for start-up businesses.

2.2 Research gap

The fashion industry has expanded rapidly in the last two decades (Todeschini et al., 2017), it requires fashion companies to continuously improve and innovate their products to meet the customer needs and timely catch up with market trends. However, not much research have been done to develop an NPD approach to optimise the process for this field. In fact, available studies about NPD projects in the fashion area mainly focused on evaluating the importance of the NPD process to increase competitive advantages, not emphasising how to do it effectively. Especially in fast fashion, there are many risks of challenging time scales, short product life cycles, and unpredictability (Parker-Strak et al., 2020), strengthening the importance of a new suitable NPD approach to tackle those problems. In order to explore this gap, this study would propose an NPD method for companies in the fast fashion industry, which can shorten the time to brainstorm new product ideas, reduce the risk of failure and quickly meet customer needs by combining competitor analysis and customer surveys.

3 Methodology

In this section, the proposed methodology is presented in detail. The NPD process is controlled by applying the project management method. The main difference of the approach mentioned in this research is in the ideas generation step, where the companies could shorten the time and reduce the risk of failure. Data collection and competitor identification are two different skills used in the case study.

3.1 Project management method

The traditional project management method is applied to manage the NDP process effectively. Project Management Institute (2001) divides the project life cycle into four stages: starting the project, organising and preparing, carrying out the project work and closing the project. According to Westland (2007), the project life cycle consists of 4 main stages, including project initiation, project planning, project execution and project closure (Figure 1). Besides, in many practical works, the third stage can be separated into two small stages: implementation and monitoring. Although the names of each step in

different documents cannot be similar, each stage's purposes remain the same. In this research, we mainly focus on the initiation phase.

Figure 1   Project life cycle
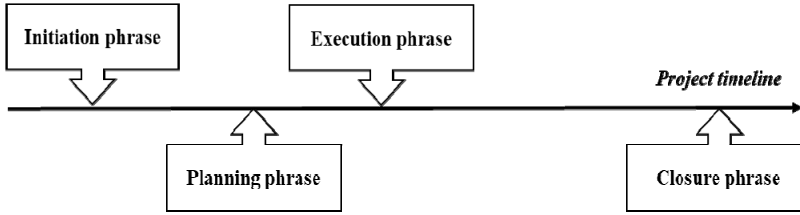
Source: Westland (2007)

3.2   Data collection method

This research collects data for evaluating competitors, identifying best-selling items on the market, checking fashion trends and applying for new product design. Two main data collection methods are observation and customer surveys.

- Observation: the data and selling performance of competitors are observed through the number of sales and customer reviews in the e-commerce of competitors such as Shopee, TikTok Shop, Facebook, etc.

- Customer survey: surveys were conducted to evaluate the strengths and weaknesses of current products in the market of competitors and to check the reaction of customers to innovate new functions of new developing products.

3.3   Competitor selection method

Selecting proper competitors is an important step to help decision-makers have suitable strategies for the company. In the NPD aspect, researching competitors' products can enhance the firm's competitive advantages by making new products that can resolve the imperfection of competitors' products. In this research, the competitor selection tool is the competitive profile matrix (CPM). Sohel et al. (2014) stated that CPM is a supportive tool for assessing major competitors using critical success factors. CPM analysis can identify the industry's most substantial companies with comparable market share strength (Wackowski et al., 2022).

3.4   Solution methodology

The NPD model is applied in this research in a fashion company. According to Kazimierska and Grębosz-Krawczyk (2017), although stages of the NPD process are established based on the discussion between R&D and other departments in a company, the main stages of the NPD process include identifying customers requirements, developing the concept of a product, generating detailed design, testing and product commercialisation. In the scope of this research, idea generation is drilled down, and a new approach is applied by combining competitor analysis and customer surveys. The detailed methodology is displayed in Figure 2.

By adopting our model, start-up companies are able to expand into new business areas, even if they lack the experience or database to develop new products. Based on this approach, firstly, the company needs to identify the competitors in the same market share and have some prominent achievements. Then, the best-selling items of competitors are analysed. The purpose of this stage is to define the essential factors of successful products in order to satisfy the customers. Besides, by checking customer feedback on social media or selling platforms, the weaknesses, dissatisfaction, and imperfections of our competitors' products could be recognised, which later can become the new functions of our company's products to increase competitive advantages. After identifying factors of best-selling items and new potential features, the R&D department can start developing detailed designs for new products. Finally, samples are made, and customer surveys are conducted to continuously improve the product to be ready for mass manufacturing and commercialisation.

This methodology focuses on two aspects of a new product: applying success factors of current top-selling products and fixing the missing points of those products that can be developed more to increase customer satisfaction. However, though the application of success factors is essential for all new product developments, the new functions are optional depending on the abilities of the companies and the effective level of those new functions.

Figure 2 Methodology
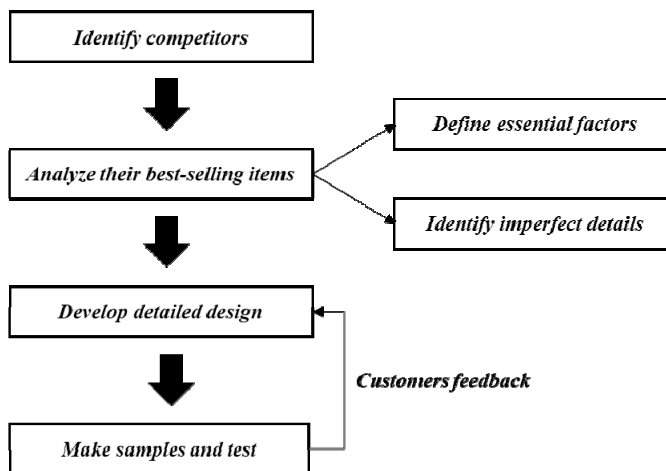
4 Case study

4.1 Project introduction

A start-up company in the fashion industry intends to expand a new business to become a local fashion brand and develop a new streetwear product. The company has some requirements for this project:

1   the first products are T-shirts, which would be sold mainly on online channels in Vietnam, including Shopee, Tiktok Shop, Facebook and Instagram, to mention a few

2   the first product is high-quality with the target price and possible to be sold 100%

3   customer segment is ranged from 18 from 25 years old

4   time interval from ideas generated and production completed is within six weeks.

4.2   New product development

4.2.1   Step 1: market research – identifying competitors

In Vietnam, the streetwear fashion market has been developing rapidly. There are over 100 different streetwear local brands established in recent years. Identifying the top competitors in the market is important because they are currently leading the fast fashion industry. If we can provide the customers with what they are selling with better quality and more innovative design, we can replace their position in the market sooner or later. The CPM method is applied to identify the top competitors. The critical success factors used to evaluate the competitors in this CPM are customer satisfaction (1), fabric quality (2), perfection level of finished product (3), packaging quality (4), reputation (5), the creativity of design (6), unique level (7) and marketing strategy (8). The factors are decided based on the purpose of this market research: finding top local brands to develop products with trendy designs and styles for customers. Notably, nearly 73% of purchasing decisions occur at the point of sale. Hence, the creativity of design plays a pivotal role in differentiating brands and elevating products above the competition, shaping specific perceptions in consumers' minds (Srivastava et al., 2022). Therefore, design creativity is among the most important criteria besides customer satisfaction.

The rating score for each factor ranges from 1 to 4 and refers to strengths and weaknesses, where 4 = major strength, 3 = minor strength, 2 = minor weakness, and 1 = major weakness. Because the factors are qualitative indicators, a group of experts in the fast fashion industry is invited to join in this process. The experts are responsible for considering the weight of all critical success factors in this CPM and rating scores for selected competitors. By checking the monthly selling performance on e-commerce platforms, the company can select a list of prominent local brands to be joined in this CPM evaluation. However, only the top 10 local brands with the highest scores are displayed in Table 1.

In conclusion, brands A, B, and C are the company's top 3 biggest competitors in the fast fashion industry with streetwear style. Then, those three competitors' best-selling T-shirts are analysed in detail to define essential factors of streetwear items in the market that can meet the customers' needs and ensure selling ability. Customer surveys are conducted, and customer feedback on social media is collected at this stage. By doing this, we can know precisely what the dissatisfactions of customers with the products of those three brands and which factors from the products of the three brands impress customers the most. The results are summarised in Table 2. The company's new products are expected to have all the current strengths of three competitors and improve all the weaknesses with new functions.

Table 1   Choosing competitors by CPM method

Factor		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	Total
Weight		0.2	0.15	0.15	0.05	0.05	0.2	0.15	0.05	1
Brand A	Score	3	4	3	2	3	4	4	3	
	Wei. Score	0.6	0.6	0.45	0.1	0.15	0.8	0.6	0.15	3.45
Brand B	Score	4	4	3	3	4	3	2	4	
	Wei. Score	0.8	0.6	0.45	0.15	0.2	0.6	0.3	0.2	3.3
Brand C	Score	3	2	3	2	4	2	3	3	
	Wei. Score	0.6	0.3	0.45	0.1	0.2	0.6	0.45	0.15	2.85
Brand D	Score	3	4	4	3	4	1	1	3	
	Wei. Score	0.6	0.6	0.6	0.15	0.2	0.2	0.15	0.15	2.65
Brand E	Score	2	2	3	3	4	2	2	4	
	Wei. Score	0.4	0.3	0.45	0.15	0.2	0.4	0.3	0.2	2.4
Brand F	Score	3	3	3	2	3	2	2	2	
	Wei. Score	0.6	0.45	0.45	0.1	0.15	0.4	0.3	0.1	2.55
Brand G	Score	2	3	3	2	3	2	3	2	
	Wei. Score	0.4	0.45	0.45	0.1	0.15	0.4	0.45	0.1	2.5
Brand H	Score	3	2	2	3	4	2	2	3	
	Wei. Score	0.6	0.3	0.3	0.15	0.2	0.4	0.3	0.15	2.4
Brand K	Score	1	2	2	2	3	3	4	2	
	Wei. Score	0.2	0.3	0.3	0.1	0.15	0.6	0.6	0.1	2.35
Brand L	Score	2	2	2	2	3	2	2	3	
	Wei. Score	0.4	0.3	0.3	0.1	0.15	0.4	0.3	0.15	2.1

Note: Wei. score: weighted score.

Table 2   Identifying competitor's strengths and weaknesses

Competitors	Strengths	Weaknesses
Brand A	• Signature graphic designs	• Size control
	• Goof fabric quality	• Limited target audience
Brand B	• Good fabric quality	• High price
	• Signature packaging	• Lack of promotion activities
		• Lack of signature design
Brand C	• Basic form, easy to wear	• Poor fabric quality (especially T-shirt collar)
		• Lack of product variety

Table 3   Choosing fabric

	Cost	Comfortable level	Durability	Final score
	0.4	*0.4*	*0.3*	*1*
2-way stretch cotton 100%	8	7	9	8.7
4-way stretch cotton 100%	6	8	8	8

4.2.2 Step 2: identify essential factors for best-selling items

In this NPD, four main aspects of a T-shirt are developed: fabric, colour, form and graphic design.

4.2.2.1 Fabric

There are two main features of fabric that we need to research, including the weight of the fabric and the type of material. Generally, brands A, B and C all use 100% cotton fabric for their T-shirts. However, the fabric's weight and the cotton type are pretty different. While brand C uses fabric with less than 200 gsm (grams per square metre), the weight of the fabric used by brands A and B is at least 230 gsm. Based on customer reviews on social media, we realise Vietnamese customers prefer thick-fabric T-shirts. Besides, brands A and B's strongest points are fabric quality. Therefore, the weight of the company's new T-shirts is decided to be 230 gsm. The second feature is the type of material. The project team has to select between 2-way stretch cotton 100% and 4-way stretch cotton 100% because brands A and B use both types for their products, and the start-up company cannot apply both for the first t-shirt collection. The decision will be made using a trade-off method with three criteria, including cost, comfort level, and durability, with weights of 0.4, 0.4, and 0.3, respectively. The score is evaluated by seven textile experts in the industry, and the result is presented in Table 3. Although 2-way stretch cotton 100% is less comfortable than 4-way stretch cotton 100%, its durability and cost are more proper for mass-selling products like T-shirts. In conclusion, 2-way stretch cotton 100% weighing 230 gsm has been selected for new product development.

4.2.2.2 Fabric colour

To identify the trendy colours in the market, the top-selling items of 3 brands are evaluated carefully. Brands B and C are famous for making collections with a wide range of fabric colours, while brand A only focuses on their signature colour. After checking the selling performance of other competitors' products, the project team can divide the colour proposals into two groups: basic and unique. The basic colour is mainly decided based on the analysis of brands B and C products. Although various colours are developed in the same collection, the T-shirts, whose main fabric colour is black, white or cream, are recorded to have the best-selling performance compared to the other items. The unique colour is considered based on the analysis of brand C's products. Besides, brand C likes to adjust the tone of original colours to create their new signature colours. According to their selling performance, the customers highly favour the new colour tone of pastel purple, brown or blue navy. Finally, the project team decided to develop new product designs with 60% of the designs applied with basic colours like black, white and

cream. The remaining 40% of designs are created with new blue navy, brown, and purple tones.

4.2.2.3 T-shirt form

The form includes two main factors, including T-shirt shape and size. About the shape, each brand has different T-shirt shapes, but the two most popular T-shirt shapes are oversized and boxy shapes. The oversize shape is wider and longer than the boxy shape. While brand A produced a 100% oversized shape, brand C made a 100% boxy shape, and brand B tried both T-shirts with different percentages in their collections. However, after checking the selling performance of products with boxy forms of brand B, the project team decided to develop only oversized forms because the average selling performance of brand B is ten times less than the unisex form. Moreover, brand C is now developing a new type of T-shirt, baby tee. The project team is also aware of a new trend for teenagers next year, the baby tee, and we can consider developing this type in the following collection.

The size project team measured the size of competitors' products in all dimensions and checked customers' reviews on social platforms. The company realised that the oversized form of brand B is preferred by the customers. Therefore, based on the brand B size chart, the project team makes little adjustments to provide customers with the most comfortable form and size. The results are presented in Table 4.

Table 4 Suggested size chart for a new collection

Size	Length (cm)	Width (cm)	Hand length (cm)	Weight (kg)	Height (cm)
Small (S)	69	54	20	35–50	140–155
Medium (M)	71	56	20.5	45–60	150–170
Large (L)	73	58	21	55–80	165–185

Table 5 Choosing design type

Type	Selling ability	Possibility to be creative	Ability to convey message	Score
	0.5	0.3	0.2	1
1	7.5	6	9	7.35
2	5	7	8	6.2
3	6.5	9	7	7.35
4	9	6	6	7.5

4.2.2.4 Graphic design

Streetwear T-shirts in the market have many different lettering and graphic designs based on the creativity and imagination of the designers. However, it can be categorised into four main types, including long lettering, short lettering with a message, short lettering combined with graphics and traditional basic lettering.

The first type is long lettering. In this type of design, the back side of the T-shirts will be decorated with a long text with 3 to 4 sentences. The content of the text can be a life lesson, a biography of a creature or even a global message. This kind of design is not so popular in the market. Brand B can be a prominent local brand for this type of design

with their two well-selling T-shirts. However, too many letters in a T-shirt can be tedious and too complicated to maintain printing quality. The font of the letters can be the key factor in making this design remarkable.

The second type is a short text with a message. This type can be similar to the first type, but the text length is much shorter. Typically, the lettering in this type is only limited to one sentence. Moreover, the designers using this type always try to convey a cool and meaningful message in this one sentence. The successful factors of this type are the colour and location of the letters. The designers can be flexible and creative to put the lettering design everywhere on the T-shirt with various colours. Brand C can be the local brand that has some interesting T-shirts using this type.

The third type is short lettering combined with graphics. This is one of the most popular designs. It combines a short text with an image in a concept. It increases the space of creativity for designers. Moreover, a small image is more favourable than a big one. However, this type can become a terrible design if the designers cannot control the colour mixing used in their design. Many items from brands A and B have their best-selling items made with this type of design.

The final type is traditional basic lettering. This type of design is essential that every brand must have in their store because this type of design never seems to be old-fashioned and is highly straightforward to wear. The content of text in this type mainly consists of brand names with some basic information about the brand in the surroundings. However, it can be difficult for designers to do something remarkably with this type. The font and size of the text can be the main factors to concentrate on while designing with this type.

To identify the best type of design to apply for new products of a fashion company, the project team has collected data about selling ability as well as asked for specialists' opinions about each type's weaknesses and strengths. The project team and ten textile experts evaluated four design types with three criteria: selling ability, possibility to be creative and ability to convey the message with weights 0.5, 0.3, and 0.2, respectively. The result is presented in Table 5. Because type 4 has been selected to develop a new product for a fashion company, the project team has researched prominent and best-selling products of other competitors using this type of design to identify the successful factors.

In conclusion, best-selling items in this type of design commonly use a simple font for their lettering and design with only one main colour, suitable for the fabric colour. The location of lettering features will be commonly put in the centre of the top half of the T-shirt on both sides. Moreover, small details can be added to the design to make the T-shirt less tedious and more unique. Some common details that are popular are:

1   symbol for real items

2   brand name with rainbow colour

3   brand name highlighted in a small box

4   small patterns arranged intentionally everywhere on one side

5   unexpected details in an unexpected location

6   making a sign

7   some nice/small graphics in the surrounding of surround 'brand name'

8   brand name is put upon a graphic design.

4.2.3 Step 3: developing draft designs (detailed design)

After identifying the design orientation, the project planning team prepared some draft designs and sent them to the design team. The draft design will display the result of the above analysis and be the foundation for designers to develop their creativity and imagination for final product designs. There are four draft designs made, and each design has applied all the orientation results from the analysis but with little adjustments about 'added details'. The result is presented in Table 6 and Figure 3.

4.2.4 Step 4: make a sample and test

In this stage, the project team selects the proper manufacturing factory and material suppliers and decides the standard for quality control of the production process. After selecting suitable factories and suppliers, product samples are made, and a customer survey will be conducted to improve the products continuously. This stage is planned to last for a month till we have the final product sample and are ready for mass manufacturing and selling.

Figure 3   Draft designs (see online version for colours)

4.2.4.1 Manufacturing process

Because the fashion company does not have a factory or other necessary infrastructures for manufacturing, outsourcing is chosen in this situation. Generally, the manufacturing process of a new product has some basic steps presented following the flow chart (Figure 4).

Figure 4   Flowchart representing manufacturing process of project
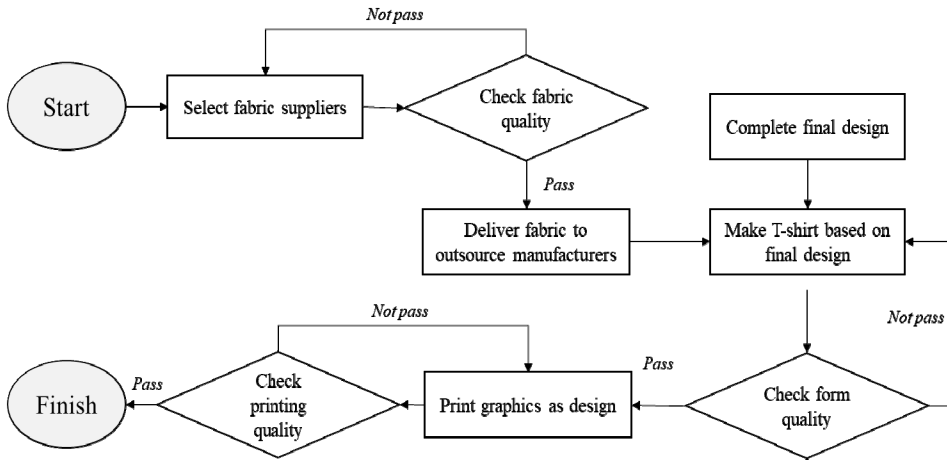
4.2.4.2   Selecting fabric suppliers

The project team has searched for about 40 different fabric suppliers online. After checking all the necessary conditions, such as availability for 2-way stretch cotton 100% 230 gsm, five fabric suppliers have been chosen to join in the final evaluation. The project team's information to assess the suppliers is MOQ (minimum order quantity), fabric cost and fabric quality. MOQ, fabric cost and quality with weights of 0.2, 0.3, and 0.5 are used to score and make decisions. As shown in Table 7, supplier D has been chosen to become the leading fabric supplier for the fashion company's new products. Besides, supplier E, ranked second, will become a backup supplier.

4.2.4.3   Selecting T-shirt manufacturers

The same method is applied for selecting T-shirt manufacturers. The most three potential manufacturers will be finally evaluated by five criteria, including minimum order quantity (MOQ), textile cost, printing cost, printing technology and final quality. The detailed result is displayed in Table 8. The weight of MOQ, textile cost, printing cost, printing technology and final quality are 0.2, 0.2, 0.2, 0.1 and 0.3, respectively. As shown in Table 9, factory A has been chosen to become the main manufacturer of the fashion company's new products. That is why silk screen printing will be a printing technology for this project.

4.2.4.4   Material quantity calculation

The only material that the manufacturing process requires is fabric. Because the target product quantity is 2,000 and 'medium' is a suitable size for over 50% amount of customers, 1,000 T-shirts' size will be medium (M), 500 T-shirts' size will be small (S), and 500 T-shirts' size will be large (L). The material quantity is calculated in Table 10.

With a 5% backup, the project team will order 250 kg of fabric from customers. Besides, packaging is also an important factor in increasing customer satisfaction. Careful packaging is also a need of customers based on the survey results. Therefore, the

project team will outsource packing bags for each product costing 0.12 USD/unit. Because the product quantity is 2,000 units, the packing bag ordered will be 2,100 units (5% backup quantity).

Table 6 Details in the draft design

Sample	Added details used in the draft details
1	• (7) Some nice/small graphics in the surroundings of the 'brand name'
	• (5) Unexpected details in an unexpected location
2	• (2) Brand name with rainbow colour
	• (4) Small patterns are arranged intentionally everywhere on one side
	• (6) Making a sign
3	• (3) Brand name highlighted in a small box
	• (8) Brand name is put upon a graphic design
4	• (1) Symbol for real items
	• (3) Brand name highlighted in a small box

Table 7 Choosing material supplier

Suppliers	MOQ		Fabric cost		Fabric quality		Score
	0.1		0.4		0.5		1
Supplier A	A roll of fabric	8	9.79	7	Excellent	10	8.6
Supplier B	A roll of fabric	8	9.59	8	Good	9	8.5
Supplier C	No limited	10	9.59	8	Good	9	8.7
Supplier D	No limited	10	9.67	7.5	Excellent	10	9
Supplier E	A roll of fabric	8	9.39	10	Fair	8	8.8

Note: Fabric cost: USD/kg.

Table 8 Evaluating manufacture factory

Manufacturer	MOQ	Textile cost (USD/pcs)	Printing cost (USD/pcs)	Printing technology	Final quality
Factory A	10	1.02	0.82	Digital	Excellent
Factory B	200	0.82	0.61	Silkscreen	Good
Factory C	100	1.02	0.69	Silkscreen	Good

Table 9 Choosing manufacture factory

Manufacturer	MOQ	Textile cost	Printing cost	Printing technology	Final quality	Score
	0.1	0.25	0.25	0.1	0.3	1
Factory A	10	8	8	8	10	8.8
Factory B	6	10	10	10	8	9
Factory C	8	8	9	10	8	8.45

Table 10   Material quantity calculation

Size	Quantity	Length (m)	Width (m)	Fabric/pcs (m²)	Total required material (m²)	Weight (kg)
Large	500	0.69	0.54	0.4471	223.56	55.89
Medium	1.000	0.71	0.56	0.4771	477.12	119.28
Small	500	0.73	0.58	0.5081	254.04	63.51
Sum						238.68

4.2.4.5   Quality plan

To ensure the quality of finished products, the quality of the fabric from suppliers and the quality of products after being manufactured has to be guaranteed. The method chosen is a sampling test, and the project team will be responsible for ensuring that. To do that, 5% of fabric and products will be randomly selected and checked with the following standards:

- fabric from suppliers: correct weight of fabric (230 gsm); the fabric is not ruffled, torn, right dyed colour

- products after being manufactured: the seam is not defective, the shirt size is exactly as designed, and the print is the correct design, with no peeling.

After this stage, samples will be produced for customer surveys for further improvement. This step is planned to last for a month.

4.3   Managerial insights and implication

Recently, private SMEs, including start-up companies, account for 97% of total companies and become the main growth engine in Vietnam (Thi, 2022), which motivated this research to focus on improving those companies' activities. The presented case mainly investigates the success factors of designing new products in the fast fashion industry. While T-shirts are a typical product, most of their developments tend to align with short-term trends. Interestingly, customers exhibit a strong inclination toward the graphic design of these products over other factors when making purchases, particularly within the fast fashion sector. Despite occasional customer feedback suggesting the incorporation of new functionalities into creating the perfect T-shirts, the study concludes that pursuing these advancements is not justifiable due to the considerable costs and efforts involved in their development. Instead, it underscores customers prefer aesthetic elements, especially graphic design, in new fashion items. Besides, compared to competitors' products, the new T-shirt collection developed by the proposed method combined all outstanding points to attract customers' interest and ensure a quick selling ratio.

    Applying this approach, the company's NPD process has many positive improvements. The project lead time was shortened, the risk of failure was decreased, and the necessary resource was reduced. The time saved is mainly on the generating stage. The time interval between the beginning of the project and the time when a draft design is finished is about one month and a half. The company spent around 2 weeks analysing competitors and collecting customer reviews to identify each competitor's

weaknesses and strengths. Then, another two weeks are spent on finding the essential factors of best-selling items of the top 3 biggest competitors. Since this stage, by utilising all collected data, the draft design is finished after two weeks to be ready for the manufacturing stages.

Regarding the resources, compared to the old plan with another NPD approach of the company, the human and budget required for this project are significantly declined because the main work is only making research about competitors and checking customer feedback on social media. Moreover, with this proposed approach, we know the essential factors of best-selling products and do not need to make many samples and test customer reactions several times, decreasing the wasted budget for this project. Moreover, by selecting all the best features of top-selling items on the market to apply for new products with some innovations, the selling performance of new products after being launched can be ensured because we know which factors can attract customers in advance. In conclusion, this approach is entirely effective for companies that want to develop new products with less time and budget but still have to ensure a certain level of success.

On the other hand, the research emphasises the importance of innovation management. The suggested method could be more accurate by combining high-level concepts like the Six Sigma concept to ensure product quality during production (Natarajan et al., 2011). Furthermore, lean product development is recorded to play a key role in the success ratio of product development projects (Jasti and Kota, 2021). Companies can build and follow the rules of lean product development to increase the success rate of projects. Additionally, companies should also study and apply a systematic approach to control their drivers of innovation to be proactive in maintaining their competitive advantages (Cormican and O'Sullivan, 2003).

5   Discussion and future direction

The case study proves the effectiveness and possibility of the proposed NPD approach. According to Cooper (2019), two success drivers for individual new-product projects can be building in voice-of-customer (VOC) or adopting a global orientation. Compared to our approach proposed in this paper, we also set up a NPD project based on competitor analysis, which can reflect the global fashion trend. Moreover, customer voice is also included in this methodology because their social media feedback is the most reliable source to evaluate the strengths and the weaknesses of competitors in the market. Therefore, the proposed approach is potential and practical, especially for start-up companies or firms expanding new business areas.

The proposed methodology is limited to addressing typical problems in start-up companies in the fast fashion industry; therefore, this methodology can be further applied more effectively by adding more product functions after doing competitor analysis and customer surveys. For example, within the scope of the case study, the T-shirt is only developed in the design by combining all success factors in the design of top-selling products in the market. Suppose the company wants to gain more competitive advantages by launching new products. In that case, they can spend more time on conducting customer research and product material analysis and further develop new functions for the T-shirts like UV protection, reducing stain intention, automatically drying quickly after washing, etc. Those new functions are outstanding and different from items in the

market and support increased customer satisfaction, although it would take more time and resources to develop. The ideas of new functions can also be inspired by customer dissatisfaction that the product development team realises through the customer feedback checking step.

Although the proposed method was applied to the company mentioned in the case study and proved its effectiveness, it can be continuously improved to become more popular and suitable for NPD projects of startup companies and others. For further research, this proposed NPD method will be applied to other companies in the future in different industries to evaluate the suitability level and explain insight of this method for each industry. Then, adjustments are necessary to increase the effectiveness of this approach.

Besides, further research is also required to analyse this methodology's risk factors in practical applications. Since this methodology mainly depends on checking customer feedback and competitor analysis, if research teams make mistakes while checking customer feedback by not removing distracting opinions or deleting wrong data, it can make the final analysis results completely incorrect, leading to later wrong decisions in product development. On the other hand, all products have a peak selling period, especially products with short life cycles like clothes and food. It is important to focus on finding top-selling products starting their selling period. The consequence of selecting out-trend products is a low selling ratio and high inventory. To avoid failures, those risks should be considered while starting a new product development project.

Acknowledgements

References

Albers, A., Bursac, N. and Rapp, S. (2016) 'PGE-product generation engineering-case study of the dual mass flywheel', *Proceedings of the DS 84: Proceedings of the DESIGN 2016 14th International Design Conference*, Cavtat, Croatia, pp.791–800.

Altuntas, S., Özsoy, E.B. and Mor, Ş. (2019) 'Innovative new product development: a case study', *Procedia Computer Science*, Vol. 158, pp.214–221, https://doi.org/10.1016/j.procs.2019.09.044.

Bandinelli, R., Rinaldi, R., Rossi, M. and Terzi, S. (2013) 'New product development in the fashion industry: an empirical investigation of Italian firms', *International Journal of Engineering Business Management*, Vol. 5, p.31, https://doi.org/10.5772/56841.

Benur, A.M. and Bramwell, B. (2015) 'Tourism product development and product diversification in destinations', *Tourism Management*, Vol. 50, pp.213–224, https://doi.org/10.1016/j.tourman.2015.02.005.

Bick, R., Halsey, E. and Ekenga, C.C. (2018) 'The global environmental injustice of fast fashion', *Environmental Health*, Vol. 17, pp.1–4, https://doi.org/10.1186/s12940-018-0433-7.

Cooper, R.G. (2019) 'The drivers of success in new-product development', *Industrial Marketing Management*, Vol. 76, pp.36–47, https://doi.org/10.1016/j.indmarman.2018.07.005.

Cormican, K. and O'Sullivan, D. (2003) 'A collaborative knowledge management tool for product innovation management', *International Journal of Technology Management*, Vol. 26, No. 1, pp.53–67.

Dewi, D.S., Syairudin, B. and Nikmah, E.N. (2015) 'Risk management in new product development process for fashion industry: case study in hijab industry', *Procedia Manufacturing*, Vol. 4, pp.383–391, https://doi.org/10.1016/j.promfg.2015.11.054.

Distanont, A. and Khongmalai, O. (2020) 'The role of innovation in creating a competitive advantage', *Kasetsart Journal of Social Sciences*, Vol. 41, No. 1, pp.15–21.

Filieri, R. (2013) 'Consumer co-creation and new product development: a case study in the food industry', *Marketing Intelligence Planning*, Vol. 31, No. 1, pp.40–53.

Helmi, R.L. (2019) 'Innovation of new product development process: a case study of healthy drink-based product line in Indonesia's company', *Innovation*, Vol. 11, No. 24, pp.148–156.

Jasti, N.V.K. and Kota, S. (2021) 'Development of an adapted framework for lean product development', *International Journal of Services Operations Management*, Vol. 38, No. 2, pp.244–275.

Kazimierska, M. and Grębosz-Krawczyk, M. (2017) 'New product development (NPD) process – an example of industrial sector', *Management Systems in Production Engineering*, Vol. 25, No. 4, pp.246–250.

Kumar, S., Luthra, S., Haleem, A., Garg, D., Singh, S. and Mangla, S.K. (2018) 'An integrated approach to analyse requisites of product innovation management', *International Journal of Business Innovation and Research*, Vol. 16, No. 1, pp.36–62.

López-Mas, L., Claret, A., Stancu, V., Brunsø, K., Peral, I., Santa Cruz, E., … Guerrero, L. (2022) 'Making full use of qualitative data to generate new fish product ideas through co-creation with consumers: a methodological approach', *Foods*, Vol. 11, No. 15, p.2287.

Marion, T.J. and Fixson, S.K. (2021) 'The transformation of the innovation process: how digital tools are changing work, collaboration, and organizations in new product development', *Journal of Product Innovation Management*, Vol. 38, No. 1, pp.192–215.

Miller, K.L., Mueller, C., Liu, G., Needleman, K.I.M. and Maynard, J. (2020) 'FDA orphan products clinical trial grants: assessment of outcomes and impact on rare disease product development', *Orphanet Journal of Rare Diseases*, Vol. 15, pp.1–8, https://doi.org/10.1186/s13023-020-01514-5.

Natarajan, M., Senthil, V., Devadasan, S., Vijay Mohan, N. and Shalij, P. (2011) 'Adoption of Six-Sigma concept in new product development: a literature survey and analysis', *International Journal of Services Operations Management*, Vol. 8, No. 4, pp.487–515.

Nurcahyo, R., Akbar, M.I. and Gabriel, D.S. (2018) 'Characteristics of startup company and its strategy: Analysis of Indonesia fashion startup companies', *International Journal of Engineering and Technology*, Vol. 7, No. 2.34, pp.44–47.

Papahristou, E. and Bilalis, N. (2017) '3D virtual prototyping traces new avenues for fashion design and product development: a qualitative study', *Journal of Textile Science Engineering*, Vol. 7, No. 2, pp.1–6.

Parker-Strak, R., Barnes, L., Studd, R. and Doyle, S. (2020) 'Disruptive product development for online fast fashion retailers', *Journal of Fashion Marketing Management: An International Journal*, Vol. 24, No. 3, pp.517–532.

Project Management Institute (2001) *Project Management Body of Knowledge (PMBOK® Guide)*, Project Management Institute, Pennsylvania, USA.

Rossi, M., Taisch, M. and Terzi, S. (2012) 'Lean product development: a five-steps methodology for continuous improvement', *Proceedings of the 2012 18th International ICE Conference on Engineering, Technology and Innovation*, Munich, Germany, pp.1–10.

Sohel, S.M., Rahman, A.M.A. and Uddin, M.A. (2014) 'Competitive profile matrix (CPM) as a competitors' analysis tool: a theoretical perspective', *International Journal of Human Potential Development*, Vol. 3, No. 3, pp.40–47.

Srivastava, P., Ramakanth, D., Akhila, K. and Gaikwad, K.K. (2022) 'Package design as a branding tool in the cosmetic industry: consumers' perception vs. reality', *SN Business & Economics*, Vol. 2, No. 6, p.58.

Thi, N.N. (2022) 'SMES survival and knowledge in emerging economies: evidence from Vietnam', *Heliyon*, Vol. 8, No. 11, p.e11387.

Todeschini, B.V., Cortimiglia, M.N., Callegaro-de-Menezes, D. and Ghezzi, A. (2017) 'Innovative and sustainable business models in the fashion industry: entrepreneurial drivers, opportunities, and challenges', *Business Horizons*, Vol. 60, No. 6, pp.759–770.

Tyagi, S., Choudhary, A., Cai, X. and Yang, K. (2015) 'Value stream mapping to reduce the lead-time of a product development process', *International Journal of Production Economics*, Vol. 160, pp.202–212, https://doi.org/10.1016/j.ijpe.2014.11.002.

Um, K-H. and Kim, S-M. (2018) 'Collaboration and opportunism as mediators of the relationship between NPD project uncertainty and NPD project performance', *International Journal of Project Management*, Vol. 36, No. 4, pp.659–672.

Wackowski, K., Tien, N.H., Dao, M.T.H. and Minh, D.T. (2022) 'Business strategy of Vietnamese real estate developers: the use of CPM matrix for analysis', *International Journal of Multidisciplinary Research Growth Evaluation*, Vol. 3, No. 1, pp.205–209.

Wardoyo, S.K. and Walean, R.H. (2022) 'The determining factors of generation Z purchase decision for the local brand T-Shirt', *Journal Multidisiplin Madani*, Vol. 2, No. 12, pp.4178–4187.

Westland, J. (2007) *The Project Management Life Cycle: A Complete Step-by-Step Methodology for Initiating Planning Executing and Closing the Project*, Kogan Page Publishers, London and Philadelphia.

Wu, Y.J. and Chen, J-C. (2021) 'Stimulating innovation with an innovative curriculum: a curriculum design for a course on new product development', *The International Journal of Management Education*, Vol. 19, No. 3, p.100561.

Zailani, S., Rajagopal, P., Jauhar, J. and Wahid, N.A. (2007) 'New product development benchmarking to enhance operation competitiveness', *International Journal of Services and Operations Management*, Vol. 3, No. 1, pp.23–40.