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Product Lifecycle Management as a Tool to Create Value in the Fashion System

Regular Paper

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Abstract The aim of this paper is to present the fashion system as a "cluster" and to evaluate the characteristics of Product Lifecycle Management (PLM) taking into account various factors, in particular the different approaches to dealing with market needs. More specifically, the "ready-to-wear fashion" and "fast fashion" models will be presented and compared. The paper takes the Italian fashion system as the unit of analysis and assumes that consumer behavioural factors act in a non-predictable (i.e., random) way in the constantly changing social and cultural environment. Considering the internal complexity of a whole market system, a simplified system dynamics model is proposed.

Keywords Product Lifecycle Management, Value Creation, System Dynamics

1. Introduction

Firms operating within the fashion system do so in an extremely competitive environment, where the competitive advantage is based on their capacity to promptly adjust their products and the timing of their collections according to changing market demand [1]. The modern concept of "delivery flow" has replaced the "seasonality" which, traditionally, characterized these firms' supply. Delivery flow can be thought of as a continuous stream of products which change globally on a weekly basis and are consistent with selling periods which have become more and more fragmented. The logic behind so-called "fast fashion" is based on the reduction of the lead time. This means that the risk of overstocking unsold products can be reduced, since the dealer is supplied more frequently and with a smaller number of products which are based on a wider range of styles.

The reduction of the response time, to correspond with market demand, requires closer cooperation between the subjects responsible for the different production phases, including fibre manufacturers, weavers, designers, clothing manufacturers and specialized suppliers. Nevertheless, firms operating in the fashion system find it very difficult to do so within this enlarged system because they have a negative attitude towards their suppliers, clients and external stakeholders. Such an attitude prevents them from taking advantage of the cooperative benefits potentially deriving from closer relationships with such players.

This paper analyses the ways in which the fashion system would benefit were it to adopt PLM, a strategic approach to the management of information, processes and resources in support of product planning, development and management over their entire lifecycle. In particular, the paper aims to investigate whether and how the PLM can improve the value creation process by effectively and efficiently handling the interactions occurring along the production chain. In order to do so, we accept the hypothesis that consumer behaviour acts quite randomly [2,3].

2. The fashion system as a "cluster"

The term "fashion" is usually associated with textile and apparel industries, but fashion also comprises the leather and related products industries, as well as those producing accessories for men and women (jewellery, glasses, watches, etc.). All of these products are characterized by their hugely symbolic and intangible nature. As a consequence, fashion is concerned with finished products which have in common neither their characteristics nor their ultimate use. Nevertheless, for all of these products, fashion is the main driver of consumer demand. In this sense, "fashion" is not an industry but a "cluster", i.e., a group of related firms and/or economic agents whose competitive advantage is strengthened by the interconnections between them. It is the whole that characterizes the economic system, rather than the entanglement of the value chains itself.

For instance, compared to the other countries, the Italian fashion cluster is characterized by a geographical concentration of interconnected firms that cooperate and compete at the same time, gaining a relevant competitive advantage. Nevertheless, the term "cluster" not only has a geographical meaning but also a functional one. Although, according to Porter, the concept of cluster is linked to the idea of a location-related competitive advantage, this does not mean that the higher efficiency of a cluster is due only to the territorial proximity of the firms involved [4].

Since it is a cluster more than an industry, fashion as a system includes not only those firms (and related industries) which are part of the production cycle, but also industries that have a support function, such as the service sector. Among the components of the fashion system we might include:

- Manufacturing: the fashion industry includes a variety of manufacturing systems including textiles, clothing, footwear and dyeing. With regards to the textile industry, production mostly consists of a first process of fibre manufacturing and a second stage in which fabrics are transformed into finished products including not only clothes but also accessories for men and women. Leather and related product industries are also characterized by an articulated production system, ranging from the tanning of leather to the assemblage of the finished products such as luggage, handbags and footwear;
- Distribution: a huge part of the Italian fashion industry's competitiveness is based on the interconnections between the firms dealing with the production phase and those involved in the distribution phase. This explains both the phenomenon of so-called "vertical branding" and why large industrial groups are sometimes active even in the textile sector. The intangible factors associated with a fashion product make the brand important in the fashion sector, and explain why the brand has not only an informative value but also an emotional one. Today, the brand goes beyond the product: it carries a *modus vivendi* that the consumers aim to share. From this perspective, mass communication and advertising would not seem to fulfil their intended functions, with the web being more effective since it can better grant direct contact with customers or potential customers. That is why the point of sale has become a place where customers and firms interact: a privileged space in which to share information. The point of sale communicates what the brand is, contributing to the creation of brand identity through a series of "hard" (location, internal and external layout) and "soft" (entertainment and services) factors, becoming a tool with which to build strong and long-lasting loyalty between actual and potential customers on the one hand and firms on the other hand;
- Instrumental mechanics: this is a sector which supports the textile industry. It includes plant planning, customer services, supplies and productive and logistic processes;
- Services: this sector includes a specialized publishing industry, fairs and design firms.

Considering the different elements or actors presented, it is clear that the product we call "fashion" is the result of a complex system of interrelations between different phases and activities which determine, to a large extent, the success that the product enjoys on the market. Its complexity justifies integration between the players participating in its articulated production cycle.

The logic of the system overcomes the conceptual limits of the sector in mere economic terms, since it includes, from a wider and more general perspective, all the firms that find their reasons for existence and growth in being part of this system. These relationships – between agents which are different, but also complementary – create strong incentives to constantly innovate the products of the fashion market and to favour the diffusion of the

industrial districts as privileged places in which to create firm culture.

In Italy, the presence of a qualified textile-mechanic industry has represented an opportunity to create partnerships between technology providers and customers, resulting in several experiences of co-planning and testing innovative technologies to create new fabrics.

This analytical perspective seems to be more appropriate if we consider that the concept of seasonality has been overcome, with a consequent increase in the number of annual collections. This means that all the phases of pre- and post-presentation are very work-intensive; this implies that reliable suppliers are crucial in order to reduce the lead time. In this sense, the success is not linked to the strategic choices of the single firm, but rather to the "extended firm", that is, the horizontal and vertical net of relationships that the firm establishes with the different players in the production cycle.

3. "Ready-to-wear" and fast fashion: two approaches to dealing with market needs

Considering the present competitive environment, the key driver for success is the speed at which fashion firms can propose something new to the market and, at the same time, react to the market's needs: this is so-called "fast fashion". Fast fashion is one of the recent macro-trends within the clothing industry, and the term refers to the short time gap between the moment a new trend emerges and the moment the trendy product is available in shops [5]. Fast fashion has replaced the traditional two-collection model with a new model involving large numbers of mini-collections, so that the dealer always has something new to offer to customers.

The fast fashion phenomenon is based on the following conditions:

- decrease in the time to market, with short development cycles of the products;
- quick re-assortment;
- care for supply chain management with complete vertical integration (from the design of products to the supervision of the distribution network), and a decreased, indeed minimal level of inventory;
- ability to minimize risks and costs of a collection not appreciated by the market;
- optimization of the creative process;
- flexibility of the productive cycle.

The fast fashion model is very different from the "ready-to-wear" formula introduced by Italian firms at the beginning of the 1980s (known as "pronto moda"). "Ready-to-wear" is based on a pull strategy, where the firm adopting this approach (henceforth the *prontista*) sells on the basis of continuous monitoring of the "sell in", and is able to tailor an item of clothing characterized by a high fashion-related profile in a very short time. The functioning of such a system requires a productive framework defined by an efficient and proactive control mechanism, mainly focused on production planning, in order to reduce the risks associated with the demand forecast and the obsolescence of the product. The "ready-to-wear" system is opposed to the "planned" approach, since, in the latter, the production phase is completed at the beginning of the season, whereas the *prontista* produces during the season, based on the products that achieve greater success [6].

The *prontista* works with a limited number of models and his only scope is to catch a commercial trend that is just taking place in the market. His focus is not on the consistency of the products but only the effectiveness of the selling activity. In this approach, the independence, in terms of style, from the original model (i.e., the one presented a few months previously, during a fashion show) is very limited and is not one of the *prontista*'s objectives.

The fashion-related profile of the models is therefore strongly affected by the stylistic choices of the most important brands: the "*prontista*" must identify the best products [7, 8].

A "fast fashion" firm invests in a collection that changes over time based on market requests; it very precisely identifies its target and, consequently, its own market style and its own brand. Furthermore, high product rotation and reduced financial effort represent undeniable benefits for multi-brand dealers working with a fast fashion firm.

Fast fashion firms do not use only the creativity of the fashion designer but also take advantage of contributions from other players involved in the production chain, such as the sub-suppliers that propose new models and the clients/dealers that frequently inspire new stylistic solutions.

4. Product Lifecycle Management

Today, fashion firms must contend with the following challenges:

- strong competitive pressure: the efficacy of production processes and their consistency, in the phase of product development, with the final objectives, in terms of costs and profits, that contribute to the success of the collection;
- the need to minimize the size of the inventory and the stock at risk, and to improve customers' buying experience: the success of the retail firms depends on their ability to optimize the space of their points

of sale and their selling potential, ensuring an appropriate stock turnover;
- the need for an effective understanding of the trend in market demand in order to meet different customers' expectations: the diffusion and the spread of multichannel sales networks affect the firms' ability to handle heterogeneous buyers' profiles with a customized offer.

Management and technology developments, such as, on the one hand, the introduction of "just in time", "total quality" and "lean production" approaches, and, on the other hand, progress in IT, have modified the fashion firms' attitude towards the external subjects with which they have relations. From this perspective, the production chain can no longer be represented simply as a value chain but should, instead, be seen as a value *net*, i.e., a net of partners not oriented toward the physical transformation and distribution of the product but rather to value creation for the final client, thereby accounting for his ultimate needs. Moving from the value chain to the value net approach is crucial in order to:

- grant distributors a reduction in uncertainty and an increase in delivery speed;
- shift from a product-driven logic to a market-driven one;
- develop a "process culture" within fashion firms.

In such a context, the Product Lifestyle Management (PLM) function is a tool with which to provide firms with mechanisms designed to adequately and effectively handle relations occurring between the subjects involved in the production chain. The PLM is a strategic approach to managing information, processes and production inputs, in support of the phases of product planning, development and management over their entire lifecycle [9]. The PLM tools have been successfully adopted in the aerospace and automotive sectors, and in recent years their use has also been extended to other markets [10].

A PLM system which would work in the fashion industry should include the following elements which contribute to the effective and sound management of the entire product lifecycle:

- product data management;
- product structure management;
- configuration management;
- change management tracking;
- workflow management;
- catalogue library;
- supply chain management.

Considering the entanglement of such elements, the PLM can be very useful for fashion firms since it can help to handle the complexity by which they are characterized, in terms of:

- supply variability, which consists of the innovation degree of different supply components;
- supply variety, that is, the number of the products and their components (i.e., models, fabric, size and colour) within a specific collection;
- importance of the service provided by the fashion firm to the retailer: the growing complexity due to supply variety has an impact on the production cycle length and, consequently, on the level of the service provided;
- need to reduce the lead time.

Cooperation and information sharing between the subjects involved, both inside and outside the production chain, are crucial to the development, manufacturing and distribution processes. Furthermore, a PLM system makes communication simpler for subjects working inside and outside the production chain and reduces the associated costs. In particular, the PLM would allow firms to achieve the following benefits:

- a reduction in the time-to-market;
- a cost reduction.

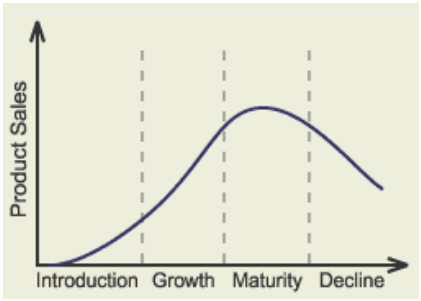

Figure 1. The Product Lifecycle Curve

5. Factors considered in formulating the model

The model presented here aims to determine the market share of the product, considering the one-to-one substitution of the products among different competitors. The simplified version proposed here is based on the assumption that each firm markets one product and that there are only two firms in the market. Considering the typical shape of the product lifecycle curve over time (Figure 1) and, in common with other seminal works on the subject, the following impact factors are considered:

a) Producer factors:
   1. Product factors (perceived quality, advertisement expenditure, word-of-mouth diffusion, perceived price:quality ratio);
   2. Consumer behaviour factors (attitude to switching brand or manufacturer, dependency on emotional motives, brand loyalty).

b) Market Factors:
   1. Direct market factors (investment size, expansion of the economy, return on investments in new technology);

2. Factors affecting the diffusion of new trends and fashions.

The simplified model we propose here is based on three additional assumptions, namely, that:

i) Durability and obsolescence of the products do not represent a significant issue (durability contradicts the idea of "ready-to-wear" and "fast fashion");
ii) Consumer behaviour is quite random in a constantly changing cultural and social environment;
iii) Growth of the economy has a major impact on the psychological tendency to switch products or brands which is (in volume) more than proportional to the maintenance of the same level of consumption for the products to which the consumer is loyal.

6. Formulation of the model

The cause-effect relationship between the various factors which may affect the lifecycle are summarized in the diagram shown in Figure 2. Accordingly, a comprehensive mathematical model was formulated.

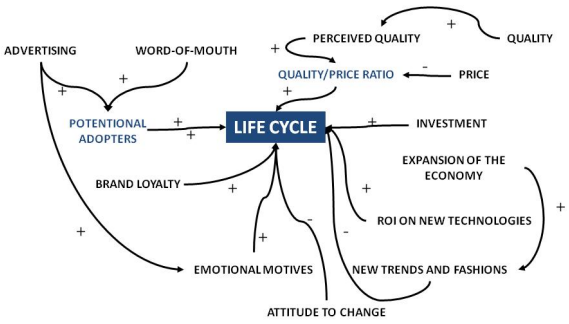

Figure 2. Causal diagram

Similarly to [11, 12] the lifecycle could be modelled as follows:

$$L1 = a1 + a2 \cdot [(P - a3) \cdot (I + a4) \cdot T)] \quad (1)$$

Where:
L1= A parameter which governs the lifecycle
P = Profitability in investing in advertising
I = Investment size
T = Numbers of weeks elapsed before launching new products (models)
a1 = Constant for the specific segment of the fashion industry
a2, a3, a4 = Constants

The investment index I is traditionally calculated as:

$$I = \frac{Average\ initial\ investment}{Average\ total\ assets\ of\ the\ firm} \quad (2)$$

The profitability of investing in advertising could be calculated as:

$$P = \frac{Rate\ of\ return\ associated\ with\ advertising}{Minimum\ rate\ of\ return\ on\ any\ investment} \quad (3)$$

The expansion of the economy has a bearing upon the substitution rate of products/brands as follows:

$$L2 = a5 \cdot G \quad (4)$$

Where:
L2 = A parameter which governs the lifecycle
G = Annual rate of growth of the GDP
a5 = Constant

The assumption of the existence of two companies with just one product allows us to consider the substitution rate of the two brands/products/companies by the customers according to the equation (5).

$$L3 = c^2 \cdot K\,(N - K)(N - 2K) \quad (5)$$

Where:
K = Adopters of the new product/brand
N = Total market size
c = Constant

Considering the Total Market Size (N) and the potential adopters (K), the number of transitions in brands/products by a consumer over time (t) could be formulated as follows:

$$dK = cK \cdot (N - K)dt \quad (6)$$

This can be integrated in:

$$K = \frac{Ne^{Nct}}{N-1+e^{Nct}}$$
(if K=1 at t=0) (7)

Considering the total market share of the company (f=K/N), the second derivative of the equation (6) expresses the rate of acceleration of the new "adopters" (alternative brands/products), which could be analytically expressed as:

$$\frac{d^2K}{dt^2} = c^2 \cdot f(1 - f)(1 - 2f) \quad (8)$$

The consideration of the above-mentioned market factors lead us to consider the parameters that govern the market lifecycle as follow:

$$L4 = L1 - L2 + L3 \quad (9)$$

The reformulation of such an equation in the frame of the model proposed in Figure 2 and the relevant impact of advertising could be:

$$L5 = C1 + C2 \cdot PA + C4 \cdot QP - C5\,NTF \qquad (10)$$

Where:
PA = Potential Adopters
PA = ADV + WOM
ADV = Advertising (by the incumbent)
WOM = Word of mouth effect
QP = Quality: price ratio
NTF = New trends and fashions

In order to include the socio-psychological approach of the customer, which is considered stochastic by nature, the three components (brand loyalty, emotional motives and attitude to change) are assumed to be of the same nature (σ).

In this way, the producer factors could be summarized as:

$$\boldsymbol{L6 = L5 + \sigma} \qquad (11)$$

Similarly to [10], our model shows a general parameter that governs the product lifecycle indicated by L:

$$L = L4 \cdot L6 \qquad (12)$$

7. Conclusion

The differences between the "fast fashion" and "ready-to-wear" models exist in the consideration of the reaction to market pressures by the company. The formulated model should be able to help companies simulate the levels of the main variables of the marketing mix in order to govern the lifecycle of their products. Despite the analytical limitation to two companies/products, the model is robust enough to consider the presence of different product lines per company as well as the renovation of pre-existing products. It might even shed light on the fact that investment in advertising could create positive returns in profitability if their impact is aligned with the customers' word of mouth. Furthermore, all the components of a Product Lifecycle Management (PLM) system, detailed above, could help companies to address decisions on quality/price perception and potential (new) adoptions and grant companies better conditions in terms of efficacy and efficiency of their competitive choices.

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