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Article

Recursive Effects to Study Feature-Based Capabilities in Supply Chain Management

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Abstract: This paper explores the benefits that firms obtain when investing in feature-based capabilities. We investigate the external pressures when deciding their feature-based strategy. In addition, we analyze the consumers' customization options and the needs for facilitators to mitigate the negative effects of excessive features. We assess the influence of feature-based capabilities on performance and search for an economically feasible loop that feature-based capabilities might entail. This latter is carried out by investigating the recursive effects in structural equation modeling. Our findings reveal that feature-based capabilities entail an economically feasible loop through competitors and supply chain partners but not also through facilitators and operational performance.

Keywords: feature-based capability; recursive model; facilitators; customization; structural equation modeling

1. Introduction

Nowadays, firms tend to offer unique customization experiences to consumers by proposing a wide variety of features [1]. The latter are defined as varieties that users can identify aiming to increase the product capabilities and attractiveness [2]. Although establishing a certain feature-based capability supplies a well-documented competitive advantage [3], over-featured goods can generate negative effects on the entire business model [4]. The authors of [5] provide key cases exemplifying this phenomenon. Consumers can purchase smartphones that work as cellphones, game consoles, internet connections, cameras, MP3 players, dashboards and GPS devices. In the end, consumers might be unsure as to whether they are purchasing a smartphone or something else. LG electronics has developed refrigerators that also mount TVs inside one of the doors. This might confuse consumers about the needs for either a refrigerator, a TV, or an electronic device that functions as both items at the same time.

The phenomenon of adding new features to a core product dates back to 1970, when [6] stated that product attributes contribute to consumers' net utility, independent of the number of attributes already existing in a product. This theory contrasts with the universally applicable phenomenon of diminishing marginal utility [7], according to which there can always be too much, even of a good option [8,9]. Consequently, the feature-based decisions challenge both the firms and the consumers, as these decisions are influenced by strategic considerations and operational issues.

In this study, we investigate the exogenous drivers influencing the firms' feature-based capability, namely, the competitors and the supply chain partners. On the one hand, the competitors' feature-based capability forces firms to develop similar capabilities to properly compete in the marketplace [10]. On the other hand, when supply chain partners hold strong attitudes about developing and proposing features, they only wish to partner with firms having similar attitudes and orientations [11], to align the supply chain members' vision and targets [12]. Once firms set practices and routines to acquire certain feature-based capabilities, they face a further exogenous challenge: the consumers' reactions to the available features [3].

Consumers show significant enthusiasm, great willingness and extensive intentions to embed features in products [8]. Nevertheless, they can experience frustration and feeling of regret when consuming a product after discovering that the features added with significant enthusiasm are highly complex and offer low usability, e.g., feature fatigue effect [5,13]. These circumstances call for the implementation of facilitators that tempt consumers during the purchasing phase, while supporting and helping them during the usage phase [9,14]. Furthermore, creating a product with excessive features has important operational implications like costs, time to market, quality checks and loss of efficiency [15].

In this study, we investigate how consumers and operational challenges can harm the firms' economic viability of developing feature-based capabilities. We also seek to verify the economic feasibility of the feature-based capabilities by analyzing the loops entailed by the firms' economic performance. More specifically, we test whether the higher economic outcomes obtained through the feature-based capabilities intensify the feature-based competition, strengthen the feature-based collaboration with supply chain partners, push the development of feature-based capabilities further or require additional investments in facilitators.

We draw a model considering the influences of both competitors and supply chain members on firms' feature-based capabilities, the consumers' demand for features, the role of facilitators, as well as the possible improvement for performance. We test some hypotheses on a sample of firms by estimating both the direct and indirect effects as well as the feedback loops by using a covariance-based structural equation model (SEM).

Our findings demonstrate that both competitors and supply chain partners offer significant stimuli for firms to invest and develop feature-based capabilities, with the former having a stronger influence. This result clearly illustrates that maturing feature-based capabilities is not an isolated phenomenon, but rather is a key asset requiring further development according to the industrial forces influencing the firms' business. Furthermore, we show that firms with a high feature-based capability greatly engage consumers in requesting more features and can significantly reinforce this engagement by providing some facilitators. This finding highlights the importance of accompanying feature-based capabilities with facilitators, making consumers more enthusiastic by customizing their products through features, while mitigating the risk of frustration and the regretful feelings when loading too many features translates into highly complex goods.

From an operational standpoint, we demonstrate that feature-based capabilities increase the operational performance, confirming that firms can efficiently develop and introduce new features without challenging the operations. Although customization options harm the firms' operational performance due to ad-hoc consumers' requests, they positively contribute to the firms' economic outcomes. At the same time, the operational excellence achieved when developing features does not imply any economic improvement.

Our results also inform managers and practitioners of the possible economic feasibility entailed by feature-based capabilities. Firms should consider competition and supply chain collaboration induced by the higher economic outcomes obtained through the feature-based strategy. Both competitors and supply chain partners are highly attracted by the success and the opportunities that feature-based capabilities offer; thus, they should invest more efforts in their feature-based capabilities and encourage firms' investments in the same direction. Acquiring additional feature-based capabilities allows firms to further improve their economic performance; this outcome highlights the economic feasibility of feature-based capabilities.

The rest of this paper has the following structure. Section 2 looks into the literature and Section 3 presents the hypotheses and the framework. Section 4 reports the research hypotheses to be tested while Section 5 displays the research design. Section 6 shows the empirical results and the discussion. Section 7 supplies the conclusions and managerial insights, as well as the limitations and recommendations for future research.

2. Literature Review

The literature documents the benefits that firms can obtain by offering customization opportunities through features (see [3] for an application in the electronics sector). Nevertheless, the recent developments in this field treat the feature-based strategy as an isolated option rather than as a global opportunity. According to [4], a feature-based strategy should be framed within the global firm's vision to be sure that all business aspects are fully covered. In this regard, the literature is silent on the impact that competitors and supply chain members have on firms' feature-based decisions. Other authors ([9,13]) recommend taking the decisions-based features by properly considering the role that the competitors play in the industry, since features are currently a real competitive tool. In fact, when firms offer a low range of features, competitors can offer a high number of features to differentiate their goods in the consumers' eyes.

The literature on competition does not explicitly deal with feature-based competition; rather, it focuses on the general topic of quality competition [10]. Indeed, a strong connection exists between quality and features, since a well-featured product possesses a more superior quality than an under-featured good [14]. Another study [16] presents a very complete analysis on how competitors influence the manufacturers' quality decisions. We seek to contribute in this research frame by investigating the influence of competitors' feature-based strategies on the firms' feature-based decisions using an empirical approach.

Several contributions highlight the issue of supply chain collaborations linked to features. In [14], game theory is used to analyze the supply chain agreements between one manufacturer and one supplier managing a joint collaboration feature-based program to improve their economic performance. The existence of collaborative feature-based programs within the supply chain reinforces the image of high quality goods and helps consumers to draw better expectations regarding the potential utility linked to the features. In [13], the authors highlight that the success of a feature-based strategy attracts the attention of some stakeholders like entrepreneurs; hence, also attracting the suppliers' interests. Other scholars [17] focus on external factors influencing the firms' feature-based strategy (i.e., synergies among features, consumers' price sensitivity, quickness of the technology frontier). Even though, they fully disregard the impact of the supply chain partners. We aim to contribute to the supply chain literature by analyzing the supply chain partners' influence on the firms' feature-based decisions.

Providing a large number of features is highly challenging and needs to be supported by facilitators. The authors of [5] conduct experiments to check the relationships between product features and consumers perceptions. More specifically, they investigate whether over-featured products are perceived as being more capable and/or more difficult to use. They conclude by suggesting a decrease in the number of features [5]. However, in [13] an opposite viewpoint is offered. The authors state that consumers can be highly confused during the purchasing phase because of the features, while they do not (necessarily) have the right knowledge to seek their full potential. In [5], it is obvious that consumers need facilitators during the purchasing and the usage phases. Nevertheless, none of the studies formally explain and analyze the role of the facilitators. The need for facilitators is clearly corroborated by some of the empirical research, indicating that consumers might experience negative emotional reactions in response to product complexity [18]. The authors of [8] demonstrate that consumers perceive both the value and the benefits linked to some of the features. Despite this, they do not demonstrate whether the existence of facilitators solves this trade-off or not while [19] suggests the use of Blockchain technology to overcome this issue.

The feature-based capabilities are also found to have a considerable impact on performance. We aim to determine the economic feasibility of feature-based capabilities. To achieve this target, we investigate the loops that the economic outcomes linked to feature-based capabilities generate. More specifically, we search for a link between the economic performance with competitors' and the supply chain partners' feature-based capability, as well as the relationships with facilitators and the

firms' feature-based capabilities. In this way, we examine the existence of a significant option through which firms' feature-based capabilities can feed themselves.

In the next section, we develop our expectations about how firms develop their feature-based capability according to the influences of the competitors and supply chain partners (H1–H2). We then develop the relationships among the firms' feature-based capability with the consumers' request of the features and the facilitators (H3–H5). Finally, we explore the links to the operational (H6–H7) and economic performance (H8–H9), as well as the existing loops entailed by the economic performance (H10).

3. Theoretical Developments

Firms feature-based capability. Firms develop certain capabilities to embed features in products. In the high-tech industry, engineers do not resist the temptation to develop new features, whose engineering is much cheaper and faster than the core product [5]. Clearly, the potential success induced by the features is linked to the product core's success [20]. The positive effect of new features to a core also depends on typicality: the more a feature (and, consequently, a function) is not typical to the product core, the more it attracts the consumers' interest [20]. At the same time, successful features must be congruent with the product core to avoid negative perceptions and undesirable repercussions [20]. A strategy focusing on the proper number of features encourages entrepreneurs and investors to pursue certain strategic directions, as ample feature ranges capture a wider part of the consumers' heterogeneity and properly cover all market needs [21]. Nevertheless, the relationships between the product core and the features are highly stochastic [4]. Improving features without a clear analysis of the global firm's vision and strategy can lead to unexpected complications and challenges.

Supply chain partners' feature-based capability. The presence of new features available for products also depends on the supply chain partners' potential. Suppliers and a focal company can be highly involved in jointly designing new features, especially when the suppliers are strategic and collaborate with the focal company on several business dimensions [12]. Suppliers can have unique capabilities in relation to identifying new features, doing marketing research and spending money on R&D [22,23]. Clearly, suppliers have a great deal of interest in proposing new features when those enhance the consumer equity and promote the supply chain's business development process [16]. Collaborating in feature developments helps both the suppliers and the focal company to be more committed to their supply chain targets and it also reinforces the partnership [24].

Competitors' feature-based capability. While the authors in [5] carefully analyze the over-featuring implications for the overall business context, other researchers [13] highlight the implications of competitors on the firms' feature-based decisions. The literature disregards the effect of competition on the feature-based strategy [25]. Instead, the over-featuring problem links to the highly competitive marketplace in which firms live. If a firm was the monopolist of a certain market, there was no featuring issue, as consumers had no alternative choice to satisfy their needs [10]. Nowadays, firms heavily compete on both the product core and its features. Offering a large number of features allows firms to differentiate themselves from their competitors [8], although high differentiation does not necessarily translate into a competitive advantage. In [26], the researchers find that when a firm's product is too similar to the competitor's product, the financial performance can substantially suffer and the market share decreases. In contrast, consumers can perceive an over-featured good that considerably differentiates from the competitors' products as not appropriate for satisfying their needs [14].

Customization through features. Consumers who are exposed to feature-based opportunities find over-featured products very appealing during the purchasing phase, as they carry out social value and recognition [8]. Nevertheless, the utility perceived when purchasing an over-featured good and the real utility generated when using it can be substantially different. During the purchasing phase, consumers are uncertain about the real utility that a batch of features might generate [13]. Although a high portion of unused features can lead to over-featuring issues, this effect would be lower than the regret due to under-featured products [3]. During the purchasing phase, people look at over-featuring

as the opportunity to increase the products' capability, while expecting a higher usage complexity as well. In [5], the authors find that consumers always ask for more features, independent of their capability to use them. For the same groups, the usage capability substantially decreases according to the number of features, even when consumers were exposed to customization options. This is due to the lack of connection between product capability and usage during the purchasing phase [8]. In the same vein, [20] find that adding new functionalities through features to a product base leads to higher consumers' satisfaction if consumers evaluate the features as congruent to the product base, which leads the new features to be assimilated to the product base in future releases. Consumers' dissatisfaction due to over-featuring issues can also entail a negative word-of-mouth, hence damaging the brand reputation, the consumers' willingness to purchase from the same brand, as well as the consumer equity [3].

Facilitators. According to [27], consumers do not use all of the features that the products embed and, more importantly, product complexity can lead to negative emotional reactions [18]. In one of the experiments in [5], it is discovered that the product capability matters more than the usability during the purchasing phases. Later, the situation reverses as the usability drives customer satisfaction and might lead to feature fatigue. According to [13], defeating feature fatigue by reducing the number of features is a suicidal strategy, as consumers do not like under-featured products and competitors must be aware of unsatisfied consumers. Rather, firms should identify ad-hoc facilitators for mitigating the negative effect of over-featuring. The study in [14] develops theoretical models to properly evaluate the needs for ad-hoc facilitators (e.g., in-store services). In [1], the authors suggest solving the issue of over-featuring through a proper communication strategy (e.g., advertising). The authors of [28] show the benefits of service through online interfaces [29]. All of these items allow firms to acquire the capacity to facilitate product usage, which turns out to be highly valuable in the case of over-featured goods.

Operational Performance. The relationship between features and operational performance reveals contrasting results in the literature. From an engineering and a technical point of view, adding features to a product can be more costless and timeless than developing the product core [15]. Nevertheless, the presence of additional features translates into higher production lead times, as new tasks enter into the production process. It is also important to control the time to market when features follow new product releases. A large number of features requires additional quality checks [17]. Because introducing new features cannot be realized without facing operational challenges, firms need to evaluate the operational implications of such a policy.

Economic Performance. Giving consumers the opportunity to increase the number of features has important repercussions on the firms' economic performance. Adding features is generally associated with high price [14], which deteriorates sales. The huge difference between under-featured and over-featured products generates downside effects for hedonic features (e.g., features leading to experiential consumption, pleasure, and excitement), rather than for the utilitarian base (e.g., features leading to instrumental and practical considerations) [20], thus having important implications for economic performance. When consumers customize their products by adding new features, this inevitably increases the product complexity. The latter calls for new decision support tools that can help firms to better estimate the negative implications of over-featuring on economic performance [1].

4. Theoretical and Research Hypotheses Developments

The firms' tendency to expose consumers to a large number of features finds its roots in clear strategic effects [1,3]. Features offer the opportunity to consumers to customize their products, creating an ad-hoc fit between the needs and product potentials [14]. Customization through features smooths the consumers' heterogeneity and amplifies the firm's capability in satisfying larger parts of the entire market potential [21]. This option considerably attracts the entrepreneurs and venture capitalists' attention, who see the customization option as a lever to reduce both the operational and financial risks of their investments.

While a feature-based capability appeals to firms from several angles, competitive threats considerably challenge the firms' feature-based strategies [13]. Since the utopia of monopolist settings vanished many decades ago, competitors' feature-based capabilities substantially affect the firms' feature-based strategies. The literature disregards the effects that competition implies. Most of the existing work consists of theoretical models (e.g., duopoly games) focusing on competition based on quality [30], while fully disregarding the feature-based competition. Accordingly, we hypothesize that:

Hypothesis 1 (H1). *The competitors feature-based capabilities have a positive impact on the firms feature-based capabilities.*

A large number of studies investigate collaborations within Supply Chains (SCs) to pursue high tech projects [22]. These projects seek to detect the most appealing features that consumers want. When suppliers hold a marked attitude in identifying and developing successful features, firms manifest a strong willingness to engage in and collaborate on joint feature-based capabilities. Suppliers can collaborate only when an alignment exists; therefore, firms invest to align their thinking to the SC partners' practices to guarantee good and fruitful relationships reinforcing the SC interdependency [12]. Recognizing a feature-based SC collaboration as to be highly promising pushes firms to reinforce their feature-based thinking and put in place extra efforts to establish their feature-based capabilities. Consequently, we hypothesize that:

Hypothesis 2 (H2). *The SC members' feature-based capabilities have a positive impact on the firms' feature-based capabilities.*

Research has shown that consumers have the attitude of adding options to a core, most likely when the features have social meaning [5]. This attitude leads to the complex design [8], which is difficult to handle. However, we hypothesize that:

Hypothesis 3 (H3). *The firms' feature-based capabilities have a positive impact on customization through features.*

The authors of [8] received lots of criticism when suggesting that the feature fatigue issue could be mitigated by simply decreasing the number of features complementing a product core [13]. In [14], it is demonstrated that firms find supportive options to make consumers willing to select a large number of features, while also being supported through facilitators. Engaging in a feature-based strategy might be risky and uncertain. Adding features to product cores can lead to high product complexity, which consumers can find ambiguous and painful to use [2]. Consequently, we hypothesize that:

Hypothesis 4 (H4). *The firms' feature-based capabilities have a positive influence on the facilitators.*

Hypothesis 5 (H5). *Facilitators have a positive impact on customization through features.*

The feature-based capabilities result in numerous issues. Features require less efforts than the core [14]. This news is very appealing for marketers, since features add soft values to a product in an efficient way. At the same time, features can generate a substantial alteration in the production routines, leading to increasing lead times and marginal production costs [1]. Furthermore, when features are linked to high levels of customization and need to also be re-engineered, the time-to-market can considerably increase [31]. Finally, when the product embeds multiple features, quality tests become more challenging, since the features share variations, require additional flexibility and harm both the reliability and the productivity [1,3]. Accordingly, we hypothesize that:

Hypothesis 6 (H6). *The firms' feature-based capabilities have a negative influence on the operational performance.*

Hypothesis 7 (H7). *The consumers' features demands have a detrimental effect on the operational performance.*

There is a wide consensus in the literature on the positive relationship between operational and economic performance. In [11], the researchers show that good operational performance directly reduces costs, enhances sales, and improves the market share. For example, new product development and responsiveness to market demand helps companies meet customer requirements, which leads to higher market shares. Similarly, better delivery, flexibility, and customer service can reduce costs and improve customer loyalty, leading to improved economic outcomes [32]. Other scholars [17] illustrate that supplying better operational performance, which can be exemplified by shorter lead times, high quality, and significant flexibility, leads to larger sales and profits. We believe that this positive relationship still holds when firms deal with features, although the operational performance can be worsened by the feature-based capabilities and customization options. Therefore, consistent with the literature, we hypothesize that:

Hypothesis 8 (H8). *Operational performance gives a positive contribution to the firms' economic performance.*

Contrasting relationships can result between the consumers' attitude in selecting features for customization purposes and the firms' economic performance. On the one hand, the feature-based strategy can lead to the feature fatigue effect [8], which has negative repercussions on the firms' business. This negative effect can be exemplified by consumers' inability to use features and the consequent frustration and regret for the purchase [4]. These effects on the economic performance might have a more significant and disruptive amplitude when associated with the reduced image [33]. On the other hand, offering to customers the opportunity to customize their products through features represents a good practice [2]. Consumers prefer to be exposed to a large number of features, rather than have a restricted number of options [3]. We definitely think that a proper feature-based strategy supplies additional value to consumers. It also provides a wide range of opportunities to pursue good economic targets, rather than destroying economic value and making consumers highly disappointed. Consequently, we hypothesize that:

Hypothesis 9 (H9). *Customization contributes positively to the economic performance.*

One question that firms should solve is whether a feature-based strategy is economically feasible. This implies that good economic performance obtained through the feature-based capabilities serves to further invest in the same direction. Hence, firms look at the loops existing between the economic performance and the entire context. When firms enjoy good economic outcomes, competitors might follow the same path and react by sponsoring a feature-based strategy even further. In such circumstances, they play the role of the followers by undertaking the same strategic directions and pushing for competition through the same levers. Similarly, the success of a feature-based capability can appeal to SC partners, who can strengthen the relationships with the firms after becoming informed about the suitable economic outcomes that a feature-based strategy generates. This can be exemplified by sponsoring collaboration about feature developments and designs, investing in marketing research, and searching for new available technologies. Finally, as competitive and SC forces can boost the firms' attitude in pursuing feature-based capabilities, economic outcomes can be further invested in supporting consumers through facilitators. We firmly believe that well-established and properly defined feature-based capabilities can be economically feasible. Therefore, we hypothesize that:

Hypothesis 10 (H10). *Economic performance has a positive influence on:*

Hypothesis 10 (H10a). *The competitors' feature-based capabilities;*

Hypothesis 10 (H10b). *The SC partners' feature-based capabilities;*

Hypothesis 10 (H10c). *The firms' feature-based capabilities;*

Hypothesis 10 (H10d). *The facilitators.*

Figure 1 displays the research design.

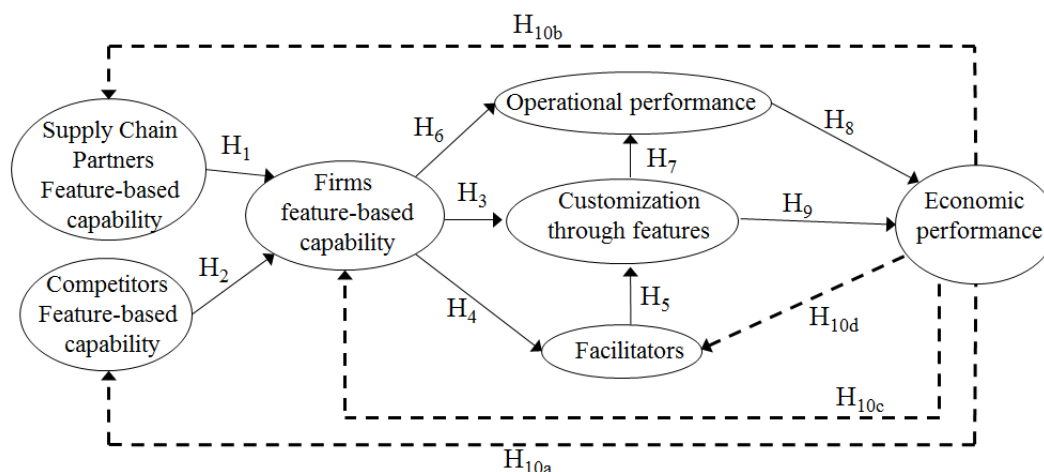


Figure 1. Conceptual model.

5. Methodology

5.1. Survey Design and Sample

To pursue the targets of this research, we generated and collected data from 189 European firms. The description is in Table 1. We checked for issues of bias before moving forward with the analysis finding no particular problems.

Before collecting the data, the content of the questionnaire has been pre-tested through 12 colleagues and 5 Ph.D. students, as well as 6 Executive MBA students. The content has been highly improved in terms of wording and readability. The final version of the questionnaire is reported in the Appendix A.

5.2. Exploratory Factor Analysis

We finalized an exploratory factor analysis using principal components analysis in Table 2, removing the items with low loads and obtaining 72.82% of the total variance explained through our design. Hereby, the list of factors are as follows: 1. “Firms feature-based capability” (FFBC), 2. “Supply Chain partners’ feature-based capability” (SCPFBC); 3. “Competitors feature-based capability” (CFBC); 4. “Facilitators” (F); 5. “Customization through features” (CTF); 6. “Operational Performance” (OP); and 7. “Economic Performance”.

Table 1. Sample composition.

Sales	#	%	Employees	#	%	Country	#	%	Industry	#	%	Professionals	#	%
<10M	42	24.9	0–199	39	22.7	Italy	54	31.4	Automobile	12	7	Supply chain manager	21	12.2
10–24.99M	33	19.1	200–499	58	33.7	France	38	22.6	Power generating	29	16.9	CEO-President-Vice President	41	23.8
25–49.99M	26	15.0	500–799	58	33.7	UK	10	5.8	Electrical and electronics	52	30	Production manager	47	27.4
50–99.99	36	20.8	>800	17	9.9	Spain	15	8.7	Chemical	26	15.1	Purchasing manager	37	21.5
>100M	35	20.2				Germany	16	9.3	Steel	19	11	Others	26	15.1
						Portugal	17	10	Petroleum	10	5.8			
						The Netherlands	6	3.5	Pharmaceutics	11	6.4			
						Belgium	10	5.8	Agriculture	10	5.8			
						Others	6	3.5	Others	3	1.7			
Total	172	100		172	100		172	100		172	100		172	100

Table 2. Explorative factor analysis.

Items	Firms' Feature-Based Capability	Facilitators	Competitors' Feature-Based Capability	Operational Performance	Supply Chain Partners Feature-Based Capability	Economic Performance	Customization Through Features
FFBC 4	0.839						
FFBC 6	0.826						
FFBC 1	0.820						
FFBC 3	0.811						
FFBC 2	0.798						
FFBC 7	0.771						
FFBC 5	0.754						
F 5		0.905					
F 2		0.878					
F 4		0.824					
F 1		0.776					
F 3		0.768					
CFBC 1			0.899				
CFBC 2			0.863				
CFBC 3			0.824				
CFBC 5			0.774				
CFBC 4			0.756				
CFBC 6			0.650				
OP 4				0.892			
OP 5				0.874			
OP 3				0.854			
OP 1				0.848			
OP 2				0.807			
SCPFBC 1					0.827		
SCPFBC 6					0.797		
SCPFBC 5					0.751		
SCPFBC 3					0.685		
SCPFBC 4					0.681		
SCPFBC 2					0.611		
EP 4						0.925	
EP 3						0.901	
EP 1						0.855	
EP 2						0.848	
CTF 3							0.732
CTF 1							0.731
CTF 2							0.724
CTF 5							0.721

5.3. Confirmatory Factor Analysis

A confirmatory factor analysis (CFA) estimated the structural model [34] by using the maximum likelihood approach in AMOS 18 and obtaining a goodness-of-fit index of 0.806. Additionally, discriminant validity, average variance extracted (AVE), and Cronbach's alpha give good results, as displayed in Table 3.

Table 3. Composite reliability (CR), average variance extracted (AVE), Cronbach's alpha and correlations.

	CR	AVE	Cronbach's Alpha	SCPFBC	FFBC	CTF	OP	Ep	F
CFBC	0.903	0.612	0.91	0.24	0.318	0.269	0.08	0.186	0.193
SCPFBC	0.852	0.537	0.851	1	0.291	0.374	0.131	0.215	0.346
FFBC	0.920	0.625	0.921		1	0.239	0.148	0.227	0.206
CTF	0.933	0.778	0.931			1	−0.139	0.249	0.717
OP	0.894	0.544	0.913				1	0.099	0.032
EP	0.922	0.751	0.927					1	0.192
F	0.927	0.720	0.926						1

6. Research Results

6.1. Structural Equation Model (SEM)

We run SEM obtaining a satisfactory goodness-of-fit index of 0.801.

6.2. Hypothesis Testing

These results (see Table 4) show that competitors have a high impact on the firms' feature-based capabilities (coef. = 0.257, p -value < 0.01). In addition, SC members have an important influence on the firms' feature-based capabilities (coef. = 0.202, p -value < 0.05). Consequently, firms should consider the pressures coming from both the competitors and the suppliers when setting their feature-based efforts and strategies.

Table 4. Results of the research hypotheses.

Research Hypothesis	Direct Effect	Results
H1. <i>The competitors feature-based capabilities have a positive impact on the firms feature-based capabilities.</i>	0.257 ***	Supported
H2. <i>The SC partners' feature-based capabilities have a positive impact on the firms' feature-based capabilities.</i>	0.202 **	Supported
H3. <i>The firms' feature-based capabilities have a positive impact on customization.</i>	0.082	Not supported
H4. <i>The firms' feature-based capabilities have a positive influence on the facilitators.</i>	0.187 **	Supported
H5. <i>Facilitators have a positive influence on customization.</i>	0.693 ***	Supported
H6. <i>The firms' feature-based capabilities have a negative influence on the operational performance.</i>	0.175 **	Supported with a different sign
H7. <i>The consumers' features demands have a detrimental effect on the operational performance.</i>	−0.178 **	Supported
H8. <i>Operational performance gives a positive contribution to the firms' economic performance.</i>	0.108	Not supported
H9. <i>Customization contributes positively to the economic performance</i>	0.220 *	Supported
H10. <i>Economic performance has a positive influence on:</i>		
H10a. <i>the competitors' feature-based capabilities</i>	0.173 **	Supported
H10b. <i>the SC partners' feature-based capabilities</i>	0.205 **	Supported
H10c. <i>the firms' feature-based capabilities</i>	0.084	Not supported
H10d. <i>the facilitators</i>	0.018	Not supported

*** $p = \text{value} < 0.01$; ** $p = \text{value} < 0.05$; * $p = \text{value} < 0.1$; italic values are not significant.

We test the influence that the firms' feature-based capabilities exert on the consumers' needs. This result does not find empirical confirmation (coef. = 0.082, p -value > 0.1), highlighting that consumers do not ask for more features when firms possess high capabilities to develop features. This effect is most likely linked to the uncertainty due to the features. In fact, the role of facilitators is important (coef. = 0.693, p -value < 0.01).

Investing on the feature-based capabilities requires facilitators (coef. = 0.187, p -value < 0.01). We see the mediating effect they have customization. Hypothesis 4 is verified (coefficient = 0.184, p -value = 0.011). We also verify the links between the customization and operations management (coef. = 0.178, p -value < 0.054).

No support is offered for features and operations (coef. = 0.175, p -value < 0.05). This result is linked to the strong capabilities in performing features generating savings and efficiency, rather than implying further operational challenges. Rather, firms can rely on economic performance improvements (coef. = 0.220, p -value < 0.01) and renounce operations (coef. = 0.108, p -value > 0.1). In addition to the traditional hypothesis testing, we also investigate the loops entailed by the economic performance

with H_{10} . Our results reveal that the higher economic performance gained through feature-based competencies intensifies both the competition in the marketplace (coef. = 0.173, p -value < 0.05), as well as the supply chain collaboration (coef. = 0.205, p -value < 0.05). Instead, the higher economic performance obtained through the feature-based capabilities does not call for additional investments in features development and facilitators. Finally, following [35], we present all indirect links (Table 5).

Table 5. Results of indirect effects.

	F	EP	OP	CTF	FFBC	SCPFBC	CFBC
F	0.007	0.032	0.005	0.010	0.003	0.041 **	0.048 *
EP	0.141 *	0.013	0.001	−0.017	0.062 *	0.013	0.016
OP	−0.121 *	0.021	0.002	0.004	−0.036	0.030	0.035
CTF	0.007	0.049	0.005	0.010	0.132 **	0.046 **	0.054 **
FFBC	0.024	0.090 **	0.019	0.035	0.011	0.002	0.003
SCPFBC	0.029	0.003	0.023	0.042	0.013	0.003	0.003
CFBC	0.024	0.002	0.019	0.035	0.011	0.002	0.003

*** $p = \text{value} < 0.01$; ** $p = \text{value} < 0.05$; * $p = \text{value} < 0.1$; italic values are not significant.

6.3. Implications of the Results

Our empirical results confirm that the dilemma of features is not an isolated instrument. Rather, it is influenced by the external forces living in the industry and exemplified by the supply chain partners, as well as the competitors influences. The latter is the major driver. The need for a properly designed feature-based strategy is given by the competition [36].

Firms must be aware of the external pressures caused by competitors. This strategy conforms with the theory in [1]. Firms should display their feature capabilities and anticipate competitors. Additionally, the supply chain members have high strategic interactions to be reconsidered.

Note that the pressures coming from competitors have a higher effect than the pressures originating from the supply chain partners. Therefore, a feature-based strategy should firstly aim to attract consumers' attention, at the expense of competitors, and, consequently, be able to supply more appealing customization experiences through features than their competitors. Secondly, a feature-based strategy should aim to align the firms' feature-based capability to the SC thinking to fully exploit the partnership's synergies and reinforce SC competitiveness. Therefore, firms can have features but consumers do not necessarily appreciate them.

Today's consumers are more and more strategic. When firms propose new solutions in the market (e.g., new features), consumers do not immediately make their purchase. Rather, they wait to analyze the other consumers' feedback before selecting the features to complement the product core.

Instead, the existence of facilitators makes features more appealing to consumers and facilitators are important for the business models. Firms cannot invest in features without investing in service and facilitators [37].

Finally, we investigate the economic feasibility of feature-based capabilities by checking the feedback loops generated by the business performance. We verify that the success linked to feature-based capabilities entails more intense competition in the marketplace, as well as additional collaboration within the supply chain. On the one hand, competitors associating the firms' economic performance with their feature-based strategy would invest more in the same direction and intensify the competition based on features. On the other hand, when firms obtain higher economic performance through features, they devote their efforts to this direction, reinforcing the supply chain partners' relationships and feature-based collaborative projects.

The two forces indirectly connect the firms' economic performance to the feature-based strategy and suggest an economically feasible loop that consists of: (a) competitors and supply chain members that entail higher feature-based capabilities; (b) feature-based capabilities that increase the needs for facilitators and, consequently, consumers' requests for features; (c) consumers' requests for features

generate higher economic performance; and (d) good firms' economic performance make feature-based capabilities very appealing for competitors and push firms to intensify the collaboration with the suppliers, thus entailing a feasible loop.

Instead, firms should not invest the economic performance generated by a feature-based strategy, neither in the development of additional features nor in the creation of new facilitators. In accordance with the previous results, the features and facilitators should always go together. Our findings suggest that firms undertaking a feature-based strategy already invest an important amount of resources in that direction. These efforts are sufficient enough to create economic value. Additional investments in a feature-based strategy should be driven by the competitors' actions and the partners' willingness, rather than by the firms' pioneering spirit.

7. Conclusions

This research investigates the economic feasibility of feature-based capabilities, according to competitors' and supply chain partners' pressures, customization and facilitators, as well as the impact on performance. We investigate feature-based capabilities and investments in several directions. Furthermore, we check whether the firms' feature-based capabilities lead consumers to be interested in features, depending on the existence of some facilitators. The impact on performance determines the convenience of pursuing feature-based capabilities and sheds light on the existence of potential loops for creating an economically feasible business.

Our research offers fresh insights into the role that features cover. The competitors are the main driver pushing firms to invest in features. Therefore, the entire policy behind the features' development becomes a vital prerequisite of the firms' business strategies, rather than an option to be potentially considered. The supply chain members are the second element with a focus on the features. All firms belonging to a supply chain share collective thinking and committed targets, coordinate on well-defined risk and benefit sharing rules, and live altogether conditionally for the existence of a common strategic orientation. Consequently, partners investing in and promoting a feature-based orientation should find consensus with other parties to guarantee the supply chain structure stability and continuity.

We demonstrate that features do not imply higher sales. Firms moving toward a feature-based direction should always complement the range of features with a batch of facilitators, reassuring consumers during the purchasing phase, along with guiding, supporting and helping them during the usage. Feature-based thinking is challenging. On the one hand, features offer an interesting effect on operations. On the other hand, customization may worsen the operational performance.

Finally, we discover the existence of a significant loop to make the feature-based capabilities economically feasible. The economic results that firms obtain through features generate more intense competition, while strengthening the supply chain partners' collaboration. Since these two elements push for investments in features, firms should spend an additional budget on developing features and facilitators, encouraging consumers to request more features and, consequently, improving their economic results. Note that this loop exists as far as firms can communicate their successful business model linked to feature-based thinking to the competitors and supply chain partners. Pushing for features and facilitators while fully disregarding competitors and supply chain partners does not provide any additional performance improvement and turns out to be not economically feasible. Therefore, feature-based thinking can be a lever to influence the dynamics within the industry, rather than an isolated internal tool.

Limitations and Future Research

Our research is limited to an analysis of an ad-hoc sample. Future research can look at different samples and see whether the results hold. The data are not collected at different points in time limiting the application of time series and panels. Consumers' online feedback can influence future requests for features. This can be accounted for through dynamic approaches and methodologies.

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Appendix A. Questionnaire

Appendix A.1. Competitors' Feature-Based Capability (CFBC)

Our competitors:

1. embed features containing the latest available technology in their products (CFBC 1)
2. propose several features to cover the largest part of the market's needs (CFBC 2)
3. offer the opportunity to customize products through features (CFBC 3)
4. offer several options for each product feature (CFBC 4)
5. frequently innovate the features over time (CFBC 5)
6. regularly propose new features (CFBC 6)
7. sell products that are more expensive than the features (CFBC 7) ^a
8. develop product features to anticipate the market needs (CFBC 8) ^a
9. can quickly offer similar product features as ours (CFBC 9) ^a

Appendix A.2. Suppliers Chain Partners' Feature-Based Capability (SCPFBC)

Our suppliers:

1. design features embedding the latest technologies available (SCPFBC 1)
2. regularly receive our visit for co-designing and developing features (SCPFBC 2)
3. have systems to identify the product features that consumers need (SCPFBC 3)
4. are indispensable to develop features that suit consumers' needs (SCPFBC 4)
5. continuously invest in jointly co-designing new features (SCPFBC 5)
6. develop features enabling a high number of functionalities (SCPFBC 6)
7. regularly suggest new features for the product core (SCPFBC 7) ^a
8. share the knowledge that they acquired in developing features with our competitors (SCPFBC 8) ^a

Appendix A.3. Firms' Feature-Based Capability (FFBC)

Our products:

1. embed features containing the latest available technology (FFBC 1)
2. contain all feature-based ideas developed during the brainstorming session for the product development (FFBC 2)
3. have features to cover the largest part of the market's needs (FFBC 3)
4. allows us to capture some new market opportunities through features (FFBC 4)
5. have features that allow for several options (FFBC 5)
6. unify several features in one unique product (FFBC 6)
7. are frequently updated to introduce new features in the market (FFBC 7)
8. are more expensive than their features (FFBC 8) ^a
9. contain features that are regularly suggested by our engineers (FFBC 9) ^a
10. have features that allow us to anticipate the market needs (FFBC 10) ^a

Appendix A.4. Customization Through Features (CTF)

Our consumers:

1. choose the product to purchase according to the available features (CTF 1)

2. desire a high number of features when purchasing a product (CTF 2)
3. seek to customize their products through features (CTF 3)
4. understand the additional functionalities linked to features (CTF 4) ^a
5. associate a specific value to each feature (CTF 5)
6. ask for features than we cannot always offer (CTF 6) ^a
7. choose the newest features that we developed (CTF 7) ^a

Appendix A.5. Facilitators (F)

We support our consumers through:

1. Online platforms and e-services (F 1)
2. Call centers (F 2)
3. The creation of front offices (F 3)
4. The presence of in-store ad-hoc helpers (F 4)
5. The development of an user-friendly interface (F 5)
6. Social networks and virtual community (F 6) ^a
7. Ad-hoc chat box embedding Artificial Intelligence (F 7) ^a
8. Information exchanged through Internet of Things (F 8) ^a

Appendix A.6. Operational Performance (OP)

Comparatively to our main competitors, we achieve good operational targets in terms of:

1. Total cost reduction (OP 1)
2. Lead time reduction (OP 2)
3. Time to market (OP 3)
4. Quality standards (OP 4)
5. Level of service (OP 5) ^a
6. Flexibility (OP 6) ^a
7. Reliability (OP 7) ^a
8. Productivity (OP 8) ^a

Appendix A.7. Economic Performance (EP)

In the last two years, we were able to achieve good environmental targets in terms of:

1. Sales growth (EP 1)
2. Profits margins (EP 2)
3. Market share (EP 3)
4. ROI (EP 4)
5. Cost savings (EP 5) ^a

^a Excluded from the analysis.

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