Outsourcing of New Product Development Activities: The Case of an Automaker

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Abstract--**In the context of global competition, companies are searching for strategies to stand out and gain competitive advantage. One of these strategies is the outsourcing of activities. Researches over the years have addressed the process of production outsourcing, but the outsourcing of New Product Development (NPD) activities is a relatively new phenomenon. This paper aims at analyzing this phenomenon in the Brazilian Volkswagen subsidiary in order to know the reasons why the company performs the outsourcing of activities regarding new product development. It also addresses the factors that affect the decisions of outsourcing. The analyses were conducted in the light of the Resource-based view and Transaction Costs. The results reveal two ways of outsourcing: engineering services and product development. The former occurs when the automaker is in charge of the equipment, risk and rework. The latter occurs when a set of tasks is subcontracted. Thus, the supplier is in charge of the equipment, financial and rework risks. The reasons for subcontracting are the lack of an important resource that the company does not have to complete the development internally and the lack of capability to perform certain activities, reduce costs and limit headcount.**

I. INTRODUCTION

Due to the steep competition, several companies have already started to present difficulties in developing and maintaining competencies and capabilities to compete effectively. This need has led many companies to get involved with several types of sourcing strategies, i.e. outsourcing, offshoring, offshore outsourcing, nearshore and onshoring [12]. According to the authors, outsourcing is the process of hiring a supplier of outsourced services to manage and execute a certain workload during a given period of time, cost and service level.

Outsourcing is a choice that resides in corporate policy as it modifies the limits of the company, such as a legal entity, and involves the decision-makers from the top management. According to [2], outsourcing is a short term for "outside resource using".

Business processes, such as information technology, payroll, logistics and human resources, were the activities that have most frequently undergone outsourcing. The subcontracting of essential tasks, such as engineering, research and development (R&D) and marketing were not performed. However, [14] states that strategic outsourcing of innovation is a necessary action to gather knowledge and manage the uncertainties of a fast-changing world. Subsequent activities in the NPD process, such as business processes or product launching, can also undergo outsourcing.

Outsourcing of new product development (NPD) activities refers to the externalization of development activities of new products (goods and/or services), in which all innovation of the NPD process, or part of it, is externally acquired according to an agreement between the organizational units of the company that executes the outsourcing [17]. This definition implies that the activity must be innovative for the NPD process. It is necessary for the activity to have been previously performed internally, and also bought through an agreement between the organizations.

NPD is an intensive activity of knowledge which requires ability to deal with uncertainties. It is also very dependent on the individuals involved in the process.

The decision regarding which operation must be executed internally and which must be executed by the suppliers is crucial for the companies' competitiveness [19]. According to [11] two major lines were developed to solve this question: Transaction Cost Theory (TCT) and the Resource-based View Theory (RBV).

The perspective of the strategic choice developed by the RBV theory and Transaction Costs is based on the assumption that the actors are economically rational and work hard to maximize financial performance, reassuring their position in the market in relation to the competitors. Both theories foresee that the choice depends on the increase in the efficiency or strength of the core competencies of new product development. The company may increase the NPD efficiency, making the outsourcing of activities unimportant and strengthening the core competencies, concentrating on core tasks [22].

This paper aims at understanding the reasons why a Brazilian automotive subsidiary outsources activities regarding New Product Development and the factors that affect the decisions of outsourcing. The analysis was conducted in the light of the Resource-based View and Transaction Costs.

This paper is composed of three sections followed by this introduction. In the next section, we discuss the outsourcing of New Product Development activities. In the third section, we introduce some methodological notes, and in the fourth section the main results are discussed. Finally, the conclusions are presented.

II. THEORETICAL REVIEW

A. Outsourcing of NPD Activities

Several studies have already approached and detailed the process of production outsourcing [9], [10], [8], [16]. However, the outsourcing of activities regarding New Product Development (NPD) is a relatively new phenomenon [22], [18]. Thus, its impact on the NPD process of a company is still little understood.

According to [17, p. 427], the outsourcing of NPD is defined as the development of new products (goods or services), in which all – or a part of – the innovating process of NPD is bought abroad according to an agreement between the individual units of the company that executes the outsourcing.

This definition implies that the activity must be innovative for the NPD process. The activity must have initially been conducted internally, and also bought via an agreement between the organizations.

[6] exposed an initial reflection on the outsourcing of activities regarding the development of products introduced by black-box parts, in which one supplier executes construction activities based on specifications supplied by an automaker. This reduces the total development time of a project and the necessary engineering resources to develop the product.

It is almost impossible for any company to have all necessary knowledge and technological capacity to develop a complex product. This means that the organization has to focus on its core competencies and extract the best knowledge available from other companies in order to have access to specialties out of its core competence. The company faces the "make or buy" decision: they need to develop the competence in-house or buy it in the market [17].

The outsourcing of NPD is considered to be one of the several types of organization to access external sources of technology or knowledge [17]. Some activities in the NPD process, or the totality of the process, can be carried out by an external entity [18].

According to [1], the companies need to expand or improve their efforts of NPD through the outsourcing of NPD activities. They state that the decision-making process is divided into three stages: a) performing the outsourcing or developing a capacity in-house (make or buy); b) defining which NPD activities should be outsourced; and c) defining which company will be the outsourcing partner in the NPD process.

Another research branch of NPD is the suppliers' involvement. The company should supply the specification to other companies and allow them to develop the tasks that meet the requirements of the NPD program. The distinction between in-house development and outsourcing lies in identifying who is responsible for each task [19].

We can find several advantages associated with the outsourcing of NPD activities. Firstly, the company concentrates its resources and "best-in-world" capacities [13, p. 11] on some essential tasks to supply a single and superior value to the customers [13]. Secondly, the company protects and strengthens its core competencies and competitive advantage in the market. The continuous development of base technologies helps the company to be updated, and it is a barrier for competitors [15].

Thirdly, outsourcing allows the company to have access to resources and capacities which are not available or are not easily developed internally.

The fourth aspect is that the outsourcing of NPD activities creates windows of opportunities [13], [15]. Traditionally, many NPD programs are abandoned or fail, and market opportunities are lost. By using external resources and capacities, the company may fully introduce NPD strategies and reinforce its competitive position. Oftentimes, the R&D department does not have a strategic focus because it is worried about operational activities. Through outsourcing, the R&D department may distant itself from routine administration and move towards a more strategic role.

[4] identified the need to evaluate the strategic position of the company, find the balance between control and flexibility, and make a plan to integrate knowledge. However, the model is sequential and does not identify important factors to make decisions.

[5] argue about executing outsourcing or internalizing activities of innovation, in addition to the performance implications of this decision. The theoretical support of the research was built on transaction costs and arguments based on resources (RBV). Both theoretical bases showed substantial correlation.

[2] initially used a generic model of outsourcing, as shown in Figure 1, which consists of four elements: outsourcing subject, outsourcing object, outsourcing partner and outsourcing project.

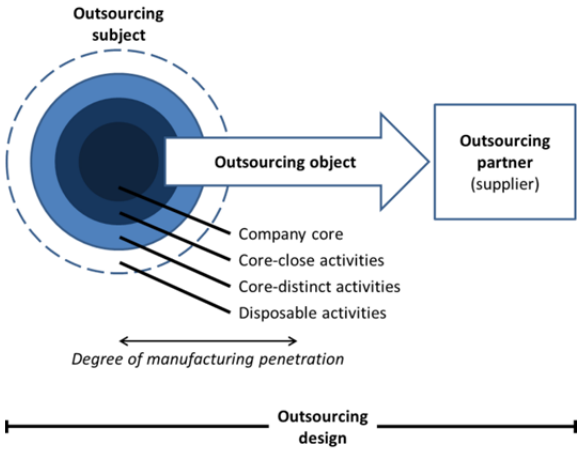

Figure 1: Outsourcing Model
Source: [2, p. 24]

The outsourcing subject is the economic institution (company) in which outsourcing is planned to be executed. Outsourcing objects are processes or results of processes that may undergo outsourcing. Regarding a company's activities, we must know the difference from (1) the company's core (all activities which are necessarily connected to its existence, such as corporate planning, pricing, R&D); (2) activities close to the core (directly related to core activities, such as supply chain); (3) support activities (e.g. technical support and payment department); and (4) disposable activities (activities with unrestricted availability, such as safety and cleaning and janitorial services,). From an industrial point of view, the outsourcing object is intimately connected to the

OPERATIONAL RISK				
	HIGH	Outsource to service provider located nearby (nearshore) LITIGATION SUPPORT	Set up captive center nearby or onshore R&D, DESIGN	Execute process in-house and onshore PRICING, CORPORATE PLANNING
	MODERATE	Offshore and outsource to service provider over time INSURANCE CLAIMS PROCESSING, CUSTOMER SUPPORT	Use extended organization offshore, but monitor closely in real time SUPPLY CHAIN COORDINATION, BIOINFORMATICS	Set up captive center offshore EQUITY RESEARCH
	LOW	Offshore and outsource to service provider DATA ENTRY, TRANSACTION PROCESSING	Use extended organization offshore TELECOLLECTION, TECHNICAL SUPPORT	Use extended organization offshore, but conduct frequent process audits CUSTOMER DATA ANALYSIS, MARKET RESEARCH ANALYSIS

Figure 2: Optimal offshoring responses to different levels of risk
Source: [3, p. 141]

manufacturing degree of penetration. All outsourcing partners are possible suppliers of activities considered for this process. This supplier may also be an internal supplier, i.e. an independent business unit within a group of companies [2].

[3] suggest that companies make their outsourcing decisions in relation to the evaluation of the structural and operational risks. They recommend the internalization for activities which present high structural and operational risks (e.g. corporate planning). For activities which present moderate structural and operational risks (e.g. supply chain management), the authors suggest real-time monitoring of the outsourcing activities. Activities with low structural and operational risks (e.g. processing of transactions) are adequate for outsourcing without the need of strict controls. Figure 2 gives us a full spectrum of the organizational and local forms for several activities, with the adequate example for each combination of structural and operational risks (each of them being low, moderate or high).

III. METHODOLOGY

The case study is an empirical study which investigates a specific phenomenon, usually contemporary, within a real life context, when the boundaries between the phenomenon and the context in which it is inserted are not clearly defined, and also when the relevant behaviors cannot be manipulated [21]. The main objective of the case study is to try to clarify the reason why a decision or set of decisions were made, how they were introduced, and which results they obtained [21]. Among the main benefits for performing this type of study is the possibility of developing a new theory and increasing the understanding of real and contemporary events [20].

Through the characteristics, questions and literature limitations initially presented in this study (Figure 3) we can state that this research is qualitative through a study of a single case. The choice of only one case is justified due to the larger opportunity of a deeper observation [20].

[7] states that the case study is based on the continuous comparison of data and theory, starting with data collection. The data were obtained through semi-structured face-to-face interviews. The questionnaire was built from a set of constructs and variables based on the theoretical background (Figure 4).

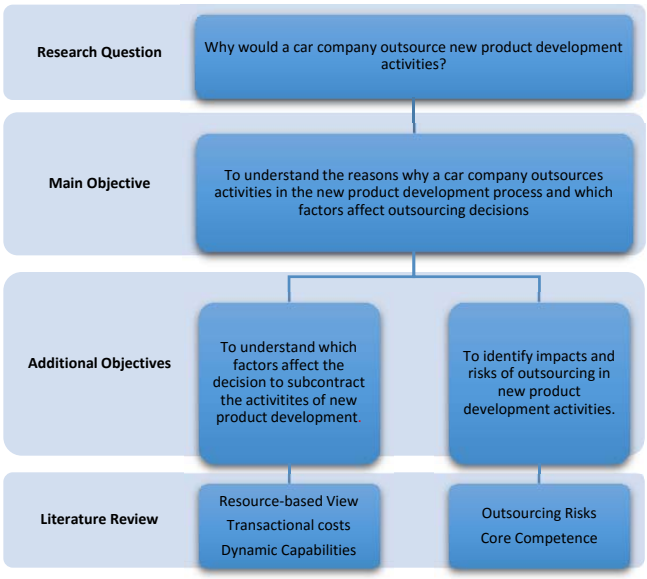

Figure 3: Chain between the objectives and the literature

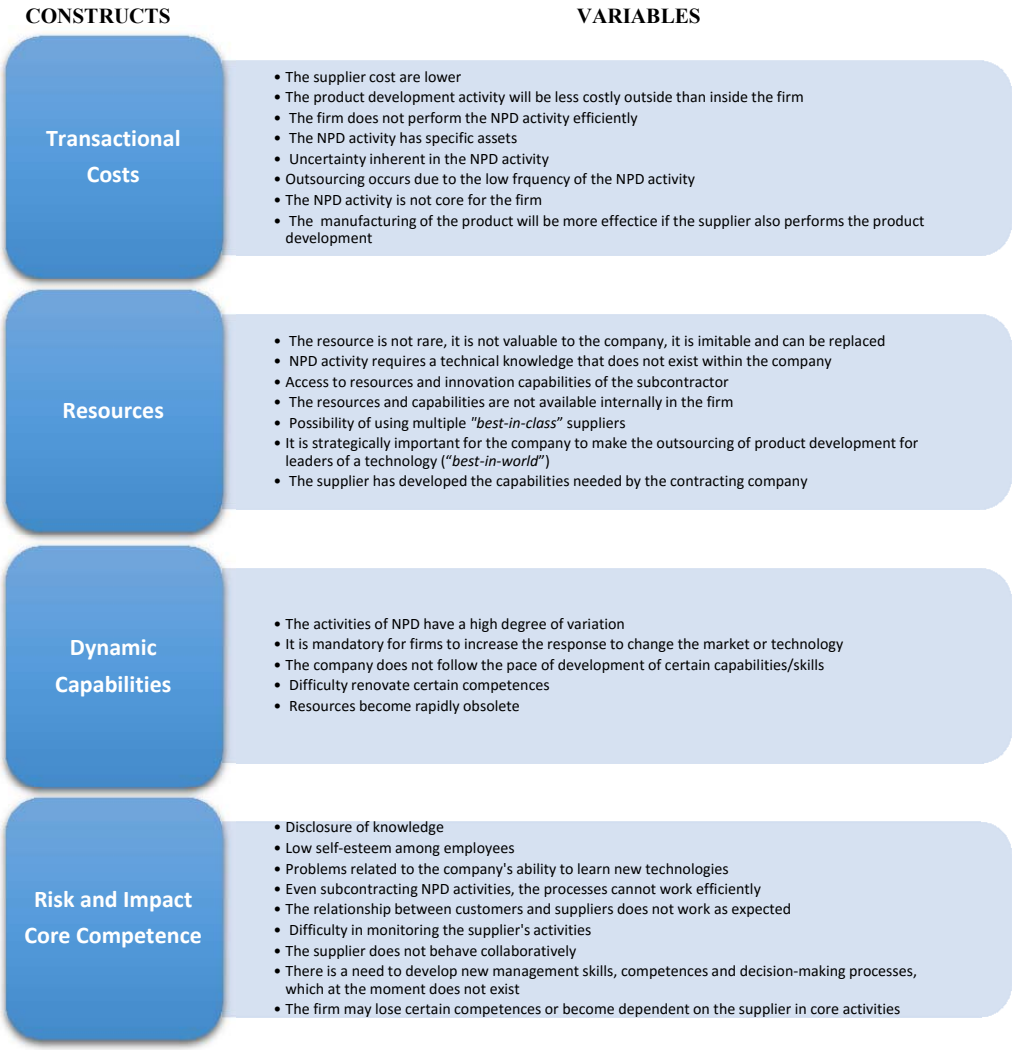

Figure 4 – Constructs and variables

The respondents were managers, executive managers and directors. Twenty respondents were invited, among directors, executive managers and managers, nine of whom were willing to participate in the face-to-face interviews from July to October 2014, as shown in Figure 5.

Role	Department
Director	Design and Package
Executive Manager	Product Development Powertrain
Manager	Interior and Air Conditioning Development
Manager	Powertrain Application
Manager	Prototypes Engineering
Manager	Product Cost Optimization
Manager	Vehicle Safety
Manager	Powertrain Concepts
Manager	Complete Vehicle Evaluation

Figure 5 – Interviewees

IV. RESULTS

A. History of NPD at the Brazilian Subsidiary of Volkswagen

In 1988, the Brazilian Volkswagen subsidiary joined up with Ford and created the joint-venture Autolatine in Brazil and Argentina. During this period, the Engineering department of the Brazilian Volkswagen subsidiary underwent some changes, such as a decrease in local activities of product engineering, only maintaining activities of manufacturing engineering. This strategy was coherent with the project Ford 2000, which aimed at constructing a standard global vehicle, decreasing the need for local engineering.

This joint venture brought another consequence for the engineering activities of the Brazilian Volkswagen subsidiary – the headquarters distanced itself from local engineering, as it was an exclusive agreement for the operations in Brazil and Argentina.

The *Konzern* (Global directive council of the Volkswagen group, based in Wolfsburg, Germany) gave the Brazilian Volkswagen subsidiary total autonomy to develop its products locally, including the use of Ford platforms. On the other hand, the Brazilian engineering was not able to obtain information from several areas of Volkswagen AG and Ford due to the local alliance. During the seven years of Autolatina, communication with the headquarters was seriously hampered, and the Brazilian Volkswagen subsidiary did not follow the headquarters' technological development. In order to better understand this situation, it is important to highlight that eight years mean two generations of products for specific components.

Autolatina was dissolved in 1997. Right after this period, some researches detected a decrease in engineering activities at the Brazilian automaker. The strategy of reducing local engineering, centralizing development activities in Wolfsburg, seemed surprising on account of happening in a company which had stood out for its local engineering force until then. Besides, a competitor followed the opposite direction at the same period – it chose the growth of its Brazilian engineering. Also at this same time, another competitor was structuring its local engineering around the project of a national car, a derivative of a vehicle produced in Europe.

However, in the early 2000s, the Brazilian Volkswagen subsidiary resumed its engineering activities, actively participating in the development of the models Polo and Polo Sedan, internally called projects PQ-240 and PQ-241 (*Plattform Querbaukasten*), respectively.

In 2003, the Brazilian Volkswagen subsidiary developed another model: PQ-249. It was a family of compact vehicles, and the Brazilian Volkswagen subsidiary had nearly complete autonomy for the project of this model. Over the last years, the Brazilian Volkswagen subsidiary has also developed all the platform for Gol Generation 5 (2007) locally, maintaining great autonomy over the work.

Nowadays, there is a large interaction with the development of products in Germany. In 2011, the Brazilian Volkswagen subsidiary started to introduce the first global platform in Brazil since Polo: the PQ-12 platform, basis of the "Up!" vehicle, released in 2013. In this project, people from different areas (Product Engineering, Planning, Quality and Production) were physically located at the headquarters in Wolfsburg and at the production place of Volkswagen Mladá Boleslav (Czech Republic) in order to use all the experience during the development and introduction of the vehicle.

This interaction, despite being important for the technological and strategic alignment of products of the Volkswagen group, reduced the autonomy of product development of the Brazilian Volkswagen subsidiary. This happened due to the use of global platforms, a strategy which benefits the group to the detriment of local specificities or brands of the conglomerate.

The next step regarding global platforms in the VW group is the MQB platform. This is the company's strategy to share modular construction of its vehicles with transverse front engines and motorized front wheels. Since 2012, the Volkswagen group has published the strategy under the codename "MQB", which means *Modularer Querbaukasten*, German for "Transverse modular construction kit".

However, this concept is not exactly a platform, but a system that introduces a rationality of different vehicles which share the same "powertrains", regardless of the model, vehicle size or group brand. This way, the MQB concept uses a component core "matrix" through a wide range of platforms, such as the sharing of a common core for engine assembly for all transmissions (e.g. gasoline, diesel, natural gas, hybrids and purely electric).

B. The NPD of the Brazilian Volkswagen Subsidiary

In order to manage the product, the Volkswagen group divides the vehicle into four parts: engine, transmission, platform and body. The aim is to make the engine, transmission and platform be standardized for all brands and models, obtaining economies of scale in development and product as the engines and transmissions tend to be produced

at few plants, which in turn supply them to the assembly plants.

Regarding development, the economies of scale are obtained because the project is performed in Germany, and only local adaptations are allowed. The justification is that platform projects are very expensive and only viable at a high volume.

There is a geographical division between the several Volkswagen subsidiaries and their responsibilities in terms of product development and production. The Brazilian branch is responsible for producing and developing automobiles for South America, Asia, and producing small vehicles and engines (e.g. engines running on ethanol, engines with a cylinder capacity of 1000 cm^3, or flex fuel). Besides, this branch oftentimes supplies to European markets.

Mexico is responsible for the markets of the United States and Canada through production, in addition to some adaptations and tests. Product development is not present there. The products destined to the U.S. and Canada are developed in Germany.

As China is a joint venture, it has few development activities – it transfers some technology due to agreements with the local government, but Volkswagen is not interested in installing many engineering activities in that country.

Finally, Germany is responsible for meeting the needs of the European market, and also for top-of-the-range products for the North American market.

At the Brazilian Volkswagen subsidiary, two departments are directly involved with product development. The first one is the Product Planning department, which is responsible for pre-projects, development of concepts and follow-up to the development of new products, mainly at the initial stages of the development process (concept and planning). The second department is Product Engineering, which is responsible for product development. Figure 6 illustrates this structure, and the departments in green had at least one respondent for this research.

In 2015, the Engineering of the Brazilian Volkswagen subsidiary consisted of 850 professionals. It has also subcontracted staff, most of whom are the company's former employees that carry out the detailing of the projects (drawings) of product engineering through their engineering companies. These are the first indications of outsourcing.

Both Product Management and Product Engineering are subject to the president of the Brazilian Volkswagen subsidiary. In 2014, the director of Product Planning was Brazilian and the vice-president of Product Engineering was German.

The laboratories with higher investment or more advanced technology are generally centralized in Germany, such as the wind tunnel. We can find two justifications for this situation: setting up expensive laboratories is only viable under a great volume of use, and the volumes produced locally would not justify an exclusive laboratory. From the headquarters' point of view, it is interesting to maintain the laboratories and the projects, which are used under their control. Yet, the Brazilian branch has laboratories that make it the second largest development center of the group: laboratories of calibration, body rigidity, materials, pollutant emission, engines and crash test. Brazil also has a Style Center.

The development process of the Brazilian Volkswagen subsidiary is divided into five steps:

a) Development of the concept, with the involvement of Product Planning (which leads this step), in addition to the local board and Marketing. At this stage, they develop the product's initial concept, the target market and its basic settings. It is important to note that a product rarely starts "from scratch", i.e. even if a platform is developed, it is always based on a previous platform, sharing parts with other platforms; and it also happens with derivatives. After the internal definition, the concept is presented and approved at the headquarters;
b) Concept validity, in which the concept proposed at the previous stage is evaluated via pre-calculations of costs, investment estimates and required time. The area of Product Planning still leads this stage, and other participants are Product Engineering, Manufacturing (including the management of the plant(s) involved in the project), Quality, and the Purchase departments;

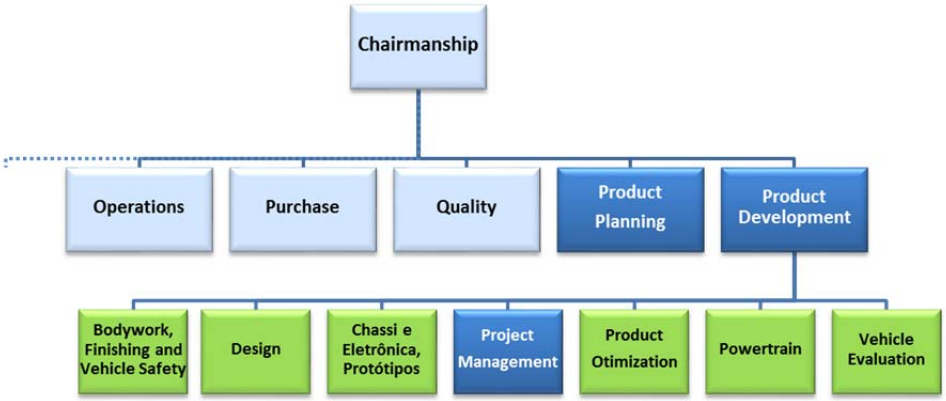

Figure 6 – Structure of Product Planning and Development at the Brazilian Volkswagen Subsidiary

c) Improvement, which effectively occurs in Product Engineering. The participating areas are the same ones from the previous stage, under the leadership of Product Engineering;
d) Implementation of production, under the leadership of "Project House" (PMO), a Project Management department, in which the project managers directly report to the vice-president of Operations. It is important to highlight that all areas previously mentioned participate in this stage;
e) And introduction of the product into the market, led by the Marketing department.

The responsibility of the decision of outsourcing or not was raised through the interviews based on the understanding of the stages of the product development process at the company.

This script was divided into three blocks, in which Block I aimed at understanding the factors which affect the decision of outsourcing NPD activities, and Block II sought to identify the impacts and risks that the outsourcing may have over the result of the development of a new product. The respondents applied marks from one (1) to five (5) – in which "one" represented an irrelevant factor and "five" a very relevant factor – in relation to their perception of the constructs questioned. Block III has open questions which aimed at analyzing some information regarding the outsourcing of NPD activities of the focal company.

We verified that the managerial level is enough to make decisions in some cases; however, this decision usually reaches the vice-presidency of the Development area. Thus, the process becomes bureaucratic, leading to slowness which may cause delays and impacts on the projects.

The results from Blocks I and II of the questionnaire were gathered in Table 1 regarding the factors which lead to the decision to outsource NPD activities, as well as their risks. We obtained the weighted average related to the interviewees' answers.

TABLE 1 – COMPILATION OF ANSWERS FROM BLOCKS I AND II

			RESPONDENTS				
			Respondent 1	Respondent 2	Respondent 3	Respondent "n"	AVERAGE
BLOCK I Understanding the reasons why a car company performs outsourcing of activities in the new product development process and what the factors affect outsourcing decisions	Transactional Costs	The supplier cost are lower	1	2	3	4	2,50
		The product development activity will be less costly outside than inside firm	1	2	3	4	2,50
		The firm does not perform NPD activity efficiently	1	2	3	4	2,50
		The NPD activity has specific assets	1	2	3	4	2,50
		The NPD activity is uncertain	1	2	3	4	2,50
		Outsourcing occurs due to the low frquency of the NPD activity	1	2	3	4	2,50
		The NPD activity is not core for the firm	1	2	3	4	2,50
		The manufacture of the product will be more effectice if the supplier also perform the product development	1	2	3	4	2,50
	Resources	The resource is not rare, it is not valuable to the company , it is imitable and can be replaced	1	2	3	4	2,50
		NPD activity requires a technical knowledge that does not exist within the company	1	2	3	4	2,50
		Access to resources and innovation capabilities of subcontractor	1	2	3	4	2,50
		The resources and capabilities are not available internally in the firm	1	2	3	4	2,50
		Possibility of using multiple suppiers "best-in-class"	1	2	3	4	2,50
		It is strategicaly important to the company to make the outsourcing of product development for leaders of a technology ("best-in-world")	1	2	3	4	2,50
		The supplier has developed the capabilities needed by the contracting company	1	2	3	4	2,50
	Capacidades Dinâmicas	The activities of NPD have a high degree of variation	1	2	3	4	2,50
		It is mandatory for firms to increase the response to changing market or technology	1	2	3	4	2,50
		AThe company does not follow the pace of development of certain capabilities/skills	1	2	3	4	2,50
		Difficulty of renovation of certain competences	1	2	3	4	2,50
		Resources become rapidly obsolete	1	2	3	4	2,50

The first question of the questionnaire was if the department outsources NPD activities, and all of the respondents answered that this practice is present at the focal company. NPD activities have been outsourced since the early 1980s at the Brazilian Volkswagen subsidiary. According to the interviewees, this practice started due to the following factors: a) a lack of capacity to perform specific activities; b) a lack of resources at the company to conclude development; c) cost reduction; and d) head count limitation (workforce).

Outsourcing may happen in two ways: a) services or b) contract.

The "services" type happens when engineering workforce is bought. The scope is defined through contract documents, internally called *Lastenheft*, with a simple description, such as skill profile and academic background. The automaker owns the hardware, as well as the financial risk of non-fulfilling the objectives and the rework.

The "contract" type consists of "buying an outcome/objective" to develop one or more parts, a group of sub-groups, or even a whole vehicle model.

The most recurrent type is "services" for smaller projects, and administrative activities such as project and financial control. The "contract" type is frequently used for larger projects, or those with a tight deadline, once the risks fall on the subcontractor.

The most common example of provision of services is hiring engineers from specialized companies, called Human Resources (HR) companies. These companies, such as MSXi, Engbras and Racing, seek the profile of the professionals desired by the company in the market, and assign these professionals to the designated activities via contracts. The payment is based on the worked hours, i.e. the Brazilian Volkswagen subsidiary is completely responsible for the risks of the execution duration and rework. These professionals do not work on a specific project – the managers assign the activities according to their needs.

An advantage of this type of subcontracting is the flexibility according to the seasonality of the projects. It is possible to reduce the number of workers rapidly without the cost of expenses. However, one disadvantage is disclosure of knowledge. Once this professional does not have an employment relationship with the Brazilian Volkswagen subsidiary, he or she can leave the company at any time and go to other companies, including competitors. This allows knowledge and possible secrets inherent to the development process or technologies of the Brazilian Volkswagen subsidiary to be used by these companies.

Regarding the project, the most common example is when the Brazilian Volkswagen subsidiary hires an engineering company (e.g. Volke, EDAG – Engineering + Design AG –, Rücker and Engbras) to develop a set, such as electronic injection, electric wiring, or even a whole vehicle. This type of hiring has already been used in all projects so far, such as Polo and Polo Sedan (VW240 and VW241), Fox (VW249 and VW219) and all the Gol family (VW23X).

The advantage is that the service is paid as part of a package and any rework due to the non-fulfillment of the quality and delivery objectives are completely the subcontractor's responsibility. The disadvantage is still disclosure of knowledge, as all resources applied in this development are the supplier's. Even if the Brazilian Volkswagen subsidiary makes the control of the activities, the service provider has the specific knowledge of the activity.

In both cases, the Brazilian Volkswagen subsidiary jeopardizes its competitive advantage because it is at the mercy of the suppliers and their teams, which have the knowledge of the company's NPD activity.

It is important to highlight that one of the greatest drivers of outsourcing is the budgetary restriction of the projects. Even when the company has a certain competence, it is outsourced. Delivery and investment objectives are each time shorter with every new development. As the internal workforce is more expensive than the suppliers' workforce, the managers have no option but to outsource certain activities.

Another relevant point is the centralization of the development of some activities or sets by the headquarters in Germany. In this case, the headquarters assign multifunctional teams to inspect these activities, which are usually new technologies, such as hot forming and new electronic architectures. Besides, vehicular tests are mostly carried out in Germany, thus being more expensive for the project. This way, a cost paradigm is created – from the moment this team is dedicated in another country and most of the tests are performed there, the costs to develop new vehicles automatically become higher.

The company seeks an outsourcing strategy mainly when an activity needs some technological knowledge or resource (competence) which the company does not have at the moment. It is illogical for the company to specifically develop a resource if it will only be applied for some activities, or if the frequency of use will be low.

It is important to highlight that the activity will be less expensive if a service provider outperforms it. This happens due to the constant reduction of development budgets that the company has been undergoing through new programs. Thus, the cost per hour of the suppliers in relation to the cost per hour of the internal development of the Brazilian Volkswagen subsidiary is inferior, and we can also highlight the flexibility that the suppliers give to the development.

The main risks identified were the lack of critical skills or the excessive dependence on an external organization to perform important business functions and the mobility of capital (disclosure of knowledge). Although both risks apparently deal with the same condition, both of them have different senses. The loss of critical skills is strictly related to the core competencies.

The disclosure of knowledge encompasses a wider range of resources: core competencies, competitive advantage or competitiveness, i.e. not only the criticisms.

Several interviewees mentioned problems related to the company's capacity of learning new technologies as being an important risk related to outsourcing. This happens because the company is not able to inspect the development or evolution of specific technologies as it does not have skilled staff in these cases. The suppliers of NPD activities are usually large engineering companies, which facilitate the communication and negotiation of deadlines and results, leading to the low relevance of this factor as an outsourcing risk/impact.

In most cases, the supervisor is responsible for subcontract management. Depending on the importance or size of the project, the manager takes on this responsibility.

Regarding the tendency to increase the outsourcing of NPD activities, it was verified that the departments with more innovative development activities tend to outsource less activities. The other departments tend to outsource more, mainly in relation to the activities regarding the design of components.

V. FINAL REMARKS

[18] and [11] state that few scientific researches have explored the theme of outsourcing and product development activities. Despite little literature on the theme, it was possible to detect that the practice of outsourcing NPD activities has been carried out at the Brazilian Volkswagen subsidiary for years, dating from the early 1980s.

The main objective of this paper was to understand the reasons why an automaker outsources activities in the development process of new products, and specifically the factors and risks that affect the decisions of outsourcing.

Firstly, the Brazilian Volkswagen subsidiary does not have a clear and structured process to evaluate and determine which activities and resources are essential. This determination is conducted by the headquarters in Wolfsburg, and the branch only applies these guidelines. Despite this finding, the interviewees mentioned that experience is also a factor when they decide which activity should be outsourced. Even with the headquarters defining which resources are essential, Product Development of the Brazilian Volkswagen subsidiary uses its experience, as previously stated, to define these criteria. This happens because its reality is quite different from Germany, considering the local specificities, which the headquarters do not have.

The factors related to resources are the most crucial at the moment of deciding to outsource an NPD activity. The dynamic capabilities and transactional costs were less influential on decisions of this strategy, although the specificity of the resource was the most important factor for outsourcing.

The option for outsourcing is related to the lack of a specific resource or lack of capacity (skilled staff) to perform the activity. To this end, the specificity of the assets presented an opposite trend to the theory and models used, such as the ones by [2]. These authors state that the higher the specificity of an asset, the higher the tendency to verticalize it. This divergence occurs due to the cost of developing them internally.

The main risks of outsourcing activities are disclosure of knowledge and loss of critical skills, and consequently the supplier's dependence. Besides, another impact raised is related to the company's capacity to learn new technologies.

The question of confidentiality of information becomes relevant in the context of subcontracting, as the risk of the company increases on account of information sharing. Therefore, all agreements signed among the Brazilian Volkswagen subsidiary and the suppliers have a specific clause on this subject, in which the contracted company must not disclose information exchanged with the automaker.

It is possible to affirm that outsourcing tends to increase. As most – if not all – future projects will follow the global platform patterns, such as the MQB platform, the development team will need to increase the number of workers located at the headquarters in Wolfsburg, Germany, in the next few years in order to follow new projects. Hence, the team located in Brazil tends to be reduced, making most of the "tropicalization" projects be bought from the suppliers, only keeping coordination and management of activities in-house. Only activities or very critical competencies (such as the ones from the areas of prototypes and vehicular tests) should continue with internal development.

Despite the impossibility to generalize results due to the method of research used, this research shows that this subject is extremely relevant to the present context of companies, in which competitiveness is ever increasing mainly on account of the globalization of the markets.

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