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The Importance of Leadership in a Company's Innovativeness: A contrasting study of two Software Development Enterprises

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Dissertation carried out under the

Master in Innovation and Technological Entrepreneurship 2018/2019

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11th of June 2019

ACKNOWLEDGEMENTS

I am deeply appreciative of every Professor I have come across during my time as a MIET student, and I owe every one of them a thank you for everything they taught me and for the opportunities and paths they opened for me. A special word for Professor João José Pinto Ferreira for being an inspiration and a guidance during my studies, and for always being so available and ready to help.

But I am especially thankful to my research supervisor, Professor Alexandra Cristina Ramos da Silva Lopes Gunes, for aiding me during the development of this dissertation and for all the advice and counsel she has given me in both my Bachelor and Master.

I would also like to thank all the people I came into contact with in Critical Manufacturing and Mindera, in particular to the Co-Founder and Operations Director at Critical Manufacturing, Teresa Carreiro, and to the Co-founder at Mindera & Ecosystems Explorer at Lemon Works, Sofia Reis, for providing me with the opportunity to study two of the most interesting software companies I have ever encountered.

Last, but not least, I could not have persevered through all my trials and tribulations without my family and friends, that supported me through the good and bad times and that gave me the inspiration and drive I needed to complete one of the most important phases in my life.

ABSTRACT

Portuguese software companies have been at the center stage for technological innovation, having progressively grown to accompany and sometimes surpass other countries, and this is made clear when we look at the employment rate that software companies are displaying nowadays.

This expansion also leads to the topic of the leadership structures that newer software companies are presenting, which involve dismissing vertical leadership structures and in exchange applying a completely horizontal and agile structure. For this, the two companies to be put into contrast were Critical Manufacturing, as the vertically structured company, and Mindera, as the horizontally structured company. As such, this study is trying to understand what are the effects of leadership and organizational structures in a horizontally structured software development company and a vertically structured software development company innovativeness.

To study these effects, and if there was an influence on innovation according to the leadership structures, a literature review and qualitative (interviews) and quantitative (survey) methodologies were utilized. It was understood that different leadership structures do not necessarily influence the innovativeness of a company. It often has to do with employee motivation and empowerment. Leadership in that sense can be thought of as having a mediating effect since it presumably may impact employee motivation and empowerment.

This study brings to the discussion that innovation is present if the leadership structure allows it to be, but more so if the resources are there to motivate the employees. In other words, it all depends on the company's openness to their employees and to their capacity to provide them with the necessary resources.

RESUMO

Empresas de Software Portuguesas têm tomado uma posição central no que se refere a inovação tecnológica, tendo crescido progressivamente e até ultrapassado outros países, claramente por razões que advêm das taxas de empregabilidade que este tipo de empresas tem tido.

Esta expansão leva à discussão do tópico das estruturas de liderança que novas empresas de Software têm apresentado, as quais envolvem a dispensa de estruturas de liderança verticais e troca da aplicação de estruturas completamente horizontais e ágeis. Por estas razões, as duas empresas a serem colocadas em contraste são a Critical Manufacturing, representando a empresa com estrutura vertical, e a Mindera, representando a empresa com estrutura horizontal. Assim sendo, este estudo tenta compreender os efeitos da liderança e das estruturas organizacionais numa empresa de desenvolvimento de software horizontal e numa empresa de desenvolvimento de software vertical no que se refere às suas capacidades de inovação.

De forma a estudar estes efeitos, e se realmente existe uma influência face á inovação de acordo com as estruturas de liderança, foram utilizadas as metodologias de revisão literária, recolha de dados qualitativos (entrevistas) e recolha de dados quantitativos (inquérito). Foi possível compreender que diferentes estruturas de liderança não influenciam necessariamente a capacidade de inovar de uma empresa. Essa influência vem mais frequentemente de efeitos relacionados com a motivação e empoderamento dos trabalhadores. Liderança, neste sentido, pode ser interpretada como tendo um efeito mediativo, uma vez que presumidamente tem impacto na tal motivação e empoderamento dos trabalhadores.

Este estudo traz à discussão a questão de que a inovação está presente se a estrutura de liderança o permitir, mas mais do que isso, se os recursos que motivam os trabalhadores estiverem ainda mais presentes. Por outras palavras, tudo parece depender da abertura da empresa face aos seus trabalhadores e face às suas capacidades de providenciar os recursos que os motivam e incentivam.

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1. INTRODUCTION

1.1. MOTIVATION

Portugal is a great stage for the creation and development of software companies. We are in the center of technological interest because we are finally imposing ourselves as sources of intellect and innovation. On the topic of software development, Portugal is the second European country (after France) to exhibit the largest rate of employment in software development and we are also climbing the ranking of values for investment rounds with each passing year.

The context for software development companies and software developers is looking up and in the road to a bright future, and with this comes the fact that innovation is not only coming from the technology itself, it is also coming from the way we structure our companies.

The motivation for this study came from a simple field trip in 2016 to a company called Mindera in Porto, Portugal. The background of the company will be developed in a later chapter, but for now, to express why this study came to be, there will be a bit of an explanation about the company.

This field trip happened in a Sociology class, with senior students, one of which was the researcher. Everyone had to take notes and ask questions about their style of organizational structure, which was highly unusual for the class students. The employees of this company had incredible flexible work hours and incredibly unusual work ethics.

The thoughts that the researcher first had was on how these people managed to abide by the deadlines they had for each project when so much freedom was given to the members - they could work from home, take days off for their personal lives, even take naps whenever and wherever. The company, at the time, was running for about 2 years - so they were founded in 2014 - and by then they had about 100 members distributed by their various locations. Therefore, the curiosity sparked from the topic of how this company was going to be competitive with so little managing being done while other companies were so strict about workload and work ethics. Nobody is going to pay anyone to take a nap, we thought by then.

The longevity of the company was the first motivation for this study, but then, the researcher got more insights on innovation and how this complex concept was able to bring success to some and total failure to others. The ability of a company to innovate is what makes it survive and thrive. So, if Mindera was so relaxed about their way of working, were they able to innovate enough to keep them afloat for long? Then came some initial research.

The motivation for this study, in a summarized way, is about how a company like Mindera innovate and how a company opposite of Mindera, in this case Critical Manufacturing, innovate. More so, not only how they innovate but also what is their innovation rate, what they do to manage it (if they manage it at all) and how many of those projects are a success in the market. It is known that companies innovate differently, but the baseline is if the organizational structure of a software development company has effects on a company's innovativeness, and because both companies are of the same industry, there will be key points that we can compare.

1.2. OBJECTIVE OF THE RESEARCH

The proposed study suggests the exploration of the correlation between innovation and leadership in a global understanding of the organizational structure of software companies in Portugal. One of the main objectives, in this sense, is to start by understanding how innovation and leadership influence each other and understand in what measure is leadership a decisive influencer of innovation and progress in software companies.

Using the literature already existing, this study will seek to get an insight into how authors view both the drivers for innovation and the types of leadership styles and, consequently, how is it that we can measure innovation. Innovation is a concept that is admittedly very hard to define, and as such, many authors have admitted that to know what to look for in a company's innovation process and to know how to measure it, one has to adapt the metrics to the company in the analysis.

On another note, we also must understand the types of leadership and how they influence the work environment and the core activities of the company.

Due to the complexity of this first objective, the researcher decided to take this supposition into a comparative context, where the contrast would be more apparent, and thus it would make the influence between innovation and leadership more apparent. The comparativeness would be coming from two distinct Portuguese software companies, in the sense that one would mirror the organizational structure said as vertical and the second company would mirror a horizontal organizational structure.

This goal presents the need for exploration of the matter of company success or failure rate on the projects commenced inside the company, and how do both companies with different leadership styles incentive or not the success of those projects. This is to say; another objective of this study is to give an insight into how different companies with different organizational

structures related to innovation. Darmastuti (2017) says that it has been typical for companies with supportive leadership styles to have better-motivated employees, which in turn not only empowers their sense of belonging but also aids with their creativity and work responsibility, being that motivation drives employees to want to innovate.

Wu, Ku & Pan (2017) even argue that there is a positive correlation between empowering leadership and psychological leadership with team creativity, which means that the way leaders work with their teams has effects on how the team learns, communicate and reflect on their work. Motivation is a solid base for a team's performance and the success rate of their current and future work projects. And as they say, this happens frequently in horizontal organizational structures.

The core objective, through this comparative analysis, is to understand not only how innovation and leadership mutually interact with each other, but also to analyze if the correlation strengthens or weakens that interaction according to the organization type of the company. This will also inform us of how companies have been evolving over the years and how their organizational structure has been evolving with them, and, consequently, what difficulties they encounter when it comes to keeping up with the intense competitiveness of this industry.

1.3. INTRODUCTION TO THE COMPANIES

The first company to be addressed in this study is called Mindera, and they are a company that, in their own words "We Build High Performance, Resilient and Scalable Software Systems To Enable Businesses Across Locations". They are in 6 different cities around the world, including Porto (Portugal), Aveiro (Portugal), Leicester (UK), Chennai (India), Bengaluru (India) and San Diego (United States of America).

Mindera works in an organizational structure than can be described as a team-centered, seeing that their company is based on the aspect that there are no CEO's, managers or supervisors – only teams and team members. Their premise is that, with each project that comes in from their group of clients, the company aggregates the best elements of the company to form a team and work together on the project requested. Since they have a growing base of partners and clients, they tend to rotate the people that constitute the teams to give the best response to the challenge as possible. They are also very open and accepting of changes, and they admit it on their introductory website to embracing change and seeing it as a chance to grow.

Their work ethic is very organized and standardized, even though they don't have standardization in other areas of the company, such as leadership. The team members each

have the liberty to work at their own pace – keeping the only baseline as the deadline for everyone to come together and combine what they have been working on – and everyone gets along in a more in-depth way than what we see in other styles of organizational structures.

On this note, the second company to be addressed in this study is considerably contrasting to that of Mindera. This second company is called Critical Manufacturing, and on the only aspect where they can relate to Mindera is on the fact that "Critical Manufacturing is dedicated to empowering manufacturers of complex, high tech discrete products with a manufacturing execution and intelligence system to achieve their goals.", which is a quote gathered from their website on the tab Overview. From this, there is a clear lining that unites these two companies together in the aspect that they are a software development company that works under their client's and partner's needs and wants. This factor alone tells us that these companies are highly competitive since they need to provide their clients with the best service they can muster because there are other software development companies out there from where the clients can choose from if they are not satisfied with the current solution.

Critical Manufacturing is a structured company – they have a board of directors, an advisory board, a general assembly, and a management department. This indicates the first difference between one another. We start seeing discrepancies in structuration. They have founders and co-founders, such as Francisco Almada Lobo with the title of Chief Executive Officer and Co-Founder; Günter Lauber as the Chairman of the Board, CEO and Executive Vice President of the SMT Solutions Segment and Mike M. Möhlheinrich, a Member of the Board (non-executive), Managing Director and CFO of SMT Solutions Segment.

From this brief description of both companies, we can understand why these two are beginning to sound so contrasting and yet so similar in core goals. This is the reason why there is a need for understanding how these two different companies deal with innovation in terms of how they measure it and control it, and how does their organizational structure influence these capabilities. Is innovation stimulated and managed differently between the two? And if it is, what roles does each of the company's leadership have to do with it?

1.4. STRUCTURE OF THE DISSERTATION

The following chapters of this dissertation will underline what the research will take into consideration when building the knowledge base on the topic and what theories already exist about innovation measurement and management and, consequently, leadership drivers and

measurement. First, a chapter about how the literature research was performed and how many articles were then taken into consideration for the study, after imposing some limiting factors.

Oncoming chapters will be divided into two phases - first, there will be a table that concisely explores the theories and future research appointed by the authors used for the literature review, and this, there will be a table related with Innovation Measurement, followed by the in-depth analysis of everything the authors presented. According to this analysis, there will be a second table related to literature to do with Leadership, again followed by an in-depth analysis of this topic.

After that, in the chapters beginning the Methodology stage, the study outlines the knowledge gap to be identified and presented, as well as the research question and consequent research hypothesis for the second stage of this thesis - the data collection stage. The first chapter on methodology includes the detailed description of this study's research design, the research questions and hypothesis and finally, a socio-demographic characterization of the sample of employees from the two companies that gave their responses on the survey.

From here, the analysis of the collected data starts in the format of a chapter dedicated to analyzing the effects of leadership on innovation and innovative behaviors. To do this, the chapter is divided in topics brought up during the interviews and the answers given in the survey, where the themes mentioned include how innovation is defined and measured in each of the companies; how communication happens internally and externally, or in other words, amongst employees and between employees and the clients; and finally, how we can statistically construct conclusions on measuring innovative behavior, process innovation and improvements and also on company receptiveness.

The last chapter dedicated to the analysis of the data is on organizational innovativeness and leadership evolution, where it is specified in detail how the companies are competitive and what are going to be the identifiable scalability obstacles, namely on Mindera's part.

The chapters following will discuss the final overview of the hypothesis and what conclusions can be achieved through the knowledge gathered in the analysis chapters, which lead to the validation or not of the hypothesis stipulated at the beginning of this study.

The second to last chapter of this study gives an insight into the major limitation this study had and how it could have been avoided.

And finally, the last chapter is dedicated to a wrap-up of the whole dissertation - the conclusion. Here, final notes on what the study added to the discussion and what future work can be done in this theme are presented.

2. LITERATURE REVIEW

2.1. INTRODUCTION TO THE PROCESS USED

The following literature review was conducted using Scopus and Sage Pub and through bibliographic references used by authors of some articles found by the search engines prior mentioned. The search for articles was divided into two overall themes, being that the first round of research was based on innovation and how previous authors interpreted it in the context of the software industry and, more importantly, how they have been measuring innovation in this industry. The following round of research was done upon the theme of leadership, which is a consequent innovation driver, and how authors described the types of leadership and how they measured leadership.

For further context on this matter, the only limitation put into place was that the investigator wouldn't accept articles below the year of 2005, which meant that all articles written since 2005 were taken into consideration for this study. This decision came from the fact that, on one hand, the topics didn't seem to be very developed before 2005 and, there is no need to look further than 2005 because what matters to the study is the most current context of software innovation and leadership types in two different enterprises.

In Scopus, the first round of research was related to Software Innovation, ways to measure Software Innovation and Software innovation drivers, or in other words, what authors encountered to be the factors that influenced innovation directly or indirectly. On this theme, the strings of keywords utilized were the following:

Figure 1 - Diagram of Scopus Research (Software, Innovation and Measurement Keywords)

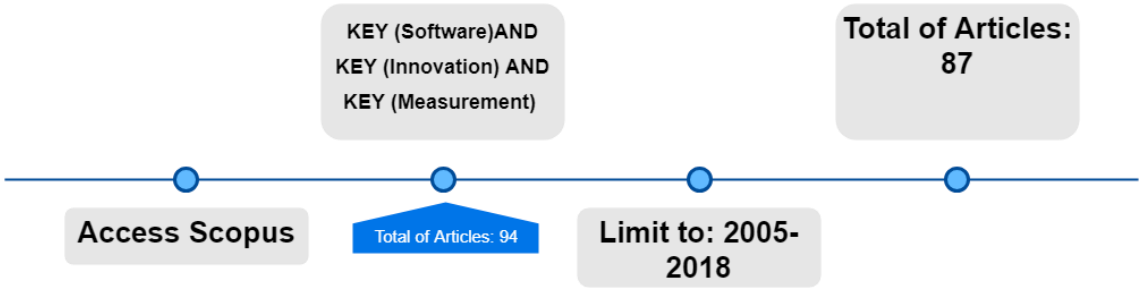
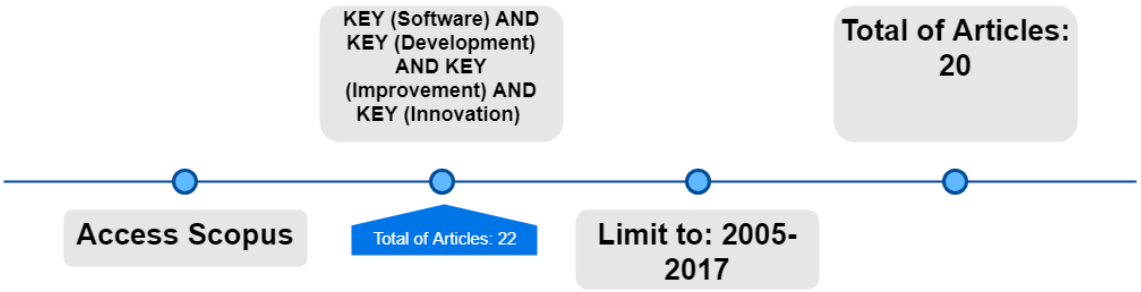


Figure 2 - Diagram of Scopus Research (Software, Development, Improvement and Innovation Keywords)



Deducting from these totals obtained, we can conclude that the joined total of 107 articles is telling us that this theme of discussion is very undeveloped and in its growing stage, which could mean that more studies need to be done regarding these keywords combined.

For the second round of literature research, still utilizing Scopus as our search engine, we focused on Leadership types, ways to measure effects of Leadership in teams and projects and what were the Leadership drivers. For this, the string of keywords used was:

Figure 3 - Diagram of Scopus Research (Leadership and Drivers Keywords)

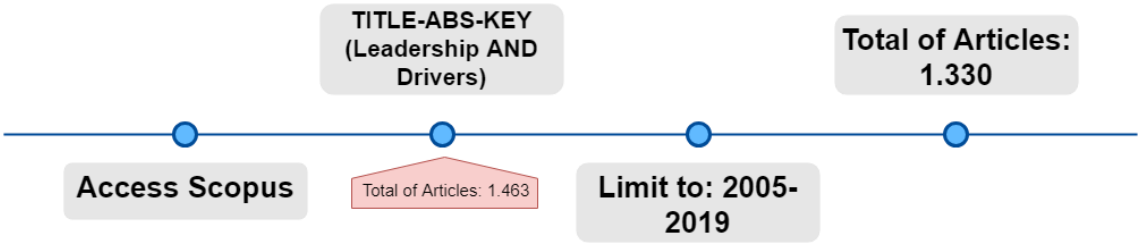
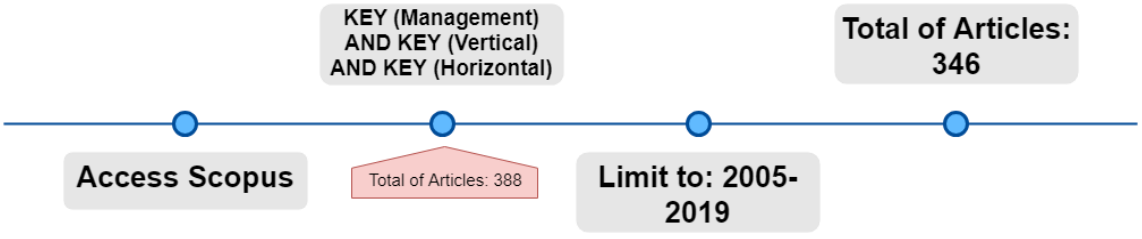
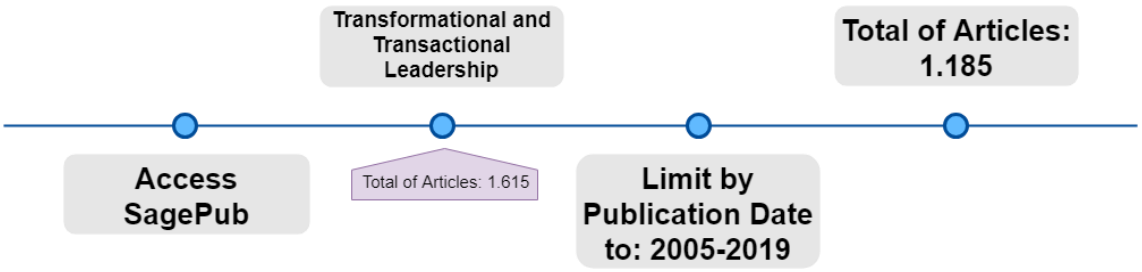


Figure 4 - Diagram of Scopus Research (Management, Vertical and Horizontal Keywords)



Still on this round of research, Sage Pub was also consulted, and the keywords utilized were:

Figure 5 - Diagram of Sage Pub Research (Transformational and Transactional Leadership Keywords)



The articles that will be used on the following chapters derived from these Keywords, and, as mentioned previously, from bibliographic references that articles derived from these keywords used to support their researches.

2.2. INNOVATION MANAGEMENT OVERVIEW

The following chapter summarizes the literature explored through a table of contents, where the reader can easily access the main concepts covered by the authors and the future research notes each of them left behind. After the table, a more in-depth analysis will follow, to better contextualize the theories and arguments brought forwards by the authors.

Table 1 - Overview of Innovation Management Literature

Author(s) and Year	Concepts Covered	Future Research
França, Peixoto, Falcão & Monteiro (2016)	The authors propose an innovation measurement model, inspired by the authors Terwiesch and Ulrich, which measures innovation considering a mix of grades gathered by the knowledge of the market uncertainties, technology uncertainties and new project uncertainties. It utilizes three different kinds of scenarios, called Horizons, which speculate on what would the result be if the company had three different types of approach towards their projects. **Concepts: The Three Horizons Model; Project Measurement; Innovation Measurement.**	The authors admit that their data collection process was lacking in understanding of the complexity of the reasoning behind their respondents' answers to their model. They lack in understanding in why their respondents saw market and technology knowledge as determinant for their cases, which could be a result of lack of time to cover all of these aspects. The model would benefit from more data collected from a lot more projects

		and a lot more evaluator's insights.
Berntsson Svensson (2017)	The author suggests measuring innovation at a team level and gives insight to innovation areas that can result in several factors which aid with innovation measurement. These innovation areas are based on innovation elicitation, project selection, ways of working and impact on innovation. This perspective on innovation measurement targets specifically agile software companies. **Concepts: Innovation Measurement; Process Measurement; Team Innovation**	The author admits that further research is needed to investigate other kinds of industries and sectors in order to get a more complete understanding of innovation capabilities and how measurement is done.
Monteiro, Silva & Capretz (2016)	The authors claim that innovative behavior is what stimulates the entire process of innovation inside companies, especially inside software companies. They also suggest that there are four possible categories that stimulate innovative behaviors, which are Leadership, Climate for Innovation, Work group and Individual problem-solving styles. **Concepts: Innovation Measurement; Innovative Behavior; Individual Performance; Group Effectiveness**	Future research for this article includes improving the conceptual model proposed by the authors by including premises such as moderating the effect of personality, investigate more generally the topic of project/task uncertainty, relate leadership style to the innovative behaviors observed and finally, explore the external demands related to client/customer relationships.
Edison, Bin Ali & Torkar (2013)	The authors target the topic of innovation determinants and argue that most of these determinants that have been identified over the years with numerous literatures, haven't been tested and measured to really give notice of their impact on a company's innovation rate. The authors conclude that the most prevalent determinants used to date relate with product and process improvement, product champion,	The authors predict that more insights are needed into how innovation measurement is conducted because of issues that they encountered in their own research. These issues were related to the sheer lack of existing models that measure innovation including all aspects that affect it; the little

	transformational leadership, software design and competition. **Concepts: Innovation Measurement; Innovation Capability**	information available in literature about how to collect, process and interpret these metrics to effectively measure innovation; the fact that so many innovation determinants have been identified but only a small amount of them were actually measured and tested.
Börjesson, Baaz, Pries-Heje & Timmerås (2007)	The authors suggested that a Software Process Improvement (SPI) model be implemented to evaluate the current progress, know how to continue with further actions, and finally, have a follow up report on the progress made. Parallel to this, the SPI metrics work in unison with the GQM model (Goal-Question-Metric), which reflects on the SPI metrics with the specifications needed for the company to relate as approximately as possible to the metrics. **Concepts: Innovation Measurement; Process Improvement; Goal-Questions-Metrics Model (GQM)**	The authors believe that their model would be beneficial to be applied in other sectors and with other organizations with other contexts because their metrics seem to clearly capture the essence of innovation measurement.
Lukes & Stephan (2017)	Beyond measuring innovation and a company's competitiveness through researches on organization climate for creativity and researches on leadership and innovation, the authors seek to intervene using cultural perceptions and their effects in employees' innovative behavior. Therefore, the authors argue that employees' innovative behaviors are a micro-foundation to an organization's competitiveness. **Concepts: Innovative Behavior; Innovation Support; Cross-Cultural**	For future studies, the authors suggest implementing longitudinally into the research, as well as their cross-sectional approach. On another note, it is also suggested that an expansion of the models used in their articles to non-European countries would also be beneficial, since their study was limited to European countries.

2.3. INNOVATION DRIVERS AND MEASUREMENT IN THE SOFTWARE INDUSTRY

Innovation in the software industry is highly necessary for the survival of any company in this field. There is a constant need for improvements and breakthroughs in technology and in the innovation processes themselves that drive software companies to be highly competitive and active. Nowadays, this industry is held on higher standards than other types of companies, since innovation can't only be done to improve the quality of the service or the technology. Because of the competitiveness of this sector, innovation must envelop every single aspect of the company itself going from processes, to prices and even offer new and improved services or products constantly to keep their customers interested (Edison, Bin Ali & Torkar (2013)).

Because of the rapid development that happens in the software industry, measuring innovation has become a top priority for software companies, and that includes Small and Medium Enterprises (SME's) and well-established mature companies that have been operating over many years. Measuring innovation, on the other hand, is something that many companies have difficulty doing and understanding in general, because the concept of innovation itself is very hard to clearly describe. Every sector has its definition of innovation because their innovativeness derives from different variants, and in the case of software companies, where there isn't necessarily a physical product that customers can hold and evaluate, innovation mainly lands on the processes and where there is room for improvement.

To measure processes in software companies, Börjesson, Baaz, Pries-Heje, and Timmerås (2007) suggested that a Software Process Improvement (SPI) model be implemented to evaluate the current progress, know how to continue with further actions, and finally, have a follow-up report on the progress made. The authors also underline that each model must be acquainted to the company in question because as previously mentioned, innovation is as hard to define as it is to measure. Therefore, for each company, the model has to undergo alterations and the metrics have to be revised to make sure that it is completely able to understand and consider all the variables.

Parallel to this, the SPI metrics work in unison with the GQM model (Goal-Question-Metric), which is the model developed by Victor Basili and that according to Börjesson, Baaz, Pries-Heje & Timmerås (2007) is dedicated to measuring specific goals under three levels, the conceptual level which corresponds to the Goal, the operational level which corresponds to the Question, and the quantitative level that corresponds to the Metrics. This model reflects on the

SPI metrics with the specifications needed for the company to relate as approximately as possible to the metrics.

But, as is it also defended by those utilizing the GQM model, its limitations begin with the incapability of the model to be applied to high-level business goals and strategies, which in turn limit the understanding of certain SPI metrics that are necessary to aid with the measurement of process innovation in software companies.

On another note, the authors França, Peixoto, Falcão & Monteiro (2016) propose a second model, inspired by the authors Terwiesch and Ulrich, which measures innovation considering a mix of grades gathered by the knowledge of the market uncertainties, technology uncertainties and new project uncertainties. This model investigates three different types of horizons when it comes to the financing of projects and their capability for success according to the amount of investment applied, and for that, the three-hypothesis stipulated dictate the scenarios of a company's future or even their current situation.

As França, Peixoto, Falcão & Monteiro (2016) argue, this three horizons model comes in handy when selecting projects that bring innovation to a mature or new company. It doesn't matter what the company's organizational maturity is, because this model only questions, as above said, the knowledge of the market and the technology.

Firstly, we understand with the study of these authors that there are numerous factors to be taken into consideration when measuring either innovation or management processes in software companies in Portugal or the world. According to Edison, Bin Ali and Torkar (2013), there are 244 determinants of innovation, being that they can be external or internal determinants. Those that are external are hard or impossible to be controlled by the software companies, therefore only the internal determinants could be accounted for.

But, as the authors also clearly state, most of these determinants have been identified over the years with numerous literature, but few of them have been tested and measured to give notice of their impact on a company's innovation rate. In other words, even though many have been identified, the most prevalent determinants used to date relate to product and process improvement, product champion, transformational leadership, software design, and competition.

Other authors, such as Monteiro, Silva & Capretz (2016) claim that innovation measurement must go beyond the product, the technology and market, the processes and even the company's

projects. This need to seek more understanding beyond what is presented inside a software company's structure comes from the fact that innovation starts with innovative behavior.

In the case of software companies, employees show behaviors that promote innovation even if it's to better their task and to make their work easier. If we scale this initiative towards a project they are working on, innovation comes from the individual innovative behavior. The reason this happens, as explained by the authors, is because innovation starts with a team or an individual that then feels the need to share their insight and propose a new idea. The idea then moves on to be approved either by the team or the managers or even investors, who then have the capabilities to make this new idea come to fruition.

As some authors have skipped upon, projects that uprise a company's innovation standpoint frequently start with an individual or a team of individuals, and not particularly the company itself. To further this point, Monteiro, Silva & Capretz (2016) based on another author's insights, suggest that four possible categories stimulate innovative behaviors, which are Leadership, Climate for Innovation, Workgroup and Individual problem-solving styles.

At the individual level, Lukes & Stephan (2017) claim that the employee's contributions through their creativity and innovative contributions can impact a company's competitive and overall success. Through the understanding of the organization's cultural perceptions, it is possible to characterize an employee's innovative behavior as the micro-foundation of an organization's competitiveness.

At the team level, Berntsson Svensson (2017) suggests that measuring innovation at a team level also brings a lot of understanding to the mix. The author gives insight into innovation areas that can result in several factors that aid with innovation measurement. These innovation areas, as the author explains, are based on innovation elicitation, project selection, ways of working and impact on innovation. This approach becomes relevant to include because it specifically targets agile software companies, with a way of operating that can diverge from other types of software companies.

Therefore, to get as accurate as possible reading and understanding into how innovation can be measured, it is equally as important to understand where this innovative behavior comes from and what can stimulate it. Taking into consideration that each company has its innovation measured differently or not measured at all, it becomes interesting to see if companies that take more interest in keeping a close eye on their innovation measurements are also the same companies that stimulate innovative behavior, or vice versa.

2.4. LEADERSHIP PERSPECTIVES OVERVIEW

Much like the chapter previously, the following chapter will present the reader with the summary table which gives a general overview over the concepts covered by the authors and, yet again, notes given for future research. The following chapter contains the detailed explanation of the theories and arguments.

Table 2 - Overview of Leadership Perspectives Literature

Author(s) and Year	Concepts Covered	Future Research
Zhu, Riggio, Avolio & Sosik (2011)	The authors want to test is there is any correlation and effects between transformational leadership and follower moral perspectives and connect those finding to a scheme of ethical decision-making processes between followers. The capability that followers have to produce their identity according to their position and responsibilities can be influenced by the type of leadership they are under, and as the authors argue, transformational leadership has a great positive effect on how moral identities are constructed. **Concepts: Transformational Leadership, Transactional Leadership, Follower Moral Identity, Follower Moral Development**	The authors argue that their study could have been better complemented if they had included other types of social influences that happen within organizations, such as incorporate the effect of peer influence on follower moral identity and test it empirically. They also only had one respondent to apply the measurement model, which may have differed some common method variance.
Mitchell & Bommer (2018)	The problematic that the authors explore in this article remotes to the need to understand why these new types of leadership, such as team leaders, are starting to become more prominent in new companies. For this, the authors examine concepts such as prosocial and impression management to predict who will arise as the team leader and why. **Concepts: Leadership Emergence; Motivation; Task Coordination**	The authors add that in terms of future research, it would benefit new studies to examine the interactive effects related with motives and task coordination behaviors that are beginning to support the appearance of horizontal leadership organizational structures. More so, the authors conclude that studies should add the trust dimension as a

		mediating mechanism and include the analysis of other mediating mechanisms that weren't taken into consideration.
Su & Baird (2018)	In this article, the authors aim to understand the connection between innovation management and the role of leaders in generating said innovation management, specifically how leadership styles relate to how innovation management is controlled. **Concepts: Management Innovation; Leadership Style.**	In terms of how to complement their study, the authors suggest that future studies should delve deeper into the impacts of leadership on management innovation in other organizational contexts. More so, while their study gives relevance to innovation management, it is still necessary to reinforce the exploration by empirically testing the effects of innovation management on competitiveness.
Müller, Sankaran, Drouin, Vaagaasar, Bekker & Jain (2018)	The following study aims to analyze the social phenomenon characterized by the interaction of Vertical Leadership Structures (VLS) and Horizontal Leadership Structures (HLS) in the context of this interaction's flow, the events that appear to define transition points and, finally, the context in which this interaction happens. This is to give an in-depth understanding of how the events and cycles for VLS-HLS can transition according to the projects. **Concepts: Balanced Leadership; Horizontal Leadership; Morphogenetic Cycle; Project Management; Shared Leadership; Vertical Leadership**	The identified cycle of events, which come to the final count of five total events (which are nomination, identification, selection, horizontal leadership and its governance, and transition) are to be applied in further studies, namely in order to enrich the cycle's model and to give an even better understanding of the iterative nature of the convergence of the two types of leadership in real case situations.

2.5. LEADERSHIP DRIVERS AND MEASUREMENT IN THE SOFTWARE INDUSTRY

Over these last few years, more and more horizontal organization structures are being used in up and coming companies. This sparked the investigation world to start speculating and analyzing why and how does leadership emerge in companies and what role do team members play in making this new type of leadership emerges. The authors Mitchell & Bommer (2018) constructed a study dedicated to understanding at what degree people's behavior and the prosocial environment that surrounds them mitigates more structured models of organization, leading them to a more natural process of selecting a leader - or a representative - in each project group. The thing here is that there is no managerial position previously underlined, so the fluidity of the process is done by the emergence of a figure that takes responsibility and care of others.

This leads us to believe that there might be a sense of belonging to the position of leader that varies according to the person's behavior and motivation to assume the temporary position. And as the group members rotate and the project is renewed to another goal, the person that appears to take the most responsibility also changes. According to Mitchell & Bommer (2018), this phenomenon is a variant of a person with strong impression management and task coordination mixed with the interest to perform tasks of higher responsibility will be in the lead, for the project at hand.

This can be connected to the concept of moral identity, which is another driver for leadership. According to the authors Zhu, Riggio, Avolio & Sosik (2011) having a leader rise to the task gives incentives for other team members to want to improve their moral identity, so that they have what it takes to take on more responsibility in the future and also become able to lead. In companies with transformational leaders, it becomes more apparent that the environment is more prosperous for morally connected leaders to emerge whenever necessary. On the other hand, as the authors go on to explore, transactional leaders are more monitors and controllers than peers and advisors. Their morality is fully aligned with the company's goal and interest, not so much with the employees under them.

This doesn't necessarily mean that the environment in a transactional company is ominous and threatening, but it does mean that they oversee tasks that are more of the economic and rational side. This means that deadlines are strict, work pace is very well stipulated and there isn't time for anything more than getting the job done.

So, with this, the authors do indeed conclude that transformational leadership styles are much more accepting and inclusive of diversity in morality and creativity, whilst transactional leadership styles leave much to be desired. So, if these effects happen, what does this mean when it comes to generating management innovation?

According to Su & Baird (2018), management innovation is decisively what makes companies distance themselves from competitors and grasping their position in the market. More so, when discussing managerial practices, the authors believe that the concept reflects daily activities inside an organization that involve rules, procedures, tasks, and functions that are targeted by assessments and regulations that make sure that the company is secure and thriving.

As the authors explain, in their theory, they believe that two different styles of leadership influence innovation management very differently. They consider the concepts of the consideration style as the more open, accepting and human-oriented style of leadership; and the initiating style as the more restricted, closed and economically/rationally driven style that pushed from the involvement of employees in decision-making situations. When it came to the results gathered from their study, the authors found that innovation management benefited from control and rules more so than it benefited from having a considerate leadership style. This meant that it became easier for the company to manage innovation under the structuration of the processes.

Regarding innovation management, having a person or group of people rendered with the task of giving specific roles to specific people and establishing good communication channels amongst them made the company better at managing innovation.

Taking the conclusions from these authors, we can deduct that even though horizontal leadership styles can promote creativity and idea generation, it becomes much easier to manage those ideas into innovation using a set of rules and procedures to measure it and manage it. The idea of combining both styles starts to appear. If one style lacks in one department and is very beneficial in another department, and if the other style reflects the same but on the flip side, would it be wiser for software development enterprises to start combining both?

The authors Müller, Sankaran, Drouin, Vaagaasar, Bekker & Jain (2018) propose that the combination of both styles, identified by them as Horizontal Leadership Style (HLS) and Vertical Leadership Style (VLS), can positively influence the emergence of balanced leadership enterprises. Therefore, it becomes necessary to evaluate in what way are each style

lacking and in what ways are they beneficial, to understand if this could be applied in the software development industry.

3. METHODOLOGY

3.1. RESEARCH DESIGN

The following study will include a qualitative and a quantitative approach towards methodology, which can also be identified as a mixed-method type of research (Bryman 2006). Because this is such a complex issue and problematic, all the ground needs to be covered in hopes that all the information that is gathered represents as close as possible each company's reality. As it is suggested by authors such as Bryman (2006) and Johnson & Onwuegbuzie (2004), combining qualitative and quantitative research not only gives rigor to the study, but it also aids other authors interested in the topic of what might be improved in the future.

More so, in hopes that contrasting studies such as this one opens doors for scalability of this topic, setting the tone for future researches was pertinent to this study. In other words, because there is a lack of contrasting studies in this field, this study is also intending to trigger the following studies to continue contrasting cases and gathering insight from that, because it becomes easier to understand the whole picture if we have both ends being analyzed.

The quantitative study will result in a survey, which will be inspired by other author's successful attempts at measuring innovation management and the project's success rate. Because there is a limitation in terms of time, it wouldn't be possible to undergo such an in-depth study if a new model had to be created to measure the metrics referred. As such and seeing that some authors have successful models constructed and already tested in the same environment as the one in question for this study, we will utilize their survey models to measure innovation and project success in the two companies above mentioned.

The survey is characterized as having the structure of a Likert Scale, where the respondent is made to choose between a scale from 1 to 5, where 1 represents Strongly Disagree, 2 represents Disagree, 3 represents Undecided, 4 represents Agree and 5 represents Strongly Agree. The way the survey proposed the thematic to the respondents was through affirmations instead of questions, as per the influence of the authors Lukes & Stephan (2017). Some of their model was utilized to build the survey utilized in this study, and other affirmations were constructed with the help of the two informants from the two companies.

On the other hand, for the qualitative study, we believe that a lot of rich and in-depth information may arise from directly talking to key personalities inside each company. From being in direct contact with people that work and like that environment every day, we will be able to gather not only more detailed information, but also people's reactions and opinions.

These semi-structured interviews will also be based on previous author's interviews and the key metrics they approached, but as we see necessary, additional questions and topics of conversation may be included as the study sees fit.

The mixed-methods research utilized in this study gives equal importance to both types of data gathered. Both the semi-structured interviews and the survey had a clear objective, each having specific topics and questions to answer.

3.2. RESEARCH QUESTION AND HYPOTHESIS

Through the exploration of the topic so far, a research question was able to be defined and adjusted to the needs of this overall project. This means that the research question constructed puts into perspective both the style of leadership being implemented by the companies and how that, in turn, has an effect or doesn't on the company's innovativeness. As such, the research question to be answered by the end of this study is the following.

Research Question: *What are the effects of leadership and organizational structures overall in a horizontally structured software development company and a vertically structured software development company innovativeness?*

To answer this, five hypotheses are being put into perspective which will lead the survey and the interview topics and questions. The first hypothesis has to do with the fact that the literature seems to indicate that structurally organized enterprises are more innovation management driven, and as such, are better and more efficient at innovation measurement. As such, we suggest the following hypothesis.

H1 - *The Vertically Structured software development company has lenient innovation measurement methods.*

The second hypothesis is also related to the conclusions gathered from the authors above mentioned that argue that horizontal leadership incentives idea generation and, therefore, promotes innovation and improvements. To verify these theories in our two contrasting companies, the following hypothesis was constructed.

H2 - *The Horizontally Structured software development company generates more churn for innovation to be applied in projects.*

There is also the need to analyze how both sides' employees see themselves as crucial for innovation generation, and so if they feel empowered and liberated to come up with new ideas individually.

H3 - *The perception of employees over empowerment and support for innovation and idea generation have a positive relationship with organizational innovation.*

More so, to test the theory that vertically structured enterprises are better at innovation management, the fourth hypothesis will bring forth the results on the vertically structured company's innovation management capabilities comparing with the horizontally structured company.

H4 - *Vertical leadership structures are more efficient at innovation management.*

And finally, there is a need to know if innovation management leads to more innovation and if there is a need for a company to be managing every step they take towards innovation because it makes them more competitive than those companies that aren't so mindful of the processes of innovation management.

H5 - *Companies that take more consideration to managing innovation are more competitive.*

3.3. SOCIO-DEMOGRAPHIC CHARACTERIZATION OF RESEARCH POPULATION

This chapter will give insight into the socio-demographic characteristics of the employees of both Critical Manufacturing and Mindera that responded to the survey (available in Annex 1) and some information on the people that were interviewed through semi-structured interviews (guiding script for semi-structured interviews available in Annex 2).

Starting with the survey, the following information will be organized in general aspects of the respondents - such as how many employees of each company responded and their genders - and then into more detail into the characteristics of each group of employees.

The following table expresses the number of survey responses in total and percentage.

Table 3 - Responses by Company

		Frequency	%
	Critical Manufacturing	58	55.2
	Mindera	47	44.8
	Total	105	100.0

Of the 105 respondents above presented, 89 defined their gender as male (equivalent to 84,8%) and 16 defined their gender as female (equivalent to 15,2%). This discrepancy in genders was also observed when the data was split according to the company of each worker. The tables below express the gender of the respondents by company.

Table 4 - Gender of the Survey Respondents by Company (Critical Manufacturing)

		Frequency	%
	Male	52	89.7
	Female	6	10.3
	Total	58	100.0

Table 5 - Gender of the Survey Respondents by Company (Mindera)

		Frequency	%
	Male	37	78.7
	Female	10	21.3
	Total	47	100.0

Another relevant characteristic is the respondent's age. Yet again, the information will be split according to the company, including information such as the minimum and the maximum age of the respondents in each company and also the mean age for each group.

Table 6 - Age of the Survey Respondents by Company (Critical Manufacturing)

	N	Minimum	Maximum	Mean
AGE	58	21.00	46.00	32.7586

Table 7 - Age of the Survey Respondents by Company (Mindera)

	N	Minimum	Maximum	Mean
AGE	47	21.00	53.00	32.4255

As indicated by the data, we can confidently contrast both companies as there are no big discrepancies in either type of gender or even age range. This sets the stage for the analysis that will be presented in the coming chapters because it gives the first insight as to the core components of both companies. Knowing that the employees aren't that socio-demographic different gives the reassurance that any similarities or discrepancies in opinions and responses are direct influences by factors other than socio-demographic characteristics.

On the topic of the people that were interviewed for this study, there were two employees of Critical Manufacturing and two employees of Mindera. The first interviewee was a 28-year-old employee that has been working for Critical Manufacturing for 6 years and has a master's in informatics and Computer Engineering. The second interviewee is also an employee at Critical Manufacturing, is 44 years old and works at Critical Manufacturing for 9 years and has a bachelor's in information systems.

The third interviewee is 40 years old and has been working for Mindera for 5 years with a bachelor's in architecture. She is also directly involved with the administrative side of the company. And the fourth and last interviewee is a 37-year-old Mindera employee that has recently taken on the role of Product Owner for the company because of situations that will be further analyzed in upcoming chapters. She has a bachelor's in psychology and works for Mindera for 3 years.

Further details about the interviewee's knowledge and positions in the companies will be shared as the analysis progresses.

4. THE EFFECTS OF LEADERSHIP ON INNOVATION AND INNOVATIVE BEHAVIOURS

4.1. DEFINING AND MEASURING INNOVATION

As before underlined, almost every company defines innovation in different terms. For that reason, it was prevalent to know, through the interviews with key people at both companies, what each of them thought innovation was and how they materialized it in their minds. It could also be discussed that their interpretation of innovation extended itself to the company's ideology of innovation since those interviewees represented the companies themselves.

The first interviewee was of the company Critical Manufacturing - working in the company's segment related to product development - and he interpreted innovation as the company's capability to make product innovation in their market segment, which is the industry of semiconductors. He gave the contrasting example of other types of companies that innovated in that segment by the acquisition of products, and not necessarily by an internal organic process. This lead to the segmentation of those companies, which meant that the products weren't centralized and organized in the core company - this was not only what differentiated the Critical Manufacturing group from others, but it also meant that the company was able to keep itself up-to-date with the technological trends.

Remembering back to what previous authors have argued on the aspect, here the innovation is seen not so much as the quantity of product development and, consequently, process improvement, but instead it falls under the way of developing the products and the internalization of the processes.

The second interviewee of Critical Manufacturing is titled as a Service Delivery Manager, which remotes not only to the second segment of the company - the service development segment - but also to a higher role of responsibility. This interviewee gave the perspective over innovation in the service segment, which is making a difference with the service provided to the client but making sure that that difference is relevant and wanted. He sees innovation in this segment as being more grounded and weighted, even though the teams are always looking for ways to provide the client with something they wanted but with added innovations that they probably didn't think to ask.

In this case, a more incremental approach to innovation is in play. Even though the improvements are slight, the client sees the benefit because it went beyond their expectations, and to them that is innovation. With the product segment of the company, on the other hand, there are some opportunities for radical innovation. As the first interviewee expressed, Critical Manufacturing is in a position where it can take risks and explore technological trends that aren't yet realized by the market or that are so underrated that other companies have yet to realize its potential. This capability comes from the involvement of the company in communitarian programs, such as a partnership with INESC in 2011, that was considered a very high-risk project but that turned out to translate into a very high financial significance to both the company and INESC.

In Critical Manufacturing alone, both incremental and radical innovations can be witnessed, because not only are they well involved in the communitarian aspects of financial investments, but because the teams are highly incentivized to participate and contribute with innovative behaviors.

Moving on to Mindera and how they interpret innovation and what it means for their company, we take into consideration firstly the interview with one of the company's management personal. Unlike Critical Manufacturing, in Mindera there isn't an effort to explore innovative technological trends that aren't established. She describes the type of innovation that Mindera produces as organic and correspondent to a need, not something that involves a plan and that goes beyond necessity. In other words, their innovation can be characterized as being necessity based.

This doesn't mean that one company is ahead of the other or that one company is more innovative than the other. Both companies try to always go beyond what the client is asking for, for example in terms of process innovation. But in Critical Manufacturing, risks are being taken through the communitarian programs they take part in, and in Mindera, they innovate with moderate risks because they work well that way. They don't need to step first into a new technological trend because what matters to their clients is the quality of their service to them.

To further this point, the fourth interviewee sees innovation in Mindera as something that stems from their behavior and environment that encourages innovation in itself. She interprets Mindera as a space where it is possible to always be heard and accepted, especially because everyone is valued. In her perspective, innovation goes beyond technological progress that they

do daily for their clients; it also comes from the way they operate and especially from the way people interact with each other.

Critical Manufacturing is also a company that takes measures into creating an accepting and creative environment for its employees, but Mindera goes beyond that. During the interviews with the two engineers from Critical Manufacturing, every time they were asked about innovation, they were quick to point out technological specifications that they improved on; but in Mindera, besides the technological aspects, people were also appointed as innovation. Indeed, their unique set-up is innovative, which is proven by the value their clients attribute them. Like the previous interviewee also pointed out, their clients not only choose them because of the quality of their work but because of their ethic and environment.

In the matter of innovation measurement, there are conscious and unconscious efforts from both companies to do so. For example, the two interviewees from Critical Manufacturing do agree that there are ways of controlling and measuring certain key points in the projects. More so, there are standardizations in place, such as the function of the project manager itself, which means that there are people responsible for managing the progress of projects. In Mindera, on the other hand, innovation management is completely unconscious most of the time. There isn't a registration of measurements, they utilize the agile methodology supported by situation reports that help the team keep track of the project's organization.

Here, with Mindera's way of measuring innovation, it is possible to relate it with the theory previously exposed in the literature review, more specifically the theory of the SPI and the QGM model by Börjesson, Baaz, Pries-Heje, and Timmerås (2007). In their core, they are following the same metrics as the QGM model - they ask questions, they establish goals and they follow up with reports.

Critical Manufacturing is a bit more pragmatic with their innovation measurement methods, and thus can be related to the theory established previously by the author Berntsson Svensson (2017), where they believe that innovation measurement should take place at a team level, which is compatible to what Critical Manufacturing is currently doing.

4.2. INTERNAL AND EXTERNAL COMMUNICATION

On the matter of leadership and innovative behavior, there are some similarities between the companies. A lot of responsibility is given to the teams and everyone has the feeling of inclusiveness when working alongside others. However, the horizontal and vertical aspects of leadership start to emerge when we delve into how the tasks are organized and how the team communicates.

Starting with Mindera, the company's values and ethics reflect on how everyone connects during a project. The fourth interviewee, on the topic of communication, shared how much of Mindera depends on human relations and communication processes between employees. There are no constraints to coworker communication, and the company has no control over it either. Through communication workshops, everyone that has been working in Mindera for a while incentives newcomers to share all of their ideas, opinions, and critiques, not holding back. They believe every perspective is helpful to innovate on the project they are working on, even if it means disagreeing with someone's point of view. But there is a major problem happening with this notion.

Because this is a foreign concept to most newcomers, and because the company's way of working and socializing isn't what some would describe as "normal", more often than not they are holding back their opinions with the mentality that if they disagree, they would be offending the other person, and since they are new, their word isn't as valuable as others.

This happens even during projects, and as the fourth interviewee expressed, she was dealing with exactly this in a project she was involved in. She couldn't get everyone on the same page when it came to communication - so to say, there was barely any communication between the team members. This also extended towards communicating with the client - maybe they weren't as connected with the client throughout the project because the problem was starting within the team itself. When asked if this affected the concretization of the project itself and the accomplishment of tasks, the interviewee argued that it didn't. It was only affecting the enjoyment of doing the tasks, which meant that the task was being performed more individually and less collectively as they should.

This wasn't necessarily underlined as a problem in Critical Manufacturing. Communication was very standardized; from the moment the contract was signed with the client to the moment the project was delivered. On the contrary to Mindera, Critical Manufacturing's service

department is constituted by a larger number of employees - 4 general programs aggregate almost 70 people at the moment, and inside each program, there is a Project Manager that communicates with the client.

But some similarities start to appear when delving into how the tasks are monitored and how the team manages reports and deliveries. For example, both Mindera and Critical Manufacturing go through a session with the client where they underline strategies such as Scope and Time of the project. Although, as a side note, Critical Manufacturing described their strategy session as Quality, Scope and Time versus Mindera that described it as Scope, Time and Cost. In the core of the matter, they both underline the most important characteristics of the project first.

In Mindera, the first session with the client is done with the client itself, Mindera's Developers, Account Owner(s) and Product Owner(s). In 3 to 6 hours, a proposition for the project is presented and everyone starts working on it. In Critical Manufacturing, however, the contract is made with the second interviewee and the client itself, not with the team directly.

More so, both companies are quite different in the way they communicate with the client during the concretization of the project. In Mindera, everyone on the team is free to communicate with the client according to their functions, or in other words, the Developers are free to communicate with the client about code or the Account Manager can communicate with the client to report on the project's scope. In Critical Manufacturing, communication with the client is done through a Project Manager, which has the functionality of establishing a bridge between the team and the client.

We can see that the structure applied by Critical Manufacturing came about because of their expansion and because the second interviewee admitted to the company's necessity to control the processes by dividing the teams between programs, for example. For now, Mindera doesn't seem to be experiencing that need, but as time goes by, it becomes harder to get everyone aligned, especially when it comes to communicating with the client.

The need for a Project Manager in Critical Manufacturing was because multiple projects were undergoing for the same client, so the client couldn't have every team member with questions and news coming to them during the weeks or months the projects were happening. Culminating this task to only one person per program assured that the communication became clear and straightforward, avoiding the chances of confusion.

4.3. MEASURING INNOVATIVE BEHAVIOUR, PROCESS INNOVATIONS AND IMPROVEMENTS AND COMPANY RECEPTIVENESS

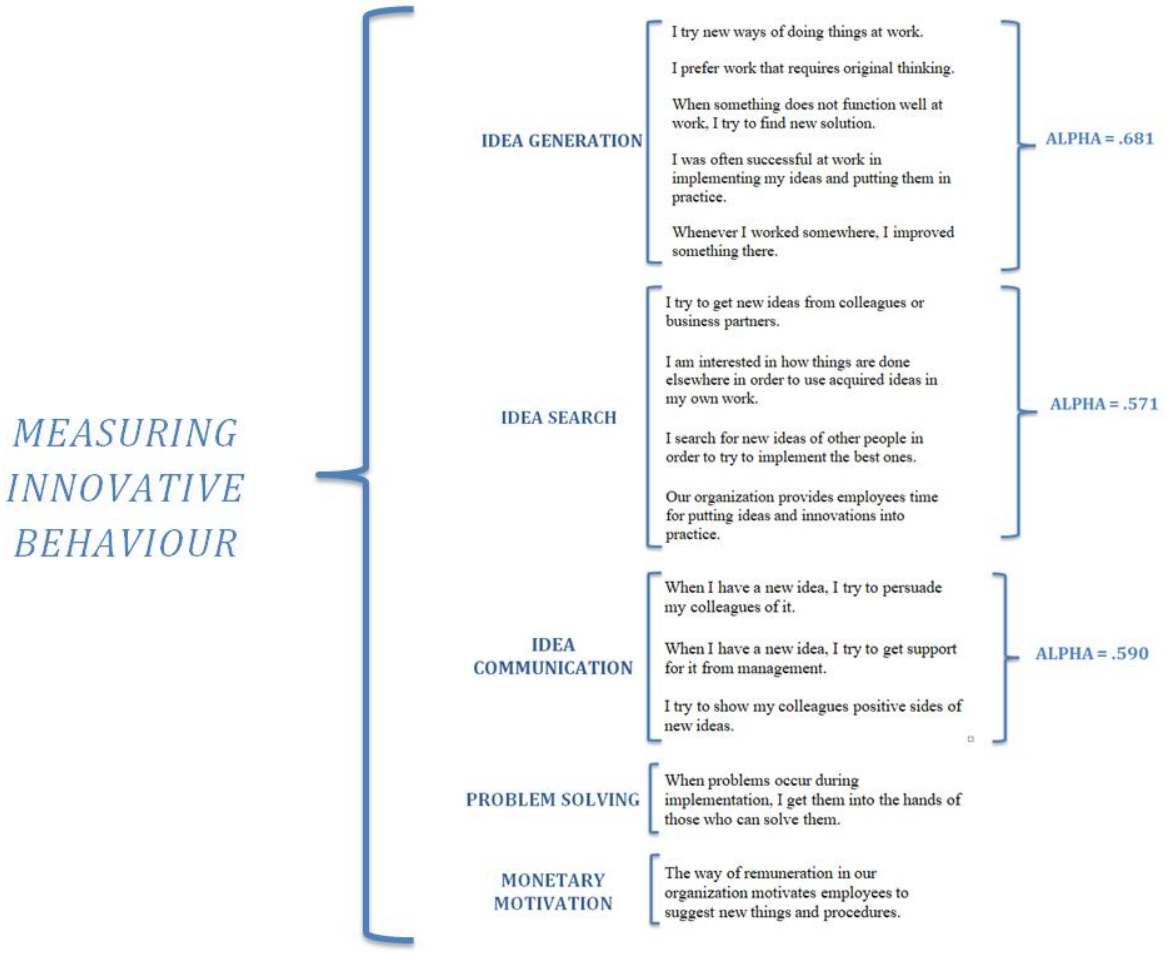
In line with the affirmations and consequent responses obtained from employees of both companies and considering that most data collected was composed as ordinal variables in SPSS, there was a need for organizing all variables into groups to make statistical analysis possible.

Therefore, each theme involving each group of affirmations was divided into subgroups that represent thematic in common with each variable. After that agglomeration, a test for reliability was performed on the subgroups to attest to the capability of usage of the subgroups to represent what they are trying to measure.

This agglomeration of variables was also performed in Lukes & Stephan (2017)'s study, where they utilized the variables to measure employees' innovative behavior. As their scale was previously scientifically proven and applied in their study, some of the affirmations constructed by the authors were utilized in the survey conducted in this study. And consequently, some of the agglomerations they did also reflected onto agglomerations made for this study.

For instance, the first theme in the survey was deemed as a way to measure innovative behavior, much like Lukes & Stephan (2017) did with their study. However, because the focus of the study was solely dependent on measuring innovative behavior and the premise of this study goes beyond that, the division of subgroups deviated from what the authors originally did. Therefore, the variables were divided into 5 subgroups instead of being divided into 10 subgroups, as the authors did. The figure below represents the list of variables that correspond to each subgroup and the subsequent results of the Cronbach's Alpha Reliability Test.

Figure 6 - Cronbach's Test for Reliability of Theme "Measuring Innovative Behavior"



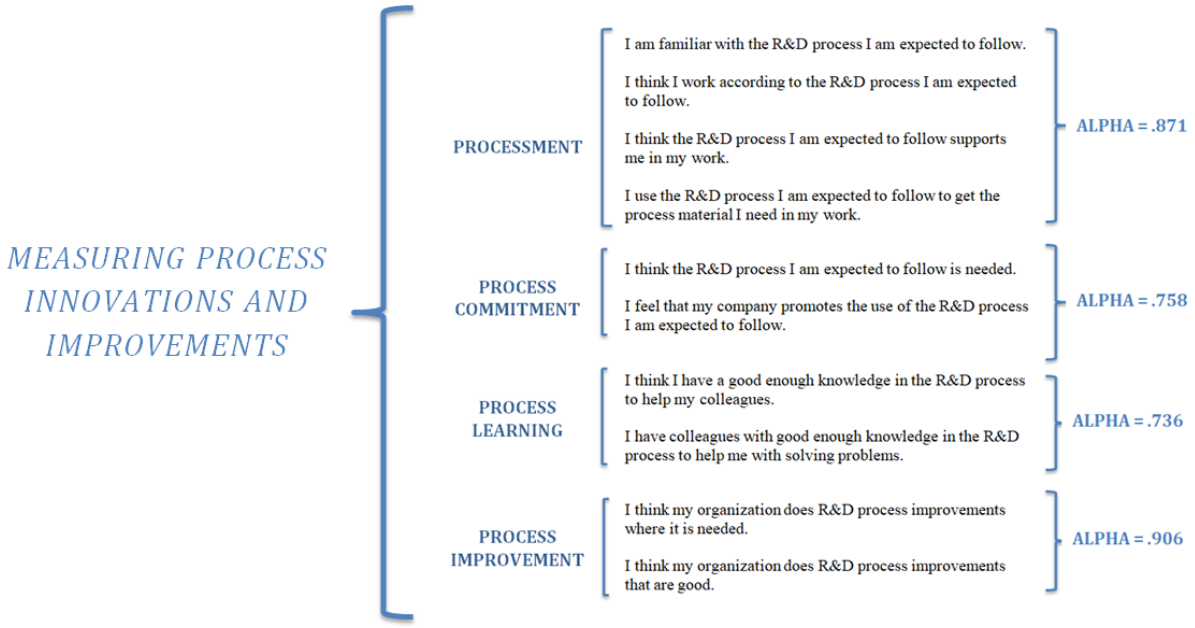
After obtaining the results for the alpha correspondent to each group, the conclusion reached was that it would be best to analyze their variables individually using non-parametric tests. The alpha results, even though they were not undermining the resulting analysis, were sufficiently low compared to other subgroups that will be presented next, that the non-parametric tests became a better option.

The second theme of the survey was constructed using the variables utilized by the authors Börjesson, Baaz, Pries-Heje & Timmerås (2007), where they focused their study on measuring process innovations and improvements, which is the resulting title of the second theme of the survey. Even though the authors utilized the GQM model previously discussed in the literature review chapters to analyze their data, for this study in concrete, the focus was not on analyzing the variables with the finality of reaching conclusions over process improvements and innovations alone. Therefore, another round of aggregations was performed to include in other

types of analysis, in line to study the effects of leadership in process innovations and improvements.

And thus, unlike this first round of results, the second group under the theme of measuring process innovations and improvements proved to have substantial results of reliability, making these subgroup representative of what they are intended to measure. The following figure presents in a compacted format the variables corresponding to each subgroup and, yet again, the consequent Cronbach's alpha values.

Figure 7 - Cronbach's Test for Reliability for Theme "Measuring Process Innovations and Improvements"



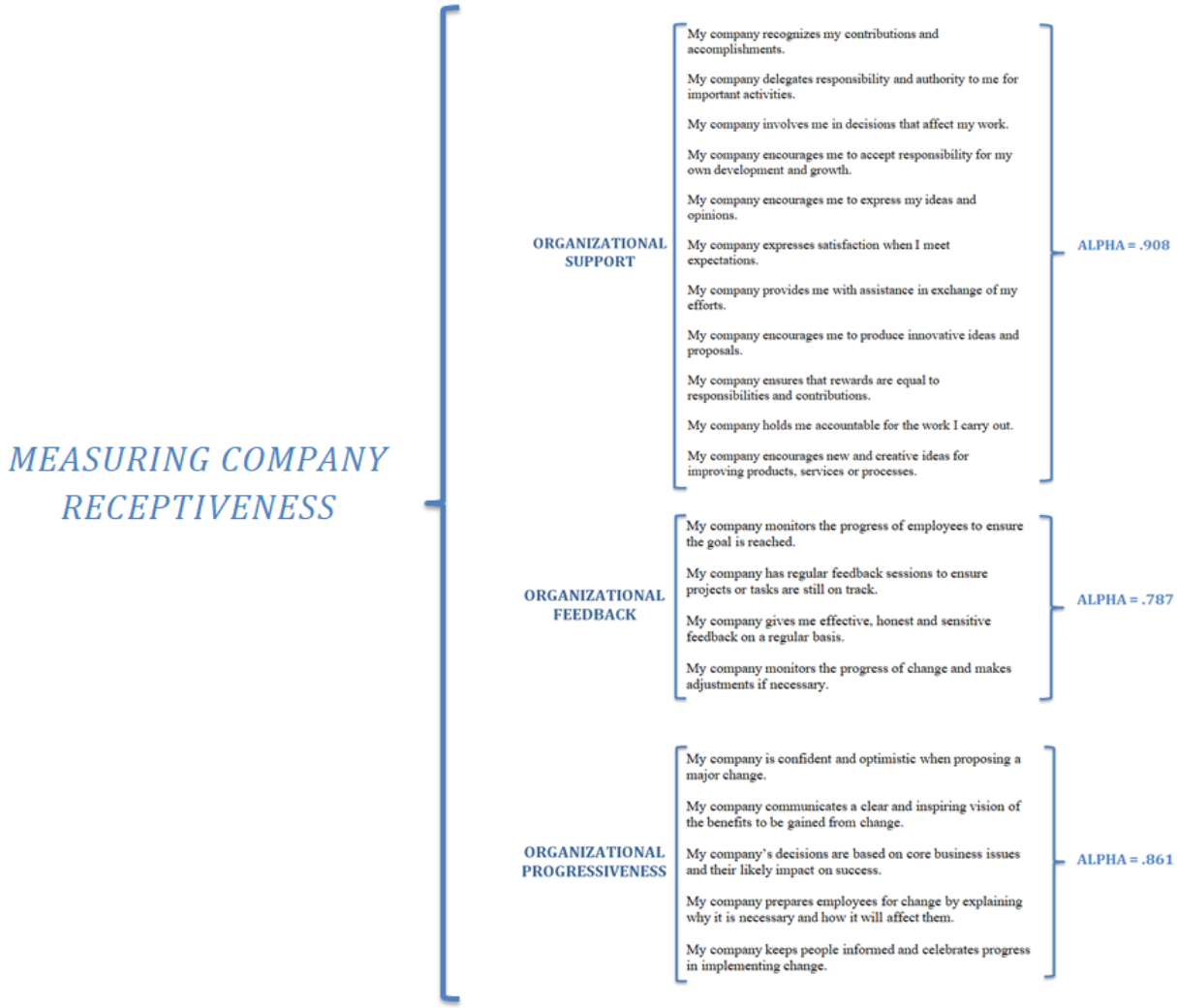
And finally, the last conglomerate of variables derived from the doctoral study performed by Brynard (2018), where the author developed a leadership behavioral scale that contained variables utilized in the survey. In the author's study, many scales were constructed and tested for the objectives of their research, but what was relevant for this study and the survey were the variables related to the dimension the author deemed as Change-Orientated behavior of a leader and Change Leadership. Taking some of the author's variables as a guide, new variables were also formulated to complete the needs for this study in particular.

Another change performed on the author's variables was the subject of the affirmation. The author utilized the expression of "My Leader", whilst in this study, and after consultation with

the companies in question, the expression of "My Organization" was deemed more appropriate and inclusive of both company's situations on the topic of leadership.

As such, even though the author did not perform this in their study, the variables were grouped in 3 other subgroups, where again, the results for the Cronbach's test for reliability were sufficiently representative of what they were supposed to measure. The figure below is the final conglomerate of variables into subgroups under the theme of measuring a company's receptiveness.

Figure 8 - Cronbach's Test for Reliability of Theme "Measuring Company Receptiveness"



As previously mentioned, the first theme of the survey was to be analyzed utilizing non-parametric statistical tests, and as such, a Mann-Whitney Test was performed on all 14 variables. For this test, the null hypothesis is that there is no difference in innovative behavior between the employees of Mindera and of Critical Manufacturing. The following graph presents the results obtained.

Table 8 - Mann-Whitney's U test for Comparison of Mean Distribution[1]

	Mann-Whitney U	Sig. (2-tailed)
I try new ways of doing things at work.	1,044,000	,020**
I prefer work that requires original thinking.	1,264,000	,469
When something does not function well at work, I try to find new solution.	1,239,500	,346
I was often successful at work in implementing my ideas and putting them in practice.	1,287,500	,587
Whenever I worked somewhere, I improved something there.	1,333,000	,830
I try to get new ideas from colleagues or business partners.	1,070,500	,033**
I am interested in how things are done elsewhere in order to use acquired ideas in my own work.	1,267,000	,509
I search for new ideas of other people in order to try to implement the best ones.	1,325,500	,785
Our organization provides employees time for putting ideas and innovations into practice.	768,000	,000*
When I have a new idea, I try to persuade my colleagues of it.	1,282,500	,577
When I have a new idea, I try to get support for it from management.	855,000	,000*
I try to show my colleagues positive sides of new ideas.	1,340,000	,865
When problems occur during implementation, I get them into the hands of those who can solve them.	1,224,500	,356
The way of remuneration in our organization motivates employees to suggest new things and procedures.	1,263,000	,495

*Distribution mean is significant at the 1% level; **Distribution mean is significant at the 5% level.

As expected, both companies share agreeance to certain affirmations that show how dynamic and fluid the teams are in both companies. From the interviews themselves, it was possible to start understanding that the teams were comfortable with their own capabilities and with the way their company works, and this reflects on their innovative behavior.

1 Non-parametric tests were used to compare the cumulative distributions across groups. Mann-Whitney's U with standardization to Z were used.

Both groups of employees appear to have the capability for problem solving[2], are quite confident they are able to make improvements in the company they work at[3], are interested and aware of new ideas appearing around them[4], and finally, are communicative when they have a new idea or improvement proposition[5], alongside other shared perspectives on innovative behavior.

On that note, for 10 out of the 14 variables, the null hypothesis was accepted, which leaves 4 variables with significance values capable of rejecting the null hypothesis. The first variable is "I try new ways of doing things at work.", which is significant at the 1% level. After performing a frequencies test, splitting the results by company, the mean response for Critical Manufacturing employees was of 4.1379 and the mean response for Mindera employees was of 4.3830. Even though the means are very close to each other, there is still a clear difference between them, which indicates in favor of Mindera employees agreeing more to the fact that they get liberty to try new things at work, something that is very incentivized by the company's work ethic. Even though Critical Manufacturing employees also agree that they have that liberty, Mindera's whole premise is to give employees the space to do what makes them feel content, especially when it comes to work-life dynamics.

For the variable "I try to get new ideas from colleagues or business partners.", which is significant at the 5 % level, the means that accompany this relation translate another very close proximity between each company's employees' responses. The mean of responses for Mindera employees is of 4.5745 and for Critical Manufacturing workers is of 4.3448. Yet again, there is a small difference, but it's still a difference, nonetheless. In means of interpreting the means in correlation with the Mann-Whitney U test results, it is possible to affirm that Mindera employees are in more agreeance to the fact that they search for inspiration and new ideas for their own from other sources. This could refer back to the communication topic above explored, but it does seem that communication flows well in both companies, and thus, the capability for sharing ideas is very present in both work environments in general.

2 For the affirmation "When something does not function well at work, I try to find new solution." the response mean for Mindera was of 4.6596 and the mean for Critical Manufacturing was of 4.5690.

3 For the affirmation "Whenever I worked somewhere, I improved something there." the response mean for Mindera was of 4.1915 and the mean for Critical Manufacturing was of 4.2586.

4 For the affirmation "I am interested in how things are done elsewhere in order to use acquired ideas in my own work." the response mean for Mindera was of 4.000 and for Critical Manufacturing was of 3.9138.

5 For the affirmation "I try to show my colleagues positive sides of new ideas." the response mean for Mindera was of 4.2766 and for Critical Manufacturing was of 4.2931.

The third variable to prove significant in the Mann-Whitney U test above presented is “Our organization provides employees time for putting ideas and innovations into practice.”, which is significant at the 1% level. When looking at the means for both companies, there is a very noticeable difference between them. Mindera’s response mean is of 4.0000, whilst Critical Manufacturing’s response mean is of 3.2241. In this case, there is a very prominent and important discrepancy between mean responses.

This could be an effect of the agile methodology adopted by Mindera in contrast to Critical Manufacturing’s more structured methodology in terms of working on projects with clients. As seen in the previous chapters, both companies utilize Scope and Time (concepts they have in common alongside others, specified before), but the influence in the response mean of this variable could have to do directly with the fact that communication between team members and clients is way more direct compared to how that communication works in Critical Manufacturing. More so, while Critical Manufacturing has teams working on multiple projects for one client at a time, Mindera doesn’t seem to do the same. The sheer dimension of both companies, when compared to one another, could be influencing the responses for this variable. Because Critical Manufacturing is older and bigger (in terms of how many employees they have), time for experimenting with ideas could be more limited.

And finally, the last significant variable out of the Mann-Whitney’s U test is the variable “When I have a new idea, I try to get support for it from management.”, which is significant at the 1% level. Here, the response mean was to be expected, even though Mindera employee’s responses were still in higher terms than expected, taking into consideration how the company works. The response mean for them was of 3.2766, and the response mean for Critical Manufacturing was of 4.0172. As expected, Critical Manufacturing workers agree with the fact that most of their new ideas have to go through someone that has the capability to judge and approve them somehow, whilst in Mindera, the mean response fell onto the undecided option, which could mean they may run the idea by someone with administrative functions or simply run it by other employees.

On another note, parametric tests were performed on the subgroups of variables that were previously established as having a strong enough alpha value to measure what it was intended that they measure. For this analysis, a T-Test for Independent means was performed, and the following table represents the results gathered.

Table 9 - T-Test for Independent Means on Process Innovations and Improvements measurement subgroups and Company receptiveness measurement subgroups[6]

		Mean	Std. Deviation	t(1)
Processment	Critical Manufacturing	14,0517	3,10869	-1,423
	Mindera	14,8298	2,32490	
Process_Commitment	Critical Manufacturing	7,1207	1,66573	-0,508
	Mindera	7,2766	1,42497	
Process_Learning	Critical Manufacturing	7,5345	1,68810	-0,816
	Mindera	7,7872	1,42853	
Process_Improvement	Critical Manufacturing	7,2414	1,96737	-1,167
	Mindera	7,6596	1,63224	
Organizational_Support	Critical Manufacturing	43,8621	7,25585	**-2,529***
	Mindera	47,0851	5,40060	
Organizational_Feedback	Critical Manufacturing	15,9483	3,08034	**2,935****
	Mindera	14,1915	3,01185	
Organizational_Progressiveness	Critical Manufacturing	19,5172	3,93474	-0,902
	Mindera	20,1277	2,72362	

** The difference between the means is significant at 1%; * The difference between means is significant at 5%

Firstly, the null hypothesis and the alternative hypothesis were stipulated, which underlined that the null hypothesis would represent that the two company's means were equal and, on the other hand, that the alternative hypothesis would represent that the two company's means are not equal.

On this note, two subgroups presented results with good levels of significance, and thus that were able to reject the null hypothesis - Organizational Support and Organizational Feedback. Starting with Organizational Support, we describe this group as a way to measure the employee's perspective on how the company interprets their efforts and how they are incentivized by the company's actions to keep improving themselves and their work. In other words, it measures the capacity the companies have to motivate and empower their employees. As seen in the mean values, Mindera has a higher mean, which could translate into the possibility of their employees feeling like they are well supported and empowered in their

6 Parametric tests of comparison of two independent means were performed under the assumption of homogeneity of variances (Levene statistics with p>0.05 for all pairs of means)

company, and thus, they feel like what they do impacts the company positively, making them want to improve themselves to consequently improve their company.

On the other hand, the mean result for Organizational Feedback is higher in Critical Manufacturing. This subgroup is meant to represent how the employees perceive their company's capacity to communicate their vision and objectives with them, and also how well does the company, in their opinion, keep track of progress and monitor projects through efforts such as having feedback sessions.

As per the value of the mean, employees at Critical Manufacturing believe that their company does a great job at tracking, monitoring, and providing feedback, which is something to be expected from this company, at this point. In Mindera, it has been possible to understand that there isn't much influence from the founders or administrative personal to keep tabs on those details since everyone is incentivized to do it amongst themselves freely and as they see fit. At Critical Manufacturing, however, there is a more structured process and employees feel like they are more monitored in comparison with Mindera employees. They are still free to give and receive feedback as needed, but there is a clear difference between the two companies.

5. ORGANIZATIONAL INNOVATIVENESS AND LEADERSHIP EVOLUTION

5.1. COMPANY COMPETITIVENESS AND SCALABILITY OBSTACLES

The topic of competitiveness was also something that went hand-in-hand when looking at literature about the effects of leadership in innovativeness. When asked about how Critical Manufacturing was competitive, the first interviewee enhanced the company's capacity to always be on the look-out for new opportunities for innovation, specifically for radical innovation. They are eager to improve whatever is already on the market or, even, to follow-up on a technological trend that is yet to be explored and isn't yet recognized by the market as being something they need. He even goes to say that the current national software market is on its' best phase yet and that the prosperity in job offers and recruitment is what is driving the competitiveness of the software market segment.

They are very selective with who they hire and with who they want to work with, and that selectiveness is what is driving them towards more and more innovation. And on the topic of people, the second interviewee follows up with the argument that what makes Critical Manufacturing competitive is the fact that it provides its employees with resources to always be better. He believes that they understand best the internal and external situation of the company because they give their employees the trust and the space to innovate and explore, which translates into making sure everyone has access to resources.

The second interviewee also goes on to mention that, in his professional opinion, what drives a company's competitiveness ability is the employee's motivation. Employees want to always improve and do better if they feel like their needs are being met and that their voices are being heard. This focus on the wellbeing and the preservation of personal interests of their employees gives Critical Manufacturing the perfect environment to be competitive in. More so because, as both the first and second interviewees mentioned, they are quite free of national competition, and their outlook on competitors is always turned to the international sphere. This does have an impact on aspects such as the realm of opportunities for the company, because they are in the midst of everything and everyone that is innovative, which drives them, every day, to improve their current ways.

On the same note as the interviewees from Critical Manufacturing, both the third and fourth interviewees talk about how beneficial and influential self-organization in Mindera is for their

stance on the competitive market. The concept of Self Organization is described as something that is supported by the people's autonomy and by the consequent inexistence of bosses and power hierarchies.

More so, the third interviewee argues that the fact that Mindera employees are incentivized and free to create and be creative is what gives the company the amazing capacity of attracting clients. Their client base, even though they might not fully understand Mindera's ethic and core message in its entirety, feel very connected to the way that people work in the company. Clients see the employee's motivation as something beneficial to their own companies, and thus, it is possible to affirm that Mindera stands out from the crowd because of their uniqueness.

As it is also explained, Mindera, much like Critical Manufacturing, works very hard on improving themselves to be better than they were yesterday, in the words of the third interviewee. And alongside this, she also points out that what matters to them is for them to surpass themselves and not to try and surpass their competitors, which again, are predominantly international.

And with this, the fourth interviewee leads the conversation into a bridge between competitiveness and company growth. She does not see how growing in size equals to being more competitive. She believes that Mindera will continue to be competitive in ways other than growth, such as involving themselves in more challenging projects with their clients or future clients. Competitiveness, in her perspective, can come in multiple different formats, and because Mindera is still trying to figure out how they will deal with expansion, they will bet on being competitive through those other formats.

The topic of Mindera's future expansion was also brought up in the interviews with Critical Manufacturing's interviewees. The first interviewee, firstly, as someone who has friends working in Mindera but isn't too knowledgeable on the culture and specific aspects of Mindera, was left with doubts about their future scalability. His way of explaining why he questions how scalability will work for Mindera is based on the fact that, as a group strays from homogeneity - such as there being employees with much more experience than others - the feel for each other's responsibility starts to also stray. In other words, in a group of 10 employees, it was clear that if someone took on the responsibility for a task to be completed by the end of the week, it was going to be done; but, in a group of 30 employees, the necessity for management and for someone to give clear indications and deadlines starts to appear because there are too many people in between the objective and the task could start to blend and get confused.

In response to this, the third interviewee confesses that they have taken the first steps into making alterations to deal with the company's scalability. Those steps involve creating an organization that needs its founders less and less. On the topic of how they are going to do this - how they are going to detach the founder's responsibilities and extend them to the organization instead - is by growing from the inside. In other words, she explains that by giving employees with experience, knowledge, and passion on Mindera's culture the responsibilities that the founders and the administrative personal currently have, they will be able to deal with their need to employ more and more people.

This is to say, those who are already on board with Mindera's work ethic, culture and core objectives, will be handed more responsibility, whilst those who are just now being hired will be handed less of that responsibility - which can be seen as the starting equivalent of the previously mentioned concept of self-organization. As they grow in the company and with the company, their responsibilities also grow.

Mindera's scalability will always be related to the incentive of personal growth inside the company, never with hiring specific people for the specific job of having responsibilities. This keeps them grounded and concise in culture because the people are also growing with the company. They have applied this strategy on the 5 years of growth they have experienced - they went from 5 to 350 employees in those 5 years alone. If this strategy is still applicable for the next 5 years, is something only time can tell.

6. DISCUSSION

At this point, it is possible to go back to the underlined research question and hypothesis that were representative of the core of this study and give them an explanatory response. As before stated, the research question was: What are the effects of leadership and organizational structures overall in a horizontally structured software development company and a vertically structured software development company innovativeness?

There are multiple effects to be expected when looking at a vertically structured software company and a horizontally structured software company. For starters, both are software companies, which means they work horizontally in one way or another - teams are based on projects, and each project is empirically conducted horizontally. But there are no project managers in Mindera as there are in Critical Manufacturing, as well as there being no intermediary between the client and the team, as again, there is in Critical Manufacturing.

Thus, the identification of the effects can start here - there is more monitorization in a vertically structured software company such as Critical Manufacturing compared to Mindera. Monitorization does not mean being controlling, and as the employees of Critical Manufacturing have shown with their input on Organizational Support, they find it beneficial to their capacity to innovate. This translates into the verification of Hypothesis 1: The Vertically Structured software development company has lenient innovation measurement methods.

Alas, the fact that Critical Manufacturing has this structuration and utilizes support systems that are more aware of their employees' actions and capabilities does reflect on their innovation measurement methods. There isn't a way of measuring per se, but there is more leniency to the way innovation is perceived. We have witnessed this before when Critical Manufacturing works alongside other companies in communitarian programs. Innovation is being put into practice, and thus, being somehow measured, even if as to say they are radically innovating at that moment.

In Mindera, however, the process is organic and natural. There are moments of risk-taking with Mindera and their projects, but in Critical Manufacturing, their times of radically innovating involve stepping so far into a technology trend that it becomes uncertain if the risk is going to be worth it.

This leads to Hypothesis 2, that said: The Horizontally Structured software development company generates more churn for innovation to be applied in projects. This can be denied with confidence. Just because Critical Manufacturing has more capabilities in terms of financial support, for example, to radically innovate, it does not in any way mean that Mindera is less innovative or that it has less of churn for innovation in their projects. Both Critical Manufacturing and Mindera are incredibly innovative in what they do, and part of that innovativeness is their perseverance in the market for being unique. Mindera is innovative in ways that Critical Manufacturing isn't, and vice versa and both can be unique in the same way. Mindera's ethic and values are innovative, Critical Manufacturing's vision of the future is innovative, for example.

Does this influence employee empowerment? Absolutely. Hypothesis 3 stated: The perception of employees over empowerment and support for innovation and idea generation has a positive relationship with organizational innovation. And indeed, this can be confirmed. The more empowered the employees feel, the more the company is innovative. This can be confirmed with the interview specifically with the second interviewee, where he explained that Critical Manufacturing was innovative because they cared so much about each employee and provides them with the resources, they need to be creative and innovative.

This is also supported in Mindera, where the whole premise of the company is to empower their employees and make them feel part of a whole. Therefore, without any doubt, this Hypothesis is clear as being one of the most prominent effects on a company's innovativeness. And on that note, Hypothesis 4 is also in agreeance with the conclusion reached in Hypothesis 1, because is stated that Vertical leadership structures are more efficient at innovation management. As before argued, the structuralizing help with measuring, and thus, it also influences management. In a way, one influences the other.

Having structure does influence the company's capacity to manage, which in turn differentiated them from their competitors, as seen in previous chapters in the literature review. In this case, it was more apparent that Critical Manufacturing has a very clear notion of where they stand in the market and where they want to go next. Perhaps this topic wasn't as well developed in interviews with Mindera employees but managing innovation doesn't seem to be a focus they have. But in consequence, this topic also gives uncertainty to Mindera's stance on Hypothesis 5, which is that Companies that take more consideration to manage innovation are more competitive.

Indeed, through the literature review performed, some authors agreed with this hypothesis. And when looking at Critical Manufacturing, we know for sure that they have a clear knowledge of their position and their competitor's position, which is an effect of managing innovation. But in Mindera, the question wasn't made clear.

Competition is something that both companies identify as being internationally located more so than nationally, which does clarify the understanding that both companies have the capabilities to position themselves. Although, we could see Mindera not managing their innovation in such a pronounced way as Critical Manufacturing, and yet still being highly competitive mainly because of the attraction clients feel towards their unique structure.

Thus, it could be argued that managing innovation isn't the only factor to influence competitiveness, and in Mindera's case, their values and ethics could be a factor to consider on their competitiveness.

7. LIMITATIONS OF THE STUDY

The biggest limitation of this study was the number of answers gathered from the survey. The total count of respondents came to 105, being that 58 respondents were employees of Critical Manufacturing and 47 respondents were employees of Mindera. Even though the amount of data is enough to perform statistical tests with confidence, it would still be ideal to get insight from more employees. There was an influence on time restrictions that caused the survey to not be available for as long as desired and there were also some minor issues with getting a larger amount of people to answer the survey.

8. CONCLUSIONS

Innovativeness in software companies is indeed influenced by leadership, and it is safe to assume that it is one of the most decisive factors that distinguish innovative companies. As previously seen, the segment related to software is quickly growing in terms of size and quality, with companies appearing with new ways of innovating and with ambitions. Critical Manufacturing is a company with a lot of history, and thus, with a lot of knowledge about themselves, the market and the future.

They are innovative because they think ahead and because they take risks, whilst at the same time maintaining a success formula of incremental innovation that has worked since the beginning of the company. They are paving the way for technological trends that aren't yet explored, and they can do that because they are well versed in the understanding of their employees.

And Mindera is alike in that sense, and yet, clearly unique. They are so unique that clients want to work with them because they are interested in their work ethic and they see the employees so motivated and stimulated to be creative and different that, even if they don't understand the whole premise, they want to be a part of it.

This is something we can correlate to what authors who wrote about leadership have already formulated. If the employees feel that their company is paying them the respect they want and need, while giving them the resources they want and need to improve their work, they will strive to improve their work. If they feel oppressed, watched and controlled, likely, that company won't have the same innovation churn or even the same competitiveness as Critical Manufacturing and Mindera have.

Although, when it comes to managing that innovation, the conclusion can also be brought back to what authors have said about innovation management - some verticality and control is beneficial to a company's innovation management and measurement capacity. Even if they don't have a model or metrics to do so, they are constantly making sure that they reach certain milestones that boost their innovativeness. More so, this management capacity is put into practice a lot when Critical Manufacturing participates in community projects, as aforementioned.

Mindera does let the responsibilities set in individually with each employee, and when working in teams, everyone is clear on their tasks and the objectives. But innovation in Mindera is different from innovation in Critical Manufacturing, even if slightly.

The whole doubt for the future and this can be seen as a suggestion for future studies, is if this horizontality can be maintained long-term. We have discussed previously that Mindera is taking the steps to create responsibilities with experienced employees to control at least as much as possible future expansion problems. But, without leadership, these responsibilities and the advice that these people will give can be interpreted as just a suggestion and not an affirmation.

In Critical Manufacturing, expansion is going to bring some challenges, as it is natural; but their way of dealing with it is by getting people to reach new functionalities in their work, and by giving them authority and capacity to assert certain aspects of leadership. Mindera wants to stray away from this as much as possible, which may influence the company's growth at some point, or it might not.

Mindera puts a lot of trust into the people they hire to work for them, and they search for like-minded people to make sure everyone is on the same page. But while that was easy in the first few years, there will be more discrepancies in perspectives in the upcoming years, because people are the hardest beings to be understood and judged.

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ANNEX A

SURVEY

Theme 1 - Measuring Innovative Behavior

Introduction - The following theme will be devoted to a set of statements whose scope is based on your innovative behavior in day to day. It is intended, by answering honestly to the following statements, to draw conclusions about your relationship with your work and your company. Thinking about your professional experience in your company, identify in the scale your degree of agreement with each statement.

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
I try new ways of doing things at work.					
I prefer work that requires original thinking.					
When something does not function well at work, I try to find new solution.					
I try to get new ideas from colleagues or business partners.					
I am interested in how things are done elsewhere in order to use acquired ideas in my own work.					
I search for new ideas of other people in order to try to implement the best ones.					
When I have a new idea, I try to persuade my colleagues of it.					
When I have a new idea, I try to get support for it from management.					
I try to show my colleagues positive sides of new ideas.					
When problems occur during implementation, I get them into the hands of those who can solve them.					
I was often successful at work in					

implementing my ideas and putting them in practice.					
Whenever I worked somewhere, I improved something there.					
The way of remuneration in our organization motivates employees to suggest new things and procedures.					
Our organization provides employees time for putting ideas and innovations into practice.					

Theme 2 - Measuring Process Innovations and Improvements

Introduction - The following set of statements serve to demonstrate your degree of involvement and knowledge in your company's R&D processes. It is intended, with your answers, to gather knowledge about how your company conveys its goals and values to its employees.

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
I am familiar with the R&D process I am expected to follow.					
I think I work according to the R&D process I am expected to follow.					
I think the R&D process I am expected to follow supports me in my work.					
I use the R&D process I am expected to follow to get the process material I need in my work.					
I think the R&D process I am expected to follow is needed.					
I feel that my company promotes the use of the R&D process I am expected to follow.					
I think I have a good enough knowledge in the R&D process to help my colleagues.					
I have colleagues with good enough knowledge in the R&D process to					

help me with solving problems.					
I think my organization does R&D process improvements where it is needed.					
I think my organization does R&D process improvements that are good.					

Theme 3 - Company receptiveness

Introduction - Finally, this third set of affirmations will cover the subject of how your company receives your work and effort, and how it encourages you daily to want to be better. Your answers to the following statements will allow to gather knowledge about the type of value that your company attributes to its employees.

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
My company recognizes my contributions and accomplishments.					
My company delegates responsibility and authority to me for important activities.					
My company involves me in decisions that affect my work.					
My company encourages me to accept responsibility for my own development and growth.					
My company encourages me to express my ideas and opinions.					
My company expresses satisfaction when I meet expectations.					
My company provides me with assistance in exchange of my efforts.					
My company encourages me to produce innovative ideas and proposals.					
My company ensures that rewards are equal to responsibilities and					

contributions.					
My company monitors the progress of employees to ensure the goal is reached.					
My company has regular feedback sessions to ensure projects or tasks are still on track.					
My company gives me effective, honest and sensitive feedback on a regular basis.					
My company holds me accountable for the work I carry out.					
My company encourages new and creative ideas for improving products, services or processes.					
My company is confident and optimistic when proposing a major change.					
My company communicates a clear and inspiring vision of the benefits to be gained from change.					
My company's decisions are based on core business issues and their likely impact on success.					
My company prepares employees for change by explaining why it is necessary and how it will affect them.					
My company keeps people informed and celebrates progress in implementing change.					
My company monitors the progress of change and makes adjustments if necessary.					

ANNEX B

INTERVIEW GUIDE

Theme 1 - Characterization / Contextualization

- Please tell me about the company's products and services.
- Please tell me about your position and functions in the company.

Theme 2 – Innovation

- What do you understand as being innovation?
- How do you know that you and your company are innovative?
- How do you measure the team's innovative capacities? Do you utilize any metrics to do so?
- What do you consider to be possible to measure in innovation?

Theme 3 – Competitiveness

- What distinguishes your company, in terms of innovation, from other companies in the same industry?
- What are the reasons that make the company implement changes?
- How does the company implement those changes?
- Who do you identify as being the company's main competitors?
- How are your products and services different from theirs?
- How does your company's innovative capacity influence your competitiveness in the market?

Extra questions for Mindera interviewees only.

- What do you think makes Mindera a unique and different?
- How does communication work between employees?
- How does communication work between employees and your clients?
- What type of clients do you have?
- What is your opinion towards the current state of the company in terms of the quantity of employees you have? What do you think would happen if Mindera hired twice as many workers?
- What is your opinion on the company's size and type of leadership?