



Remote Work and Entrepreneurial Orientation in Startups created under Crisis Scenarios

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ABSTRACT

Crisis environments, such as the one posed by SARS-CoV-2 outbreak, have disrupted many businesses across the world. Other businesses, however, were born from emerging markets fostered by the pandemic. Healphant is a Portugal-based telemedicine startup that was born against all odds amid the SARS-CoV-2 pandemic crisis solely recurring to remote work tools.

The current work was inspired by Healphant due to both its entrepreneurial results and effectiveness in dealing with remote work practices.

Entrepreneurial Orientation (EO) - a widely studied construct linked to business performance - of startups developed under such crisis environments is at the core of this work. To assess the EO of startup firms, a research model based on the framework of (Covin & Slevin, 1989) was built in Smart PLS 3.0 software. The software runs based on Partial Least Squares Structure Equation Modelling method. The model input data was gathered in line with the survey results of 35 Portuguese startups. Results suggest that two crucial factors should be considered when developing a startup under crisis scenarios: the willingness to make large and risky resource commitments and the tendency to engage in and support new ideas, experimentation and creative processes.

Given the novel transition to remote work by many firms under the SARS-CoV-2 crisis scenario, the impact of remote work apps in the EO of startups was also studied. To assess this, a multiple-case study of 13 Portuguese startups founded during the crisis scenario prompted by SARS-CoV-2 was conducted. The case study analysis was based on a pattern-matching procedure. Results suggest that communication platforms were reported to be the ones with the highest influence on the EO of startups and that some organizations may successfully make the transition towards a remote work paradigm with productivity gains.

KEYWORDS: Crisis, Entrepreneurial Orientation, Telemedicine, Startup, Remote Work, SARS-CoV-2

RESUMO

Cenários de crise, tais como o despoletado pelo surto de SARS-CoV-2, impactaram muitos negócios em todo o mundo. No entanto, alguns negócios nasceram derivados de mercados emergentes estimulados pela pandemia. A healphant é uma startup de telemedicina sediada em Portugal que nasceu contra todas as probabilidades durante a crise pandémica SARS-CoV-2 recorrendo exclusivamente a ferramentas de trabalho remotas.

O trabalho atual foi inspirado por Healphant devido aos seus resultados empresariais e eficácia em lidar com práticas de trabalho remoto.

A Orientação Empreendedora (OE) - um conceito amplamente estudado ligado à performance empresarial - de startups desenvolvidas em tais ambientes de crise representa o objeto principal deste trabalho. Para avaliar a EO de startups, um modelo de pesquisa baseado na framework de (Covin & Slevin, 1989) foi construído recorrendo ao software Smart PLS 3.0. O software é executado com base no método Partial Least Squares Structure Equation Modeling. Os dados de entrada do modelo foram recolhidos de acordo com os resultados do inquérito a 35 startups portuguesas. Os resultados sugerem que dois fatores cruciais devem ser considerados ao desenvolver uma startup em cenários de crise: a vontade de assumir compromissos envolvendo avultados e arriscados investimentos em recursos bem como a tendência de se envolver e apoiar novas ideias, experimentação e processos criativos.

Dada a recente transição para o trabalho remoto por muitas empresas no âmbito do cenário de crise pandémica SARS-CoV-2, o impacto das apps de trabalho remoto na OE de startups também foi estudado neste trabalho. Foi realizado um caso de estudo múltiplo de 13 startups portuguesas fundadas durante o cenário de crise desencadeado pelo SARS-CoV-2. A análise do caso de estudo foi baseada num procedimento de pattern-matching. Os resultados sugerem que as plataformas de comunicação são relatadas como as que mais influenciam a OE das startups e que algumas organizações podem fazer a transição para um paradigma de trabalho remoto com ganhos de produtividade.

PALAVRAS-CHAVE: Crise, Orientação Empreendedora, Telemedicina, Startup, Trabalho Remoto, SARS-CoV-2

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LIST OF ACRONYMS

AVE – Average Variance Extracted

CNTS – Centro Nacional de TeleSaúde

EO – Entrepreneurial Orientation

EC – European Commission

ICT – Information and Communication Technologies

LV – Latent Variable

MV – Manifest Variable

NHS – National Health System

OECD – Organisation for Economic Co-operation and Development~

PLS-SEM – Partial Least Squares Structure Equation Modelling

RPM – Remote Patient Monitoring

SNS – Sistema Nacional de Saúde

SPMS – Serviços Partilhados do Ministério da Saúde

WFH – Working From Home

WHO – World Health Organization

Chapter 1

INTRODUCTION

A contextualization of the thesis theme is presented in the current introductory chapter, enabling the reader to become acquainted with the addressed topics in this work. It starts by highlighting the impacts of the SARS-CoV-2 pandemic on entrepreneurship. This has led to the creation of many startups, namely healphant - the main motivation to conduct this dissertation work. Subsequently, an overview on the importance of EO concerning startup firms developed under such crisis scenarios is provided. This is followed by the potential influence of remote work practices in EO dimensions. Furthermore, the increased importance of telemedicine in recent times motivated by the outbreak of SARS-CoV-2 is briefly analyzed. Lastly, the research questions to be investigated in this work are stressed, as well as the structure of the current dissertation work.

1.1. Problem Definition

Pandemic crisis environments such as the outbreak of SARS-CoV-2 have severely curtailed some areas of entrepreneurship. Notwithstanding, crisis usually create opportunities for some entrepreneurs in certain industries – including telemedicine (Zahra, 2020). Entrepreneurship is suggested to rise as a preponderant factor in what concerns an escape from the negative impacts of crisis (Devece et al., 2016; Levinthal & March, 1981).

Crisis scenarios are also likely to potentiate certain industries around the world, namely by driving the creation of new start-ups, such as healthtech, as it will help raise aggregate demand (Gries & Naudé, 2020). Correspondingly, past literature has long pointed out that crises might be one of the fundamental motivations for innovation - an aspect often related with creation of startups (Levinthal & March, 1981). (Li-Ying & Nell, 2020) underlines that “perhaps the only way of escaping or minimizing the negative impact of SARS-CoV-2 on our businesses is to pursue innovation and entrepreneurship.”

On the other hand, crisis environments such as the one generated by the SARS-CoV-2 outbreak have been characterized by a reduction in new ventures creation, an increase in firm exits (activity shutdown) and in the increase of unemployment (Gries & Naudé, 2020).

Government policies have been implemented across the world in response to the current health crisis aiming to mitigate the deterioration of economic conditions (Chen et al., 2020). Portugal stands as a country where innovative policy measures such as the “simplified lay-off” and relaxation measures in the national health system (SNS) were adjusted according with the changing economic and social needs, leading to unemployment and firm exit mitigation (Mamede et al., 2020).

Solidarity initiatives promoted by the Portuguese society such as tech4Covid19 have also represented valuable solutions to fight the negative impacts of SARS-CoV-2 in Portugal. Easing the access to digital healthcare, housing and transportation are examples of implemented projects under the scope of tech4Covid19. (tech4COVID19, 2021).

Entrepreneurial Orientation (EO) is a concept that describes the processes, practices, and decision-making activities that lead to new entry and it has been linked with a better business performance of a firm (Hughes & Morgan, 2007; Lumpkin & Dess, 1996). Empirical studies have largely found that Small and Medium Enterprises (SME) firms with a higher degree of EO perform better (Brettel et al., 2019).

The literature in EO is vast. However, a proposed framework by (D. Miller, 1983) and (Covin & Slevin, 1989) is extensively employed and accepted in the literature. According with this framework, EO is characterized by 3 dimensions: innovativeness, proactiveness and risk-taking.

However, the key dimensions driving EO of startups are scarcely studied in the literature. Despite the attention devoted to EO throughout the literature, its impact on startups has been neglected (Kee & Rahman, 2018).

Remote work has constituted a reality for many multinational firms in the past. However, the outbreak of SARS-CoV-2 pandemic has forced most companies to adopt working from home (WFH) approaches, namely SMEs, micro-firms and startups (McKinsey Global Institute, 2020). This resulted in a “scramble to adapt to remote collaboration” and its technological infrastructure. (George et al., 2020a).

Under the telemedicine realm, while the patient receives treatment from home as a standard practice, the doctor is usually located at a medical facility - e.g. hospital or clinic (Hospital da Luz, 2020; Lusíadas, 2020a; E. A. Miller, 2003). As such, under these terms telemedicine cannot be classified as a remote work practice.

Propelled both by the outbreak of SARS-CoV-2 pandemic as well as the latest technological developments, telemedicine represents a field of growing relevance in today's society at a global scale. More specifically, due to the outbreak of crisis such as the SARS-CoV-2 sanitary crisis, a number of entrepreneurs and startups have turned their attention to the digital health realm. (Sust et al., 2020).

The growing tendency of telemedicine among scholars is backed up by the number of telemedicine articles published in PubMed, an archive of biomedical and life sciences journal literature at the U.S. National Institutes of Health's National Library of Medicine, as illustrated in Figure 1.

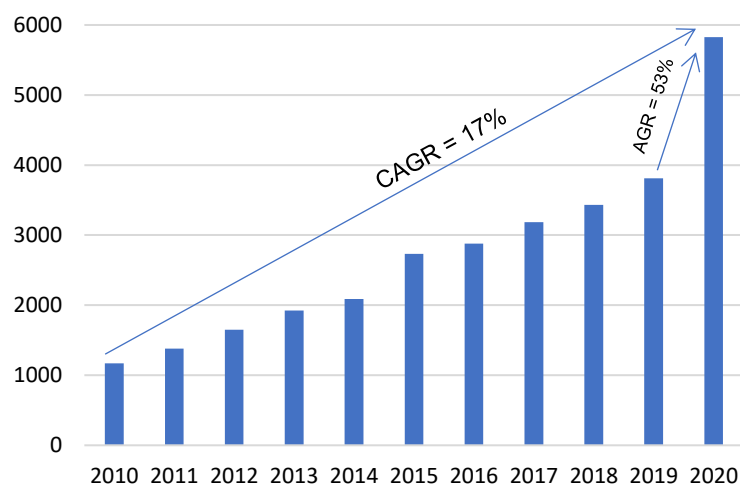


Figure 1 - Number of telemedicine articles published from 2010 until 2020. Search keyword used: "Telemedicine". Source: (PubMed, 2020).

In line with Figure 1, the average yearly increase in telemedicine articles publications in PubMed was registered to be 17% across the 2010-2020 decade, evolving from a registered number of 1172 articles in 2010 to a maximum of 5828 articles in 2020. Remarkably, there was a significant annual growth rate (AGR) increase of 53% in 2019-2020 when compared to the 17% Compound Annual Growth Rate (CAGR) regarding the number of articles published in PubMed. This might be partially explained due to the buzz generated by the SARS-CoV-2 outbreak.

Therefore, the EO of startups created under crisis scenarios, such as the SARS-CoV-2 outbreak, remains yet to be studied in detail as a mode of shedding some light on how new ventures can emerge under these scenarios, in particular when recurring to remote work practices.

To this end, the present work aims to assess what are the more impacting EO dimensions as well as the effects of remote work in terms of EO dimensions of Portuguese startups created under the SARS-CoV-2 pandemic. In addition, it shall address an overall view on the telemedicine market, namely the degree of implementation of telemedicine services in Portugal.

1.2 Healphant startup

1.2.1 History, Mission and Vision

Healphant was born in a harsh period for mankind – during the eruption of SARS-CoV-2. It was built under pressure, with few resources and with imposed social distancing. Nevertheless, the company always aimed to bring people closer using all available technology, in a simple, inclusive and fair way. Hence, a group of experienced professionals in the management, healthcare and computer engineering fields joined efforts to form a company that today is composed by over 20 people.

All of healphant team believe that bringing patients and doctors closer in the abovementioned manner is especially important in healthcare. Healthcare is a sector where human fragility is evidenced, which requires increased responsibility and bullet-proof behaviours from all healthcare professionals and those that support their activity.

Healphant's code of conduct aims to reflect a physician's effort to excel in patient care while being fair and righteous to all stakeholders involved. It's within the firm's values to consistently strive to foster a culture of honesty and accountability.

As a portuguese telemedicine early-stage startup, healphant was created with the mission of “making health services accessible for anyone, anytime, anywhere”.

Healphant's vision is “to become a worldwide reference as a healthcare service provider, simplifying processes in the sector by using cutting edge technologies, highly focused on delivering value to the patient and stakeholders involved in the process”.

1.2.2 Company Structure

As illustrated in Table 1, the company is composed by a total of 23 people (10 full-time professionals and 13 student collaborators) with a wide variety of professional backgrounds and years of experience in the respective industries.

Regarding its organizational structure, healphant is organized in line with a functional organization, which means that the organization is divided into departments based on their specific function.

Table 1 – healphant workers’ professional background. Date: 1st January, 2021.

Position	Professional Background	Years of Experience
CEO	Industrial Engineering and Management	10
CMO	Medical Doctor	14
CTO	Computer Engineering	8
Board Advisor	Project Managent	3
IT Advisor	Computer Engineering	5
Head of Business	Medical Doctor	5
Head of Product	Biomedical Engineering	1
Head of Dev	Student	1
Head of Brand	Brand Strategist	12
Head of Legal	Lawyer	4
Students	Industrial Engineering and Management	0

The board is composed by three board members – the CEO (Chief Executive Officer), the CMO (Chief Medical Officer) and the CTO (Chief Technology Officer).

Healphant possesses two advisors duly classified as Board and IT advisors. The Board Advisor communicates directly with the entire board while the IT Advisor usually only communicates with the CTO and the Head of Dev on a daily basis.

Each department is headed by a functional manager (“Heads”) and it is composed by a number of employees grouped according with their role. In line with Figure 2, there are 5 departments within the company: Legal, Brand, Business, Product and Dev (Dev denotes a short-term for Development, which comprises the team responsible for coding).

The company’s organizational structure is illustrated in Figure 2.

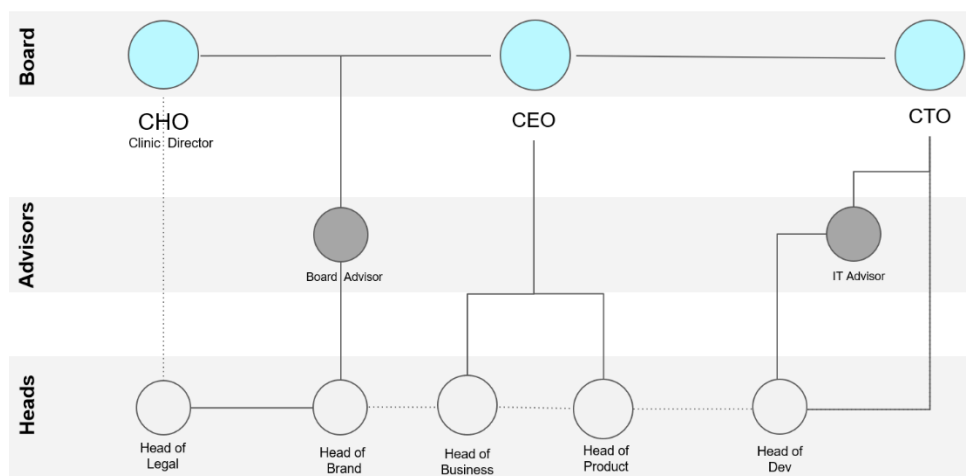


Figure 2 – healphant’s Organizational Structure. Source: (healphant, 2021a).

1.2.3 A day-to-day reality: Remote Work

Constrained by the pandemic risks related with SARS-CoV-2 sanitary crisis, healphant challenged the standard paradigm of office working (face-to-face work). It accomplished this by implementing a working mode solely relying on remote work through IoT devices such as computers, smartphones and tablets. Healphant was created 100% remotely with only 2 people (the CEO and the CTO) having met prior to its foundation – 5th November, 2020. Until today many people working for healphant haven't still physically met.

Healphant differentiates itself from remaining telemedicine service providers since it doesn't require doctors to be located in a medical facility while practicing telemedicine. This enables the use of remote work tools in this field. Given the infectious diseases risk sometimes posed in a hospital environment, this represents a positive influence in what concerns the widespread prevention of such diseases, namely SARS-CoV-2.

Online productivity and collaboration tools that have enabled the creation of a proper remote work environment for the development of daily work-related tasks at healphant. These tools have been previously studied in the literature and are subsequently identified.

Google Workspace, formerly known as GSuite, has been used as a core cloud computing service, based on which the workers and collaborators have been able to asynchronously exchange information essentially through data storing and online meeting tools.

Some of the utilized Google Workspace tools by the company are Google Drive, Google Docs, Google Sheets, Google Slides and Google Meets.

In what concerns software development, the web-based code repository Gitlab has been used. It served the purposes of assuring a coordinated fulfillment of coding tasks and debugging within the Dev department.

In addition, under the software development realm, Jira - a Software as a Service (SaaS) platform - has been utilized for the purpose of planning, tracking and managing software development. Jira was used with the goal of establishing a bridge between the Product and Dev departments.

For the purpose of guaranteeing an effective day-to-day communication, the business communication platform Slack and the messaging system Whatsapp are utilized by all workers and collaborators.

Figure 3 represents a scheme regarding the internal collaboration tools used in healphant allowing to establish a remote work environment under the SARS-CoV-2 pandemic crisis scenario.



Figure 3 – healphant’s internal collaboration tools used to enable remote work.

1.2.4 Business Model

The business model Canvas was applied by the company as a methodology to describe the composition and configuration of resources and activities within the boundaries of the firm. The definition of such business model allows an organization to describe how it creates and captures value by which a firm creates and captures value (Ladd, 2018).

Figure 4 describes healphant’s operations when incorporated into the business model Canvas.










<p>Key Partners </p> <ul style="list-style-type: none"> • Insurance Companies • Clinics • Medical Societies • Patients Societies • Medical Regulators • Governmental Institutions 	<p>Key Activities </p> <ul style="list-style-type: none"> • Recruit Doctors • Increase Patient Engagement • Continuous App Development • Promotion Actions • Establishing Partnerships <p>Key Resource </p> <ul style="list-style-type: none"> • Servers and Technological Services • Engaged teams: Legal, Brand, Business, Product, Development • APIs • Doctors from different specialties 	<p>Value Propositions </p> <p><u>Patients</u></p> <ul style="list-style-type: none"> • Improve convenience of medical services through a text messaging system for follow-up of medical appointments • Increase the number of solved medical cases per unit of time • Patient-Doctor increased proximity <p><u>Doctors</u></p> <ul style="list-style-type: none"> • Privacy regarding personal contacts • Possibility to adjust prices according with the interaction 	<p>Customer Relationship </p> <ul style="list-style-type: none"> • Team support contact • User-friendly app • Quality Customer Service • Assure care and GDPR norms to protect patient information <p>Channels </p> <ul style="list-style-type: none"> • Doctors as ambassadors to share it with their patients • Word of Mouth – Doctors and Patients • Social Media Ads • Progressive Web App 	<p>Customer Segments </p> <p><u>Patients</u></p> <ul style="list-style-type: none"> • Millennials and Generation Z • Tech-savvy patients • Low mobility, deafness, chronic & rare diseases with geographical constraints <p><u>Doctors</u></p> <ul style="list-style-type: none"> • Doctors with frequent patient-doctor interaction specialties • Tech-savvy Doctors
<p>Cost Structure </p> <ul style="list-style-type: none"> • Promotion • Legal and Accounting • Human Resources • Product Development • IT Costs • Administrative Costs and Taxes 		<p>Revenue Streams </p> <ul style="list-style-type: none"> • Fixed flat fee for each consultation 		

Figure 4 – healphant’s Business Model.

1.2.5 Services

Healphant provides a digital application that enables patients and doctors to perform both asynchronous and synchronous teleconsultations. Regarding asynchronous teleconsultations, healphant’s platform allows to exchange text messages, voice messages and attach files (text documents and/or pictures) between patients and doctors.

When a synchronous consultation is performed – demanding both the patient and doctor to be online - videoconsultation services can also take place.

By using healphant app, it's possible to address a variety of medical cases. Some examples are clarifying quick doubts to the patients, diagnose and treat common medical issues, send medical reports, attach medical prescriptions, forward the patient to a physical consultation, perform follow-ups on post-treatment or post-operative situations, wound care follow-ups and monitoring patients with chronic diseases.

Healphant application relies on a technology developed by Google in 2015 - Web Progressive App (WPA), which allows to overcome the disadvantages posed by native apps and web browser apps by combining the best of both technologies. Hence, a WPA provides the user with a rich user experience just like native apps while avoiding take up memory from a device through a download like web apps (Tandel et al., 2018).

Figure 5 depicts the service functioning process of healphant application. It's relevant to point out that the patient can resort to three alternative mechanisms in order to access a doctor in the 1st stage. It can do it by accessing the app and select one doctor from the list of registered doctors, through a QR Code shared by the doctor with a patient or through a link shared by the doctor with the patient.

1. A patient opens the app, chooses a doctor from our list and sends them a message explaining their symptoms 🗣️.
2. The doctor receives a notification and accepts or declines the request 🔔.
3. When the doctor accepts the case, the patient then provides their payment details in order to unlock the chat 💬.
4. Then the appointment starts ⌚.
5. When the doctor decides the appointment is over, they close the case and charge the patient the price they think it's fair not exceeding the maximum value previously established ✓.

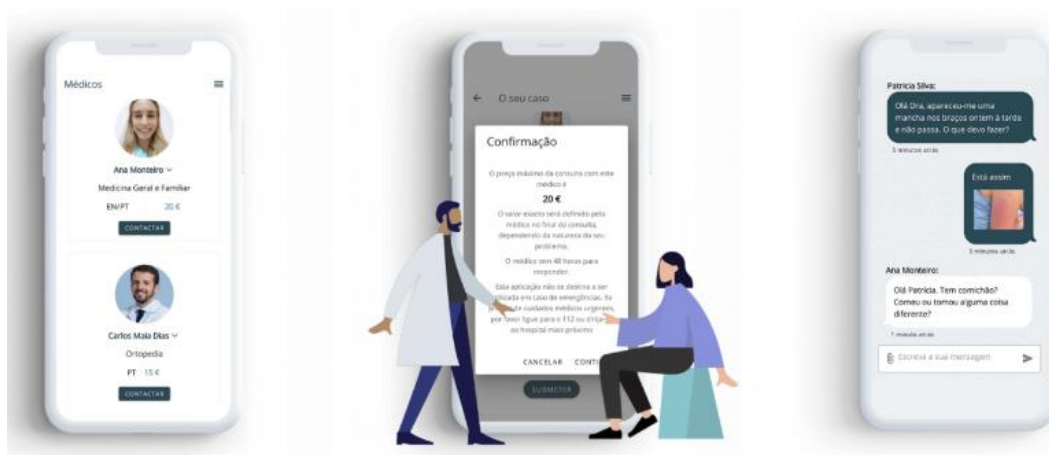


Figure 5 – Healphant App: “How it works”. Source: (healphant, 2020).

1.2.6 Business Outcomes

In terms of results, healphant has experienced increases in its activity as a digital healthcare platform. The following KPIs (Key Performance Indicators) are defined with the aim of assessing such increase: number of registered users, medical cases, links shared and geographical reachability.

The performed analysis concerns a timeframe ranging from the launching of the app - 27th November 2020 - until 6th June 2021.

The number of users is measured in line with the amount of registered doctors and patients in the platform.

Figure 6 illustrates the evolution of such weekly metrics throughout the given timeframe.

The number of user registrations was higher in early March, reaching a maximum of 30 registrations in a single week. However, this number has been decreasing along time, suggesting a gradual decrease in the company's traction results in terms of user registrations.

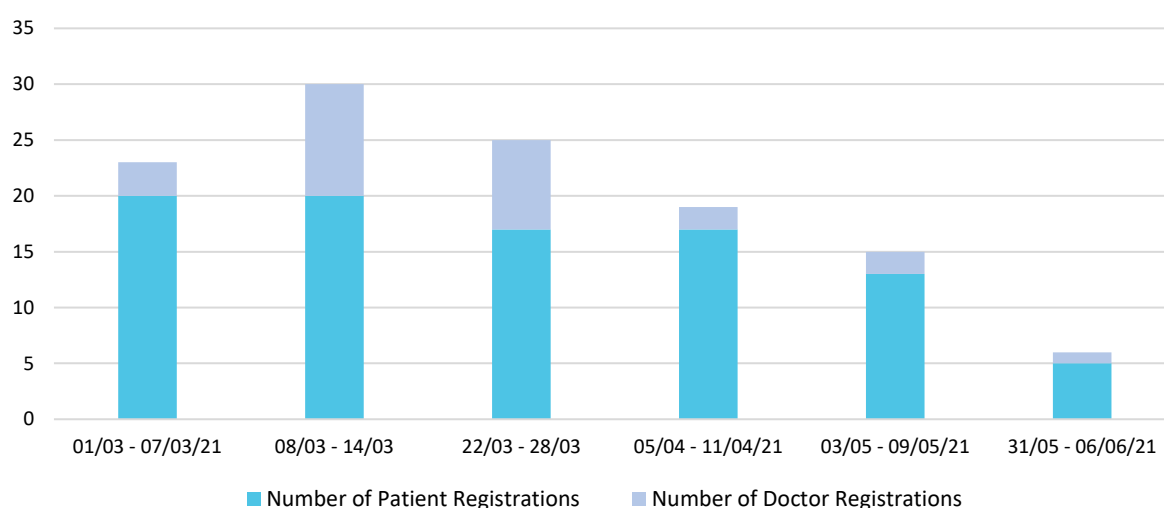


Figure 6 – Number of healphant users (doctors and patients) registrations per week from 1st March 2021 until 6th June 2021. Source: (healphant, 2021b).

The number of registered doctors has increased by approximately 19-fold from 27th November 2020 until 6th June 2021 - from 5 to 112 doctors. In addition, the number of registered patients increased by approximately 48-fold during the considered timeframe - from 8 to 386 patients.

In its turn, a medical case is defined as an interaction between a doctor and a patient from the moment it is open until being closed by the doctor.

Figure 7 illustrates the cumulative evolution in the number of medical cases, which have increased 14-fold (up to almost 250 cases) during the analyzed timespan.

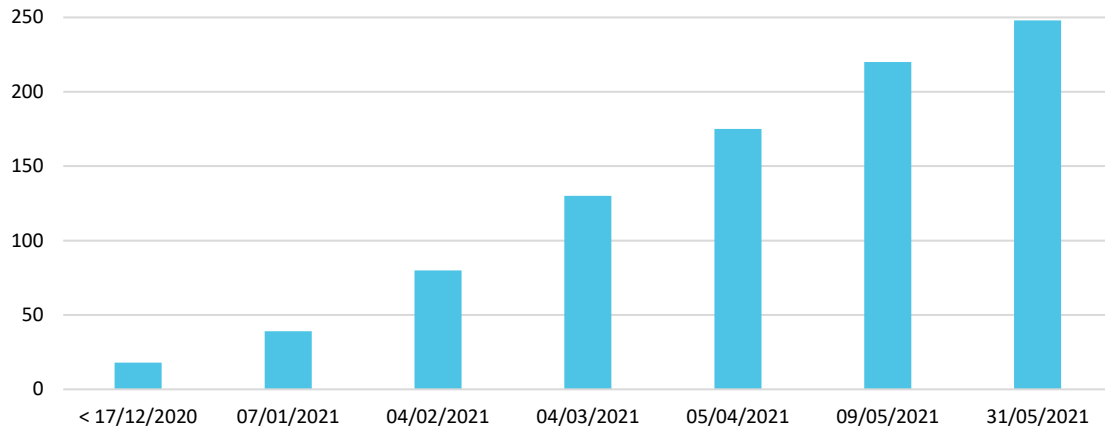


Figure 7 - Cumulative evolution in the number of medical cases performed through healphant.
Source: (healphant, 2021b)

Geographical reachability involves the range of countries from where patients and/or doctors are accessing healphant's platform. In 27th of November users were accessing healphant solely from Portugal. Figure 8 depicts the wider range of countries from which users have been accessing healphant in May 31st, 2021 - over 15 countries in total -, being that Portugal still remained the country from where most people were accessing the app, followed by USA and UK.



Figure 8 - Countries from where healphant users have accessed the app. Date: May 31st, 2021.
Source: (healphant, 2021b).

1.3. Research Objectives

This work aims to expand the literature regarding the knowledge concerning the importance of EO dimensions for startups created under crisis scenarios. Also, it shall explore the effects of remote work in EO of startups created under the SARS-CoV-2 pandemic crisis and shed some light regarding the status quo of telemedicine development in Portugal.

It was essentially motivated by Healphant and the perceived importance of telemedicine as an efficient healthcare digital solution

Therefore, the main objectives of the current dissertation project are as follows:

- Assess what are the more impacting EO dimensions of startups created under crisis scenarios.
- Assess how remote work impact the EO dimensions of startups developed under crisis scenarios.
- Provide an overall view on the telemedicine market, namely the degree of implementation of telemedicine services in Portugal.

Ultimately, this work shall provide some recommendations on which EO dimensions a startup should focus on and how the use of remote work applications can be used to enhance the EO dimensions of startups developed under crisis scenarios.

1.4. Document Structure

The dissertation is composed of eight chapters, as follows – Figure 9.

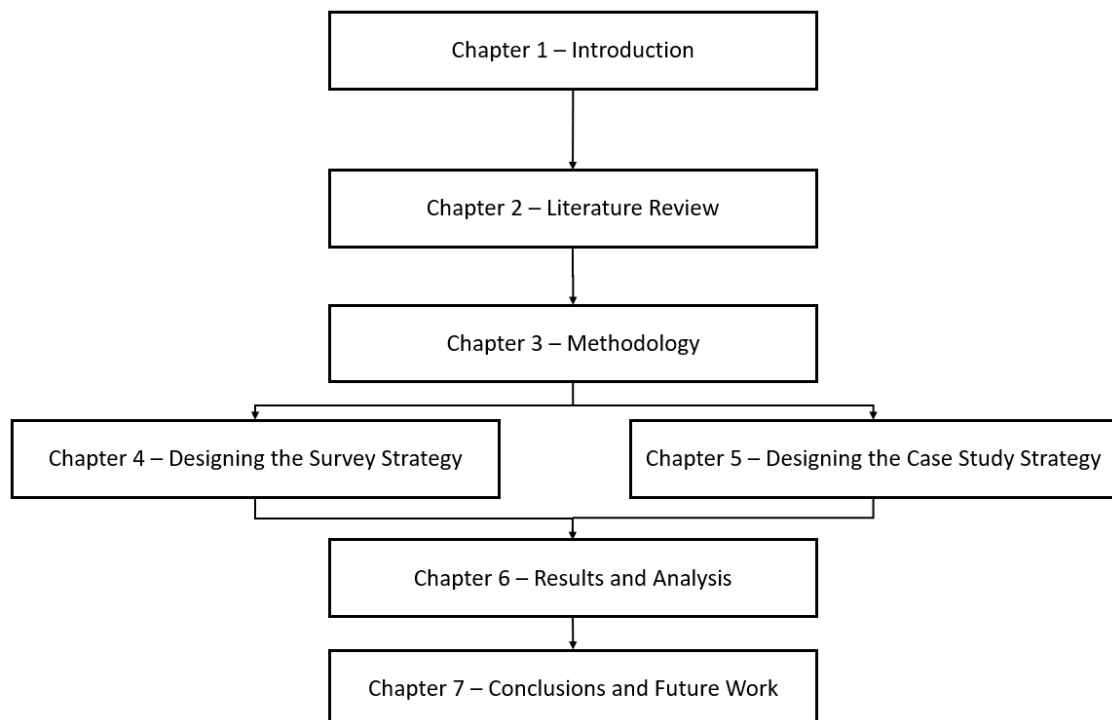


Figure 9 – Structure of the Dissertation work.

Chapter 1 contextualizes the approached problem and details the motivation of this study. The main objectives are highlighted, and the structure of the dissertation work is presented.

In Chapter 2, the object of study is contextualized in accordance with the existing literature. Particular emphasis is given to entrepreneurial orientation, the use of remote work ICT applications under crisis contexts and the evolution of telemedicine.

Chapter 3 concerns the methodology to be developed in this dissertation work. The research “onion” outline of (Saunders et al., 1997) was employed for the purpose of designing the methodology to use. The survey and case study research strategies were based on the work of (Saunders et al., 2009) and (Yin, 2003), respectively. The research strategies to be employed will consist of exploratory analysis on the research topics being investigated.

Chapters 4 and 5 consist in designing the research strategies – survey and case study - to be used for the purpose of pursuing the research objectives proposed in this work. Hence, the theoretical hypothesis to be tested are formulated. A questionnaire was issued to a group of 35 Portuguese startups as the quantitative survey data collection method. In its turn, 13 semi-structured interviews to CEOs/Co-Founders of Portuguese startups were performed as the data collection method for the qualitative case study.

Chapter 6 composes the results and analysis stage where the obtained results are respectively analyzed. This stage aims to provide an exploratory reasoning in line with the respective parameters being tested. As such, the relevance of each one of the EO dimensions and the effect of remote work on EO dimensions of a startup firm developed under crisis scenarios are analyzed.

In one hand, the results for the first research question were obtained by running a model based on the PLS-SEM method in SmartPLS 3.0. The model input data was gathered in line with the survey results. On the other hand, the results for the second research question were based on a pattern-matching procedure applied to the interview results.

Finally, the main conclusions of this work are documented in Chapter 7. This regards both the importance of EO dimensions as well as the effect of remote work applications on EO dimensions for startups created under crisis scenarios. A brief contextualization concerning the status quo of the telemedicine paradigm in Portugal is also provided. In addition, a set of future work suggestions is presented as a way of complementing the present dissertation work.

Chapter 2

LITERATURE REVIEW

With the purpose of investigating the relevant elements impacting the entrepreneurial performance of startup businesses developed under crisis environments, the landscape of the existing literature concerning EO is conducted on section 2.1. As such, a set of objectives and methodologies already studied in the literature are presented. A summary on part of the literature regarding remote work is outlined in section 2.2. It should render an informative background on how remote work has impacted firms operating under the SARS-CoV-2 paradigm, specifically from the perspective of startups. Finally, section 2.3 presents a study regarding the documented literature on telemedicine. The scope is to provide an overall view on the telemedicine market, namely the degree of implementation of telemedicine services in Portugal.

2.1 Entrepreneurial Orientation

The concept of Entrepreneurial Orientation (EO) was introduced on the research conducted by (D. Miller, 1983) and (Covin & Slevin, 1989). According with these authors, EO is related with extent to which the “top managers are inclined to take business-related risks, to favor change and innovation in order to obtain a competitive advantage for their firm, and to compete aggressively with other firms“. In other words, EO reflects the tendency of pursuing product and market innovation, taking a certain amount of risk and proactively reacting, thus overcoming competitors' initiatives.

Since then, EO has become a relevant subject on the fields of entrepreneurship and strategic management as to shed some light on how firms may demonstrate an entrepreneurial strategic posture that may contribute to enter the market (Covin & Slevin, 1989; Kreiser et al., 2013). Later on, (Lumpkin & Dess, 1996) defined entrepreneurial orientation (EO) as a concept referring to “the processes, practices, and decision-making activities that lead to new entry”.

In line with more recent studies and coherent with the past literature on EO, (Naldi et al., 2007) characterizes EO as a “construct that addresses the mindset of firms engaged in the pursuit of venture creation and provides a useful framework for research into entrepreneurial activity“.

Additionally, empirical studies conducted by (Brettel et al., 2019; Shim, 2020) have stated that firms with a higher degree of EO perform better. According with (Venkatraman & Ramanujam, 1986), business performance is measured in line with the financial and operational (non/financial) performance of organizations. Business performance has been positively linked several times with the EO of a firm (Hughes & Morgan, 2007). Under these contexts, performance has been related with the capacity of a firm to be “financially stable and resilient within the first five years”.

Hence, from a performance standpoint it may become appropriate to gauge what are the factors, or dimensions, influencing the EO of a startup organization.

EO is assessed based on a specific set of dimensions that may vary across the literature. (D. Miller, 1983) was the first author to define the factors impacting entrepreneurial orientation, namely under the form of innovativeness, proactiveness and risk-taking. In this work, the considered definitions of EO dimensions are illustrated in Table 2.

Evolving from the three abovementioned dimensions used by (D. Miller, 1983) and (Covin & Slevin, 1989) to characterize and distinguish a firm's entrepreneurial orientation, other studies have suggested the use of additional dimensions, such as autonomy and competitive aggressiveness (Hughes & Morgan, 2007; Lumpkin & Dess, 1996).

Table 2 – Concept description of Entrepreneurial Orientation dimensions. Source: (Lumpkin & Dess, 1996; Rogers & Shoemaker, 1971; Venkatraman, 1989)

Concept	Description
Innovativeness	A firm's tendency to engage in and support new ideas, novelty, experimentation, and creative processes that may result in new products, services, or technological processes
Proactiveness	Processes aimed at anticipating and acting on future needs by seeking new opportunities
Risk-Taking	The degree to which managers are willing to make large and risky resource commitments

Although past literature has registered a variety of dimensions to characterize EO, several studies have demonstrated the prominence of three of these dimensions in what concerns EO drivers across history, namely innovativeness, proactiveness and risk-taking (Brettel et al., 2019; Naldi et al., 2007).

In addition, (Hughes & Morgan, 2007) highlights the non-significant impact of autonomy and competitive aggressiveness on business performance for startups. This provides an indicator of the non significant influence of autonomy and competitive aggressiveness for measuring EO according with the past literature.

Table 3 depicts the dimensions used to test EO constructs, the company typology serving as object of study and also the statistical analysis concerning the performed analysis.

Table 3 – Entrepreneurial Orientation Dimensions and Type of Firms. Adapted from (Kreiser et al., 2002)

Authors	Dimensions	Type of Firms (Object of Study)	Statistical Analysis
(D. Miller, 1983)	Innovativeness, Proactiveness, Risk-taking	SMEs	Hypothesis Testing, ANOVA
(Covin & Slevin, 1989)	Innovativeness, Proactiveness, Risk-taking	SMEs	Regression Analysis
(Miles & Arnold, 1991)	Innovativeness, Proactiveness, Risk-taking	SMEs	Correlation Analysis

(Naman & Slevin, 1993)	Innovativeness, Proactiveness, Risk-taking	SMEs	Correlation Analysis
(Lumpkin & Dess, 1996)	Innovativeness, Proactiveness, Risk-taking, Autonomy, Competitive Agressiveness	N/A	N/A
(Knight, 1997)	Innovativeness, Proactiveness	Large Ent.	Correlation Analysis
(Zahra & Garvis, 2000)	Innovativeness, Proactiveness, Risk-taking	SMEs and Large Ent.	Regression Analysis
(Kreiser et al., 2002)	Innovativeness, Proactiveness, Risk-taking	SMEs	Factor Analysis, Correlation Analysis Correlation
(Hughes & Morgan, 2007)	Innovativeness, Proactiveness, Risk-taking	Startups and SMEs	Analysis, Regression Analysis Factor and
(Naldi et al., 2007)	Innovativeness, Proactiveness, Risk-taking	SMEs	Regression Analysis
(Kropp et al., 2008)	Innovativeness, Proactiveness, Risk-taking	Startups	Multiple Discriminant Analysis
(Vora et al., 2012)	Innovativeness, Proactiveness, Risk-taking, Autonomy, Competitive Agressiveness	SMEs	N/A
(Kee & Rahman, 2018)	Innovativeness, Proactiveness, Risk-taking	Startups	Structural Equation Modelling

Note: Large Ent. stands for Large Enterprises. N/A stands for Not Applicable.

The European Commission defines Small Enterprises and Medium Enterprises as enterprises employing fewer than 250 persons and with an annual turnover or balance sheet total not exceeding €43 million and €50 million, respectively. Conversely, large companies employ over 250 persons and possess values of annual turnovers or balance sheet total over €50 million. (EC, 2020).

Although there has been many scholars presenting their own definition of a startup, according with (Skala, 2019) the most popular definition of a start-up “widely cited not only in industry publications, but also in scientific literature was formulated by Steve Blank”. (Blank, 2013) defines a start-up organization as “an organization designed to search for a repeatable and scalable business model”. Additionally, early-stage startups are defined in the literature as “companies seeking first-round seed money or startup capital to get their venture off the ground” (Paik & Woo, 2014).

According with

Table 3, innovativeness, proactiveness and risk-taking are the most frequently explored dimensions for the purpose of assessing entrepreneurial orientation.

Also, as illustrated in

Table 3, most of EO studies seem to focus on Small and Medium-sized Enterprises (SMEs). The effects of EO in startups are documented throughout the literature in (Kropp et al., 2008), (Kee & Rahman, 2018) and (Shim, 2020) studies. Yet, in line with the study performed by (Kee & Rahman, 2018), despite the outstanding attention on EO “its impact on startups has been largely neglected”.

Regarding the methods used to extrapolate conclusions from the collected data,

Table 3 illustrates a series of statistical methods used throughout the entrepreneurial orientation measurement literature.

Table 3 was adapted from (Kreiser et al., 2002) and more recent studies were included in order to update the collected data.

Based on the used statistical methods indicated in

Table 3, correlation analysis and regression analysis constitute the prominent methods used to analyze the gathered data regarding entrepreneurial orientation. Nevertheless, a recent EO study have employed PLS-SEM methods in its EO research (Shim, 2020).

2.1.1 Innovativeness

According to (Covin & Slevin, 1989), “innovativeness is embodied by a strong organizational commitment to new product introductions and technological leadership”.

In its turn, (Rogers & Shoemaker, 1971) define innovativeness as “the degree to which an individual is relatively earlier in adopting an innovation than other members of his system”. “Relatively earlier” refers to the actual time of adoption, rather than whether the individual perceives he adopted the innovation earlier than others in his system.

Innovativeness reflects a firm's tendency to engage in and support new ideas, novelty, experimentation, and creative processes that may result in new products, services, or technological processes (Lumpkin & Dess, 1996).

According with the literature review presented by (Hughes & Morgan, 2007), firm innovativeness was found to favorably impact a firm’s performance as well as contributing to gain competitive advantage by enabling creative thinking inside the firm.

2.1.2 Proactiveness

In line with (D. Miller, 1983), proactiveness of a firm's decisions is determined by answering the question “Does it shape the environment (high score) by introducing new products, technologies, administrative techniques, or does it merely react?”.

From another perspective, proactiveness refers to “processes aimed at anticipating and acting on future needs by seeking new opportunities” (Venkatraman, 1989).

As such, proactiveness may be crucial to an entrepreneurial orientation assessment because it suggests a forward-looking perspective that is accompanied by innovative or new-venturing activity (Lumpkin & Dess, 1996).

The purpose of proactiveness relies on assuring “a first-mover advantage in the short-term” and “shape the direction of the market in the long term”. Hence, two of the main advantages offered by proactiveness as an EO dimension are the increase in a “firm’s receptiveness to market signals” and “awareness of customers’ needs”. (Hughes & Morgan, 2007).

Considering the literature review performed by (Kreiser et al., 2002), proactive firms hold the chance of applying first-mover strategies in order to acquire a competitive advantage against rival firms.

As an EO dimension, (Hughes & Morgan, 2007) concluded that proactiveness plays a positive influence on business performance.

2.1.3 Risk-taking

Risk may assume various meanings depending on the context in which it is applied (Lumpkin & Dess, 1996).

Under a context of entrepreneurial orientation, (D. Miller, 1983) defines risk-taking as " the degree to which managers are willing to make large and risky resource commitments “.

While all organizations have associated a certain degree of risk, there is an interval between what is considered as a “safe risk“ and “high risks“. A safe risk is characterized by having a low uncertainty and implying few resource commitments, while a high risk encompasses plans with high uncertainty and significant financial and other resource investments. (Vora et al., 2012).

However, it is important to recognize that risk taking involves engaging in calculated risks in order to obtain benefits, rather than a firm gambling with little thought about these risks (Lumpkin & Dess, 1996).

Former research has found that the risk-taking dimension is positively related with the business performance of a firm (Naldi et al., 2007).

Nevertheless, controverse conclusions regarding the impact of risk-taking on business performance are documented in the literature, as according with (Hughes & Morgan, 2007) this EO dimension was concluded to have a negative relationship with business performance.

2.1.4 Entrepreneurial Orientation in Startups

According with (Lumpkin & Dess, 1996) “entrepreneurial orientation (EO) refers to the processes, practices, and decision-making activities that lead to new entry”.

It becomes important to highlight that in line with this definition EO describes the elements explaining how new entry is undertaken (Lumpkin & Dess, 1996).

Studies linking a firm’s entrepreneurial orientation to its successful performance have been documented throughout the literature (Devece et al., 2016; Kee & Rahman, 2018; Martens et al., 2018; Shim, 2020). (Kee & Rahman, 2018) defines the success of a start-up according with financial stability and resilience within the first five years. However, the dimensions impacting EO may vary in line with the diverse studies and respective conditions proposed and tested by scholars (Hughes & Morgan, 2007).

As mentioned in

Table 3 of section 4.2, most of EO studies seem to focus on Small and Medium-sized Enterprises (SMEs). (Kropp et al., 2008), Still, in line with the study performed by (Kee & Rahman, 2018), despite the outstanding attention on EO “its impact on startups has been largely neglected”. Hence, a further investigation regarding this topic will be conducted in this dissertation work aiming to complement the existing literature on the topic.

2.1.5 Measuring Entrepreneurial Orientation

Once the relevant dimensions for assessing the EO degree of a firm are determined, it becomes necessary to determine a proper method to evaluate these dimensions. The purpose of this relies on measuring the extent to which the several dimensions impact a firm’s EO.

(Khandwalla, 1997) was the first author to propose a scale for measuring corporate entrepreneurship. This was a 9-item scale known as the 'Entrescale' which was subsequently refined by (D. Miller, 1983) and (Covin & Slevin, 1989).

The proposed reformulation symbolizes a 9-item scale and is devoted to measure the subconstructs of EO - innovativeness, proactiveness and risk-taking according with a 7-point Likert rating. This formulation is hereafter referred as “Covin and Slevin scale” as in line with literature standards,

(Kreiser et al., 2002) and (Soares & Perin, 2019) highlight the validity and reliability of application of Covin and Slevin scale in numerous studies pursuant with extensive literature research.

Furthermore, based on a meta-analysis comprehensive study, (Soares & Perin, 2019) concluded that the scale “has dominated research on EO”.

In line with Table 4, within the Covin and Slevin scale, three items are dedicated to each one of the aforementioned dimensions of EO. These were the items used in this dissertation work for assessing the formulated hypothesis regarding EO.

Table 4 - EO Covin and Slevin scale. Adapted from (Covin & Slevin, 1989).

Innovativeness		
Generally our company prefers to...		
a. Strongly emphasize the marketing of the company's present products	1 2 3 4 5 6 7 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Strongly emphasize R&D
How many new kinds of products or services has your company introduced over the past 5 years?		
b No new products and services	1 2 3 4 5 6 7 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	A lot of new products and services
c There has been small changes of the present products and services	1 2 3 4 5 6 7 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	The changes of the company's products and services have been radical
Proactiveness		
Our company's relation towards competitors...		
d. Normally we react upon initiatives taken by our competitors	1 2 3 4 5 6 7 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Normally we initiate changes upon which our competitors react
e. Our company is seldom the first one to introduce new products or services	1 2 3 4 5 6 7 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Our company is very often the first one to introduce new products or services
f. Normally our company tries to avoidovert competition, but	1 2 3 4 5 6 7 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	

rather takes on a “live-and-let-live” – position

Normally our company takes on a very competitive oriented “beat-the-competitor” - position

Risk-taking		
Generally our company has...		
g. A strong tendency toward projects with low risk	1 2 3 4 5 6 7 <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	A strong tendency toward getting involved in high risk projects
Generally we believe that...		
h. The business environment of the company is such that it is better to explore it carefully and gradually in order to achieve the company’s objectives.	1 2 3 4 5 6 7 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	The business environment of the company is such that fearless and powerful measures are needed to obtain the company’s objectives.
When we are facing insecure decision/making situations...		
i. We normally take up a cautious “wait-and-see” position in order to minimize the hazard of making costly erroneous decisions.	1 2 3 4 5 6 7 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	We normally take up a fearless, aggressive position, in order to maximize the chance of being able to exploit possible opportunities

2.2 Remote Work under Crisis Context

2.2.1 Remote Work Definition

Distributed work is defined as the “arrangement that allows employees and their task to be shared across settings away from a central place of business or physical organizational location”. (Gajendran & Harrison, 2007). Remote work and telecommuting are two concepts covered by the distributed work umbrella concept.

Remote work is defined as “the practice of working outside of the traditional office” and it’s a concept which contemplates working from home (WFH) - often referred interchangeably with telework (Eriksson & Petrosian, 2020).

Recent definitions stated by (Eddleston & Mulki, 2017) distinguish remote work from telecommuting in line with the amount of time spent working remotely. While remote work implies working full-time remotely, telecommuting implies spending one to three days per week working remotely.

However, according with (Eriksson & Petrosian, 2020), these definitions vary across the literature.

2.2.2 Crisis Definition

Most definitions describe a crisis as an extreme, unexpected or unpredictable event that requires an urgent response from organizations and creates challenges for them - by interfering with its operations, creating ambiguity in its decision-making processes, threatening its goals and values, damaging its public image and bottom line (Doern et al., 2019).

In its turn, an extreme event is a dynamic occurrence within a limited timeframe that impedes the normal functioning of a system or systems. Pandemics, such as SARS-CoV-2, stands for an example of occurrence that receives the label extreme event in scientific literature. (Broska et al., 2020).

Crisis scenarios such as the one posed by the inherent impacts of SARS-CoV-2 pandemic have unravelled a new reality in what concerns the working place for many people around the world, since health constraints such as quarantines and lockdowns have obliged tens of millions of people to work from home across the world (McKinsey Global Institute, 2020).

In addition, the SARS-CoV-2 outbreak has culminated with global entrepreneurship impacts at different levels, of which “small scale businesses and startups were among the most vulnerable”. Nonetheless, the entrepreneurial impacts differed according with the respective geography. (Meahjohn & Persad, 2020).

2.2.3 Remote Work and SARS-CoV-2

Despite being a reality for multinational firms around the world, the SARS- CoV-2 pandemic has forced most companies to adopt working from home (WFH) approaches, including SMEs, micro-firms and startups. This resulted in a “scramble to adapt to remote collaboration” and its technological infrastructure. (George et al., 2020a).

In line with research conclusions of a recent study on the coronavirus pandemic on remote work, there is a considerable amount of work potential that may be unlocked recurring to remote work (McKinsey Global Institute, 2020). More specifically, this potential is “determined by tasks and activities instead of occupations”, being that information gathering and processing and coding data – core activities for a telemedicine firm – constitute examples of tasks that can theoretically be done remotely.

Figure 10 depicts the results of the previously mentioned study regarding a viability measure for remote work - potential share of time spent working remotely - in several sectors in the United States. In compliance with the conducted study, the Finance and Insurance, Management and the Professional, scientific and technical services denote the ones with the highest effective potential for remote work. Also, the IT (Information and Technology) sector (where several telemedicine companies perform) represents a sector with considerable amount of effective potential for remote work – 58%.

Nevertheless, according with Figure 10, there is also a set of tasks that can be more effectively performed in person, namely the ones involved in the agriculture, accommodation and food services sectors.

(Cukier, 2015) points out a number strategies that software startup companies may follow in order to overcome multiple problems that these ventures naturally face. The “prioritization of existing cloud solutions for features non-core to the business” constitutes one of these strategies (Cukier, 2015).

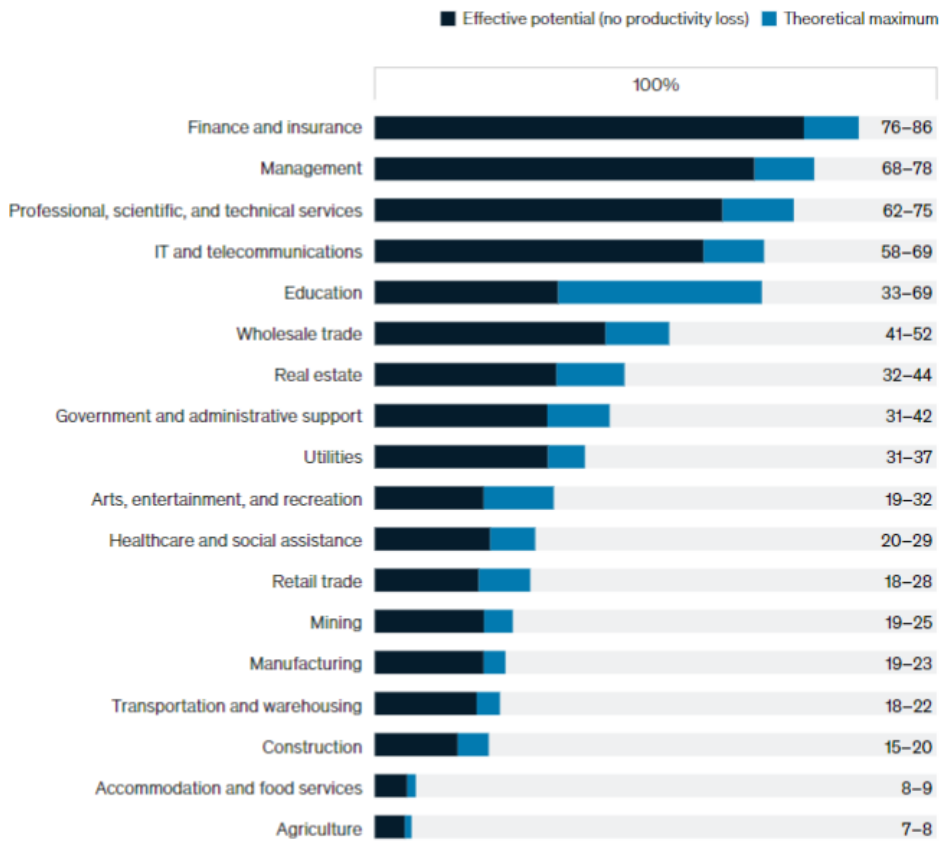
This means that by using ready-made infrastructures and business communication tools such as Google Drive and Slack can facilitate the adaptation to remote work while contributing to eliminate the time and cost burden associated with focusing on non-core functionalities (Cukier, 2015; Hern, 2020).

Additionally, utilizing collaboration tools such as Jira and GitHub may contribute to increase productivity (Konig & Vetter, 2020).

Furthermore, in their recent work regarding the pandemic impact on business, (George et al., 2020b) highlight the growing importance of asynchronous coordination practices (“the backbone of software development”) through management tools such as Gitlab.

(Konig & Vetter, 2020) suggests that “the sudden shift to remote working requires companies to adapt their agile practices, work modes, and processes rather than reinvent them”.

Facing crisis scenarios, namely the SARS-CoV-2 pandemic declared by WHO on March 11th, many firms, including startups, have come across a shift from the usual face-to-face work to a remote work mode, which may lead to drastic changes in the work paradigm. Firms may have to adopt a set of practices and tools for the purpose of enabling viable remote work conditions. Also, (Cukier, 2015; George et al., 2020b; Hern, 2020) underline a set of relevant online tools, including Google Workspace, Slack and Gitlab that may facilitate the adaptation to remote work. Hence, a methodology was developed to study how remote work online applications may influence EO dimensions of startups.



Note: The Theoretical maximum potential includes all activities that theoretically can be performed remotely. The effective potential for remote work excludes activities that have a clear benefit from being done in person as defined in the study.

Figure 10 - Potential share of time spent working remotely by sector in the United States, %.
Source: (McKinsey Global Institute, 2020)

2.2.4 Remote Work in Startups

Remote work has been widely studied in agile companies. Agile companies acquire this designation if employing agile methods, which emerged in the early 2000s and are defined in the literature as being characterized by a series of pre-determined principles such that “a detailed visualization of the final product takes place before even starting working on it” (Papachartofyli, 2018).

According with (Eberlein et al., 2002), agile methods are appropriate options for “those pressured to produce code fast”.

Remote work business tools have been documented in the literature as drivers of agile methods. (Sarkan et al., 2011) stresses the importance of Jira as an agile framework component, while (Stray et al., 2019) state Slack as an important tool for agile practices. Also, (Ciancarini et al., 2020) underlines Gitlab and Github as relevant means to take advantage of when implementing agile techniques.

Several technological startups have shown great adaptability by applying remote work practices through agile methods, therefore showing remarkable increases in productivity since the pandemic lockdown due to SARS-CoV-2 has started (Konig & Vetter, 2020).

Nevertheless, since the remote work paradigm may constitute a novel reality for many startups, thriving in technology uncertainty remains a relevant concern. Thriving in technology uncertainty is defined as “developing technologically innovative products, which requires cutting-edge development tools and techniques” (Giardino et al., 2015). Correspondingly, (Giardino et al., 2015) has found that picking the proper development tools constitutes the major key challenge faced by early-stage software startups.

2.2.5 Measuring the Impact of Remote Work

For the purpose of measuring how the use of remote work through ICTs might impact workers performance, (Torkzadeh & Doll, 1998) defines two constructs that have been used to this end based on past literature review : task productivity and task innovation.

Table 5 illustrates the definition and previous literature support on such constructs.

Table 5 – Definition of information technology’s impacts in remote work. Adapted from (Torkzadeh & Doll, 1998)

Label	Definition of Construct	Literature Support
Task productivity	The extent that an application improves the user's output per unit of time	(Braverman, 1974), (Curley & Pyburn, 1982), (Kraemer & Danziger, 1990) and (Liff, 1990)
Task innovation	The extent that an application helps users create and try out new ideas in their work	(Curley & Pyburn, 1982), (Davis, 1991), (Harvey et al., 1993).

A comprehensive literature review was performed by (Torkzadeh & Doll, 1998) in order to generate a list of items to measure dimensions of application impact of each construct. Based upon this review, a set of items was selected to measure aspects of impact according with a five point Likert-type scale, corresponding to “1 = not at all; 2 = a little; 3 = moderately; 4 = much; 5 = a great deal”.

Table 6 depicts the items selected to measure the aspects of impact of task productivity and task innovation according with (Torkzadeh & Doll, 1998). Under this framework, the items are assessed in line with the ICT applications¹ used by workers.

In line with Table 6, the set of business development tools referred in the previous section – Google Workspace, Slack, Jira and Gitlab – constitute examples of ICT applications to assess the task productivity and task innovation constructs.

¹ Under this context, an application, is defined as “the use of ICT to accomplish work” (Torkzadeh & Doll, 1998).

Table 6 – Impact measures of ICT applications on work. Adapted from (Torkzadeh & Doll, 1998)

Task productivity					
P1. This application increases my productivity	1	2	3	4	5
P2. This application allows me to accomplish more work than would otherwise be possible	1	2	3	4	5
Task innovation					
I1. This application helps me create new ideas	1	2	3	4	5
I2. This application helps me try out new ideas	1	2	3	4	5

In accordance with the employed ICT applications, Table 6 states two parameters that were used to measure each construct of task productivity and task innovation (P1, P2, I1 and I2).

In this context, productivity is defined as “lowering costs and increasing output” of a certain activity recurring to remote work tools, while innovation is related with “generation of ideas”.

The framework proposed by (Torkzadeh & Doll, 1998) has subsequently been adopted across the literature by several researchers under the realm of remote work - (Kreiner et al., 2009) and (Yeh et al., 2020).

(Kreiner et al., 2009) suggests that ICT applications can be used in situations that involve work-home challenges such as remote work and telecommuting. The work conclusions of (Yeh et al., 2020) indicate that employees should be provided with “greater freedom to engage in the use of ICT applications at work and home” with the goal of improving performance.

2.2.6 Remote Work and Entrepreneurial Orientation

Across the literature some studies have established relations between the use of remote work and a variety of factors that may be linked to the three most frequently investigated entrepreneurial orientation dimensions in the literature - innovativeness, proactiveness and risk-taking.

In what concerns innovativeness, innovation behaviour is driven by collaboration and communication. Although a positive role of face to face interaction in innovation and creativity has been documented in the literature, “the innovation impacts in virtual teams remain largely unexplored”. (George et al., 2020a).

According to (Soroui, 2020), there is evidence on the influence of remote work on supporting innovation and learning networks, particularly for the employees living in “non-commutable distance to corporate sites”. (Nurmi & Hinds, 2016) also reports a positive association between virtual work and workers’ improved innovation capabilities.

(George et al., 2020a) and (Soroui, 2020) highlight that the implications of virtualization will become increasingly important for innovation in the future.

Under the field of proactiveness, the research conducted by (Coun et al., 2021) expresses the importance of virtual settings inherent to remote work as a consequence of the SARS-CoV-2 pandemic to promote workplace proactivity – the “employees’ ability to take self-directed action to anticipate changes in their work and to respond to future possibilities instead of undergoing developments passively”.

(Soroui, 2020) stresses the proactiveness role of remote work in the sense that it has been increasingly utilized as a proactive talent acquisition strategy. This means that guaranteeing the access to remote work has been often used to proactively retain key employees of a firm.

Regarding risk-taking, the likely series of business failures (cessation of involvement in business) being undermined by the SARS-CoV-2 pandemic may discourage risk-taking on behalf of these firms (Mason & Hruskova, 2021).

Under the pandemic outbreak and the remote work related practices, people planning to commercialize new products or services through startups have been facing many economic difficulties (Morales-Narváez & Dincer, 2020). The research of (Tromberg et al., 2020) supports these economic difficulties for startups and suggests the reduced willingness for firms to engage in risk-taking approaches.

Withal, as a work condition imposed by the recent SARS-CoV-2 public health restrictions, the influence of remote work in the dimensions of entrepreneurial orientation of a startup firm remain yet to be studied in detail as a mode of shedding some light on these organizations can positively leverage from remote work applications.

2.3 Telemedicine

Etimologically, the prefix “*tele*” derives from the Greek “*telos*”, which stands for “at a distance” (Zundel, 1996). Hence, a literal definition for telemedicine term would be medicine at distance.

Several authors have utilized the term telemedicine as involving a “consultation between a patient and a geographically separated doctor”, while others have used it in a much broader perspective of “rapid access to shared and remote medical expertise”. Several concepts are utilized to relate to the same phenomenon among the literature and these concepts do not follow any precisely defined way. (Brauchli, 2006).

The World Health Organization provides a telemedicine definition as follows - “ telemedicine is defined as the delivery of health care service, where distance is a critical factor, by healthcare professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing of health care providers, all in the interests of advancing the health of individuals and their communities.” (WHO, 2010).

Patients and healthcare providers represent key stakeholders among the paradigm of telemedicine. According with (WHO, 2011), a patient is “a person who is the recipient of healthcare” , while healthcare is defined as “a service received by individuals or communities to promote, maintain, monitor or restore health”.

Digital health, telehealth, telemedicine and telecare depict four concepts that have generated repeated discussions among the literature regarding its definition (Craig & Patterson, 2005).

Digital health is a broad term encompassing categories such as telehealth, telemedicine and telecare. Digital health technologies use computing platforms, connectivity, software, and sensors for healthcare and related uses. (FDA, 2020).

Telehealth represents a term that has been interchangeably used with telemedicine throughout history (Tuckson et al., 2017).

Yet, according with (OECD, 2020), telehealth encompasses broader healthcare areas than telemedicine, and can be defined as “the use of ICT (Information and Communication Technologies) to promote health at a distance, including non-clinical services”. A telehealth related field enabling its use is mHealth, which is defined by (OECD, 2020) as “medicine and public health supported by mobile communication devices”.

In its turn, telemedicine is defined as “ the use of ICT to deliver healthcare (clinical services only) at a distance” (OECD, 2020).

Telecare, or assisted living, resembles a narrower healthcare term, and it may be defined as “the use of ICTs to allow dependents (elderly) to live at home” (OECD, 2020).

In the aftermath, all the aforementioned set of concepts involve the transfer of information about health-related issues between one or more sites, so that the health of individuals and their communities can be advanced.

Additionally, an umbrella term encompassing all health-related activities carried out over a distance by ICTs is 'health telematics' (Craig & Patterson, 2005).

In line with the research conducted by (Craig & Patterson, 2005) telemedicine use increased from 1975 to 2005, concomitant with advances in information technology. Nevertheless, more recent studies indicate that, as a telemedicine modality, teleconsultations only represent between 0.1% and 0.2% of face-to-face consultations where telemedicine is most used (OECD, 2020).

2.3.1 Modalities

Along history, the scope and categorization of telemedicine has been influenced as new technologies employed in this industry have emerged. Teleconsultations, telemonitoring, telesurgery and tele-education represent four different types of telemedicine modalities. (Coiera, 2002).

Teleconsultation is defined as synchronous or asynchronous consultation using information and communication technology to omit geographical and functional distance. The purposes of teleconsultation rely on the diagnosis or treatment between two or more geographically separated healthcare providers or between healthcare providers and patients. (Deldar et al., 2016).

Teleconsultation services can be classified as one of two concepts depending on the mode according to which information is transmitted from a temporal perspective: synchronous communication (*id est* “realtime”) and asynchronous communication (*id est* “store and forward”). (Coiera, 2002).

Prerecorded telemedicine is a term that also appears in the literature as a synonym for synchronous telemedicine (Mea, 2005).

An asynchronous teleconsultation involves data being sent for assessment by the consulting health-care professional at a later time. Internet websites, mobile apps and electronic mail methods constitute some examples of means used for asynchronous teleconsultations, being that an important advantage of asynchronous communication is that the two parties do not have to be present for the transfer of data to take place. (Ferguson, 2006).

On the other hand, synchronous teleconsultations, also known as prerecorded telemedicine, occur in realtime at a distance using communications technology. Telemetry, radio communications and telephone portray major methods to practice synchronous teleconsultations. This type of teleconsultation allows the collection of information with no added interpretation and the visualization of non-verbal prompts. (Ferguson, 2006; Mea, 2005)

At its instance, telemonitoring consists of either a continuous or sporadic monitoring that can be either dependent on the patients' action or completely independent and automated. This telemedicine modality can be segmented into active and passive telemonitoring. (Campion et al., 2016).

While passive telemonitoring is typical for invasive implantable devices sending either sporadically or continuously data to the receiving physician, active telemonitoring via non-invasive devices involves an action (e.g., a video call) or a self-measurement (e.g., blood pressure measurement) by the patients themselves. (Faragli et al., 2020).

Among the literature, telemonitoring is also used as an equivalent term to Remote Patient Monitoring (RPM). (Mathew & Jefferies, 2018).

Telesurgery is an emerging surgical system that utilizes wireless networking and robotic technology to connect surgeons and patients who are distantly located from one another (Choi et al., 2018).

Regarding relevant contributes, telesurgery systems allow to overcome today's shortage of surgeons, geographical inaccessibility of immediate and high-quality surgical care, significant financial burden, potential complications, and long-distance travel. (Hougen et al., 2016).

Tele-education is defined as the application of ICTs in the delivery of distance healthcare learning. Tele-education has been used for many years to deliver continuing education programmes to rural health-care professionals. (Curran, 2006)

2.3.2 Market Characterization

In 2018, the European Commission (EC) estimated that the global telemedicine market size reached 16.29 billion € in 2015 (EC, 2018). Based on this value and market trends, the global telemedicine market size was forecasted to reach 37.08 billion € in 2021 with a CAGR of 14% during the 6-years period - Figure 11.

As a side note, the first mover in the American telemedicine market, the American company Teladoc founded in 2002, represents the biggest worldwide market player in terms of business volume, with revenues of \$1,09 billion in 2020.

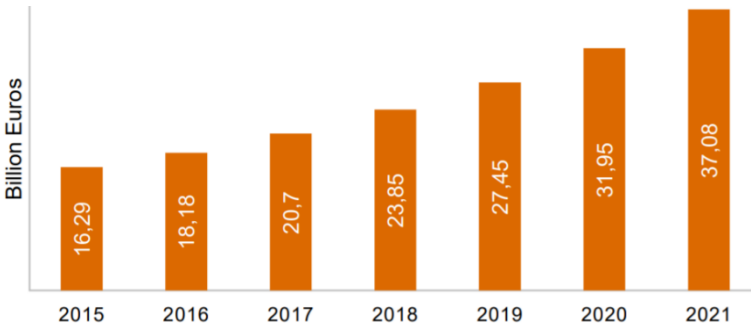


Figure 11 - Global telemedicine market size in 2015 and forecasts for 2016-2021. Source: (EC, 2018)

A more recent studied conducted by (CBInsights, 2020) gathered the global digital healthcare market size from the fourth quarter of 2017 (Q4'17) to the third quarter of 2020 (Q3'20) – Figure 12. Remarkably, these amounts correspond to lower values than the ones forecasted by EC in 2015 since the scope of the studies was not the same. While the EC analyzed the telemedicine market size as a whole, CBInsights only analyzed the funding of digital healthcare.

An investment increase in telemedicine companies was impelled by the outbreak of coronavirus with the goal of addressing the disrupting health effects triggered by the inflicted pandemic scenario. Accordingly, global digital health equity funding grew by 73% in the 3rd quarter of 2020 – setting a new quarterly record - Figure 12. (CBInsights, 2020).

Figure 12 displays the amount of deals and dollars of global digital healthcare funding. However, the weight of this investment concerning startups and early-stage ventures is unclear in the abovementioned chart.

As such, Figure 13 provides an insightful view on the amount of global digital health investment devoted to companies categorized by the respective stage of investment.



Figure 12 - Quarterly global digital health funding and deal count, Q4'17 – Q3'20. Source: (CBInsights, 2020)

As it can be stated in accordance with Figure 13, most of the global digital health investment was directed to early-stage deals. This statistic implies that most of digital health investment in the period Q4'17 - Q3'20 - was performed in order to finance startup companies for the first time, suggesting that the investment money in the digital health industry is highly concentrated in new businesses – including telemedicine startups.

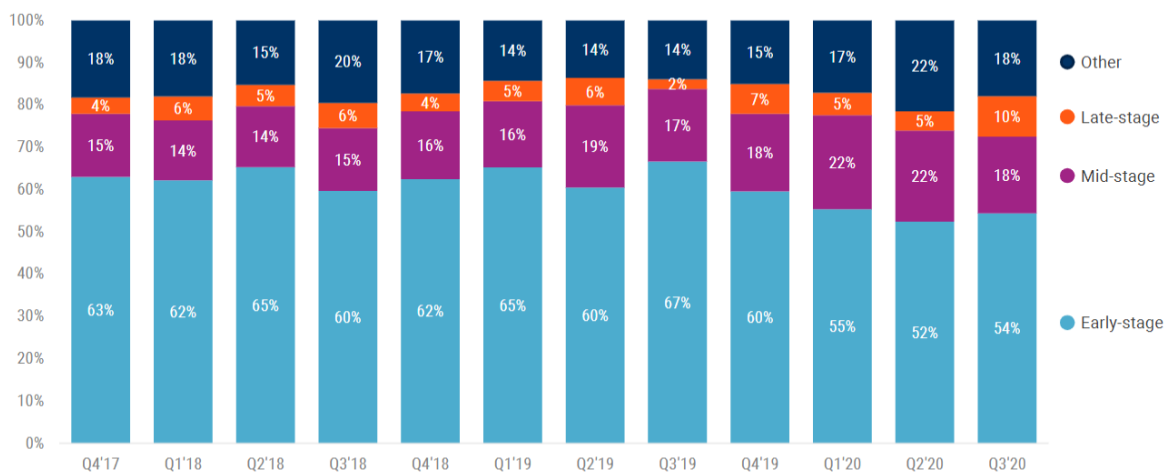


Figure 13 – Percentage share of global digital health deals by stage, Q4' 17 – Q3'20.

Note: “Early-stage” includes convertible note, angel, seed, and Series A rounds. “Mid-stage” includes Series B and Series C rounds. “Late-stage” includes Series D, Series E+, growth equity, and private equity rounds. “Other” includes unattributed and corporate minority rounds.

2.3.3 Applications

Telemedicine is often employed with the purpose of connecting medically deprived or geographically distant areas with medical centers. Thus, less highly trained on-site personnel is able to provide health services with long-distance help. As a concept, telemedicine covers a diversified range of technologies and applications. (Zundel, 1996).

Table 7 represents a summary regarding the information collected on PubMed in line with a literature search by certain keywords (“search item”) regarding telemedicine and respective medical specialties.

Table 7 - Literature search on PubMed from 02.01.2021. The column “PubMed hits” indicates how many entries are found in Medline using the keyword search represented by "search item".

Search item	PubMed hits	Reviews	%
telemedicine	38,868	4,909	12,6
telepathology OR tele pathology	1160	178	15,3
telectyology OR tele cytology	148	9	6,1
telehematology OR tele hematology	430	50	11,6
teledermatology OR tele dermatology	913	140	15,3
teleradiology OR tele radiology	1823	218	12,0
teleophtalmology OR tele ophtalmology	205	37	18,0
telecardiology OR tele cardiology	273	35	12,8
telepsychiatry OR tele psychiatry	818	149	18,2
teleoncology OR tele oncology	385	49	12,7
telepharmacy OR tele pharmacy	150	26	17,3
telemedicine AND primary care	5506	588	10,7
telemedicine AND trauma	1478	172	11,6
telemedicine AND emergency	5095	853	16,7
telesurgery OR tele surgery	636	81	12,8
tele-education OR tele education	859	135	15,7
telemonitoring OR tele monitoring	1801	336	18,7
teleconsultation OR tele consultation	7160	656	9,2

According with the displayed data in Table 7, teleconsultation represents the most cited telemedicine modality in PubMed out of all the included “search items”, thereby providing an indicator of this modality as the most explored throughout the scientific literature.

Analyzing the abovementioned medical specialties depicted in Table 7, it’s important to highlight the relevant role that telemedicine assumes in what concerns primary care (“telemedicine AND primary care” retrieves 5506 citations). This statement is backed up by the conclusion on the literature review performed by (Bashshur et al., 2016) research, which concluded that “telemedicine has significant potential to address many of the challenges facing primary care in today’s healthcare environment”.

According with (WHO, 2019), primary health care is “a whole-of-society approach to health and well-being centred on the needs and preferences of individuals, families and communities”. Primary

healthcare includes family medicine and general internal medicine and it is usually the first contact a person has with the health system when they have a health problem.

The application of telemedicine in emergency care is also often cited in the scientific literature (“telemedicine AND emergency” retrieves 5095 citations). As time and locations of emergency are not able to be determined *a priori*, telemedicine is often seen as a tool to “bridge the gap between patient or mobile emergency teams and specialists” located at the healthcare institutions (Brauchli, 2006).

Teleradiology likewise comprises a medical specialty of notable telemedical application with over 1800 references registered in PubMed. According with (Brauchli, 2006) this is not a surprising result since the digital image generated by modern X-ray machines possess a standardized format able to be forwarded into telemedicine networks.

Figure 14 depicts teleradiology, teledermatology and telepsychiatry as constituting medical specialties included in “Established” telemedicine programmes in the majority of OECD countries, thus implying a considerable development degree of these specialties across Europe and the United Kingdom. On the other hand, out of the four analyzed fields, telemonitoring resembles the least developed telemedicine modality adopted by the major part of OECD countries still under the form of “Pilot” programmes, therefore exhibiting a lower degree of development when compared to the remaining three telemedicine application areas considered.

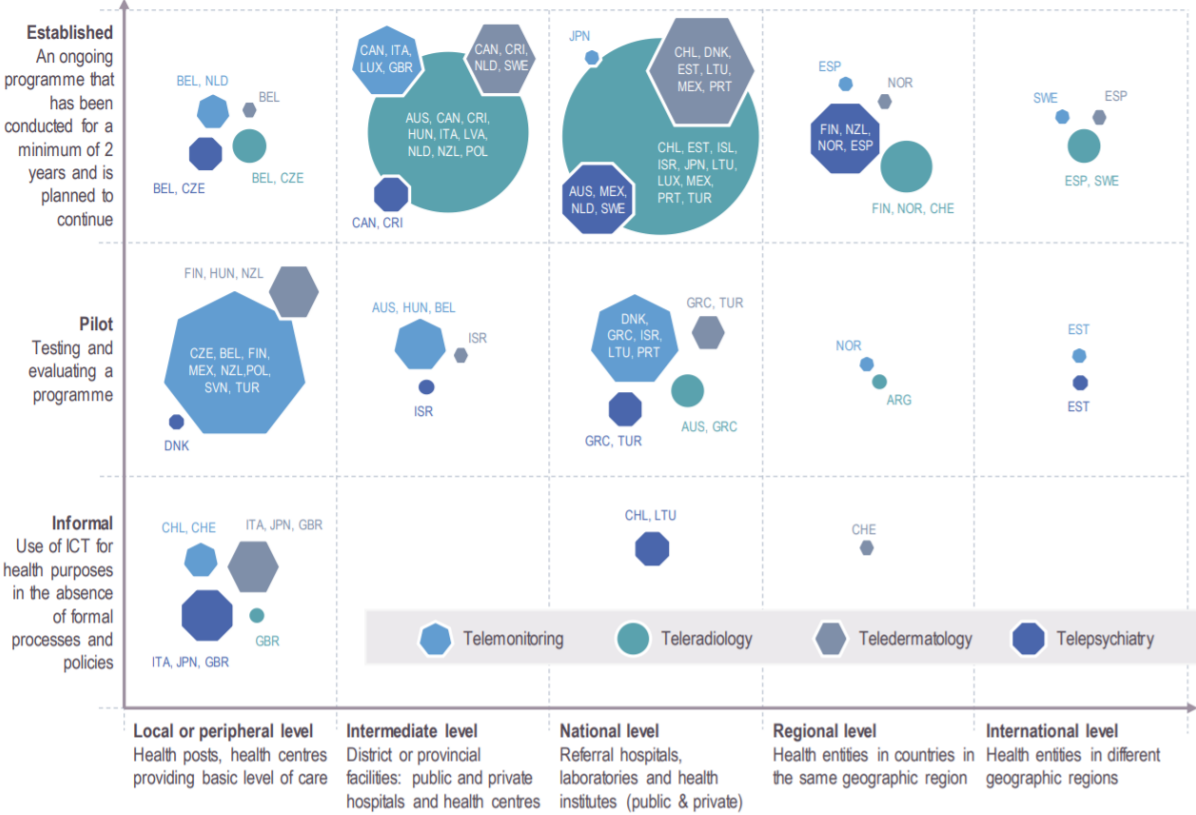


Figure 14 – Countries reporting use of telemedicine by level of health system and type of programme. Source: (OECD, 2020).

2.3.4 Telemedicine in Portugal

Health ministry defends the use of telemedicine for the performance of medical consultations and exams. According with the dispatch 3571/2013 published in Diário da República on 6th March of 2013, the use of telemedicine is positively remarked and a reduction in travelling times and distances between patients and healthcare services are underlined as telemedicine advantages (Ministério da Saúde, 2013). Since then, the provision of telemedicine services and its applications have been further developed both in the private and public sectors.

The public health sector in Portugal is characterized by the existence of the national health system - SNS (Sistema Nacional de Saúde) -, created in 1979, whose main goal is to assure the right to health protection through a timely, equitable and universal manner to provide the needed healthcare to all citizens according with their clinical situation and regardless of their economical conditions (Ministério da Saúde, 2018).

In 2010, SPMS E.P.E (Serviços Partilhados do Ministério de Saúde, Entidade Pública Empresarial) is created under the XVIII Constitutional Government Programme, “Decreto-Lei nº 19/2010”, with the purpose of providing specific shared healthcare services articulated with the establishments and services of SNS - including ICTs derived services such as telemedicine

CNTS (Centro Nacional de TeleSaúde) is established later on in 2016 through SPMS E.P.E with the purpose of potentiating the use of ICTs and promote synergies through an inclusive network of partners to bring health closer to citizens (Ministério da Saúde, 2020).

The most recent public initiative promoted by SPMS under the scope of CNTS is the national strategic plan for telehealth 2019-2022 (PENTS – Plano Estratégico Nacional para a TeleSaúde) which rises as a strategic aggregation tool for the development of telehealth in Portugal (CNTS, 2019).

In 2014, 33% of Portuguese hospitals were performing telemedicine activities (Morgado, 2015) and in 2018 Hospital Garcia de Horta launched a home hospitalization programme recurring to telemedicine has been implemented with over 6000 treated patients. According with the coordinator of the National Programme of Home Hospitalization Units in SNS, roughly 1 million patients are hospitalized in SNS hospitals each year, being that 40 to 60% of these can be remotely treated at home, with projected cost savings in the state’s budget of 700 to 800 million €. (Secção Regional do Centro da Ordem dos Médicos, 2020)

In 2020, there was a 67% growth in the number of teleconsultations taking place under the public health system when compared with 2019. In 2021, the number of teleconsultations reached a historical maximum of approximately 30000 teleconsultations per month in comparison with the average number of 3716 teleconsultations per month registered in 2020. The outbreak of the SARS-CoV-2 virus has led to global lockdown measures including, Portugal, which constitutes the main reason for the drastic increase in the number of consultations in 2020 and the first months of 2021.

Regarding the private health sector, several companies – including startups, SMEs and Large Enterprises –, private hospitals and insurance companies operate in Portugal as telemedicine service providers (Morgado, 2015; Uscher-Pines & Mehrotra, 2014).

Knok healthcare is a Portuguese telemedicine startup created in 2015 that possesses its own API (Application Programming Interface) that enables the booking of consultations, performing videoconsultations and other health services. The company functions based on both B2B (Business to Business) and B2C (Business to Consumer) models and has served over 1.2 million customers around the world. Also, it possesses several partnerships with large Portuguese enterprises such as AdvanceCare, Medicare, Grupo Lusíadas and NOS telecommunications. Knok healthcare represents one of the largest telemedicine players in the Portuguese market together with Teladoc. (Knok, 2021). As the largest telemedicine service provider worldwide, Teladoc is present in Portugal under the subsidiary company Advance Medical which offers a digital platform for telemedicine focused on the B2B segment counting with over 27 million customers worldwide (Teladoc Health, 2021).

Besides Knok and Teladoc, a number of other telemedicine companies are present in the Portuguese market such as HopeCare, Doctorino, Doctoralia and Tellocare.

The largest Portuguese private hospital groups namely José de Mello Saúde (comprising CUF hospitals), Luz Saúde, Lusíadas and Trofa Saúde have increasingly started to implement telemedicine as part of its clinical services portfolio. Within these groups, Luz Saúde was the first one to implement telemedicine services through “Centro Clínico Digital”, available on the mobile app MYLUZ since 2017 (Hospital da Luz, 2020). Only in 2020, aiming to decrease the occupation rate in hospitals as a result of the SARS-CoV-2 virus, CUF, Lusíadas and Trofa Saúde have launched telemedicine services to their customers (CUF, 2020; Lusíadas, 2020b; TrofaSaúde, 2020).

Portuguese insurance companies represent one type of institutional stakeholder that have also bet on the development of their own telemedicine applications to provide to their payees. In 2017, Multicare developed the native app Medicina Online which allows the user to have access to videoconsultations and medical prescriptions prescribed by a doctor from the insurance network. As a response measure to the infectious rate imposed by SARS-CoV-2, in 2020 Médis similarly developed the telemedicine app Médico Online that enables a patient to have access videoconsultations and medical prescriptions.

According with Figure 14, an OECD report discloses the use of telemedicine in Portugal under the scope of the approached four fields of application as either pilot or established programmes taking place at national level. OECD reports on digital health indicate a considerable development in terms of Telemonitoring, Teleradiology and Teledermatology in Portugal. Nevertheless, the same reports indicate that there is still a long way to go in order to achieve a generalized increase in digital health in Portugal, namely in terms of Telepsychiatry. (OECD, 2020).

Additionally, depending on the year there are only between 7 and 25 teleconsultations per 1 000 people in Portugal, compared to the average of between 4 and 8 traditional face-to-face doctor consultations for every person in OECD countries (OECD, 2020).

The impacts deriving from the rapid spread of SARS-CoV-2 pandemic, declared by WHO on March 11th 2020, has led to an increased importance in telemedicine in Portuguese hospitals and telemedicine firms have received a growing degree of attention by scholars (PubMed, 2020; Sanches, 2020).

As a hot topic in today's society directly related with Healphant and remote work practice, despite the already existing telemedicine programmes in Portugal, "there is still a long way to go to achieve a generalized increase in digital health" (Sanches, 2020).

Chapter 3

METHODOLOGY

The current chapter presents the methodology to be developed in this dissertation work. Based on the literature regarding research strategies, the strategy to be employed will consist of both a quantitative survey as well as a multiple-case study with the purpose of providing an exploratory analysis on the research topics being investigated. The research methodology was based on the research “onion” of (Saunders et al., 1997). The survey and case study research strategies were based on the work of (Saunders et al., 2009) and (Yin, 2003), respectively.

In accordance with the previous literature explored throughout Chapter 4, the key dimensions affecting EO of startups remain yet to be studied in detail. Also, it is still unknown how the use of remote work online applications may impact the entrepreneurial orientation of a startup developed under crisis scenarios.

Figure 15 illustrates the research outline to be used in this work in a way of investigating the two abovementioned research questions.

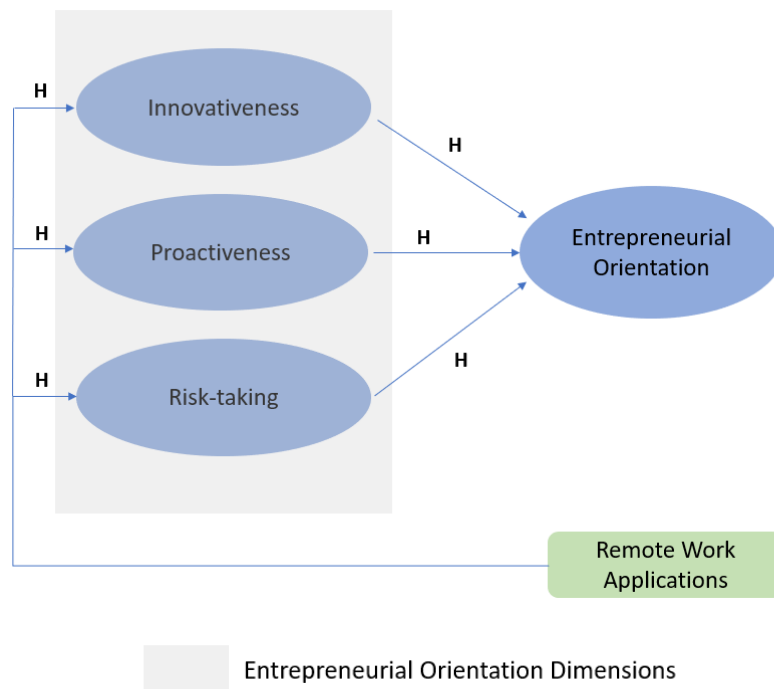


Figure 15 – Research Outline.

The rightside hypotheses are intended to assess the influence of each one of the EO dimensions in startups as a way of shedding some light on which dimensions may be assumed of as more relevant for these firms to enter the market. These hypotheses concern the first research objective posed in this work and are addressed in Chapter 5.

The leftside hypotheses are targeted to assess how remote work online applications may impact the three discussed EO dimensions in startups developed under crisis scenarios. These hypotheses concern the second research objective posed in this work and are analyzed in Chapter 6.

According to (Yin, 2003) there are three types of research: exploratory, explanatory and descriptive. Exploratory analysis “helps in gathering background data of a particular topic” and it is frequently used when information regarding a particular topic is scarce but there is already a framework in place to be applied to the phenomenon being studied as a basis of hypothesis testing. (Kalogiannidis & Chatzitheodoridis, 2021).

As illustrated in sections 3.2.4 and 3.3.6, the significance of EO dimensions as well as the impacts of remote work in the EO dimensions of a startup firm are poorly studied in the literature and thus the current work aims to contribute with exploratory analysis to these fields.

The research onion was developed by (Saunders et al., 1997) to describe the stages, or “layers”, through which a researcher must pass when developing an effective design methodology before starting the ultimate “layer” – data collection and data analysis.

The research onion consists of a systematic approach for developing a research methodology in business studies. According with (Melnikovas, 2018) it is particularly appropriated and relevant to be employed by students and scholars that possess little experience in the realm of scientific research.

Each layer of the research onion demonstrates a specific method. In the present work, the following layers of the research onion that were employed in this work are described along this Chapter.

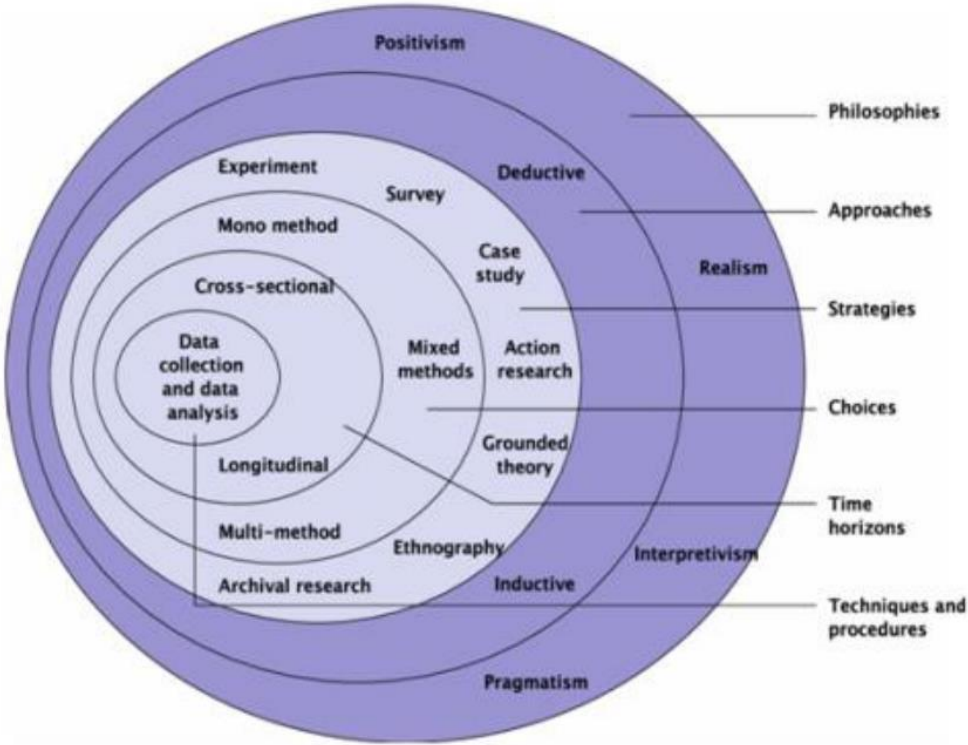


Figure 16 – The “Research Onion”. Source: (Saunders et al., 1997)

3.1 Research Philosophy

(Saunders et al., 1997) defines research philosophy as a way according to which a researcher views the world, involving her or his taken-for-granted assumptions about human knowledge and about the nature of the realities encountered. These inevitably shape how a research question is understood and the associated research design is built.

According to (Long et al., 2018) there are mainly three different kinds of research philosophies used in the methodology of research. They are as follows: Pragmatism, Positivism, and Interpretivism.

(Burke et al., 2017) suggests that Pragmatism is a sort of philosophy that considers new innovative concepts that are important only if they assist any action. In its turn, Positivism gives the researchers independence and directs them in creating a research document that is entirely externalised. Lastly, Interpretivism claims that people are unaffected by external causes of society.

In this dissertation work, the philosophy of Pragmatism has been undertaken in order to assure that the drawn conclusions will follow a high degree of scientific rigor without involving unnecessary variables. This was accomplished by adopting the previously studied framework of (Covin & Slevin, 1989).

3.2 Research Approach

This layer refers to the approach that the researcher takes, which can be described as either deductive or inductive.

The deductive approach starts with a specific hypothesis or hypotheses that has been developed based on information or patterns that have been observed by the researcher. It then seeks to test this hypothesis and develop a broader theory from it.

Conversely, the inductive approach starts with a certain theory and then focuses later on the more specific details. This approach is sometimes mentioned as a move from the specific to the general.

A deductive approach will be employed in the current work since the hypotheses of study were formulated and assessed based on the previously formulated framework by (Covin & Slevin, 1989) and (Torkzadeh & Doll, 1998) aiming to assess the importance of EO dimensions as well as the impact of remote work applications on such dimensions.

3.3 Research Strategies

Several research strategies are documented to have been used throughout the literature in scientific work. Table 8 illustrates the most frequently used research strategies as well as three criteria used to choose the most suitable strategy to employ in a particular research (Yin, 2003).

Regarding the form of research question, “what” research questions - as the first research question is hereby presented in this work - are adequate to be addressed by recurring to a survey since this strategy is advantageous when the research goal is to provide information about the “incidence or prevalence of a phenomenon” (Yin, 2003). This is the case when analyzing the first research question, which concerns the study of what EO dimensions are more relevant in driving the EO for startup firms developed under crisis scenarios.

Table 8 - Research Strategies. Adopted from (Kalogiannidis & Chatzitheodoridis, 2021) and (Yin, 2003).

Strategy	Form of Research Question	Requires Control of Behavioral Events?	Focuses on Contemporary Events?
Experiment	how, why?	Yes	Yes
Survey	who, what, where, how many, how much?	No	Yes
Archival analysis	who, what, where, how many, how much?	No	Yes/No
History	how, why?	No	No
Case study	how, why?	No	Yes

According to (Yin, 2003), “how” research questions, as the second research question is hereby posed in this work, are more appropriate to be dealt with by using case studies as it is the case when investigating the second research question - how remote work applications have impacted EO dimensions of startups developed under crisis scenarios.

Both the case study and the survey are preferred when investigating contemporary events but when the relevant behaviors do not require being controlled (Yin, 2003). In this work, EO dimensions of a telemedicine startup and the impact of remote work deriving from a contemporary event - the SARS-CoV-2 pandemic – are to be studied while not having any control over the event.

In some situations more than one strategy may be considered equally attractive and therefore multiple strategies can be used in a study – e.g. using a survey and a case study (Yin, 2003). In line with the abovementioned criteria, utilizing a survey and a case study appears to be the proper research strategy to pursuit in this situation. Hence, according with the research onion model of (Saunders et al., 1997), the research choice consists of a mixed method since two research strategies will be employed – a case study and a survey.

According to (Zainal, 2007), case studies provide little basis for scientific generalization, particularly in the situation where a single case study is chosen due to the small number of subjects used. However, (Hamel & Dufour, 1993) and (Yin, 2003) point out that the value in a case study relies on “expanding and generalizing theories (analytic generalization) and not to enumerate frequencies (statistical generalization)”.

Regarding the first research question, Figure 17 illustrates the survey methodology to be used in this work. The survey methodology was based on the work of (Saunders et al., 2009).

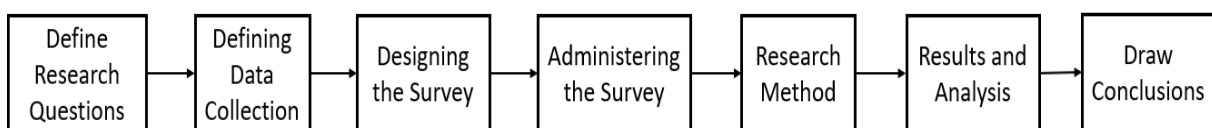


Figure 17 - Survey Methodology. Adopted from (Saunders et al., 2009).

The research question to be analyzed through the proposed survey is defined in section 6.1 according with the research objectives defined in the Introduction Chapter. Subsequently, section 6.2 describes the reasoning for the data collection method to be employed - a questionnaire. The survey design, outlined in section 6.3, is intended to assure the internal validity and reliability of the collected data. The relevant tactics are therefore mentioned along this section. As the last stage of the survey methodology, the survey administration details are presented in section 6.4, including a description of the sampling population used in this work.

In what concerns the second research question, Figure 18 illustrates the case study methodology to be used in this work. The case study methodology was based on the work of (Yin, 2003).

The initial step in designing the case study consists in developing the theory upon which the case study relies on, documented in section 6.1. In line with the gathered theory, the case study is selected and the research questions and data are designed accordingly – section 6.2. The case study is then conducted by gathering the relevant data in line with the chosen sources of evidence – in this case under the form of interviews and documentation. This process is illustrated in section 6.3.

Once the data is collected, the results are analyzed by reporting how and why a particular proposition was demonstrated or not, as described in Chapter 7.

As a relevant element of Figure 18, the dotted line feedback loop represents the situation in which a discovery occurs leading to a reconsideration of one or more of the study’s original theoretical propositions. Under these circumstances, the redesign may involve changes in the case study protocol. In addition, section 6.4 presents the tactics used throughout the case study to assure the quality of the developed research. Such tactics were adopted from the work of (Yin, 2003).

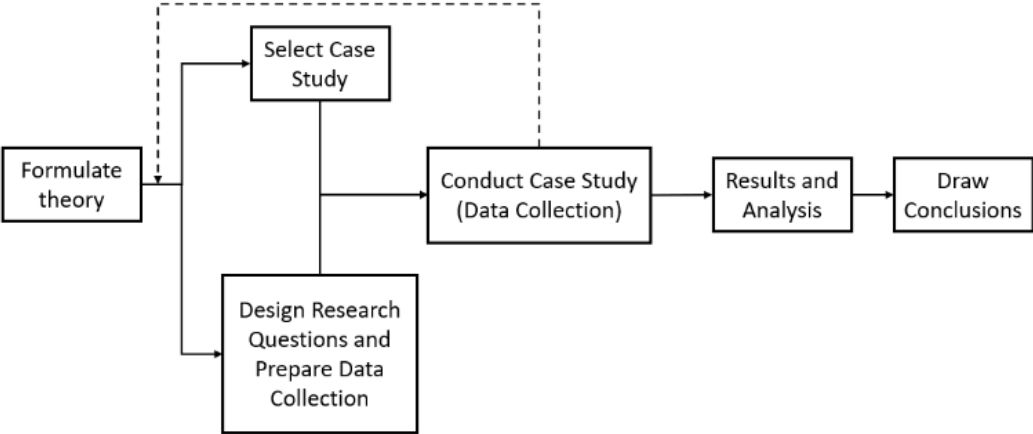


Figure 18 – Case Study Methodology. Adopted from (Yin, 2003).

3.4 Research Choices

The adopted research choice methods were different in line with each of the research strategies conducted in this work – case study and survey.

Regarding the case study strategy, a mono-method qualitative technique was chosen to be applied, which means that “one data collection technique was used with associated analysis techniques

restricted to a qualitative world view". A qualitative data collection technique is used predominantly as "a synonym for any data collection technique or data analysis procedure that generates or use non-numerical data". (Saunders et al., 2009).

The selected data collection technique regarding the case study were interviews being that the reasoning behind this choice is accordingly presented in section 6.3.

With respect to the survey strategy, a mono-method quantitative technique was selected. Mono-method means that a single data collection technique was employed whilst a quantitative technique resorts to a "data collection technique that generates or uses numerical data". (Saunders et al., 2009).

Questionnaires were chosen as the data collection survey strategy for the reasons outlined in section 6.2.

3.5 Time horizon

From a time horizon perspective, the research can be analyzed either from a cross-sectional or a longitudinal standpoint, as described by (Saunders et al., 2009).

Since the current work represents a time constrained boundary to be completed, the cross-sectional method was applied. Hence, the current work represents "the study of a particular phenomenon (or phenomena) at a particular time" – a "snapshot" of a certain situation (Saunders et al., 2009).

(Saunders et al., 2009) recognizes that most research projects undertaken for academic courses are time constrained, and therefore cross-sectional.

Chapter 4

DESIGNING THE SURVEY STRATEGY

In this Chapter, the survey strategy to be used with the aim of assessing what are the more impacting EO dimensions of startups created under crisis scenarios is described. The data was collected through online questionnaires based on the proposed research questions of (Covin & Slevin, 1989) and 35 answers from the sampling population were obtained accordingly. The data was treated recurring to standard statistical procedures in SPSS software. PLS-SEM was chosen as the research method to analyze the data and it was operationalized with Smart PLS 3.0 software following the recommendations of (Garson, 2016) and (Hair et al., 2016).

4.1 Research Questions

The survey strategy is usually associated with a deductive approach and it is most frequently used to answer “what” questions, as it is the case with the first research question posed in this work – “what are the more impacting EO dimensions of startups created under crisis scenarios”.

Table 9 illustrates the hypothesis to be tested regarding the first research question, being that H1 denotes the hypothesis prefixes regarding the first research question.

Table 9 - Hypothesis to be tested in the first question of the dissertation work.

Hypothesis	Description
H1a	A higher degree of Innovativeness is associated with a higher degree of EO
H1b	A higher degree of Proactiveness is associated with a higher degree of EO
H1c	A higher degree of Risk-taking is associated with a higher degree of EO

Perhaps the most frequent critique in the literature regarding the use of questionnaires relies on ensuring that the researcher will collect the precise required data to answer the research question(s) and achieve the stated objectives (Saunders et al., 2009).

In this case, the questionnaire proposed by (Covin & Slevin, 1989) was chosen to be employed. Since this tool has been extensively explored, refined throughout the literature and applied for the same purposes explored in this work, as described along Chapter 4.2, it's reasonable to state that the collected data will serve as precise and adequate criteria to assess what are the more impacting EO dimensions of startups.

4.2 Data Collection

Several sources of evidence can be used as data collection for a survey, namely interviews, observation and questionnaires. Yet, the questionnaire is one of the most widely used data collection techniques within the survey strategy. (Saunders et al., 2009).

Questionnaires work best with standardised questions with which the researcher can be confident that will be interpreted the same way by all respondents (Bell, 2014). This is the case when referring to the first research question which may be analyzed recurring to (Covin & Slevin, 1989) questionnaire.

Online questionnaires are one of the most efficient methods in quantitative research because they have a low implementation cost, are easy to answer for respondents, and data is immediately available to the researcher (Thietart, 2001).

Therefore, online questionnaires were used as the data collection method to answer the first research question documented in this work.

According with (Saunders et al., 2009), it is possible for a questionnaire to encompass three kinds of variables: opinion, attribute and behavioural variables.

Behavioural variables are defined as “containing data on what people (or their organisations) did in the past, do now or will do in the future” (Saunders et al., 2009).

Behavioural variables are not subjectively dependent and these compose the only kind of variable collected due to the nature of the questions and the respective explored framework. This data may therefore provide unbiased conclusions unlike opinion or attribute (which are dependents on the characteristics and own feelings of people).

4.2.1 Pilot testing

According (Bell, 2014), the questionnaire should be pilot tested prior to using it to collect data. The goal of the pilot test is to refine the questionnaire so that respondents will have no problems in answering the questions and there will be no problems in recording the data (Saunders et al., 2009).

The pilot testing usually comprises two stages: asking an expert or group of experts to comment on the representativeness and suitability of your questions and, in a subsequent stage, perform the pilot test. (Saunders et al., 2009) states that as well as allowing suggestions to be made on the structure of your questionnaire, this will help establish content validity (the extent to which the questionnaire provides adequate coverage of the investigative questions) and face validity (“whether the questionnaire appears to make sense”).

Both the supervisor and co-supervisor of this work were selected as the experts consulted to address the first stage of the pilot testing. Both of them provided their consent on the questionnaire’s representativeness and suitability given that the questionnaire was adopted from a previous framework explored in the literature.

Subsequently, the pilot test was conducted with the CEO of healphant, which has also provided his approval on the questionnaire’s comprehensibility, stating that he was able to understand and answer to all the posed questions.

4.3 Designing the Survey

As documented by (Kreiser et al., 2002), previous studies on EO dimensions have largely focused on SME’s and large firms, while startup firms are less studied in the literature. The survey formulated by (Covin & Slevin, 1989) has been extensively used as a framework to test EO dimensions in all the aforementioned typology of firms.

Regarding the first research question, since the object of study is focused on the EO of startup firms the data was uniquely collected from primary data sources through online surveys. This is due to the standard research strategy that has been extensively documented on the topic according with (Covin & Slevin, 1989) framework. (Covin & Slevin, 1989) uses a survey involving a Likert 7-point scale according to which EO dimensions are measured. Also, the survey was chosen as a primary data source collection method since the startup firms sampling population didn’t possess a long enough market presence for secondary data sources to exist online.

Accordingly, the survey presented in section 3.2.5, Table 4, was selected to be used in what concerns the first research question.

4.4 Administering the Survey

Once the survey design and the study sample were determined, the survey was then ready to be applied for data collection purposes under the form of a questionnaire. In this case, the final phase is called “questionnaire administration” (Saunders et al., 2009).

Regarding its nature, the questionnaire was an internet-mediated self-administered questionnaire. Accordingly, the questionnaire was made available to the respondents electronically using the Internet (via e-mail and LinkedIn) and returned by the respondents upon completion. The questionnaire was administered through Google Forms and the respondents were startup CEOs since according with (Covin & Slevin, 1989) these constitute the most appropriate employees to answer this questionnaire due to its “holistic and clear view of the company”. The contacted startups consisted of companies that have participated in incubation and acceleration programmes promoted by Startup Lisboa and Fábrica de Startups. Also, LinkedIn connections between entrepreneurs and information provided by Informa D&B² served as a mean to reach out to more startups.

4.4.1 Sampling Population

The full set of cases from which a sample is taken is called the population (Saunders et al., 2009). In this situation, each case represents a company rather than an individual due to the nature of the first research question, as underlined along section 4.2. The minimum sample, or sampling population, size was determined in line with the following heuristics.

Heuristics suggest that the minimum sample size should be equal to the larger of the following: ten times the largest number of indicators used to measure one construct; or ten times the largest number of paths directed at a certain construct in the model (Garson, 2016). In this case, each of the constructs (innovativeness, proactiveness and risk-taking) are measured according with 3 indicators which implies that in line with the abovementioned heuristics the sample size should not be lower than 30.

Regarding the sampling population criteria, three parameters were considered in line with both the scope of this work as well as the conducted literature review: funding date of the company, company typology and geographic location of the company.

In what concerns the creation date of the company, the eligible period was considered to encompass the timeframe from March 11th of 2020 (date of declaration of SARS-CoV-2 as a pandemic) until the present date. This is due to the fact that the first research objective is related with companies created under crisis environments, such as SARS-CoV-2.

² Informa D&B is a company specialized in corporate information that has provided a database of 500 companies founded in Portugal free of charge, under a social responsibility policy of cooperation towards academical students and scholars.

Regarding the company typology, only startup companies were considered as part of the sampling population as a result of the research objective being analyzed. This derives from the identified gap in the literature in terms of the typology of companies being studied in the field of EO. As described in section 4.2.4, startups represent a minor share of companies being investigated in terms of EO dimensions.

The need for establishing a geographical boundary was considered with the purpose of avoiding biased results deriving from the significant variability of economical effects that were verified across the globe stemming from SARS-CoV-2 pandemic restrictions, as mentioned in section 3.3.

As such, only companies funded in Portugal were selected for the sampling population. This choice was related with the provided facilitated access to reach these companies through supervisors' network of contacts.

As illustrated in Annex 2, the sampling population is composed of 35 Portuguese startups, being that these organizations perform in 20 different industries including Big Data, Digital Marketing, Healthtech and Social Media. Education and Tourism represent the industries where the respondent startups performed the most, composing roughly 30% of the sampling population.

4.5 Research Method

4.5.1 Data Description

As outlined in section 3.2, data regarding EO of startups is scarce in the literature. In addition, since no secondary data source of this evidence was found about Portuguese startups, primary data collection was performed.

As such, questionnaires were issued to several Portuguese organizations, namely startup incubators, startup accelerators and startup associations. This served as a mean of contacting organizations fitting the criteria described in the following section in order to collect data for testing the formulated hypothesis. After 16 days counting from the start date of the data collection approach (8th of April of 2021), survey results from 35 organizations were received – Annex 1 displays the issued survey. This data composed the evidence used for the data analysis regarding the first research question, which is conducted in Chapter 7.

The initial database was composed of 575 companies. Out of this universe, 86 companies were successfully contacted. Only 86 companies were inquired due to the sampling population fitting criteria mentioned in section 5.4.1. Despite having obtained 39 responses, 3 were promptly discarded because they weren't provided by the CEO and only 33 were considered valid³.

Regarding missing values, the recommendations of (Hair et al., 2017) were followed. Specifically, when the amount of missing data on a single questionnaire exceeds 15%, the observation was removed from the data file. Otherwise, the remaining missing values were handled through mean value replacement when there were less than 15% values missing per questionnaire. This procedure consists in replacing

³ Invalid answers imply that one or more questions were not answered (missing values).

the missing values of a certain answer for the average of the remaining answers to the same question, allowing to preserve as much information as possible. By applying the replacement procedure, the final sample size was composed of 35 observations - Annex 2.

The response rate was considerably high⁴ – 45%. According with (Deutskens et al., 2004) this is particularly common when data is collected through online self-administered questionnaires and these possess a short length (taking less than 15 minutes to answer) - the issued questionnaire in this work had an average response time of 4 minutes.

The aforementioned data regarding the statistics of the questionnaire results are displayed in Annex 2.

Before starting to conduct a statistical analysis the data is checked to see whether the distribution deviates from a normal distribution. This procedure is particularly relevant for small sample sizes ($n < 50$) because parametric procedures⁵ may not be adequate to use in case of a nonnormally distributed sample. The same problem doesn't arise for large samples ($n > 50$) since "the sampling distribution tends to be normal, regardless of the shape of the data". (Ghasemi & Zahediasl, 2012).

Despite several methods are suggested in the literature for normality testing, the Shapiro-Wilk test was used since it is the "most widely used method" for small sample size due to its highest power to detect nonnormality (Mishra et al., 2019). In addition, Skewness and Kurtosis values were also calculated to complement the normality analysis – Annex 4, Panel A.

The results reveal that data significantly diverges from normal distributions, supporting the decision regarding the type of modeling which best fits the data collected.

Lastly, to check a possible response bias, the results obtained from the initial respondents (first 15%) are compared with the late respondents (last 15%) for all model variables. Using a Mann-Whitney (Wilcoxon rank-sum test) and a median test (Chi-square test), which allow comparing independent samples, no statistically significant differences were found between the two groups (Annex 4 Panel B).

4.5.2 Research Model

To validate the proposed research hypotheses, a Structural Equation Model using Partial Least Squares (PLS-SEM) was applied. Specifically, data analysis was performed using SmartPLS 3.0 software.

Partial Least Squares-Structure Equation Modelling (PLS-SEM) and Covariance-based Structure Equation Model (CB-SEM) are two non-parametrical methods to deal with non-normality conditions. The research of (Jannoo et al., 2014) proposed that when the sample size is small and the data is non-normal, PLS-SEM is a better approach when compared with CB-SEM when the research objective is prediction. PLS-SEM was the adopted method in this work.

PLS-SEM is a second-generation technique that enables to integrate unobservable variables measured indirectly by indicators and is based on a multivariate iterative approach that identifies "key driver" constructs. PLS-SEM is recommended in an early stage of theoretical development for the purpose of

⁴ (Deutskens et al., 2004) considers any value above 25% as a high response rate.

⁵ Parametric statistical procedures are a class of statistical procedures that rely on assumptions about the shape or form of the probability distribution from which the data were drawn (Hoskin, 2010).

testing and validating exploratory models. Given that it doesn't depend on the normality conditions of data, PLS-SEM is a feasible non-parametric method to use in case the sample is small sizes ($n < 50$) - as it is the case. As a non-parametric tool, PLS-SEM is a distribution-free approach and can be applied with reduced sample sizes, even with highly complex models, achieving high levels of statistical power (Hair et al., 2017).

In recent years, PLS-SEM has been used as a research model throughout the literature by several researchers under the scope of entrepreneurial orientation in startups - (Kee & Rahman, 2018; Shim, 2020)

The advantages of PLS-SEM include: " i) ability to handle problematic modelling issues that regularly arise in social sciences; ii) capacity to handle multicollinearity; iii) robustness against data noise and missing data; and iv) creation of independent latent variables (LV) directly based on cross-products involving the manifest variables (MV)". (Garson, 2016).

The PLS path model is composed of a structural model (or inner model), which displays the relationships between the constructs being evaluated and the measurement model (or outer model). The latter evaluates the relationships between the MV and their corresponding construct.

The measurement model formulation depends on the direction of the relationships. If the LV give rise to each MV, the measurement model should be formed in the reflexive way, if the MV give rise to the LV, the formative way is more suited (Garson, 2016).

According to theoretical considerations, the model presented was operationalized with reflexive indicators, so it is assumed that the constructs are the "reality" and MV are a sample of all possible indicators of that reality. This implies that after dropping one indicator, the meaning of the construct remains the same since the other indicators are also representative (Garson, 2016).

Figure 19 represents the path modelling and the underlying hypotheses to be tested. The hypotheses match those previously formulated in section 5.1 and these are concerning the first research objective stated in section 1.3.

In the studied model, innovativeness, proactiveness, risk-taking and entrepreneurial orientation (circle figures) represent the constructs - LVs - while the rectangle figures represent the reflexive indicators – MVs. The reflexive indicators correspond to the variables used by (Covin & Slevin, 1989) to measure each one of the EO dimensions.

The research model followed a second-order factor⁶ using the repeated indicator approach. This means that the indicators related with the second-order LV "Entrepreneurial Orientation" match the reflective indicators characterizing each of the first-order factor LVs - "Innovativeness", "Proactiveness" and "Risk-taking" - in order to implement the model in the Smart PLS 3.0

⁶ According with (Tehseen et al., 2017), a second-order factor concerns a model where a latent construct (in this case "Entrepreneurial Orientation") emerges from a further factor analysis (i.e., a second-order factor analysis) of the primary dimensions derived from correlations among a set of items or variables (in this case Innovativeness, Proactiveness and Risk-taking).

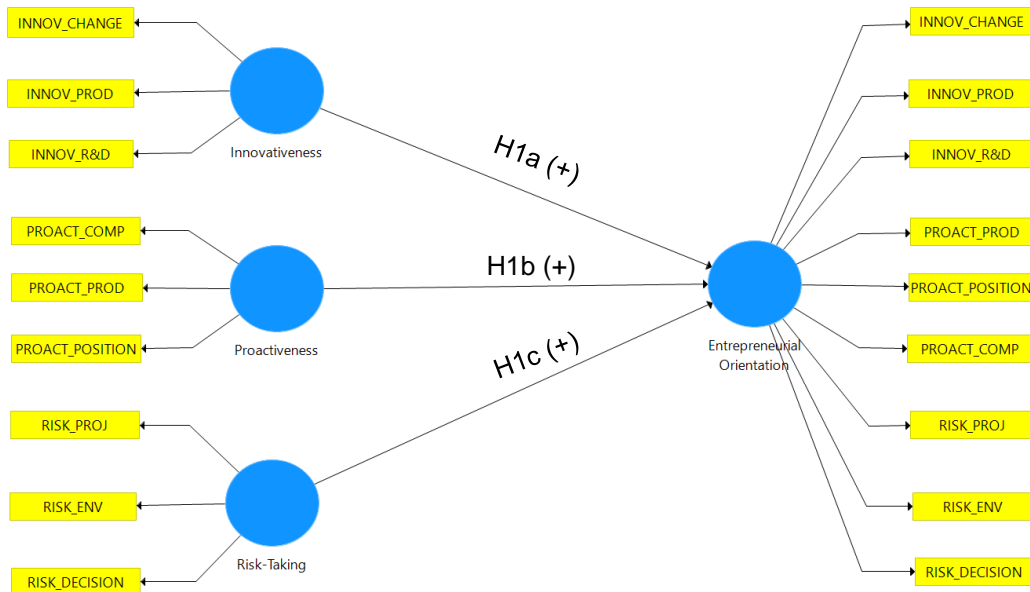


Figure 19 – Research Model in Smart PLS 3.0.

Consistent PLS algorithm (PLSc) was applied following the recommendations of (Dijkstra & Henseler, 2015)⁷. The authors argued that the use of traditional PLS should be restricted to formative settings while the PLSc may be preferred in reflexive models - as it is the case - due to estimation consistency reasons.

⁷ When running the algorithm, the measured MV are standardized with an average of 0 and a standard deviation of 1 and the selected weighting scheme was the path method. The stop criterion was set at 10^{-7} and the maximum number of interactions at 300. Bootstrapping procedures were conducted using the no sign changes option, as well as 35 cases and 5000 samples.

Chapter 5

DESIGNING THE CASE STUDY STRATEGY

In this Chapter, the survey strategy to be used with the aim of investigating how remote work online applications impact the EO dimensions of startups developed under crisis scenarios is described. A multiple-case study design is selected based on interviews conducted to the board members (CEOs, CTO and Co-Founders) of ten Portuguese startups created during the SARS-CoV-2 pandemic. Pattern-matching was chosen as the procedure to draw conclusions in line with the interview outcomes.

5.1 Theory Development

When designing case studies, theory development is an essential step prior to data collection since it provides guidance regarding what data to collect and the strategies for analyzing the data (Yin, 2003). Unless there is already a theoretical framework in place from previous literature, “theory development may take time and can be difficult” (Eisenhardt, 1989).

Five components are particularly important to be addressed when designing case studies (Yin, 2003): the study’s questions, the study propositions, its unit(s) of analysis, the logic linking the data to the propositions and the criteria for interpreting findings .

The study question to be addressed in the case study is defined in the Introduction Chapter as the second research question: how remote work online applications impact the EO dimensions of Portuguese startups developed under crisis scenarios.

The study propositions concern something that should be examined within the scope of study. Regarding the second research question, the focus of study propositions will be directed towards the impact of several ICT remote work tools promoting EO dimensions.

The unit of analysis regards the problem of defining what the case is. In this context, either the CEOs or Co-Founders of 13 startups constituted the unit of analysis as these individuals’ testimonies served as research elements to investigate the study propositions.

Linking data to the defined study propositions through pattern-matching is the core procedure in theory-testing in case study analysis. In this kind of analysis, a pattern analysis is often made to determine whether they do or do not match the data as a basis for drawing conclusions (Yin, 2003).

Hence, pattern-matching was the applied procedure by assigning “low” and “high” effect propositions to the question being analysed according with the obtained results deriving from the collected data.

The criteria for interpreting a study’s findings served as a measure to define what is considered as “low” and “high” effect propositions of the pattern-matching. Accordingly, the “low” and “high” effect propositions in the pattern-matching were classified in line with the frequency pattern of the findings resulting from the conducted interview questions, as defined in Table 14 of section 7.2.

As such, the second research question was assessed considering a set of qualitative interviews and based on the previous EO literature by (Covin & Slevin, 1989), (Torkzadeh & Doll, 1998) and the past research linking the use of remote work applications to EO dimensions documented in section 3.2.6..

Table 10 illustrates the hypothesis to be tested regarding the second research question. H2 denotes the hypothesis prefixes regarding the second research question.

Table 10 – Hypothesis to be tested in the second question of the dissertation work.

Hypothesis	Description
H2a	The use of Remote Work ICT Applications positively influences Innovativeness
H2b	The use of Remote Work ICT Applications positively influences Proactiveness
H2c	The use of Remote Work ICT Applications positively influences Risk-taking

5.2 Case Selection

When designing case studies, an important decision relies on whether it's going to be addressed as a single or multiple-case design. (Yin, 2003) advises researchers to perform multiple-case designs over single-case designs, since the evidence from multiple case studies is often considered as “more compelling and the overall study is therefore regarded as being more robust”.

According with (Yin, 2003), multiple-case study designs may be preferred over single-case designs. Single-case designs are vulnerable because it implies “putting all the eggs in one basket”.

(Yin, 2003) states two arguments in favor of picking a multiple-case study design.

As a first argument, there is the possibility of direct replication, which means that analytic conclusions drawn from several different cases are more powerful than those coming from a single case. Secondly, the context of each case is likely to be different and, if under these varied contexts similar conclusions are drawn, the external generalizability of the findings will be expanded when compared from a single case.

In his research, (Zainal, 2007) also advocates that multiple case studies should be considered in order to improve case study robustness due to the replication technique through pattern-matching.

Given its general reliability over single-case study designs, a multiple-case study design approach was picked to investigate the impact of using remote work ICT applications in EO dimensions. Hence, 13 Portuguese startups created during the SARS-CoV-2 pandemic were selected, as subsequently described along section 6.3.

5.3 Data Collection

When building a case study several sources of evidence may be considered. (Yin, 2003) considers six possible sources of evidence in his work, including interviews.

Data triangulation is a technique that can be applied when resorting to interviews. Data triangulation enables the “corroboration of the same fact or phenomenon by collecting and crossing information from distinct data sources” (Yin, 2003). This constituted the rational basis of the pattern-matching criteria.

Regarding the second research question, the source of evidence used in the case study was chosen to consist of interviews directed to the CEOs of Co-Founders - in line with their availability - of the 13 selected Portuguese startups. Section 6.3.1 provides the rationale regarding the selection of this source

of evidence. The followed standards when carrying out the interviews were based on the research of (Yin, 2003).

5.3.1 Interviews

One of the most important sources of case study information are interviews since most case studies are about human affairs. Interviews enable the interviewer to shape the questions according with the conversational flow. Therefore an interview allows to follow the line of inquiry while asking conversational questions in an unbiased manner that may serve the needs of the line of inquiry. Altogether, this allows the interviewer to collect in-depth information about a topic. (Yin, 2003).

In semi-structured interview, the actual stream of questions in a case study interview can be fluid rather than rigid (as it happens with questionnaires) which allows the participants to fully express their viewpoints and experiences, thus contributing to the robustness of the results. Semi-structured interviews are one of the most popular form of interviewing utilized in research studies and due to the stated reasons it was the one adopted in this work. (Iii, 2010).

The interview guidelines followed in this work were based on the research of (Creswell et al., 2007) which encompasses four main stages: selecting participants, pilot testing, the construction of effective research questions and the actual implementation of the interview.

In addition, a group of eight principles recommended by (McNamara, 2009) are further discussed in section 6.3.1.4, being that these principles were applied with the purpose of “maintaining an unambiguous focus to provide maximum benefit to the proposed research study”.

5.3.1.1 Selecting participants

The importance of selecting the appropriate candidates for interviews is highlighted in the work of (Creswell et al., 2007). In addition to the sampling criteria considered in section 5.4.1, the interview sampling strategy took into consideration two of the criteria mentioned by Creswell in order to obtain qualified candidates capable of providing the most credible information to the study: role relevance within the organization and willingness to openly and honestly share information or “their story”.

Table 11 illustrates the studied startups as well as the interviewed people working for these firms.

Either the CEOs or the Co-Founders were interviewed since these had a small size in terms of workers (2-3 workers) and the interviewees possessed a holistic and detailed view of all the remote work applications used throughout the entire organization. Also, the interviewees affirmed their willingness to contribute with their open and honest insights.

Both the CEO of Dearly and the CEO of Sideline⁸ were considered key informants⁹ due to both providing relevant feedback about the studied topic and facilitating contacts with other startup CEOs to further enhance evidence collection from the relevant data sources.

Table 11 – Startup interviewees’ position and respective industry.

Organization	Industry	Interviewee Position
Wace Lda	Digital Marketing	CEO
Dearly	On-demand Delivery	CEO
Bridge In	Strategic Consulting	CEO
SixPush	Digital Marketing	Co-Founder
YesDoc	HealthTech	Co-Founder
Pluckd	Human Resources	CEO
Hunchat	Social Media	Co-Founder
Sideline	On-demand Car Wash	CEO
Mudey	Insurance	Co-Founder
HandyHostel	Tourism	CEO
healphant	HealthTech	CEO
Cosmetikke	Cosmetics	CEO
Intern Platform	Data Services	Co-Founder

5.3.1.2 Pilot Testing

Implementing a pilot test resorts to another important element of the interview preparation. The pilot test assists the research in “determining if there are flaws, limitations, or other weaknesses within the interview design”, allowing for the necessary revisions and changes prior to the implementation of the study to take place (Kvale, 2007).

The pilot test was then conducted with participants that showed similar interests as those that will participate as interviewees of the implemented study, *id est*, being interested in contributing to a social study aiming to assess the effects of remote work in EO dimensions of startups developed under SARS-CoV-2. It served the purpose of assisting the with the refinement of the posed interview questions, which are discussed in the next section.

Two pilot tests were then conducted with two workers from healphant. According with the interviewees feedback, the interview design was clearly structured and they had no difficulties answering the posed questions.

⁸ Despite not having been interviewed, this person reached out to the Slack group of Impact Hub, with the intent of facilitating contacts with other startup CEOs.

⁹ According to (Yin, 2003), a key informant is a person that provides both the case study investigator with insights into a matter as well as suggests sources of corroboratory or contrary evidence.

However, the interviewees asked permission to speak in Portuguese both due to the fact it was regarding their native language and also their lack of English proficiency. This raised awareness for a potential problem when performing the interviews, which consisted in the language preferred by the interviewee to answer the interview questions. Hence, all interviewees were asked whether they would prefer to speak in English or Portuguese. In case the latter option was chosen, the responses were accordingly translated for result analysis purposes.

5.3.1.3 Research Questions

When it comes to building effective interview research questions, McNamara (2009) suggests some elements to be taken into consideration.

The first one refers to open-ended wording meaning that “respondents should be able to choose their own terms when answering questions”. Secondly, questions should be as neutral as possible which implies to avoid wording that might influence answers, “e.g. evocative, judgmental wording”.

Also, questions should be asked one at a time and should be worded clearly.

At last, a special attention should be considered when asking "why" questions. (Yin, 2003) also points out the issue of posing “why” questions which creates defensiveness on the informant’s part and addressing a “how” question instead is generally more comfortable to the participant.

Few research seem to have been conducted when analyzing the influence of remote work applications in what concerns its direct impact on EO dimensions as pointed out in section 4.3.6. Nevertheless, the influence of remote work applications has been already measured by (Torkzadeh & Doll, 1998) according with a questionnaire framework to assess workers performance.

As such, the nature of the questions posed in the interview were inspired by the work of (Torkzadeh & Doll, 1998) and reshaped in line with the scope of this work.

Table 12 illustrates the questions that were asked to each member during the interview.

Table 12 – Interview questions.

Question	Description
I1	Have you been using remote work applications in “company name”? Which ones / What were the reasons that led you to not using remote work applications?
I2	Were there any changes in the work tools your company was using before and after Covid19 outbreak?
I3	How do you feel like remote work has impacted productivity in “company name”?
I4	How do you feel like remote work has impacted your Innovativeness proclivity?
I4.1	Which remote work applications have impacted your Innovativeness the most?
I4.2	Do you believe that the use of any other app could have been used to improve your Innovativeness proclivity? Which one(s)?
I5	How do you feel like remote work has impacted your Proactiveness proclivity?
I5.1	Which remote work applications have impacted your Proactiveness the most?

- I5.2 Do you believe that the use of any other app could have been used to improve your Proactiveness proclivity? Which one(s)?
- I6 How do you feel like remote work has impacted your Risk-taking proclivity?
- I6.1 Which remote work applications have impacted your Risk-taking the most?
- I6.2 Do you believe that the use of any other app could have been used to improve your Risk-taking proclivity? Which one(s)?
- I7 If you could go back to the time before Covid19 outbreak, what would have you done differently?
- I8 After conducting a survey to 35 startups created under the Covid19 outbreak, the results suggested that Risk-taking was the most relevant dimension promoting EO, followed by Innovativeness. However, Proactiveness was the one least related with EO. Do you relate to these results?
-

5.3.1.4 Implementation of Interviews

In line with (McNamara, 2009), the following set of principles should be followed when performing research interviews.

In the first place, a setting with little distraction should be chosen. (Iii, 2010) corroborates this statement, affirming that it might be easier to conduct the interviews with participants in a comfortable environment where the participants do not feel restricted or uncomfortable to share information. This condition was fulfilled since the interviews took place in a virtual setting (via Google Meets) and the participants were located in their own homes during the interview – a circumstance that was also facilitated due to lockdown government policies. In addition, comfort was also provided given the fact that the use of Google Meets tool was familiar to the majority of the interviewees.

Secondly, the purpose of the interview should be explained to the participants. Therefore, each interview started with a contextualization about the concepts of EO dimensions as mentioned in section 4.2, followed by the formulated questions in Table 12. In addition, for contextualization and reminder purposes, an e-mail was also sent to all participants two days prior to the interview date contampalting the scope of the work and the interview's purpose.

The terms of confidentiality were addressed in the third place. Accordingly, it was communicated to the participants that the data collected during the interview would be solely treated for purposes with regards to this work.

The interview's format was subsequently stated. Hence, it was explained to the participants that an open-ended interview was about to take place and that a group of 14 questions was going to be directed to them.

The participants were also informed about the length estimation of the interview. This length was considered to be the one corresponding to the pilot testing length, thereby 30 minutes. However, the duration of the interview depended on the openness, understanding and communication ability of the

interviewee. The average duration of the interviews was 30 minutes, being the interviews duration ranged from 15 to 45 minutes.

Next, contact informations were provided to the participants in case they would like to get in touch by some reason and it was asked to them if they had any questions before getting started with the interview.

Lastly, (McNamara, 2009) advises not to rely on memory to recall all the interview answers. As such, the interviews were recorded with the participant's permission to ensure an accurate transcription of the collected data and to prevent data loss.

Once all the interviews were finalized, the data interpretation stage was ready to be initiated. Before moving on to this stage, (Creswell et al., 2007) suggests that the data gathered during the interview process must be compiled into sections or groups of information, also called "themes" or "codes".

These "codes" are "consistent phrases, expressions, or ideas that were common among research participants" (Kvale, 2007).

This practice was implemented and it's described in Chapter 7.

5.4 Research Quality

In line with the research of (Yin, 2003), the quality of any given design can be judged according to certain logical tests. Overall, four tests have been commonly used to classify the quality of any empirical social research: construct validity, internal validity, external validity and reliability.

The construct validity regards the establishment of correct measures for the concepts being studied. One of the case study tactics suggested by (Yin, 2003), and applied in this situation, relies on using multiple sources of evidence in the data collection phase. In this case, this was done through several interviews directed to members of twelve different companies.

Internal validity tests involve establishing causal relationships whereby certain conditions are shown to lead to other conditions. The case study tactic applied in the current work was the pattern-matching, as previously mentioned in section 6.1. According to (Yin, 2003), this tactic must be applied in the data analysis phase, which corresponds to Chapter 7.

The external validity deals with the issue of the generalization of a study's findings beyond the immediate case study. As mentioned in section 5.3, case studies offer a poor basis for generalizing. However, according with (Yin, 2003), these critiques are often directed to survey research, which rely on statistical generalization, whereas case studies rely on analytical generalization. As a case study tactic, analytical generalization takes place when a particular set of results is generalizable to some broader theory, which consists of the tactic that will be employed in this work.

As an example, this is the case with the theory behind the present case study and the conducted research on remote work - as the broader theory - firstly conducted by (Torkzadeh & Doll, 1998) and subsequently by (Kreiner et al., 2009; Yeh et al., 2020).

Reliability demonstrates that “the operations of a study – such as the data collection procedures – can be repeated, with the same results” (Yin, 2003). The goal of this test is to assure that a later investigator will arrive at the same findings and conclusions by following the same procedures. Therefore, the applied case study tactic was similar to the general case study tactic to address this problem, which consists in following a case study protocol (Yin, 2003). In this manner, the followed procedures regarding the selected data collection methods – interviews - were systematically documented in order to assure that the achieved results can be reproducible by following the same procedures.

Chapter 6

RESULTS AND ANALYSIS

This Chapter consists in reporting and analyzing the results obtained in line with the responses deriving from the issued surveys to the 35 respondent Portuguese startups - section 6.1 - as well as the performed interviews to the 13 CEOs of the mentioned startups – section 6.2. The results were respectively analyzed in line with the PLS-SEM standard procedures regarding the Structural Model recommended by (Garson, 2016) procedures and the pattern-matching procedure mentioned in the work of (Yin, 2003).

6.1 EO dimensions in startups developed under crisis scenarios

6.1.1 Description and Measurement of Constructs

With the goal of operationalizing the research model mentioned in section 5.5.2, the proposed variables of (Covin & Slevin, 1989) were used. Annex 3 exhibits a description of the model variables, namely the item variables designation, scales and sources included in the questionnaire regarding innovativeness, proactiveness and risk-taking constructs.

All the item variables were measured according with a Likert-type 7 point scale based on the research conducted by (Covin & Slevin, 1989), given that each construct is measured in line with three item variables.

Innovativeness was measured in line with (1) INNOV_R&D: amount of marketing and R&D investment, (2) INNOV_PROD: number of new products and/or services released into the market and (3) INNOV_CHANGE: extent of changes in the products and/or services.

Proactiveness was measured in line with (1) PROACT_REAC reactivity towards competitors initiatives (2) PROACT_PROD frequency of introducing new products and/or services when compared with competitors and (3) PROACT_POSITION competitive aggressiveness.

Risk-taking was measured in line with (1) RISK_PROJ tendency towards risky projects, (2) RISK_ENV business environment pressure and (3) RISK_DECISION insecure decision-making posture.

6.1.2 Descriptive Statistics

The descriptive statistics of the measured variables are synthesized in Annexes 2 and 8.

The industries concerning the surveyed startups are classified in Annex 2. This work contains observations from 19 different industries, allowing the sample to vary widely in the entrepreneurial orientation results. Nonetheless, more than half of the documented industries were characterized by a single startup performing in that industry.

According with the frequency chart displayed in Annex 2, Education and Tourism concerned the industries where the highest number of startups were performing, followed by HealthTech, Human Resources and Recycling industries. Despite considerably limited in sampling size, this statistic may provide some hints regarding the current industry trends of startups driven by the pandemic scenario in Portugal.

Respecting EO and the 7-point scale employed, the descriptive statistics are reported in Annex 8. In general, EO indicators were rated above the midpoint of the scale in all three dimensions. The mean of innovativeness (4.1), proactiveness (4.63) and risk-taking (4.92) were all relatively strong across the sample which shows that the issue of EO is pertinent. Generally, the surveyed firms revealed a higher tendency towards risk-taking and proactive attitudes and a lower tendency towards innovative practices.

In spite of this general trend, proactiveness regarding the competitive position adopted by the surveyed startups exhibited the lowest mean score (3.69), suggesting that these firms generally chose to avoid the competitors rather than beating their initiatives. The second mean lowest score concerned innovativeness in terms of product changes (3.86), a result leading to consider that little have been the changes that startups have undertaken regarding their existing product¹⁰.

Conversely, proactiveness regarding competitors initiatives exhibited the highest mean score (5.17), followed by product proactiveness (5.03) and risk-taking decisions (5.06). Therefore, these statistical results suggest that an attitude towards anticipating competitors initiatives, being the first-movers in introducing a new product or service and assuming an aggressive position for exploiting new opportunities were prevalent stances adopted by Portuguese startups founded during the outbreak of SARS-CoV-2¹¹. Hence, it seems reasonable to state that these firms' competitiveness and willingness to thrive were considerably high for the analyzed scenario.

6.1.3 Reflective Measurement Model Evaluation

As mentioned in section 5.5.2, there are two main assessments in PLS-SEM: the Measurement Model and Structural Model, also respectively known as outer and inner models.

According with (Hair et al., 2016), the Measurement Model is assessed using the item's outer loadings¹², Average Variance Extracted (AVE)¹³ and Composite Reliability (CR)¹⁴.

As a rule of thumb, loadings between 0.40 and 0.70¹⁵ should be considered to be removed if deleting them leads to an improvement of CR and AVE above threshold values. Indicators with loadings of 0.40 or less should always be eliminated from reflective scales. Moreover, all loadings should be statistically significant. (Hair et al., 2016).

Running the PLSc Algorithm reveals three indicators below 0.40 (concerning Innovativeness and Proactiveness), three indicators with loadings between 0.40 and 0.70 (concerning Proactiveness and Risk-Taking), and the remaining above 0.708.

After removing the indicators below 0.40, composite reliability and AVE increased above the threshold values for Innovativeness (CR: 0.797; AVE: 0.663), Proactiveness (CR: 1; AVE: 1)¹⁶ and and EO (CR: 0.678; AVE: 0.266) variables.

¹⁰ "Proactiveness regarding competitive position" and "innovativeness in terms of product changes" are described by PROACT_POSITION and INNOV_CHANGE indicators in the research model, respectively.

¹¹ "Proactiveness regarding competitors initiatives", "product proactiveness" and "risk-taking decisions" are described by PROACT_COMP, PROAC_PROD and RISK_DECISION indicators in the research model, respectively.

¹² Measurement loadings are the standardized path weights connecting the factors to the indicator variables (Garson, 2016).

¹³ AVE is the mean value of the squared loadings of the indicators linked with the construct, measuring convergent validity on the construct level (Garson, 2016).

¹⁴ Composite reliability is a test of convergent validity in a reflective model. It is preferred to Cronbach's alpha in PLS-based research because Cronbach's alpha may over- or underestimate scale reliability (Garson, 2016).

¹⁵ The loading of 0.70 refers to a level at half the variance in the indicator is explained by its construct (Garson, 2016).

¹⁶ Two out of the three Proactiveness indicators exhibited loadings below 0,4. Hence, they were removed from the model, which lead to a "single-item variable". Although single-item variables may cause identification and convergence problems in covariance-based SEM, this is not a problem in PLS-SEM according with (Garson, 2016).

Regarding the indicators with loadings between 0.40 and 0.70, removing RISK_ENV and RISK_DECISION resulted in a CR value above the threshold values for EO variable (CR: 0.643). However, each of these indicators were also dropped at a time and the changes were analyzed. As a result, RISK_ENV was erased and RISK_PROJ was preserved since this led to the highest overall threshold values both in Risk-taking (CR: 0.708; AVE: 0.552) and EO (CR: 0.657; AVE: 0.284) when compared with the previous alternatives.

Even though one of the Proactiveness LV indicators had a low loading (PROACT_PROD: 0.464), it was preserved to guarantee the model validity, since deleting this indicator would result in an LV with no indicators. Annex 5 presents all the outlined aforementioned assessments.

All the indicators reveal statistically significant loadings for a 5% confidence level through the Bootstrapping procedure, thus contributing to enhance the indicators reliability.

In the implemented model, all variables have satisfactory/high Composite Reliability, considering as acceptable values of 0.60 to 0.70 in exploratory research (Hair et al., 2016).

Convergent validity was assessed with AVE, with values higher than 0.50 for the first-order LVs, suggesting that these explain more than half of its indicators' variance (Garson, 2016).

The evaluation of discriminant validity attempts to ensure that each LV represents, in a unique way, its feature. This can be checked by the cross-loading criterion and the Fornell–Larcker criterion. Thus, the variance shared with LV's block of indicators should be higher than the variance it shares with any other LV (Garson, 2016). Annexes 6 and 7 show that the present study is concordant with the two criteria mentioned above.

Overall, the implemented model shows a satisfactory goodness of fit regarding the model's internal consistency, indicator reliability, convergent validity and discriminant validity.

6.1.4 Hypothesis Analysis

A survey analysis concerning the results obtained in the Smart PLS 3.0 software is conducted throughout the present section.

Intending to investigate the significance of the hypothesized relationships among the LVs defined in the research model, the Structural Model approached in section 5.5 is analyzed through the coefficient of determination (R^2) as a goodness of fit criteria. According to (Hair et al., 2017), the research context determines the acceptable level for R^2 . Among social science researchers, (Lee & Che, 2013) suggest values above 0,67 as providing practical and statistical significance. Since the obtained value for EO was 1,00, the model was assumed as practical and statistical significant¹⁷.

The LVs were also tested for multicollinearity since this may interfere with the relative importance of the assessment of predictor variables in the structural paths¹⁸. The analysis shows that all LV have a

¹⁷ This value derived from the fact that a repeated indicator approach was used, as described in section 5.5.2.

¹⁸ The predictor variables consist of the independent variables utilized in the structural model, which in this case correspond to the first-order LVs: Innovativeness, Proactiveness and Risk-taking.

Variance Inflation Factor (VIF) of less than 5¹⁹. The changes in R², resulting from the omission of exogenous LVs (Effect Size f²) were also analysed and none the of omitted constructs was shown to have a substantive impact on the endogenous LV (EO) individually^{20,21}. Overall, the structural model reveals appropriate fit quality.

As recommended by (Garson, 2016), the *Bootstrapping* method was used to test the relationships significance in the Structural Model, as illustrated in Table 13.

Table 13 - Hypotheses Analysis for the 1st Research Question : Significance testing results of the structural model (N=35).

H	Path	Expected Sign	Coefficient (β)	T-value	p-value	Inference
H1a	INNOV → EO	+	0.476	2.093	0.037**	Supported
H1b	PROACT → EO	+	0.286	1.705	0.089***	Supported
H1c	RISK → EO	+	0.633	5.521	0.000*	Supported

INNOV, PROACT and RISK respectively denote the constructs of Innovativeness, Proactiveness and Risk-Taking.

Note: * Significant path coefficient at *p-value* level of 1% (two-tailed).

** Significant path coefficient at *p-value* level of 5% (two-tailed).

*** Significant path coefficient at *p-value* level of 10% (two-tailed).

The positive expected sign of each hypothesis path derived from the previous research conducted regarding EO. To this extent, as documented in section 3.1, literature has stated the positive impact of all the three studied dimensions in EO, suggesting *a priori* that the three studied dimensions positively impact EO.

The results indicate that all three EO dimensions are positively related with EO (path coefficient $\beta > 0$), thus supporting all the tested hypothesis. Nevertheless, hypotheses were supported for different confidence levels.

INNOV exhibited a positive EO relationship (H1a) at the significance level of 5%. This result is concordant with (Hughes & Morgan, 2007) and (Kee & Rahman, 2018), according to which innovativeness is one key driver of EO for startups.

The results also show that PROACT is positively associated with EO, thereby supporting hypothesis H1b at the 10% significance level. This result is in line with the research conducted by (Hughes & Morgan, 2007), (Kropp et al., 2008) and (Kee & Rahman, 2018), which suggested that proactiveness was one “significant dimension of EO” for startups.

¹⁹ Model's VIF were: INNOV_CHANGE: 1.783; INNOV_PROD: 1.783; PROACT_PROD: 1.000; RISK_DECISION: 1.397; RISK_PROJ: 1.397.

²⁰ Following (Hair et al., 2017), 0.02, 0.15 and 0.35 were adopted values as thresholds for small, medium and large effects, respectively. In the implemented model, there is only "small" effects, corresponding to the omission of the variables INNOV, PROACT and RISK.

²¹ According with (Garson, 2016), a latent variable is exogenous if it is not an effect of any other latent variable in the model (there are no incoming arrows from other latent variables). A latent variable is endogenous if it is an effect of at least one other latent variable (there is at least one incoming arrow from another latent variable).

In what concerns RISK, the obtained results support a positive relation with EO at the significance level of 1%. This result is in line with the research of (Kropp et al., 2008) and (Kee & Rahman, 2018). However, it suggests a different result from what has been concluded over the past literature by (Hughes & Morgan, 2007) as the authors concluded that risk-taking had a negative relationship with EO.

Despite all the three tested dimension revealed a positive relation with EO, risk-taking and proactiveness were the most significant ones, thus contributing as key drivers of EO. In other words, the results suggest that startups with a higher proclivity to incur in business risks and to engage in and support new ideas, novelty, experimentation, and creative processes have a higher chance of promoting the EO of the firm.

As mentioned in section 3.1, it's worthwhile noting that previous research has shown that the EO of a firm has been positively linked with the capacity of a firm to be "financially stable and resilient within the first five years" (Kee & Rahman, 2018; Shim, 2020).

6.2 Remote Work and EO dimensions in startups developed under crisis scenarios

6.2.1 Pattern-matching Evaluation

The analysis of the interviews concerning the results obtained in line with the feedback of the 13 inquired CEOs/Co-Founders is conducted throughout the present section.

Once all the 13 interviews were conducted, the data was gathered and summarized for respective analysis. The data gathered during the interview process was compiled into sections or groups of information - denoted by "codes" - and a data summary recurring to the pattern-matching procedure, approached in sections 6.1 and 6.3 was performed. Table 14 presents an overall view regarding the interview results.

Regarding the answers to the first interview question, I1, illustrated in Table 14, all 13 interviewees confirmed to be using remote work applications in their startup. Figure 20 illustrates the frequency of use of the reported remote work apps.

Google Workspace was reported to be the most commonly used app amongst the interviewees – 11 out of the 13 respondents confirmed to use Google Suite on a daily basis. Despite a variety of different tools is available to be used in Google Workspace, the service was categorized as "Communication" since all the interviewees stated to be using it essentially for communication purposes, mainly through file sharing via Google Drive or chatting through Google Meets and Google Mail.

As depicted by the blue bars in Figure 20, communication apps were among the most frequently reported to be used within the interviewed startup universe, namely Google Workspace, Slack, Whatsapp, Discord and Zoom. Depending on the app, between 4 and 11 interviewees acknowledged to be using these remote work apps in their startup.

Table 14 – Interview Results.

Interview elements	Mace	Deaily	Bridge In	SixPush	Yesdoc	Pluckd	Hunchat	Sideline	Mudey	HandyHostel	healphant	Cosmetikke	Intern Plat.	Total
I1. Use of Remote Work Apps	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	13
Codes														
Communication Apps	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	13
Google Workspace	✓	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	11
I2. Work tools changes with Covid	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	2
Codes														
Use of Collaborative Tools	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	2
I3. ↑ Productivity	✗	✓	✗	✗	✓	✓	✗	✗	✗	✓	✗	✗	✓	5
Codes														
Similar Productivity due to tech-savviness and improved time efficiency	✓	✗	✓	✓	✗	✓	✗	✓	✓	✗	✗	✗	✗	6
I4. ↑ Innovativeness	ND	✓	✓	✓	✓	✓	✗	✓	✗	✓	✓	✗	✓	9
Codes														
Communication Platforms	✗	✓	✓	✓	✓	✓	✗	✗	✗	✓	✗	✗	✓	7
I5. ↑ Proactiveness	✓	✗	✓	✓	✓	✗	✗	✓	✓	✓	ND	ND	✓	8
Codes														
Proactiveness is a requisite of being entrepreneur	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	3
I6. ↑ Risk-taking	✓	✓	✗	✓	✓	✗	✓	✓	✗	✗	✗	✗	ND	6
Codes														
Remote work led to an increased quantification of processes, which allowed to take more calculated risks.	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓	✗	4
I7. Changes if going back before Covid was possible	✓	✗	✓	✗	✓	✗	✓	✗	✗	✗	✗	✓	✓	6
Codes														
Anteceptating the implementation of Remote work practices	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓	✓	4
I8. Agree with Survey Results	✓	✗	✗	✗	✗	✗	✓	✓	✓	✗	✗	✓	✓	6
Codes														
Proactiveness as the main driver of EO	✗	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	3
Innovation as the main driver of EO	✗	✗	✗	✗	✗	✓	✗	✗	✗	✓	✓	✗	✗	3

Notes: The symbols ✓ and ✗ respectively denote concordant and non-concordant feedback from the interviewees. ND (Non-Determined) represents a case where the respondents could not provide an answer due to data insufficiency. The red and green cells denote the cases where the total amount of concordant answers were ≤ and > 6 (half of the number of interviewees), respectively.

Product Management apps such as Github, Jira and Trello also assumed some significance in what concerns the use of remote work apps in startups developed under crisis scenarios since 3 or more startups disclosed to use these tools – green bars in Figure 20.

In addition, as illustrated by the orange bars in Figure 20, several remote work apps, used for purposes other than communication and product management, were also disclosed to be used by the interviewees in their startups. Amazon Web Services (AWS), Microsoft Azure and Canvas illustrate some of these apps. Furthermore, Yesdoc disclosed to have developed its own remote work tool (“Own tool”) to use under the scope of team coordination and control of operations.

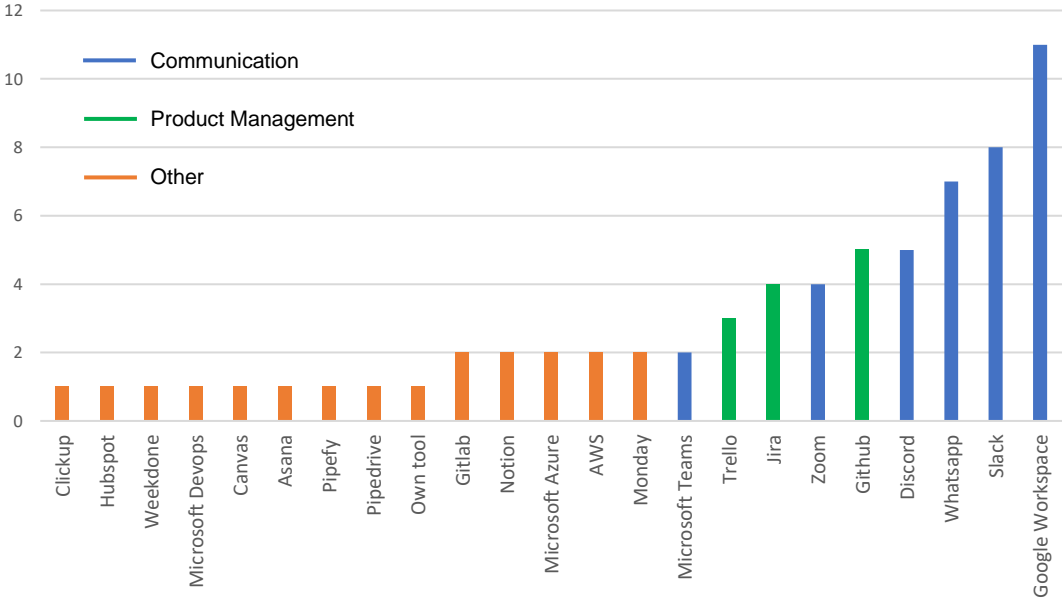


Figure 20 - Frequency of use of remote work apps according with the interview results.

In line with the chart depicted in Figure 21 - Number of remote work apps used in each startup, according with the interview results., the number of remote work apps being used by the analyzed startups ranged from 3 to 9. Also, as depicted by the yellow line in Figure 21 - Number of remote work apps used in each startup, according with the interview results., companies were using, on average, 5 remote work apps to operate during the SARS-CoV-2 outbreak.

In what concerns the answers to the second interview question, I2, illustrated in Table 14, no changes happened in the work tools used by the majority (11 out of 13) of the interviewed startups in response to the global restrictions triggered by the SARS-CoV-2 outbreak. According with the results, this is explained due to the fact that these 11 companies started their operations amid the outbreak of SARS-CoV-2, having chosen to adopt a fully remote work environment, where “remote work tools were seen as the working *status quo*” of the company.

Conversely, the startups whose operations were being carried out prior to its funding date have chosen to start implementing an integrated experience of remote collaboration, mainly in communication. The purpose of it was preparing to build a remote company through the use of the remote work apps cross-sectionally discussed throughout this section.

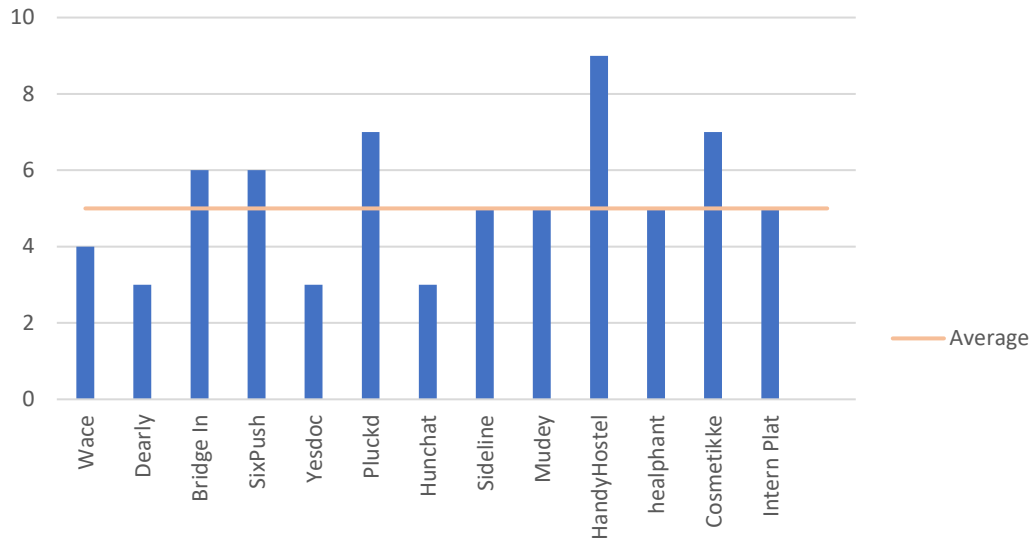


Figure 21 - Number of remote work apps used in each startup, according with the interview results.

As depicted in Table 14, the answers to the third interview question, I3, revealed that 5 out of the 13 interviewees reported to have had productivity increases due to the implementation of a remote working mode, through the use of remote work apps, when compared with the traditional one. According with these interviewees feedback, this tendency was explained by a change in workers' motivation, which has increased due to the freedom related to the choice of the working place on behalf of the workers. In other words, working remotely has contributed to productivity increases as it has allowed for one to work dynamically regarding the workplace (*exempli gratia* at home or at the beach). Other reported motives related with productivity increases and the use of remote work apps concern the easiness of communication spontaneity (punctuality) - assured through communication apps such as Google Meets, Whatsapp and Slack -, the elimination of time spent on work transportation.

In contrast, 7 interviewees stated that productivity remained similar with the shift to a remote work paradigm. The reasons behind this statement were that the workers were young and already acostumed to use remote work apps. Therefore, despite producing more the time spent working also increased due to the reallocation of the time spent on transportation, work breaks and moving between rooms to work activities. It's worthwhile noting that these interviewees reported a trade-off between the increased production rate and well-being since people end up losing the notion of time and work more.

Regarding innovativeness, the answers of the fourth interview question, I4, most interviewees - 69% - agreed that the use of remote work applications, namely communication platforms such as Slack (5 upvotes), Google Workspace (4 upvotes), Discord and Whatsapp (2 upvotes), positively contributed to the capacity of developing new ideas capable of resulting in the generation of new products and/or services. These remote app results are displayed in Figure 22 – Remote Work Apps reported to drive EO dimensions, according with the interview results. according with the green line.

The access to new features and tools, for instance screen-sharing and drawing tools, was the main supporting argument amongst the interviewed CEOs/Co-Founders to justify the previous statement.

Other least upvoted reasons favouring innovativeness included the “undeniable need of people to reinvent themselves (getting creative)” based upon the shift towards a remote work setting; remote

brainstormings, promoting a comfortable work environment, thus “enabling the workers to bring more novelties to the table”.

In contrast, the lack of physical contact - which can lead to isolation issues - for identification and discussion of problems was pointed out by two interviewees as promoting the loss of spontaneity since “innovation is not a matter of tools but rather of bringing people together”. Although apps promoting visual contact may be useful to solve this problem, “a lot of time is wasted remotely in doing follow-ups of everything it was done and not focusing on the discussion of new ideas”.

Also, by enabling working from home (WHF), two interviewees reported that “remote work can result in a work environment with less distractions that allows workers to focus more”. Nevertheless, the same interviewees also stated pointed out a mental well-being trade-off, in the sense that “workers sometimes experience time perception issues, ending up working more hours than what they’re supposed to”, which can lead to mental burnouts in the long term (Giurge & Bohns, 2020).

Additionally, as depicted by the green line in Figure 23 – Remote Work Apps reported as potential drivers of EO dimensions, according with the interview results., Miro was the most frequently referred tool (3 upvotes) that could be used as a potential driver of the innovativeness proclivity within a startup firm, among other least upvoted tools such as Trello, Mural and Canvas (1 upvote).

In what concerns proactiveness, the majority of the interviewees - 62% - agreed that the use of remote work applications, namely through the use of the communication app Whatsapp (3 upvotes), positively contributed to the capacity of foreseeing and antecipating future company needs by searching out new opportunities. According with the interviewees, the argument used to explain the previous statement relied on the feedback that “communication is a crucial element in proactiveness” and “being an entrepreneur requires no less than being proactive each single day”. This is represented in Table 14 by the code “Proactiveness is a requisite of being entrepreneur”.

As illustrated by the blue line in Figure 22 – Remote Work Apps reported to drive EO dimensions, according with the interview results., other remote work communication and product management apps such as Slack, Discord, Jira and Trello also played a minor role in promoting proactiveness within the firm (1 upvote). These tools were reported by the interviewees as helping in achieving well defined OKRs (Objective Key Results) and optimal time management, being that both aspects “help attaining a proactiveness spirit”.

In addition, as illustrated by the blue line in Figure 23 – Remote Work Apps reported as potential drivers of EO dimensions, according with the interview results., meditation and mind-fullness apps such as Calm and Headspace (summing up 2 upvotes) were some of the referred tools by the respondents that could be used as a potential mechanism to leverage a proactiveness spirit in the company. In line with the interviewees feedback, the reason behind such statements can be explained by the “mental stress and loss of identity” caused by the pandemic in some people, which can be resolved by using such tools.

As a side note, the interviewees also testified that the fact of having less distractions allows one to have more bursts of focus. However, “it becomes more fatiguing and boring not to have someone to chat/work with physically as there's only the chance of minimizing the computer working windows”. This may

impact one's proactiveness due to the long-term decreased focus time, derived from the lack of motivation, in the in searching out new opportunities for the firm.

With respect to risk-taking, most interviewees (54%) agreed that the use of remote work applications did not contribute to the increased level of risk managers were willing to take in a way of incurring in large and risky resource commitments. The main reasons behind such statement were related to the fact that "risk has to do with personality and not about working remotely". Furthermore, feelings were also expressed about the fact that "a startup is made of people and being surrounded by people promotes cohesion, which makes managers more pre-disposed to take risks".

As subsequently mentioned, other aspects that gained relevance with the remote work paradigm shift due to the outbreak of SARS-CoV-2 were important to explain the reported positive impact of remote work apps on risk-taking proclivity.

Amongst the interviewed CEOs/Co-Founders who reported the opposite idea, risk-taking has increased since remote work apps have increased the comfort to take risks - calculated risks. This means that "risks were easier to calculate since more activities and processes within the firm started to be documented, hence making it measurable and quantifiable". An example of this relies on analogic marketing versus digital marketing, being that the latter concept allowed for monitoring success indicators such as views, clicks, likes and comments. As depicted by the red line of Figure 22 – Remote Work Apps reported to drive EO dimensions, according with the interview results., according with the interviewees feedback Google Suite constituted the main tool promoting risk-taking proclivity - red line (2 upvotes).

In addition, as illustrated by the red line in Figure 23 – Remote Work Apps reported as potential drivers of EO dimensions, according with the interview results., Tableau and Crunchbase were some of the referred tools by the respondents that could be used as potential tools to enhance the risk-taking proclivity of the firm's managers. As reported by the interviewees, data analysis tools such as Tableau and Crunchbase "could serve as interactive tools for market analysis, namely as a competition screening radar" through dashboarding and other data visualization features under the realm of business intelligence. Therefore, these tools may provide hints regarding market conditions that may lead to informed decisions of whether or not to lead managers to incur in large and risky resource commitments – risk-taking proclivity of the firm.

As defined by interview question I7, when asked about whether there would be any decision changes in the startup in case there was the chance of going back in time before the outbreak of SARS-CoV-2, the answers were almost evenly distributed between affirmative and negative (yes and no, respectively). In one hand, as displayed in the leftside chart of Figure 24 – Changes that would be made by the CEOs/Co-Founders in case going back in time before SARS-CoV-2 was possible, according with the interview results. 54% of the interviewees declared that they would not introduce changes in their decisions if there was a chance to go back in time to the referred period. This was essentially explained due to the fact that the interviewed CEOs and/or Co-Founders believed that the "Covid19 pandemic was a needed challenge to improve the company's operations. Despite the planning, organization and

processes work flow errors that happened, these were mandatory for the company to learn how to behave”.

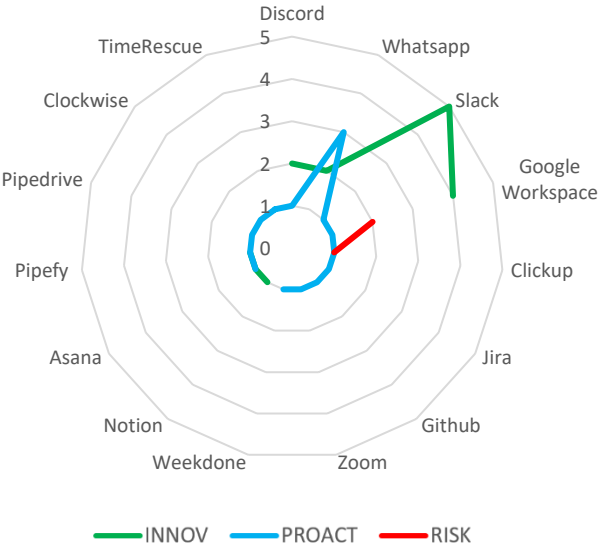


Figure 22 – Remote Work Apps reported to drive EO dimensions, according with the interview results.

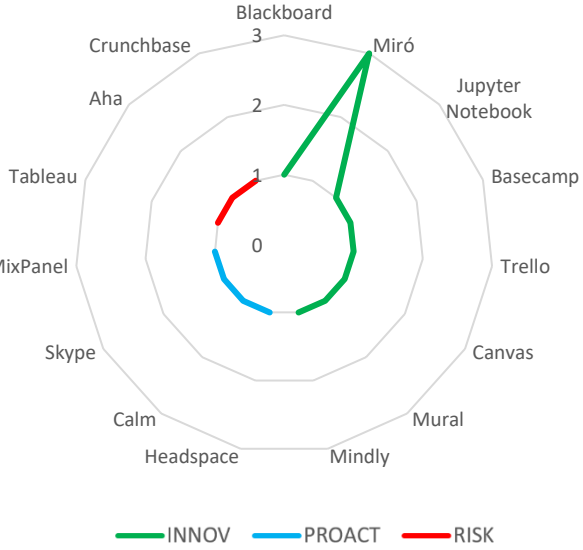


Figure 23 – Remote Work Apps reported as potential drivers of EO dimensions, according with the interview results.

On the other hand, as illustrated by the leftside chart of Figure 24 – Changes that would be made by the CEOs/Co-Founders in case going back in time before SARS-CoV-2 was possible, according with the interview results. , 46% of the interviewees revealed that they would change some of their decisions in case there was a chance to go back in time before the SARS-CoV-2 outbreak.

As depicted by the rightside chart of Figure 24 – Changes that would be made by the CEOs/Co-Founders in case going back in time before SARS-CoV-2 was possible, according with the interview results. , out of the population presenting an affirmative answer, most of the interviewees (66%) stated that they would have anticipated their strategic positioning by starting to implement an end to end remote work process sooner. Managers didn't want to invest much resources in a transient work model, and according with the interviewees “it only became evident that remote work came to stay when the second wave of SARS-CoV-2 stroke the country”.

Furthermore, hiring juniors (people with less work experience) was also a mentioned factor by 17% of the population presenting an affirmative answer, as the CEOs / Co-Founders noticed that “these workers needed coaching due to the pandemic times, something that managers felt very hard to provide remotely”.

The remaining 17% of the population that presented an affirmative answer indicated that “introducing cool-off moments such as playing music in the beginning of the meetings and playing online team games, would be a nice to have”. Physical team building moments was also a mentioned practice as a “nice to have” in order to promote collaboration, trust and motivations among workers.

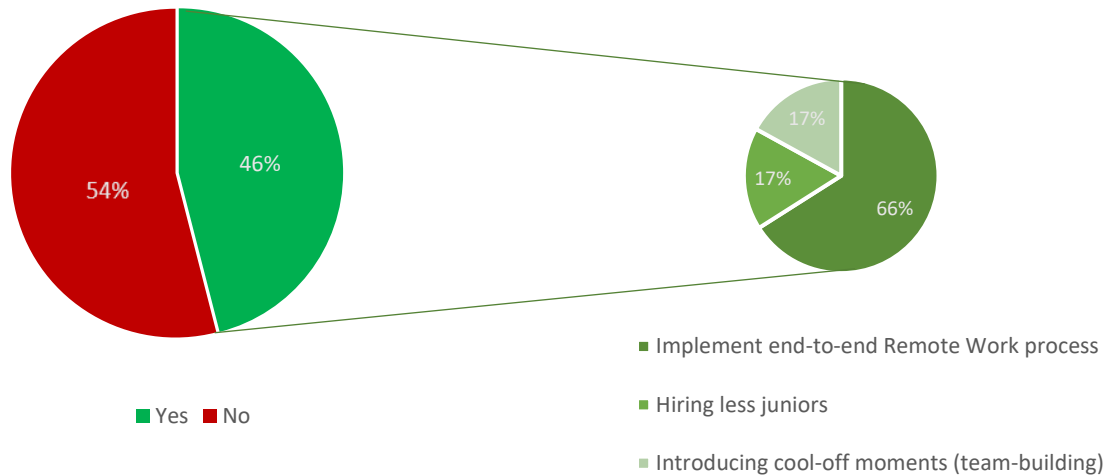


Figure 24 – Changes that would be made by the CEOs/Co-Founders in case going back in time before SARS-CoV-2 was possible, according with the interview results.

As described by the interview question I8, the interviewed CEOs/Co-Founders were asked if they agreed with the analysis of the survey results regarding the importance of EO dimensions in the development of startups under crisis scenarios, conducted in section 7.1. The answers were almost evenly distributed between affirmative and negative (agree and disagree, respectively).

According with the leftside chart of Figure 25 - Level of agreement of the CEOs/Co-Founders regarding the survey results concerning the importance of EO dimensions in the development of startups under crisis scenarios, according with the interview results., 46% of the interviewees agreed with the obtained results in section 7.1. This means that risk-taking, innovativeness and proactiveness were concluded to be the most significant dimensions to promote the EO of a firm in a descending order, respectively.

According with the interviewees, the agreement rate was justified due to the opinion that risk becomes evident given the novel remote work reality and “no one is going to have an impact if they don’t take risks”. Subsequently, risk-taking is accompanied by the need of innovate as “achieving PMF (Product Market Fit) is not possible without an innovative idea”. Lastly, the interviewees in general reported that the proactiveness dimension played a complementary role within the startup because “being proactive in a startup is a must as if you don’t do it yourself, no one else will”.

Regarding the share of interviewees that disagreed with the obtained results in section 7.1 - 54%, in line with the leftside chart of Figure 25 - Level of agreement of the CEOs/Co-Founders regarding the survey results concerning the importance of EO dimensions in the development of startups under crisis scenarios, according with the interview results. -, alternative feedback was presented for the purpose of ranking the importance of the three analyzed EO dimensions. Overall, the most important factors driving the EO of the startups were alternatively reported to either be proactiveness (58%) or innovativeness (42%).

Out of the 58% interviewees that disagreed with the obtained survey results, 29% classified proactiveness, innovativeness and risk-taking in line with its significance to promote the EO of a firm in

a descending order, respectively. The remaining 29% classified proactiveness, risk-taking and innovativeness in line with its significance to promote the EO of a firm in a descending order, respectively. These groups of respondents clearly stated that proactiveness is the most important factor for driving the EO of a firm, particularly in what concerns the “proactiveness in communicating”. According with these interviewees, “the quicker a company adapts and learn with its own mistakes, the more robust the business will become”. In addition, due to its own experience and personal opinions, they’ve classified “proactiveness as a precursor of risk-taking and innovativeness”.

From a different standpoint, out of the 42% interviewees that disagreed with the obtained survey results, 29% classified innovativeness, risk-taking and proactiveness in line with its significance to promote the EO of a firm in a descending order, respectively. The remaining 13% rated innovativeness, proactiveness and risk-taking in line with its significance to promote the EO of a firm in a descending order, respectively. The interviewees that shared these opinions have justified it by stating that “innovation is the most important dimension until you reach PMF”, as the market may sometimes reject what it was concluded to result in theory, therefore demanding for a continuous inflow of new ideas. In addition, these groups firmly stated that “no one takes risk without doing something new”, which explains why risk-taking was reported to be a less significant driver of EO when compared with innovativeness.

In sum, the most frequent answer to the interview question I8 presented by the interviewees matched the survey results analysis: risk-taking as the most significant factor driving the EO of a startup firm developed under crisis scenarios, followed by innovativeness and proactiveness. However, due to the abovementioned reasons, the majority of the interviewees did not agree with the survey results analysis, being that proactiveness and innovativeness were reported as being the most crucial factors promoting the EO of a startup firm developed under crisis scenarios such as SARS-CoV-2.

These results indicate that unanimity regarding the EO drivers of startups under such circumstances was not achieved, posing a significant doubt regarding the generalization of the results obtained according with the performed survey.

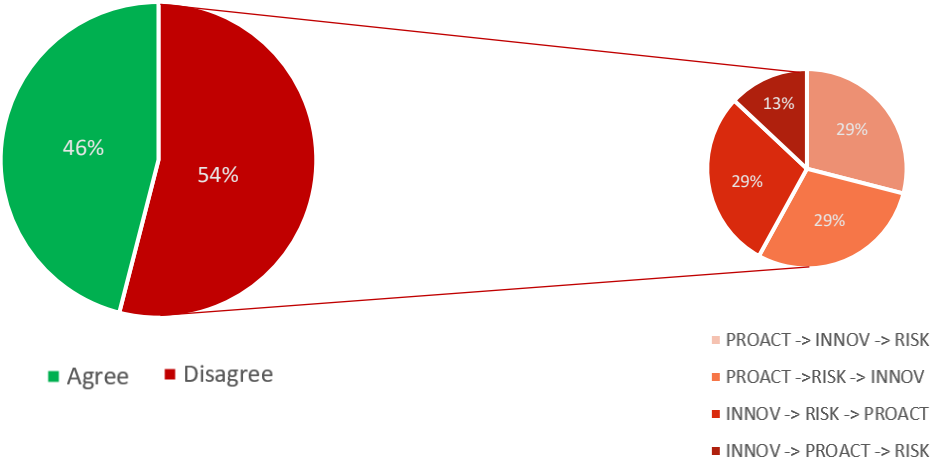


Figure 25 - Level of agreement of the CEOs/Co-Founders regarding the survey results concerning the importance of EO dimensions in the development of startups under crisis scenarios, according with the interview results.

6.2.2 Hypothesis Analysis

As displayed in Table 15, the aforementioned conclusions are summarized and finally used for expressing inferences regarding the proposed hypotheses concerning remote work and EO. Thus, the inference results of the aforementioned hypotheses were validated in line with the “Pattern-matching Value”, which corresponds to the reported frequency of a certain concordant answer given by the interviewees concerning the core questions assessing the impact of remote work in each EO dimension, namely I4, I5 and I6.

A certain hypothesis was supported in case the “Pattern-matching Value” was higher or equal than 7, thus corresponding to the concordant vote of more than half of the interviewees. Otherwise, the hypothesis was not supported.

Table 15 - Hypotheses Analysis for the 2nd Research Question.

H	Path	Expected Sign	Pattern-matching Value	Inference
H2a	Remote Work → INNOV	+	9	Supported
H2b	Remote Work → PROACT	+	8	Supported
H2c	Remote Work → RISK	+	6	Not Supported

Note: INNOV, PROACT and RISK respectively denote the constructs of Innovativeness, Proactiveness and Risk-Taking.

The positive expected sign of each hypothesis path derives both from the obtained interview and survey overall results. Accordingly, all interviewees reported to be using remote work applications daily and all the three studied EO dimensions were characterized by values above the mean point of the 7-point Likert scale in line with the survey results, suggesting *a priori* that remote work exhibited a positive impact in the three studied EO dimensions.

As a result, the considered hypotheses that the use of remote work apps contributed to an increase in innovativeness and proactiveness as EO dimensions were supported, while the hypothesis regarding an increase in risk-taking deriving from the use of remote work apps was not supported.

The results suggest that the use of remote work apps revealed the highest impact in innovativeness, followed by proactiveness and risk-taking.

In other words, the results seem to suggest that the use of remote work apps positively impacts the tendency of a startup to engage in and support new ideas, novelty, experimentation, and creative processes that may result in new products, services, or technological processes. Also, the results indicate that remote work apps also play a positive role in improving the processes aimed at anticipating and acting on future needs of a startup by seeking new opportunities. Lastly, the results have shown a lower influence of using remote work apps on the degree to which managers are willing to make large and risky resource commitments.

Chapter 7

CONCLUSIONS AND FUTURE WORK

The current Chapter presents a summary regarding the main conclusions and limitations resulting from the developed work. Additional research topics that could be investigated to further complement the developed work are also approached throughout this Chapter.

Based in the survey results of the 35 inquired startups, the Smart PLS 3.0 analysis indicated that all the three tested EO dimensions were positively related with EO. Risk-taking assumed a more significant role, followed by innovativeness and proactiveness, respectively. In other words, being the first-movers in introducing a new product or service and assuming an aggressive position for exploiting new opportunities were prevalent stances adopted by Portuguese startups founded during the outbreak of SARS-CoV-2. Therefore, it seems reasonable to state that these firms' competitiveness and willingness to thrive were considerably high for the analyzed scenario.

Accordingly, risk-taking and innovativeness were determined to be key dimensions driving the EO of startups created under the SARS-CoV-2 pandemic in Portugal. These results suggest that both a firm's willingness to make large and risky resource commitments as well as the tendency to engage in and support new ideas, novelty, experimentation and creative processes may be crucial factors to consider when developing a startup under crisis scenarios.

Although the developed model in Smart PLS 3.0 was demonstrated to be valid (goodness of fit regarding the model's internal consistency, indicator reliability, convergent validity and discriminant validity), 5 items of the implemented EO scale were dropped, suggesting that EO dimensions are not equally valuable for early-stage Portuguese startups developed under crisis scenarios.

Based on a pattern-matching procedure, the multiple-case study of the 13 analyzed Portuguese startups founded during the crisis scenario prompted by SARS-CoV-2 suggests that innovativeness and proactiveness exhibited the most impacted EO dimensions by the use of remote work applications. The use of remote work communication platforms such as Slack, Google Workspace, Discord and Whatsapp have been determined to be used by all the approached startups. Among other employed remote work tools, communication platforms were reported to be the ones with the highest influence on EO dimensions, particularly with respect to innovativeness and proactiveness. Slack and Whatsapp were concluded to be the most appropriate tools for promoting innovativeness and proactiveness, respectively.

In other words, the results seem to suggest that the use of remote work apps, in particular through the use of Slack, positively impacts the tendency of a startup to engage in and support new ideas, novelty, experimentation, and creative processes that may result in new products, services, or technological processes.

Also, the results indicate that remote work apps, in particular through the use of Whatsapp, also play a positive role in improving the processes aimed at anticipating and acting on future needs of a startup by seeking new opportunities.

Lastly, the results have shown a lower influence of using remote work apps on the degree to which managers are willing to make large and risky resource commitments.

When asked about whether or not the interviewees agreed with the survey analysis, the results indicate that unanimity regarding the EO drivers of startups under such circumstances was not achieved, posing a significant doubt regarding the generalization of the results obtained according with the performed survey.

Approximately 35% of the interviewees has reported increases in productivity due to remote work providing an evidence that some organizations may successfully make the transition towards a remote

work paradigm with productivity gains. In addition, given the uncertainty related to the pandemic timespan, most of the interviewed CEOs/Co-Founders confessed that if they could go back, they would have started to implement remote work practices earlier. Nevertheless, no one possesses a “crystal ball” that enables one to foresee the future in such circumstances, requiring for decisions to be made with its inherent opportunity costs.

Notwithstanding, the results obtained in this work provide hints about how startups may shape its attitudes and decisions towards enhancing its EO and consequently improve its capacity of becoming financially stable and resilient within the first five years of operation. This can be achieved not only in terms of attitude changes in EO dimensions but also in terms of the remote work tools to use within the firm.

Telemedicine has significantly evolved in the past century and today mobile, consumer-driven technology trends are quickly impacting the field of telemedicine. The impacts deriving from the rapid spread of SARS-CoV-2 pandemic have led both to an increased importance of telemedicine in Portugal and remote work. As a telemedicine startup and the main motivation to develop this work, healphant was founded aiming to address the negative SARS-CoV-2 outbreak negative impacts in healthcare. The company has been operating remotely until the current date and it has registered over 110 doctors and 380 patients, being that over 250 medical consultations were performed through healphant app. As a side note, the author of this thesis has worked in healphant since its foundation.

Regarding the status quo of telemedicine in Portugal, OECD reports on digital health indicate a considerable development in terms of Telemonitoring, Teleradiology and Teledermatology nationwide. Nevertheless, the same reports indicate that there is still a long way to go in order to achieve a generalized increase in digital health in Portugal, namely in terms of Telepsychiatry.

As far as limitations go, this work is cross-sectional in nature. Thus, future research might consider applying a longitudinal study to establish the extent to which the hypothesized relationships might be causal, particularly to assess which remote work apps have contributed to promote each EO dimensions. This procedure was not undertaken due to time boundary constraints.

Also, despite not extensively analyzed in the literature, the 2 additional dimensions - Autonomy and Competitive Aggressiveness - of EO initially proposed by (Lumpkin & Dess, 1996) were not examined in this work.

The scales used to examine this phenomenon were based on existing theory and they meet both standard reliability and validity criteria, maintaining the integrity of the constructs. Nonetheless, modifications to the existing scales or even the introduction of novel scales could be developed to measure the EO of firms that would potentially enhance the reliability of the existing scales.

An important limitation of PLS approaches, such as the one used to interpret the survey results, include the difficulty in interpreting the loadings of the independent latent variables since the distributional properties of estimates are not known. As such, it's not possible to assess significance except through bootstrap induction.

The present study was limited to startups. Comparative studies with SMEs and large enterprises in the future could be also performed as a mode of extending the applicability of the obtained results.

Limitations on the size sample were also verified since a universe of 35 startups composed the object of study as an input for the survey strategy. This size sample often constitutes a small size in the literature, being that the use of larger sample size may provide greater statistical power for detecting the hypothesized effects.

In addition, Education and Tourism concerned the industries where the highest number of startups were performing, followed by HealthTech, Human Resources and Recycling industries. This statistic may provide some hints regarding the current industry trends of startups driven by the pandemic scenario in Portugal. However, given the heterogeneous socioeconomical impacts of SARS-CoV-2 throughout the world, comparative studies could be conducted in the future across different business sizes, industries, and countries to further understand the constructs used in this study and its impacts.

A major limitation regarding the pattern-matching method, applied in the case study analysis, include difficulties in deducing convincing, inclusive, and focused theoretical patterns from the various existing theoretical perspectives. As a consequence, the generalizability of the insights from studies where the pattern-matching method is applied is often a concern for some researchers.

In what concerns the remote work paradigm, further human implications of working remotely in a full-time schedule such as isolation feelings, building healthy relationships among employees and enthusiasm about growing a business were not studied in this work. This sets the scenario for additional study factors to consider in future researches aiming to complement the literature in this area.

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ANNEXES

Annex 1 – Entrepreneurial Orientation Survey

Entrepreneurial Orientation in Startups developed under Crisis Scenarios (Covid-19)

• Covid-19 did not stop the creation of new ventures.

The key dimensions (Innovativeness, Proactiveness and Risk-taking) driving Entrepreneurial Orientation of startups are scarcely studied under these crisis scenarios.

• Hopefully the results of this Thesis will provide future guidelines on how startups may behave under crisis scenarios environments in order to facilitate their entry into the market.

Thank you for taking out some minutes of your time to answer the survey!

Note: The personal data (e.g. Company/Project Name) inserted in this survey will be treated as confidential and thus not disclosed in the Thesis. Only quantitative data will be treated for statistical analysis purposes.

1. Company/Project Name

2. Industry

3. Innovativeness: Generally our organization prefers to...

Marcar apenas uma oval.

1 2 3 4 5 6 7

Strongly emphasize the marketing of the company's present products Strongly emphasize R&D

4. Innovativeness: How many new products or services has your organization introduced since its foundation?

Marcar apenas uma oval.

1 2 3 4 5 6 7

No new products and services A lot of new products and services

5. Innovativeness: Changes in organization's products

Marcar apenas uma oval.

1 2 3 4 5 6 7

There has been small changes of the present products and services The changes of the company's products and services have been radical

6. Proactiveness: Our organization's relation towards competitors...

Marcar apenas uma oval.

1 2 3 4 5 6 7

Normally we react upon initiatives taken by our competitors Normally we initiate changes upon which our competitors react

7. Proactiveness: Our organization's relation towards competitors...

Marcar apenas uma oval.

1 2 3 4 5 6 7

Our company is seldom the first one to introduce new products or services Our company is very often the first one to introduce new products or services

8. Proactiveness: Our organization's relation towards competitors...

Marcar apenas uma oval.

1 2 3 4 5 6 7

Normally our company tries to avoid competition, but rather takes on a "live-and-let-live" - position Normally our company takes on a very competitive oriented "beat-the-competitor" - position

9. Risk-taking: Generally our organization has...

Marcar apenas uma oval.

1 2 3 4 5 6 7

A strong tendency toward projects with low risk A strong tendency toward getting involved in high-risk projects

of the company is such that fearless and powerful measures are needed to obtain the company's objectives.

11. Risk-taking: When we are facing insecure decision-making situations...

Marcar apenas uma oval.

1 2 3 4 5 6 7

We normally take up a cautious "wait-and-see" position in order to minimize the hazard of making costly erroneous decisions. We normally take up a fearless, aggressive position, in order to maximize the chance of being able to exploit possible opportunities

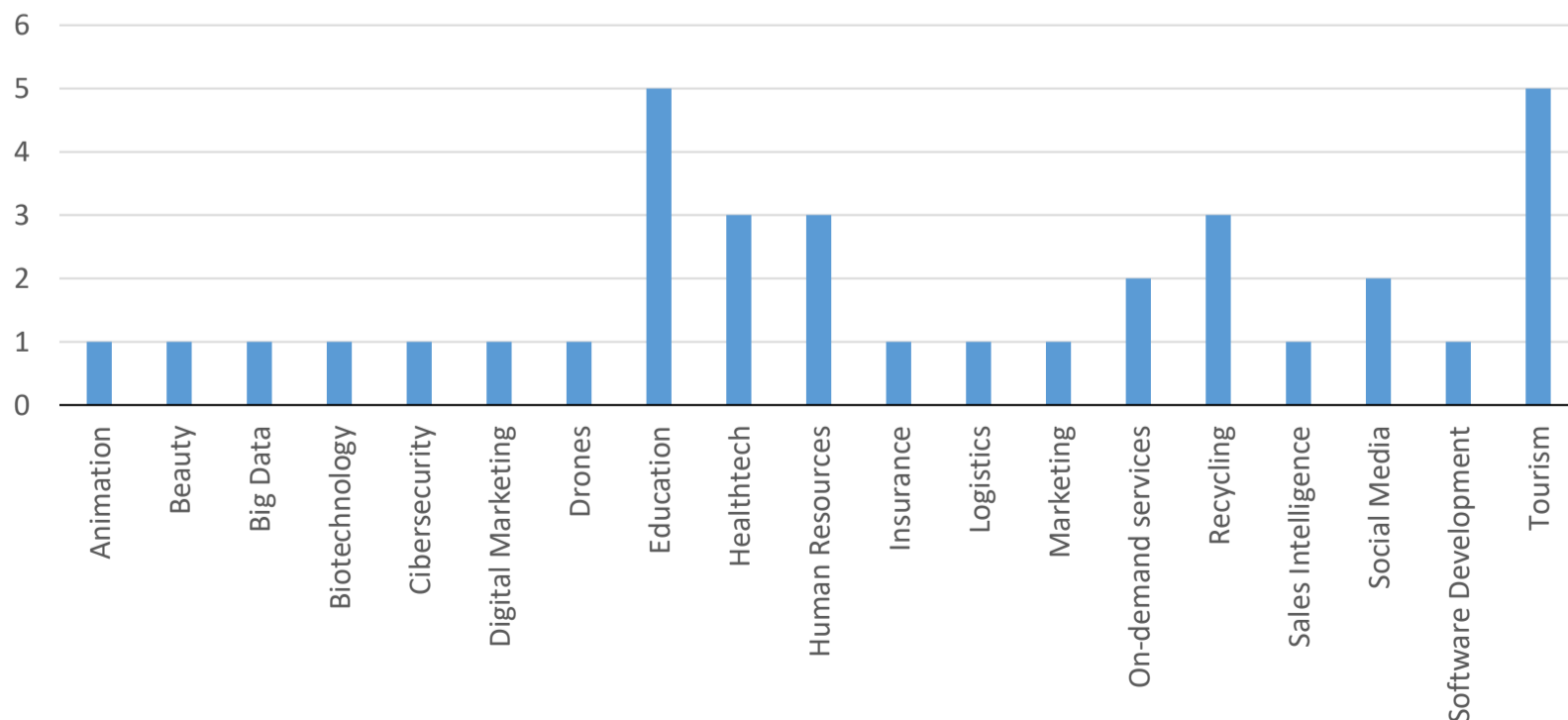
Annex 2 – Sample selection details

Questionnaire	N
Number of questionnaires sent	86
Number of questionnaires answered	38
No. of unusable answers*	3
Intermediate Sample	35

* Questionnaires completed by people other than the CEO

Sample selection	N
Intermediate sample	35
No. of incomplete questionnaires	3
Total sample size with complete questionnaires	32
Response rate	45%
Total sample size with mean value replacement of missing values	35

Industry Profile of the selected Sample



Annex 3 – Description and Measurement of PLS-SEM Model Variables

Innovativeness	Questions	Scales	Anchors	Source
INNOV_R&D	Generally our organization prefers to...	7-point Likert scale	“Strongly emphasize the marketing of the company’s present products” to “ Strongly emphasize R&D”	(Covin & Slevin, 1989)
INNOV_PROD	How many new products or services has your organization introduced since its foundation?	7-point Likert scale	“No new products and services” to “A lot of new products and services”	(Covin & Slevin, 1989)
INNOV_CHANGE	Changes in organization’s products...	7-point Likert scale	“There has been small changes of the present products and services” to “The changes of the company’s products and services have been radical”	(Covin & Slevin, 1989)
Proactiveness				
PROACT_COMP	Our organization’s relation towards competitors...	7-point Likert scale	“Normally we react upon initiatives taken by our competitors” to “Normally we initiate changes upon which our competitors react”	(Covin & Slevin, 1989)
PROACT_PROD	Our organization’s relation towards competitors...	7-point Likert scale	“Our company is seldom the first one to introduce new products or services” to “Our company is very often the first one to introduce new products or services”	(Covin & Slevin, 1989)
PROACT_POSITION	Our organization’s relation towards competitors...	7-point Likert scale	“Normally our company tries to avoid competition, but rather takes on a <i>live-and-let-live position</i> ” to “Normally our company takes on a very competitive oriented <i>beat-the-competitor position</i> ”	(Covin & Slevin, 1989)
Risk-taking				
RISK_PROJ	Generally our organization has...	7-point Likert scale	“A strong tendency toward projects with low risk” to “A strong tendency toward getting involved in high-risk projects”	(Covin & Slevin, 1989)
RISK_ENV	Generally we believe that...	7-point Likert scale	“The business environment of the company is such that it is better to explore it carefully and gradually in order to achieve the company’s objectives” to “The business environment of the company is such that fearless and powerful measures are needed to obtain the company’s objectives”	(Covin & Slevin, 1989)
RISK_DECISION	When we are facing insecure decision-making situations...	7-point Likert scale	“We normally take up a cautious <i>wait-and-see</i> position in order to minimize the hazard of making costly erroneous decisions” to “We normally take up a fearless, aggressive position, in order to maximize the chance of being able to exploit possible opportunities”	(Covin & Slevin, 1989)

Annex 4 – Normality test results for the sampling population using the Shapiro-Wilk and Skewness test (Panel A); Mann-Whitney and Median test results for two independent samples: comparison between the first 15% respondents and the last 15% of respondents (Panel B).

Variable	Panel A			Panel B	
	Shapiro-Wilk Test Sig. (2 tailed)	Skewness	Kurtosis	Mann-Whitney U Test Sig. (2 tailed)	Median Test Sig. (2 tailed)
Innovativeness					
INNOV_R&D	0,041*	- 0,332	- 0,450	0,664	0,558
INNOV_PROD	0,015**	0,160	- 1,212	0,452	0,119
INNOV_CHANGE	0,082	0,008	- 0,901	0,915	0,306
Proactiveness					
PROACT_COMP	0,001*	- 0,561	- 0,101	1,000	0,446
PROACT_PROD	< 0,001*	- 0,904	- 0,359	,0197	0,615
PROACT_POSITION	0,008*	0,152	- 1,301	0,665	0,221
Risk-taking					
RISK_PROJ	0,020**	- 0,535	- 0,018	0,116	0,362
RISK_ENV	0,019**	- 0,311	- 0,694	0,669	0,856
RISK_DECISION	0,004*	- 0,522	- 0,757	0,915	0,306

* *p-value* < 0,01. The null hypothesis that variables follow a normal distribution are rejected with a confidence level of 99% (Panel A).

** *p-value* < 0,05. The null hypothesis that variables follow a normal distribution are rejected with a confidence level of 95% (Panel B).

Annex 5 – Internal Consistency, Indicator Reliability and Convergent Validity Assessment – PLS Reflective Measurement Model

	<i>Loading</i>	<i>P-values</i>
Entrepreneurial Orientation		
(CR = 0,657 ; AVE = 0,284)		
Innovativeness		
(CR = 0,797 ; AVE= 0,663)		
INNOV_R&D a.	---	
INNOV_PROD	0,774	0,011**
INNOV_CHANGE	0,714	0,014**
Proactiveness		
(CR = 1,000 ; AVE= 1,000)		
PROACT_COMP a.	---	---
PROACT_PROD d.	0,464	0,000*
PROACT_POSITION a.	---	---
Risk-taking		
(CR = 0,708 ; AVE= 0,552)		
RISK_PROJ	0,709	0,000*
RISK_ENV c.	---	---
RISK_DECISION b.	0,610	0,007*

* The indicators were statistically significant at a 1% level (p-value < 0.01), thus the examined hypothesis of non-significant effect is rejected with a confidence level of 99%.

* The indicators were statistically significant at a 5% level (p-value < 0.05), thus the examined hypothesis of non-significant effect is rejected with a confidence level of 95%.

Note: a. Items removed because their outer loadings were below 0.40

b. Items considered for removal due to an outer loading below 0.7, only retained in the model because its removal led to a decrease in composite reliability.

c. Items (with outer loadings between 0.40 and 0.70) removed in order to increase composite reliability and AVE above threshold values

d. Items (with outer loadings between 0.40 and 0.70) preserved in order to guarantee the model validity (no LV with zero indicators).

Annex 6 – Discriminant Validity Assessment (Cross Loadings)

	EO	INNOV	PROACT	RISK
INNOV_CHANGE	0,654	0,908	- 0,050	0,232
INNOV_PROD	0,680	0,915	0,017	0,246
PROACT_COMP	0,422	- 0,017	1,000	0,388
PROACT_PROD	0,422	- 0,017	1,000	0,388
RISK_DECISION	0,619	0,100	0,310	0,839
RISK_PROJ	0,805	0,330	0,365	0,908

Note: The above output was obtained through running the PLS Algorithm, since Consistent PLS Algorithm do not provide it.

Annex 7 – Discriminant Validity Assessment (Cross Loadings)

	EO	INNOV	PROACT	RISK
EO	0,597			
INNOV	0,744	0,912		
PROACT	0,438	- 0,017	1,000	
RISK	0,804	0,263	0,388	0,874

Note: The above output was obtained through running the PLS Algorithm, since Consistent PLS Algorithm do not provide it. INNOV, PROACT and RISK concern Innovativeness, Proactiveness and Risk-Taking LVs.

Annex 8 – Descriptive statistics for the Measurement Instruments

N = 35	Min	Mean	Median	Max	Std.Dev	Skewness	Kurtosis
Innovativeness							
INNOV_R&D *	1,00	4,42	4,00	7,00	1,67	- 0,33	- 0,45
INNOV_PROD	1,00	4,03	4,00	7,00	1,82	0,16	- 1,21
INNOV_CHANGE	1,00	3,86	4,00	7,00	1,55	0,01	- 0,90
Proactiveness							
PROACT_COMP *	2,00	5,17	6,00	7,00	1,30	- 0,56	- 0,10
PROACT_PROD	1,00	5,03	5,00	7,00	1,74	- 0,90	0,36
PROACT_POSITION *	1,00	3,69	3,00	7,00	1,88	0,15	- 1,30
Risk-taking							
RISK_PROJ	1,00	4,86	5,00	7,00	1,49	- 0,54	- 0,02
RISK_ENV *	2,00	4,86	5,00	7,00	1,46	- 0,31	- 0,69
RISK_DECISION	2,00	5,06	5,00	7,00	1,55	- 0,52	- 0,76

* Items not included in the final measurement model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) INNOV_R&D *	1,00								
(2) INNOV_PROD	- 0,20	1,00							
(3) INNOV_CHANGE	- 0,25	0,66	1,00						
(4) PROACT_COMP *	- 0,08	0,19	0,16	1,00					
(5) PROACT_PROD	0,39	0,02	- 0,05	0,26	1,00				
(6) PROACT_POSITION *	0,27	0,43	0,17	0,02	0,00	1,00			
(7) RISK_PROJ	0,10	0,30	0,30	- 0,02	0,37	- 0,11	1,00		
(8) RISK_ENV *	0,05	0,12	0,16	0,17	0,19	0,20	0,23	1,00	
(9) RISK_DECISION	0,15	0,11	0,07	- 0,05	0,31	- 0,16	0,53	0,42	1,00

* Items not included in the final measurement model