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# The Impact of Group Learning and Innovation Management in Automotive Companies

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## Abstract

The relevance of workgroups resides in the fact that they play an essential role in individual behaviour and cognition through which organisational learning occurs. Thus, this paper aims to identify and describe the formation process of Cross-Functional groups and their relationship with learning. Due to its focus, this research was developed with a qualitative perspective, descriptive, interpretive, and exploratory in nature. Regarding the subject of study, this research was carried out in two automotive companies and therefore can be classified as a multicase study. The results showed there is great concern about the member selection process for the Cross-Functional group. It can be inferred that this process is a way to ensure learning occurrence at the group level. When the group leader defines selection criteria such as work experience, formal education, and predisposition to learn, he is, even if unconsciously, preparing the group for learning.

**Keywords**: Workgroup; Automotive companies; Group learning.

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## 1. Introduction

Group level attracts particular attention from researchers and managers by representing the main link between individual and organisation and being the gateway to organisational learning. Groups are vital for forming learning units, which are crucial to modern companies. According to Osterman (1994), organisations are increasingly using groups to complete tasks and, from an organisational learning perspective, to cause changes.

The relevance of workgroups resides in the fact that they play an essential role in individual behaviour and cognition through which organisational learning occurs. They are shaped by social influence, i.e., by other individuals' attitudes and behaviours (Salancik & Pfeffer, 1978); (Hackman, 1992); (Peltokorpi & Niemi, 2019); (Grèzesa, Bonazzia, & Cimminoa, 2020).

The location of social influence creates the organisational subcultures (Trice & Beyer, 1993) and the predisposition to learn varies across the organisational cultures (Schein, 1985). Most considerations regarding groups in organisations support the idea of interaction, interdependence, a shared past, and the anticipation of a future (McGrath, 1984); (Punstein & Glückler, 2020).

From this viewpoint, Cohen and Bailey (1997) define a group as a gathering of individuals who work interdependently in their tasks, sharing results, considering themselves and being considered by others a single social entity belonging to a larger social system that manages their relationships within the organisational boundaries.

In management literature, papers on group learning have been established and complemented for decades of research. They assess that both the group and organisational learning are originated from a common denominator, which understands that the collectivity (and not only the individual) can learn (Edmondson, Dillon, & Roloff, 2007).

Studies focused on group learning emerged in management literature in the 1990s, increasing in number and variety from 2000 onwards. The term was applied in Senge's book (1990) "The fifth discipline: the art and practice of the learning organisation", which brings a managerial look at the insights obtained mainly from the field of systems dynamics. Even though the systems thinking theories and tools were the main contribution of the book, group learning has been introduced as one of the five disciplines that allow organisations to achieve competitive advantage. Thus, aiming to bring a deeper understanding of the learning that occurs in the organisations, one can assume that the analysis at the group level is essential to obtaining the aspects inherent to the meso-approach in this paper's context.

Regarding this segment of the study, it is essential to mention the most recent reports from the National Association of Motor Vehicle Manufacturers – ANFAVEA. According to its data, in 2023 the total production of motor vehicles (passenger cars, light commercial vehicles, trucks, and buses) reached approximately 2.36 million units, representing a decrease of about 1.9% compared to 2022.

Domestic sales of new vehicles, however, grew by around 9.7%, totaling 2.30 million units licensed in the Brazilian market in 2023. Vehicle exports fell by approximately 16%, with 403.9 thousand units shipped abroad.

In terms of electrified technologies (hybrids and electric vehicles), around 88.8 thousand units were registered in 2023, showing a strong increase compared to the previous year. Projections for 2024 indicate approximately 2.45 million vehicles sold domestically, with production close to 2.47 million units. Data on the exact number of manufacturers, auto parts plants, dealerships, overall market value, and Brazil's updated position in the global ranking were not available in the 2023 publications consulted.

Therefore, given the aspects highlighted in this introduction, the authors consider the proposed research topic to be both academically and practically relevant, offering significant value to scholarly discourse and business applications alike. The research question guiding this study is: How does the formation process of cross-functional groups occur in automotive companies, and what is its relationship with group learning?

Guided by this question and grounded in theories of organizational learning, while acknowledging the need to delineate the scope of this study, the main objective is: to identify and describe the formation process of cross-functional groups and their relationship with learning.

This will be achieved through the following specific objectives: (*i*) to analyze the formation process of cross-functional groups, including its underlying reasons and fundamental characteristics; (*ii*) to investigate intergroup mobility and its role in facilitating information exchange and collective learning; (*iii*) to identify the criteria used for selecting members of cross-functional groups, with emphasis on work experience, formal education, and predisposition to learn.

## 2. Literature review

### 2.1. Building a concept of group learning

When consulting some significant research with a literature review on group learning, it is possible to identify a set of studies elaborated from different theoretical and methodological guidelines that result in findings that are scattered and little systematised (Wilson, Goodman, & Cronin, 2007); (Edmondson, Dillon & Roloff, 2007), (Sessa & London, 2008a), (Sessa & London, 2008b). The assessment of such studies shows that there is little consensus about the definition of group learning itself, as stated in Table 1:

Frame I – Definitions of Group Learning

| Paper | Definition |
|---|---|
| Argote, Gruenfeld and Naquin (1999, p. 354). | "The activities through which individuals acquire, share, and combine knowledge through experience with one another". |
| Edmondson (2002, p. 129). | "A process in which a team takes action, obtains and reflects on feedback, and makes changes to adapt or improve". |
| Sole and Edmondson (2002, p. 18). | "The acquisition and application of knowledge that enables a team to address team tasks and issues for which solutions were not previously obvious". |
| Ellis, Hollenbeck, Ilgen, Porter and West (2003, p. 822). | "A relatively permanent change in the team's collective level of knowledge and skill produced by the shared experience of team members". |

| | |
|---|---|
| Gibson, Vermeulen (2003, p. 203-204). | "The exploration of knowledge through experimentation, the combination of insights through reflective communication, and the explication and specification of what has been learned through codification". |
| London; Polzer and Omoregie (2005, p. 114). | "The extent to which members seek opportunities to develop new skills and knowledge, welcome challenging assignments, are willing to take risks on new ideas, and work on tasks that require considerable skill and knowledge". |
| Wilson, Goodman and Cronin (2007, p. 1043) | "A change in the group's repertoire of potential behaviour". |
| Sessa and London (2008a, p. 555) Sessa and London (2008b, p. 7). | "A deepening and broadening of the group's capabilities in (a) (re)structuring to meet changing conditions, (b) adding and using new skills, knowledge, and behaviours, and (c) becoming an increasingly sophisticated system through feedback and reflection about its own actions and consequences". |

Source: Updated from Wilson, Goodman and Cronin (2007)

Based on the concepts above, the definition of group learning introduced by Wilson, Goodman and Cronin (2007) implicitly refers to the cognitive approach. In this context, group learning is essentially a manifestation of information acquired from the internal and external environment of the group. It occurs when a knowledgeable member shares information with other individuals, allowing the group to obtain answers from the most varied work situations (Grèzesa, Bonazzia, & Cimminoa, 2020). For Sessa and London (2008b), group learning can be defined from three basic approaches: emphasising its adaptive nature, generating new skills and ways to apply what has been learned, and affecting members' behaviour.

The review of the main definitions brings little consensus. While some focus on individual learning that occurs within the groups, others are based on collaborative knowledge at the group level. For Wilson, Goodman and Cronin (2007), some group learning studies are confusing because they cannot distinguish between individual learning at the group level and collective learning.

## 2.2. Group process perspective

Research following this approach tried to study the processes in group learning, assessing how they are affected by management and other contextual factors (for example, team climate, goals, and identity) and how they influence the group performance. In its early stage, these studies sought to identify the group learning process in real or focus groups by applying qualitative and exploratory methods. Lately, however, the research concepts have been formalised from legitimised survey metrics. These field studies attempt to describe learning behaviours that could be identified neither through the logic of learning curves nor through laboratory experiments (Punstein & Glückler, 2020).

In general, researchers working within the social perspective tend to observe group processes rather than focus on improving group performance as evidence that learning has occurred (Grèzesa, Bonazzia, & Cimminoa, 2020). Based on this approach, Edmondson, Dillon and Roloff (2007) have identified five main concepts within group process perspective, which are: (i) team climate and learning behaviour; (ii) team-members learning behaviour; (iii) shared learning goals; (iv) team identification; and (v) effects of context.

From a group processes perspective, research has mainly focused on the effects of the behaviour of the team leader and team climate. A representative example of this type of research is the case study presented by Brooks (1994), which analysed four Cross-Functional groups in a high-tech company. The study identified two types of learning behaviour: those that occurred within internal meetings with group members (for instance: identifying a problem, sharing, and discussing new ideas or information), and those that promoted the acquisition and sharing of information outside the group boundaries. Within the groups, the members' perception of the interpersonal risk created by power differences appeared strongly related to learning behaviour. Another relevant study was conducted by Sarin and McDermott (2003) in Cross-Functional groups to develop new products. The results showed that team leaders have a considerable influence on learning processes. These authors argue that the deeper the involvement of team leaders in the decision-making process, the greater the learning. Such participatory behaviour motivates team members to broaden their views on their work, especially about the variety of information, inputs, and restrictions (typical elements in the decision-making process).

For Sarin and McDermott (2003), a more democratic climate leads to freedom to express ideas and allows for more significant opportunities for the emergence of Cross-Functional knowledge, preventing members from solving problems in a localised and isolated way. However, these authors alert that this type of behaviour can also trigger a state of complacency among group members. Indeed, team leaders tend to create an aversion to conflict situations, prioritising maintaining peace and harmony.

Under such conditions, group members are less likely to challenge themselves, reducing the level of learning. Thus, the advantages of the team leader's participatory behaviour can be neutralised by the climate of aversion to conflict created as a direct consequence of an apparently positive management style (Jeong & Shin, 2019).

### 2.3 Team identification

Team identity provides another antecedent factor of learning behaviour. Studies have investigated members' identification with their team as a moderator of the effects of context and group composition on learning. Gibson and Vermeulen (2003) argue that the strength of a subgroup (the degree to which some team members' peers share specific demographic characteristics) was considered important moderators of contextual factors. With similar goals, Lau and Murnighan (2005) studied the effects of intergroup and subgroup communication in a field study conducted under conditions of demographic diversity. Results indicate that demographic diversity explains the variance in group learning perceptions and their psychological safety, satisfaction, and expected performance. These authors also learned that the communication between subgroups is more efficient in groups considered weak in member diversity and less efficient in groups with substantial diversity.

In a study of Cross-Functional teams in the oil and gas industry, Van der Vegt and Bunderson (2005) examined the relationship between diversity and learning performance under varying levels of collective identification. The authors found that diversity is negatively correlated to learning and team performance in groups with low collective identification, whereas in cases of stronger identification, such correlation was positive. Results also suggested a connection between diversity, learning and team performance.

## 3 Method

Due to its focus, this research was developed with a qualitative perspective, descriptive, interpretive, and exploratory in nature. Although the phenomenon of learning in workgroups is a reality in Brazilian companies, it is a topic that shows little collected and systemised knowledge. Regarding the subject of study, this research can be classified as a multicase study in which, according to Yin (2001), it is not limited to one organisation. This study was conducted in two automotive companies, the first in South Minas Gerais and the second in Greater São Paulo.

In order to protect their names, brands, projects and products, and the people involved in the study, the organisations investigated were labelled Alpha and Beta. Alpha refers to the first organisation whose work is exclusively focused on projects to adapt and nationalise automotive products and production processes. Moreover, Beta to the second one, whose work focuses on innovative product designs, although they also work with some adaptation projects.

Frame II – Main characteristics of the companies investigated

| Characteristics | Company Alfa | Company Beta |
|---|---|---|
| Situated | South Minas Gerais | Greater São Paulo |
| Number of employees | 1,300 | 190 |
| Number of operational Cross-Functional groups | 7 | 12 |
| Cross-Functional groups work focus | Adaptation of process and nationalization of products developed by the client | Adaptation of process and nationalization of products developed by the client, but mainly **technological innovation** |
| Average of members in Cross-Functional groups | 10 | 10 |
| Average age of studied groups (years) | 2 | 7 |
| Number of groups studied | 3 | 3 |
| Number of people investigated | 10 | 9 |

Source: Authors (2013).

As for data collection, according to Godoy (2006, p.133), qualitative research is a multi-method by excellence and must adopt several sources of information. Thus, this research applied two strategies: non-participant observation and interviews. Members of Cross-Functional groups were interviewed in both organisations: three groups in each company, in a total of nineteen interviewees – ten in Company Alpha and nine in Company Beta. All data were revalidated and readjusted in 2022. The non-participant observation happened during the meetings of Cross-Functional groups. During those meetings, observation focused on the general context of the social process, such as the definition of individual and group goals, the justifications for non-compliance with them, the conflicts and discussions between members, the role of the project leader, and their defence and persuasion strategies.

### 3.1. Data analysis by templates

After analysing the interview data from the initial template made of fifteen categories through analytical codes, the next step was to identify response patterns that could add information to categories. This first attempt at data analysis allowed the initial template to reduce the number of categories, leading it to completion. As repetitions occurred, more similarity patterns emerged, making the template less redundant and more robust, as Merriam (1998) suggested.

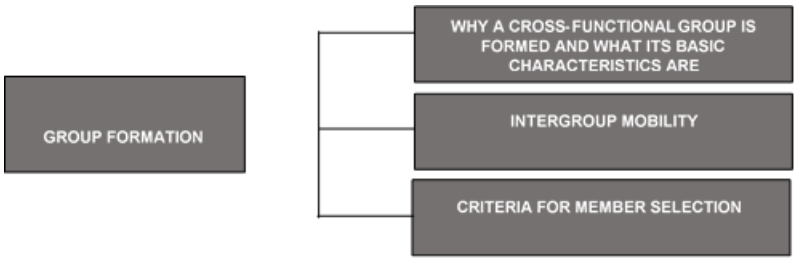


Figure I. Category and subcategory identified from template analysis
Source: Research data

## 4. Results and discussion

### 4.1. Group formation

Three subcategories were identified in this category, exemplifying the formation process of a Cross-Functional group. The first one analysed the reasons that lead to the formation of a Cross-Functional group and its main characteristics. The second one explored intergroup mobility when members are able to form new groups concurrently with the work performed in their original group. Furthermore, the third and last subcategory listed the three criteria identified for member selection: formal education, work experience, and predisposition to learn.

#### 4.1.1. Why a cross-functional group is formed and what its basic characteristics are

The formation of a Cross-Functional group starts when the car manufacturer (client) introduces a new project to their supplier. In turn, they check whether or not to manufacture it. In this negotiation process, many aspects are considered, like the specific requirements for each project, the international rules and conventions, applicable laws in each country that buys the parts that will be used to make a car. Furthermore, there are also the goals for products/ processes, such as costs and investments in human resources and technology (Wang, Li, Gong & Cheng, 2019).

For instance, in Company Alpha, the main objective of a Cross-Functional group is to deliver the final product in compliance with the specifications previously established by the car manufacturer. In such cases, any innovation or creativity applied will merely refer to the

industrial process. Interviewee ALPHA B5 gives more details about group formation in Company Alpha:

> Actually, we don't develop the project itself, but the manufacturing process, right? It's something like this… it's like implementing the project designed by the manufacturer. So, after analysing the whole project, the team leader, chosen by the process manager or the company director, is responsible for putting the workgroup together […]. Who will be chosen depends on who is linked to the necessary stages of this project. The responsibility is assigned to other employees who will be part of the group. So, like, if they need two production engineers, a designer, two financial analysts, and so on […].

In Company Beta, for instance, any prior negotiation to establish group formation strategies must have extensive legal support, technical documents, well-planned budgets, contractual signature registered in a notary's office or international arbitration chambers. Moreover, the new patent registration with the INPI (Brazilian National Institute of Industrial Property) as most projects developed by this organisation are breakthroughs. Interviewee BETA B17 explains:

> Here's the deal. Groups are formed based on the requirements for project development. I mean, the client requires a quotation in the market, analyses the company they want to work with, and when they choose Company Beta, then we are appointed here to form a Cross-Functional group […].

Souza (2006, p. 32) helps us understand the formalities existing in the triple relationship "client-supplier-group". According to this author, the legal requirements are those defined by organisations recognised by the automotive, social, and legal fields, such as CONTRAN – Brazilian National Traffic Council, the Federal Motor Vehicle Safety Standards and Regulations (FMVSS) and the Economic Commission for Europe of the United Nations (ECE). The author also states that the development must comply with regulations defined for the product groups related to legal standards even if they are not expressed in the client's requirements. Thus, development team members must possess a certain level of expertise, access to updated standards or assistance from external experts to list, interpret, and ensure that all legal requirements are met by the product project (Souza, 2006).

Moreover, the end market for the products must also be recognised and understood, as some region-specific requirements can completely or significantly alter the scope of a project, requiring team members to be constantly updated on laws and regulations and constituting a factor of continuous learning (Grèzesa, Bonazzia & Cimminoa, 2020).

This requirement emphasises the relevance of certain primary conditions, including organisational goals, the specific requirements for production and sale of each type of auto part, domestic and end-market laws and regulations, the groups' internal goals, products or processes, and the investments in human resources and technology (Jeong & Shin, 2019).

Company Beta systematically employs Cross-Functional groups as a strategic component of the organisational work method. Their use is not sporadically dependent on the emergence of projects but something built into the company's operational framework. When joining the company, or even before that, the employee is aware that he will work as a member of one or more Cross-Functional groups.

Aspects such as members rotation observed in Company Beta can severely affect group formation and teamwork dynamics. It occurs due to a misallocated member who was designated

to perform a task for which he was not qualified, resulting in their dismissal or layoffs promoted by the organisation. In both cases, the dismissed member will be replaced by someone from other groups or even from outside the organisation.

Unlike Company Alpha, work in Company Beta is guided by the ability to anticipate the main market trends in the automotive sector, even before customers notice or request them. An interviewee explains this characteristic in the process of his group formation:

> Groups are formed like this… We have some teams for development, adaptation, innovation, etc. So, it's really about a portfolio of similar products rather than a project or an isolated product […]. Then, another client requests a new project, something new in the market, but they provide the design […].

### 4.2. Intergroup mobility

Members from both Alpha and Beta companies do not work endogenously, i.e., focused strictly on the internal group micro process. With few exceptions, in general, there is excellent intergroup interaction, so a member is not exclusive of a specific group, being concomitantly and actively part of several other groups with the same work profile as his original group. Probably a group will never be completely new or made up of inexperienced people. In the group formation process, there will be people from other more developed groups whose function resembles the new project, as reported by ALPHA A2:

> Here, team members always work with other groups. Nobody is exclusive. For example, there's usually someone from the finance department. This person is in two or three projects […].

Both companies allow their members to apply their technical and conceptual skills to perform related tasks in various groups formed within the organisation. This dynamic movement involving group boundaries will be described as Intergroup Mobility, i.e., the ability of a member from a specific group to move and work beyond the limits of his own group, allowing new group formations and, thus, sharing information with other realities. This dynamic movement can be an element of the same strategy for forming and operating a Cross-Functional group, receiving natural support from the organisation provided that it does not fall into the customer's requirement for exclusivity, which will be discussed further in this paper.

In terms of Intergroup Mobility, members are allowed considerable mobility outside the group, enabling their formal or informal entry and exit from any other group that provides tasks related to their own, which leads members to renew their individual work skills through a constant exchange of experiences. It evokes the peripheral learning concept identified by Ancona, Bresman and Kaeufer (2002) and the construct of X-teams. Some excerpts help illustrate that:

> [...] each engineer is responsible for one, two or three specific clients. So, in the end, many groups are formed. Sometimes, a supervisor is a member of my team and of my workmate's team, and vice-versa. It happens […]. (ALFA B6).

This dynamic also favours the information flow from the external environment into the group, considering that the team members are in constant mobility, promoting a more significant interaction with individuals who do not belong to their original group. Intergroup activities may also work as information channels that enable employees to access as much information as possible once employees can compare similar decision-making and receive and provide new content with new knowledge applicable in the most diverse work situations (Punstein & Glückler, 2020).

A good example is an experience acquired by a more developed group that can be applied in a newly formed group in the early stages of their work. It also emphasises the formation process of the Cross-Functional group and its dissolution, which will never fully occur, at least not until the product goes out of line.

Based on the interviews and observations from both companies, the life cycle of a Cross-Functional group begins at the project startup, when members are given their first roles. In this stage, the group might have around 20 individuals but, as goals are met, members connected to middle activities are the first ones to be exempted from the heavy schedule of meetings seen at the beginning of the project.

From the second phase (group development) onwards, the meetings tend to be less frequent, concentrating on members related to the technical parts of the project and problem-solving. Even after completing a project (stagnation), the group remains with a reduced number of members – around ten individuals – in a state of latency, following the product's manufacture. However, members are called to resume work if a new problem arises, and a new group formation might occur. It includes the possibility of new members joining if necessary due to project adjustments or the emergence of something unexpected and other operational contingencies.

Thus, the third stage is group stagnation, when a few group members follow the manufacturing process that is relatively stabilised (Peltokorpi & Niemi, 2019). The group will meet again whenever a new problem arises, but now with new resources, such as more significant accumulated learning.

The formation process of a Cross-Functional group ends when all group members have been selected and appointed their several roles. After the formation stage, it is time to consolidate the aspects that will enable the group's smooth operation, mainly those related to creating a collective identity, as described by Dixon (1999).

In Company Alpha, there is a meeting to get the group's work started, when the project manager makes a formal presentation about the client and the project. According to the interviewees' excerpts, there are debates, information about the schedule, the definition of each member's role, identification of possible requirements for training, and some celebration in this kind of meeting.

Raising awareness for the project is a common practice, so the project manager usually promotes small internal contests, for instance: voting for the team's name and slogan, which should relate to the project and client's brand; giving away t-shirts; and so on. According to Dixon (1999), every effort put into this initial stage helps create a feeling of participation and belonging.

The new member now is identified as belonging to a Cross-Functional group and not as an ordinary employee in the organisation, as can be attested by interviewee ALPHA A3:

> Creating a group identity is something I think is also cool. For example, an employee who created a slogan for the group was rewarded once. It was a big project for Renault. Then, an intern was the winner. How cool is that? Everybody participated in the contest, even the production workers, people from the engineering department, managers […]. I think creating an identity is very cool, you know? Then, we made t-shirts, and everyone in the team wore them like a uniform. It is nice, and I believe it makes the team members stand out from the rest of the plant workers, creating an identity […].

### 4.3. Criteria for member selection

Regarding the criteria for member selection to form a Cross-Functional group, three main aspects were identified in both Company Alpha and Company Beta. The first aspect is formal education, i.e., the learning acquired through technical courses in secondary or higher education and internal training offered by the company. All interviewees informed that having one or more formal courses helped them perform their jobs in the company and within the Cross-Functional group.

The second aspect is the experience acquired by working in this and other organisations. Of 19 interviewees, 16 referred to this aspect. The third, and perhaps the most relevant aspect, is the predisposition to learn. Twelve interviewees revealed that the learning acquired formally or through experience is not always enough to ensure the selection of a member to a Cross-Functional group. It is indispensable for the worker to show interest in the tasks performed in a project group. This aspect involves the effort undertaken by the future team leader to analyse, identify and value the positive behavioural characteristics to learning (Raelin, 2018), as stated by worker ALPHA B7:

> Because I already had the know-how and because of how curious I am, that's exactly what the team needs. Using Excel, you need this a lot to understand it and try to learn more about it. So, there's a lot of help, even in the Excel program itself, and if the person is determined, they can do it.

Predisposition to learn has also been identified in excerpts from ALPHA B9, a Cross-Functional group leader at the time. For him, whoever wanted to join his team must be willing, proactive, humble, able to listen to workmates and take on their own mistakes (Sharma & Shekhawat, 2020). Nevertheless, following the criteria adopted by this leader, any negative behaviour traces identified in a candidate represent an obstacle to joining the team, as it may hinder the group learning process. When discussing group formation, team leader ALPHA B9 states that:

> It's always great to have proactive people in the team, so things run incredibly well. They usually have that expression, a cycle, for a given subject. […] determined people are always great and contribute to amazing debates. Humility, knowing how to listen and taking on mistakes […] are not easy to come by. It's hard to find people like that. Experience, it's always worth having experienced people. Why? If you have any doubts, you ask the person who has already experienced it or seen it. All in all, off the top of my head, these would be the basic characteristics […].

Although these three aspects have been identified in both companies, data suggest that Company Alpha's main goal is to guide the formation process of a Cross-Functional group following the team leader's perspective. Two excerpts illustrate this situation:

> Members working in the group usually are more experienced and have an affinity with the product to be developed. Just as a last resort I select less experienced people for the team (ALFA A4).

> [...], first of all, I'm here because of a technical course I've started at Sest/Senat […]. In logistics and inventory control. So, we can say that the course has gotten us this job [...]. [...] So, at first, I was placed at Production Planning and Control (PPC), but because the company required it, I was transferred to tooling. What I do in the tooling department is to control preventive maintenance of moulds, control service orders. Also, I sometimes help out with PPC, stuff related to moulds. […] formal education per se has been important, too, because I've been trained at the courses I've taken… But the most important aspect has been how I approach things. […] for example, right after I joined the team, I did something that nobody had ever done before, things people didn't experience using Excel because they didn't use Excel so much [...]. And I've only had basic training in Excel, but my curiosity made me explore it and use it more. If I wasn't so curious, just the basic training at Excel wouldn't have been enough for me to help my team. That's it. That's what has been influencing it. The other training can also influence it. But especially my determination in getting things done. Because I'm very curious [...] (ALFA B7).

The notes resulting from the observation in both companies prove that the three aspects must be simultaneously embedded in the subject because the lack of any one of them may represent an unwanted profile for a worker to join the group. Furthermore, these three aspects are not an end in themselves, as will be discussed later, because the presence of less experienced members with a lower level of know-how is also a possibility to compose a group.

At Company Beta, the team leader and managers from other sectors involved in the project identify possible members to form a Cross-Functional group. According to the interviews, the main sectors that supply workers for the group formation are purchasing, logistics, accounting, engineering, maintenance, and marketing. Those manager's main task is to assist the team leader to identify and invite/appoint the most qualified workers. Interviewee BETA C19 confirms this assumption:

> As an HR manager, I bring qualified professionals to these groups. If team members require new skills, then the team leader, together with the HR, establish an IDP, and the HR implements it, the leader plans it. So, the first premise is internal recruitment […]. If there are no candidates in the internal recruitment, then we recruit externally. But if there is, the candidate goes through the selection process. In case they do not meet the criteria, even though they are interested, then we recruit externally, but the priority is internal recruitment.

Besides these three aspects that have been identified and discussed previously, there is also the client requirement for exclusive staff in group formation, even if rarely, in order to reduce the possibility of confidential information leaks to the competitor. According to manufacturers, the existence of shared intergroup members can result in the interaction and

sharing of information that could be used by competitors (Shehata, 2020). This situation has been observed in both companies. It is common for factory workers, assistants, analysts and managers to work in multiple groups simultaneously, with no distinction whether the project under development is from client A, B or C. Excerpts by interviewee ALPHA A4 explains this situation:

> The group is always formed based on the manufacturer's guidelines. For example, for some manufacturers like Toyota, group formation is a basic requirement. Because first, they want to know whom they should hold accountable, and second, an exclusive Cross-Functional group prevents some information from leaking to competitors. Here we work with several manufacturers, but in Toyota's case, they require their group members not to be involved in other groups [...]. That's why I'm telling you this. There's a lot of confidential stuff. Sometimes, they have a new project that'll drastically improve their car or become a competitive advantage. Of course, this will get to their competitor sooner or later, but they don't want it to be during the project stage. When the car is out on the street, it's fine, then, right? Before that, not really.

Based on data from Company Alpha, a group member can be recruited when an unexpected problem occurs during a project, without being subjected to the integration process nor being selected to join the team from the beginning. For instance, a member may be selected because of their communication skills. That was the case when a sales analyst started to attend sporadically and the meetings of a Cross-Functional group. He soon became an effective member due to his communicative resourcefulness and acting as a bridge between the client and the group. This member also demonstrated considerable organisational mobility and could promote "connections" between the several sectors involved in the project, even outside the company. This interviewee (ALFA B9) explains how he joined the group he now belongs to:

> Look, when I started [...] I was an intern at the finance department before joining the sales team. But, due to the situation, the structure at the time, I made the process of quotation requested by clients to pass around the company. Because of that, I was also invited to join other Cross-Functional teams, as I have a degree in engineering. That allowed me to have a broader view of the process […] Specifically, in my case, my participation in the Cross-Functional teams was immediate. Whenever there was an issue involving clients, I was called for a meeting. When there was a different issue involving processes and budgets, I was also called. I often participated like that until a sales team was created, and I became the team leader. [...] Today, I coordinate the quotation, so it's ready on time. In sales, I'm still doing this and some other tasks not related to quotation. It's better to serve our clients within the required deadline, and without mistakes, so we can have considerable control of the company's revenue.

## 5. Conclusion

The results show that both companies investigated are greatly concerned with the process of member selection to form a Cross-Functional group. It can be inferred that this process constitutes a way to ensure the occurrence of learning at the group level (Punstein & Glückler, 2020). When the group leader defines selection criteria such as work experience, formal education, and predisposition to learn, he is, even if unconsciously, preparing the group for learning (Raelin, 2018). Furthermore, Souza (2006) argues that the first signs of learning

can be confirmed even before the process of group formation. This knowledge acquisition remains at the organisational level and is due to the legal requirements and understanding of the end market for the manufactured products. Thus, the company is able to anticipate the main market trends, directly improving organisational results (Jeong & Shin, 2019); (Shehata, 2020).

Regarding group formation, signs of learning are evident when group members can move to other groups. Notice that Edmondson (2004) named this phenomenon as cross-boundary teaming, very similar to the peripheral learning concept found in X-teams by Ancona, Bresman and Kaeufer (2002) and to the Intergroup Mobility determined in this study. The reviewed literature shows that Intergroup Mobility slightly deviates from the idea of cross-boundary teaming, at least in the work situation identified in Company Alpha. Such behaviour should include the communication between groups and encompass the coordination of objectives, schedules, and even common resources, whose evidence was not found in the work situations at Company Alpha.

In contrast, data from Company Beta attest that such occurrences are highly related to the construct of cross-boundary teaming. In this case, the project portfolio encompasses an interdependence of activities and a master schedule for the project stage or checkpoints and shared resources according to the project portfolio.

However, the observation in Company Alpha shows that the concept of group mobility is more similar to the construct of X-teams. As Ancona, Bresman and Kaeufer (2002) explain, this phenomenon is related to the combination of internal and external activities and the extensive connections whose internal links must be supplanted by external links.

Edmondson and Nembhard (2009) support this idea by arguing that Cross-Functional groups will rarely display uniform time allocations or exhibit clear, precise boundaries.
Thus, the concept of group mobility encompasses the idea that an individual learns from other groups and the organisation in general, including its external environment. Nevertheless, this learning remains at the collective level, in the "hallways" (Dixon, 1999), since it has not been taken to the group's inner sphere. At the core of its information cycle, it allows group members to share information, reflect on it, and learn through the convergence of opinions (Jeong & Shin, 2019).

This situation illustrates the occurrence of collective learning explained by Dixon (1999). It also exemplifies the idea that group learning occurs inside the group, according to the concept of group learning by Edmondson (2002, p. 129), who argues that learning involves "a process in which a team takes action, obtains and reflects on feedback, and makes changes to adapt or improve".

Regarding the initial stages of a "group life-cycle", they are composed of internal celebrations, awareness, and a sense of belonging that must be established mainly by the team leader, causing the new member to be identified as belonging to a specific Cross-Functional group and not an ordinary employee in the organisation (Raelin, 2018).

Such situations can alleviate the challenges of communication and diversity of roles identified by Edmondson and Nembhard (2009). These authors argue that the early stages of a Cross-Functional group are not simple and, ideally, the internal climate should allow members' development and involvement.

As for the limitations, the matter of internal diversity could not be further explored. Results showed that groups from both companies have great demographic diversity, which is directly related to learning. However, the conduction of interviews did not result in evidence of

such aspects. Thus, the authors suggest further research about the cultural and diversity matters in order to understand how these aspects can influence meso-Cross-Functional learning.

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