

# Informational Flow Model: A case study in the textile and confection sector

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**Abstract**— Consumer-oriented companies are pressured to seek for constant innovations in short term for product launches. Thus, to become competitive, they use processes and tools that can qualify information for decision making. The objective of this study is to apply a reference model of information flow in small company in the textile and confection sector, to increase the responsiveness to product development teams and the commercial area. The methodological approach is qualitative, developed through the case study, characterizing it as of an applied nature. The results suggest the importance of seeking greater alignment of the commercial and marketing teams in product planning, providing a more comprehensive view of the activities and information channels that guide each element of Product Planning and Development (PPD).

**Keywords**— Product planning, Clothing Manufacturing, Information flow, Management model, Decision making.

## I. INTRODUCTION

According to [10], in Brazil, the textile and clothing industry reached in 2016, 29,500 companies scenario with more than five (5) employees and 1.5 million direct jobs. Data from [11] shows that clothing manufacture in the state of Santa Catarina, except underwear, rose 7.6% and sales increased by 0.3% in the period between 2014 and 2017, including domestic and [7].

Consumer-oriented companies are pressed to meet their desires, including constant innovations in short delivery term and being a difference against competitors [12]. In addition, the offer of new products requires efficient processes and tools and therefore "a strong product development system is an essential skill core for success of any company dedicated to the consumer" [17]. In this context, according to [21], the monitoring of information originated within and outside organizations determine partly its competitiveness. From this, information can be defined as usable data, descriptions or inferences, supporting the organizational processes.

The need to organize and share information arises from the opportunity to guide the information flow [3], which is determined by activities network performed by certain number of people [18]. [22] define activity as the actual action to perform design task. On the above, we see the possibility of bringing together departmental efforts and focus on the design of an information flow able to answer

to product development teams and commercial area of the textile and clothing industry. In this sense, the use of a well-designed information flow between those involvements in the PDP is among the ways to achieve the optimization of time, which is essential in the clothing industry.

The methodology used in the design of information flow model in the product development for companies in the textile and clothing manufacture industry is guided by the deductive method, and are based also by a conceptual and theoretical framework [13]. The adopted approach is qualitative, through a case study of a small business in the state of Santa Catarina (Brazil). The adopted model is designed and implemented in a sequence of Steps comprising the respective Steps. In parallel, the case study draws an analogy between the information flow model built on the basis of the literature and information flow linked to the reality of company studied [13].

The selection of the case study took place in order to choose a company among those participating in South Santa Catarina Fashion Center (NMSC) in the city of Criciúma, Santa Catarina. The criterion was added by activities required to implementation according to the template such as: fashion planning; trends research and interaction between product team and commercial area.

In this context, the main features of the template are outlined. Next, the content analysis is presented of the implementation and the results thereof.

## II. INFORMATIONAL FLOW TEMPLATE FOR TEXTILES AND CLOTHING MANUFACTURE COMPANIES (REFERENCE TEMPLATE)

Starting on the assumption that the information flow is given by mapping activities and the work processes to be reviewed in a continuous data transfer between sender and recipient through a transformation process and subsequent generation of knowledge, guided by the proposals by [18], [8], [15] and [6].

The steps and stages (Figure 1) are shown in flowchart, according to its performance logic, subject to feedback between steps. In Step 1, the strategic planning information are the inputs for product planning in its design phase, thus requiring to choose the business environment.

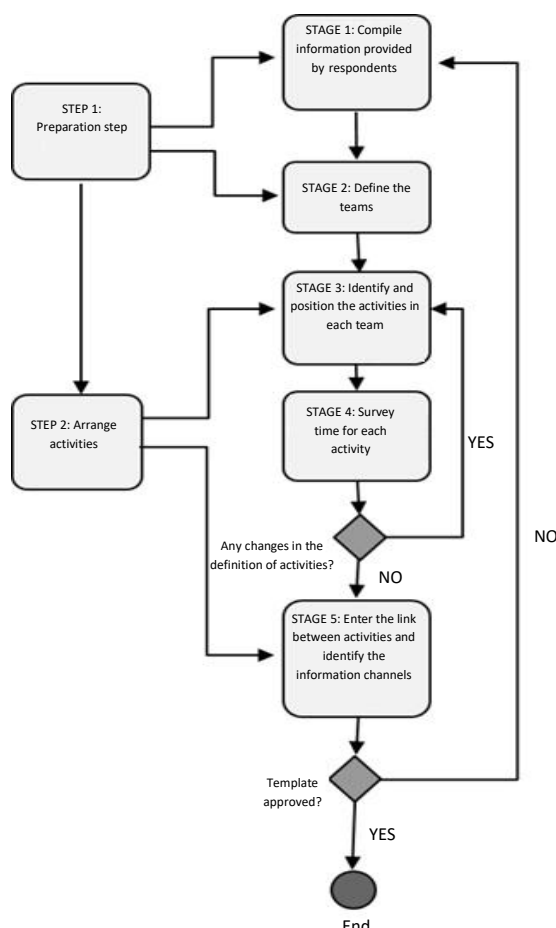


Fig. 1: Informational Flow for Textiles and Clothing Manufacture Industry (Reference Template)

Stage 1 is to know the reality of the organization, with brief history and its current moment, such as: which fashions worked by the company and which products set is developed and delivered at certain times of the year [20].

In the information flow template for product planning in companies in the textile and clothing marketing industry, teams composition (Stage 2) is used as identified by [16] in which five teams participate in the product planning: senior management; marketing; product team; commercial department and engineering. They can relate to external teams for activities involving product planning. We also have path structure extracted from [6] and [19].

In Step 2, using the assumptions by [18] and [6], both the organization, represented by people, and the structure of activities implemented by them in product planning should be considered in understanding the exchange of information. In Stage 3, we identify activities that each team developed and perform the survey of performance time of each activity in Stage 4.

The performance time of the activities related to product planning depends on a few strategic definitions of the company, as: number of fashions to be developed; if the sale is to wholesale or retail; and how much of its production depends on suppliers [2]. Before proceeding to the next Step, you should check if the activities require any changes. In the event of significant changes, return to the Stage 3; otherwise, the design of the activities could be made to be followed within the product planning and identification of communication channels (Stage 5).

To identify the types, sources and information channels, [8], [16] and [11] templates are used, highlighting the need to check which information is transmitted within the product planning. The Bizage software enables representing the information to be sent to the next activity with the data object symbolism and seek additional information in the data repository analyzed.

On the refinement of the proposed template (Figure 2), the survey of user(s)' data and their requirements are activities taking place together and generate information to build a Product Mix. The schedule allows guiding all product chain, requiring information access relating to the compilation of the resulting activities, i.e. from the commercial department and the product team. On definition of the Schedule, activities information are shared and set which shall be developed in the current fashion, as well as the dates on which they should be performed.

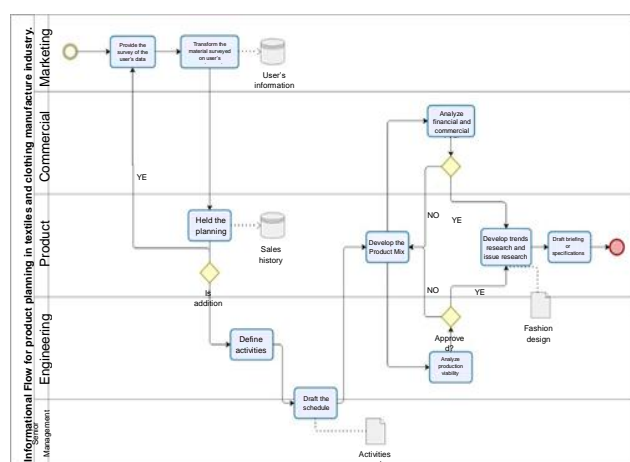


Fig. 2: Informational Flow for product planning in textiles and clothing manufacture industry

The communication channels, i.e. tools that people use for relationship contribute to the information flow framework, which should take place orally, in writing or electronically [5]. The communication channels between the activities should be sequential, such as e-mail, for example, or simultaneously as a meeting. If any extemporaneous need is found, return to the Stage 1, reviewing the other stages described for the appropriate adjustments.

### III. IMPLAMENTATION OF REFERENCE TEMPLATE

#### 3.1. Preparation Step

Data was collected in individual semi-structured interviews, following a predetermined script, in order to determine the current situation of the company, the scenario on the fashion planning, the type of each management activities set, the existence of management tools, information shared between teams and information channels. Therefore, individuals in the sample have been represented by general management, marketing, the product development and the commercial area. The interviews purpose convergent and different aspects were defined between the Reference Template and the reality of the company in order to represent a more consistent information flow on product planning.

Stage 1 or Preparation Stage aimed at contextualizing the respondent's opinion, representing the flow described in path by management. The X Brand and Y Brand recently acquired were selected, each with a designer responsible for the fashion design called designer A and designer B.

The initial focus of the interview with product and marketing manager was focused on the X Brand, considering that it can present a product planning with the most significant advances in respect to Y Brand. But on the contrary, it was found that the development processes are best designed in the Y Brand. Thus, the templates chose as the standards the best in each development in its the practices within their overlapping by co-existence of two brands.

The X Brand features two product categories: pieces of clothing (jackets, skirts, blouses, dresses) and accessories (handbags, belts and bags). In 2018, according to the product and marketing manager for X Brand three fashions were designed for pieces of clothing: 2018 Winter; 2018 high winter and 2019 summer. Six fashions were included for accessories in the women's segment and one fashion in the men's segment.

The Product Team for X Brand consists of: one product and marketing manager, responsible for the creative and marketing management; one owner of the company, which helps with the planning and development of products; one designer and one engineer, responsible for creating the pieces of clothing and accessories; and a pattern maker, whose assignment is to develop the molds for the pieces. The engineer is an outsourced professional who is responsible for the prototype of X Brand products and perform productive analysis, indicating the best manner to enable production and indicate the machinery to be used. The product Team for Y Brand also is under the management of the same product and marketing manager and includes a pattern maker. The productive viability of this brand is analyzed by the pattern maker, which draws upon her experience to decide.

The commercial area includes one manager, responsible for working with the commercial representatives in the wholesale and responsible for stores, and serving the retail. The latter also holds the shipping department's responsibilities, which controls the finished products for both brands.

In senior management, one administrative director is responsible for strategic planning together with the product and marketing manager, and both build the proposed scenarios for company's management.

To check the activities design that follow the Reference Template, presenting to each respondent a list, requesting to product and marketing manager to check to check if they were performed within the fashion management. The result of this sequence was:

- Survey consumer's data through the outcome of sale;

- Hold meeting for fashion framework;
- Check commercial viability (analysis of previous fashions);
- Specify consumer's needs;
- Develop the Product Mix;
- Prepare schedule, survey trends, research raw material;
- Research the issue;
- Draft briefing or specifications of fashion.

Noting that, even before a planning meeting, there is a data survey of consumption and sales outcomes through the company's ERP system with an analysis by the commercial area that highlights the existing market opportunities. In Table 1 the information is specified and sources of collection described the product and marketing manager; the most used communication channels are e-mails and meetings. Before you start formatting your article, write and save the contents as a separate text file.

*Table.1: Types and sources of information*

Types of information	Sources of information
Consumer's data (outcome of sale)	Report via ERP system, feedback from representatives and storeowners.
Growth calculation designed by the company, number of pieces of each type or gender of each compose the Product Mix.	Planning Meeting
Previous dates and corresponding activities	Schedule
Trends, theme and raw materials	WGSN, internet, international travel, suppliers

When considering that the commercial area is in contact with both the end customer and storeowners, commercial manager considers it important his attendance to planning meetings. However, as to the development schedule of the fashions, he does not have a specific follow-up tool for development of fashions.

The survey of consumer's data and product specifications (size, color, model etc.) is frequent, while the planning meeting is held once every new fashion. It is noted that the commercial manager has a more specific view of the area in which he acts, i.e. the activities are restricted to the object of interest in the area.

The sales report is also a rich source of information to understand the performance of the products sales, so it is discussed in detail in the planning meetings. The stores selling the X and Y Brands are an important source of information for the success of a product or fashion relating to expected sales percentage. The main communication channels used in this interface by the commercial manager are: WhatsApp; onsite meeting; telephone call and e-mail (less common).

According to the managing director, Brand X works with two product categories: the first is pieces of clothing, the second is accessories. Two fashions are released for pieces of clothing: one for winter in which 35 (thirty-five) to 40 (forty) pieces are designed, mainly jackets; and one for summer in which pieces like skirts and dresses are designed, an average of fifteen (15) to twenty (20) pieces.

For Y Brand also according to the managing director, two fashions are released: winter and summer, with forty (40) to fifty (50) types of pieces varying the amount of reference from hundred (100) to two hundred (200) introducing pieces with different patterns in the same type of piece. Owning the stores, both the wholesale and retail, complements for fashions should be released, i.e., new pieces, according to the sales in each store, adding recent trends (novelty, details).

The managing director further describes that in addition to internal staff, some representatives of fashion centers, business owners of the clothing industry in the region and some suppliers are involved with the product planning. Consumer's data is surveyed raised through the analysis of sales performance for the previous year by representatives and sellers, which are transmitted via e-mail or by the WhatsApp application. Next, based on this information and aiming at the market, specificities are determined for the pieces; according also to the identity of each Brand, the Product Mix is designed after a planning meeting that sets each fashion. The Schedule is developed and controlled by the use of Excel spreadsheets as to the identification of the types and sources of information transmitted. The trend research still uses international travel, suppliers' feelings and blogs consultation via web, in addition to the research on issue.

The product development environment being set, we follows to Stage 2.



### 3.2. Stage 2 - Arrange the Activities

According to the Reference Template, the activities are listed for product Planning in charge of the involved teams (7, 24). The commercial manager presents activities relating specifically to his scope: survey of consumer's data through access to feedback from stores' employees and representatives. However, in the reference template, such activity should be performed by the marketing team, which performs it using business information that allow the understanding of consumer's habits and result in the building of consumption profiles, based on a closer look at the consumer's behavior [1].

As for the opinion by the managing director and product and marketing manager, an alignment is noted on activities allocated in product planning, except for materials research, which feasibility of use, according to the reference template, should be adjusted in the product planning, which does not happen in fact in the fashion design in the company.

According to product and marketing manager, the schedule is drafted by him and approved in the strategic meeting by internal teams and for the managing director, internal teams jointly draft it. Defining the activities, sequence and schedule, according to [23] and [16], should be under the liability of engineering and senior management, in order to guide the entire chain of the product.

It is appropriate to highlight the importance we all attribute to planning meetings, which sets the guidelines for fashions, develops the design of Product Mix of Brands and define the research trends and themes, and compiling at the end the briefing and the specifications set.

The time required for each activity would only be established through actual follow-up of an entire fashion. As to the understanding on the activities taking place within the company, attention is drawn to the amount of fashions and the release dates of each. According to the product and marketing team manager, X Brand has seven series of accessories and three series of clothes. The accessory line of X Branch, considering two of the seven series, holds a planning meeting in January and the closing schedule in the same month, and research on trends and materials in September and another in October which is released in March and in April.

The X Brand also releases two series. Owning the retail stores, it is possible to introduce new pieces to the fashions, taking into account percentage of reported sales.

The approximate time being determined on the perspective of each respondent, the difference is

determined. This reinforces the importance of a broad understanding of information flow and how it can guide the implementation of the mentioned activities, and using the Reference Template, reach a sequential standardization and a broad understanding of management responsibilities within the product planning.

The manager of product and marketing team and the managing director were presented the activities related to product planning, according to the Reference Template, in order to obtain a comparison against the flow defined by the management teams. The outcome is in Table 2.

Table.2: Activities by order of performance of the X and Y brands

Managing Director	Product and Marketing Manager	Reference Template
1. Schedule;	1. Planning meeting;	1. Survey user's data;
2. Research trends;	- Survey consumer's data and sale outcomes;	2. Transform the material surveyed on user's requirements;
3. Research the issue;	- Commercial viability (analysis of the previous fashions);	3. Held the planning meeting;
4. Survey consumer's data	- Specify consumer's needs;	4. Define activities and sequence and draft schedule;
5. Specify consumer's needs;	- Specify consumer's needs;	5. Check the productive viability;
6. Planning Meeting;	- Product Mix;	6. Check the financial (economic) viability and commercial;
7. Product Mix;	2. Schedule;	7. Develop the Product Mix;
8. Briefing or specifications of fashion.	3. Meeting strategy	8. Research trends and theme;
	4. Research trends;	9. Draft briefing or specifications.
	5. Research raw material;	
	6. Research the issue;	
	7. Briefing.	

#### IV. FINAL CONSIDERATIONS AND CONCLUSION

The study showed, by applying the Reference Template, the universe researched requires further alignment of product planning teams. As seen in Table 2 and in opinion of the research subjects, key decision makers lack information, even if compiled for the PDP. It is understood that all organization is basically composed by communication processes, with the dissemination of information involving seeing different groups of people [6]. In product planning, the information flow is based on two pillars: the understanding of customer's needs and identification and anticipation of market trends. Customer requirements (Customer Requirement - CRs) according to [24], have an important role in the PDP, particularly in the product design phase. Noting that the process in the studied company is supplied by different sources, but the subjectivity of interpretation by the managing person. Competitive tools should be created to the acquisition, organization and information in the current market [3], provided that such processes are guided by coherent and concise information flow.

The first pillar of an information flow is a survey of consumer data. Such activity is carried out under the management of commercial manager through feedback received from employees of the area, also including the sales results via ERP system considered not to be fully integrated into the PDP, by the lack of that manager's concern to store and record such information (see Table 2), which corroborates the statement by [25], that the Knowledge Management (KM) in small and medium-sized companies is guided by a lack of planning and informality.

As for the productive viability to [23], [16] and [8], this is on the engineering team's liability. It appears that the technical feasibility of company production is deemed completed after making the first piece (pilot piece), which contrasts with the Reference Template: on the absence of employees skilled in such activities, the analysis are carried out with based only on the professional experience of product planning teams.

It should be noted that the reality of a family business, in the case described, contains an imperative of informal control methods resulting from the accumulation of practical experience of the owners and employees according to [4].

Important to remember that informal decision systems can be useful in some stages of the life cycle of companies; however, the increase in business volume and complexity from acting in different markets require the introduction of better defined processes. According to [14], some

characteristics contribute to the non-standardization of information flow particular to this niche of companies such as short term strategies limited resources; and centralized management, accounting obstacles to the product innovation process [9]. As an alternative to this centralizing perspective of the decisions on the PDP, it is suggested the cooperation of external agents (by apparent proximity of the company with its market), so that the design of information flow can use the full potential of knowledge it can produce.

Moreover, it is observed that the marketing model in wholesale and retail of company enables real-time acquisition of a diversity of information from the perspective of their sales representatives and stores. Therefore, it is suggested the strengthening of relations between the commercial area with its market activities (marketing), and the initiatives of creation core institution together with customers in order to sustain a significant external interaction channel for more assertive development of products, according to suggestions by [1].

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