

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

1. INTRODUCTION

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, Peris-Ortiz, & Rueda-Armengot, 2016; Levinthal & March, 1981). Crisis scenarios are also likely to potentiate certain industries arounds the world, namely by driving the creation of new start-ups, such as healphant, 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 transportation are examples of implemented projects

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, Igan, Pierri, & Presbitero, 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, Pereira, & Simões, 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 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). Empirical studies have largely found that Small and Medium Enterprises (SME) firms with a higher degree of EO perform better (Brettel, Chomik, & Flatten, 2015). 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, Lakhani, & Puranam, 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, 2017; Lusíadas, 2020; 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. 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.

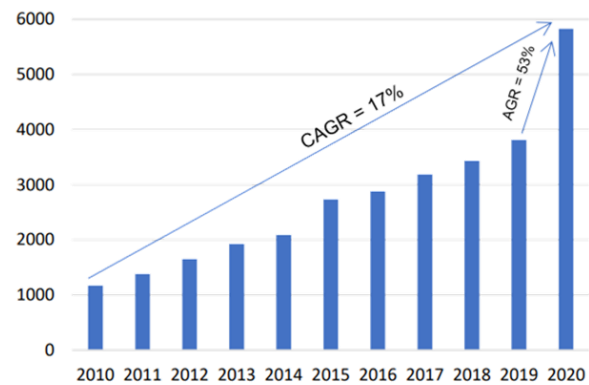


Figure 1 – Number of telemedicine articles published from 2010 until 2020. Search keyword used: “Telemedicine”. Source: (PubMed, 2020)

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 SARSCoV-2 pandemic. In addition, it shall address an overall view on the telemedicine market, namely the degree of implementation of telemedicine services in Portugal.

2. LITERATURE REVIEW

Since the goal of this work relies on the study of EO, remote work under crisis scenarios and telemedicine, these three elements are explored in the literature review, as well as taken into consideration when applying the suggested methodology.

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, Marino, Kuratko, & Weaver, 2013). Later on, (Hughes & Morgan, 2007) 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, Nordqvist, Sjöberg, & Wiklund, 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., 2015; 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 presented as follows.

Innovativeness describes 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 concerns the processes aimed at anticipating and acting on future needs by seeking new opportunities. Risk-taking refers to the degree to which managers are willing to make large and risky resource commitments.

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).

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, Chomik, & Flatten, 2019; Naldi et al., 2007).

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. The Covin and Slevin scale was chosen as a mean to measure the EO of the studied firms. In this 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.

REMOTE WORK UNDER CRISIS SCENARIOS

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.

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, Williams, & Vorley, 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, Poganietz, & Vögele, 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” (George et al., 2020a). Nonetheless, the entrepreneurial impacts differed according with the respective geography (Meahjohn & Persad, 2020). 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 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 2 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%.

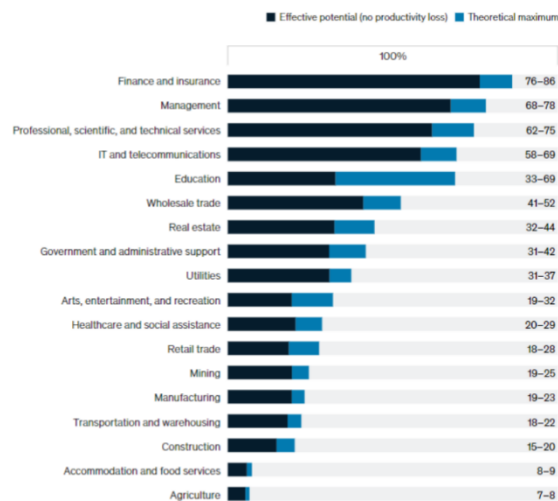


Figure 2 - Potential share of time spent working remotely by sector in the United States, %. Source: (McKinsey Global Institute, 2020)

Nevertheless, according with Figure 2, 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, Lakhani, & Puranam, 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.

TELEMEDICINE

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”.

The exact date when telecommunications first were used in health care is unknown (Brown, 1982). The concept of telemedicine may have originated centuries ago if, for example, information about bubonic plague was transmitted across Europe by heliograph or bonfires as was information about war and famine (Zundel, 1996). Records of telemedicine uses 500 B.C. in ancient Greece and Rome, where patients received medical advice from doctors using representatives is pointed out by an European Commission report (EC, 2018). It is also known that the telegraph was used during the American Civil War (1861 – 1865) to transmit casualty lists and order medical supplies (Zundel, 1996).

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)

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 3

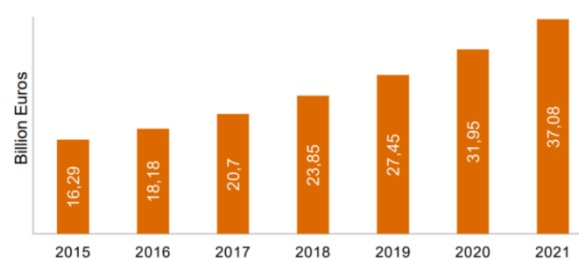


Figure 3 - Global telemedicine market size in 2015 and forecasts for 2016-2021. Source: (EC, 2018)

A more recent studied conducted by (CBInsights,

2020a) gathered the global digital healthcare market size from the fourth quarter of 2017 (Q4'17) to the third quarter of 2020 (Q3'20) – Figure 4. 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 4. (CBInsights, 2020b). Figure 4 displays the number of deals and dollars of global digital healthcare funding.



Figure 4 - Quarterly global digital health funding and deal count, Q4'17 – Q3'20. Source: (CBInsights, 2020)

However, the weight of this investment concerning startups and early-stage ventures is unclear in the abovementioned chart. As such, Figure 5 provides an insightful view on the amount of global digital health investment devoted to companies categorized by the respective stage of investment.

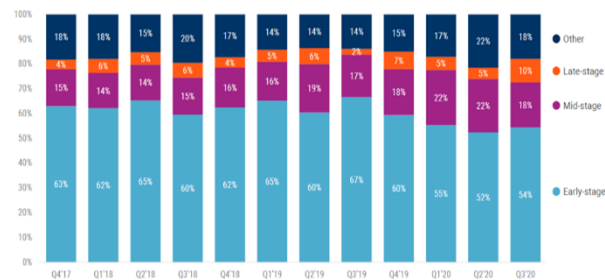


Figure 5 – Percentage share of global digital health deals by stage, Q4' 17 – Q3'20. Source: (CBInsights, 2020)

Figure 6 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 a 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.

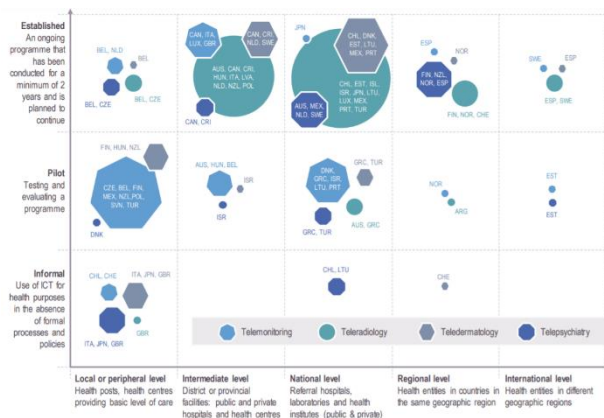


Figure 6 – Countries reporting use of telemedicine by level of health system and type of programme. Source: (OECD, 2020)

In Portugal, the 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 economic conditions (Ministério da Saúde, 2018).

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 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).

3. METHODOLOGY

In accordance with the previous literature review, the key dimensions affecting EO of startups (1st research question) 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 (2nd research question).

Figure 7 illustrates the research outline to be used in this work in a way of investigating the two abovementioned research questions. The right-side 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. The left-side hypotheses are targeted to assess how remote work online applications may impact the three discussed EO dimensions in startups developed under crisis scenarios.

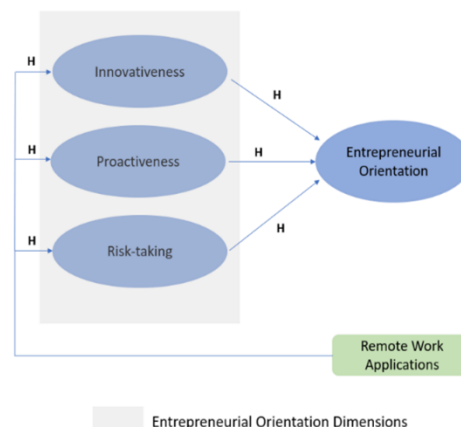


Figure 7 – Research Outline

EO Dimensions

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.

The data was collected through online questionnaires based on the proposed research questions of (Covin & Slevin, 1989). 35 answers from the sampling population were obtained accordingly. The data was treated recurring to standard statistical procedures in SPSS software, namely arithmetic means, maximum and minimum value functions. PLS-SEM was additionally chosen as the research method to analyze the data and it was operationalized with Smart PLS 3.0 software. The model built in Smart PLS 3.0 is illustrated in Figure 8.

The recommendations of (Garson, 2016) and (Hair, Hult, Ringle, & Sarstedt, 2016) were followed, including the application of methods regarding Normality Tests (Shapiro-Wilk and Skewness tests), Internal Consistency, Indicator Reliability, Convergent Validity, Discriminant Validity (Cross-loadings and Fornell-Larcker Criterion) and Descriptive Statistics.

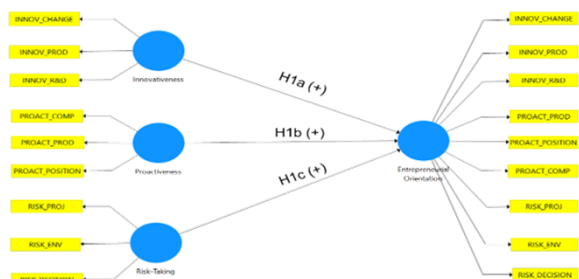


Figure 8 – Research Model in Smart PLS 3.0.

Remote Work Apps

According with (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.

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. 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 analyzed according with the obtained results deriving from the collected data.

Assumptions and Limitations

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. 85 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 fulltime 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 research aiming to complement the literature in this area.

4. RESULTS

Regarding the 1st Research Question, intending to investigate the significance of the hypothesized relationships among the Latent Variables (LVs) defined in the research model, the Structural Model was 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 statistically significant . The LVs were also tested for multicollinearity since this may interfere with the relative importance of the assessment of predictor variables in the structural paths . The analysis shows that all LVs have a Variance Inflation Factor (VIF) of less than 5 . The changes in R^2 , resulting from the omission of exogenous LVs (Effect Size f^2) were also analyzed and none the of omitted constructs was shown to have a substantive impact on the endogenous LV (EO) individually. Overall, the structural model revealed 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 1.

Table 1 - 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

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

Regarding the 2nd Research Question, 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" (denoted by red cells) and "high" (denoted by green cells) 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 2.

Table 2 – Interview Results

Interview elements	Value	Diversity	Bridge In	Slip/Slip	Verbal	Practical	Heuristic	Stimulus	Memory	Memory/Visual	Heuristic	Concrete	Formal	Total
I1. Use of Remote Work Apps	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	13
Codes														
Communication Apps	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	13
Google Workspace	✓	x	✓	✓	✓	✓	x	✓	✓	✓	✓	✓	✓	11
I2. Work tools changes with Covid	✓	x	x	x	✓	x	x	x	x	x	x	x	x	2
Codes														
Use of Collaborative Tools	✓	x	x	x	✓	x	x	x	x	x	x	x	x	2
I3. ↑ Productivity	x	✓	x	x	✓	✓	x	x	x	✓	x	x	✓	5
Codes														
Similar Productivity due to tech-savviness and improved time efficiency	✓	x	✓	✓	x	✓	x	✓	✓	x	x	x	x	6
I4. ↑ Innovativeness	ND	✓	✓	✓	✓	✓	x	✓	x	✓	✓	x	✓	9
Codes														
Communication Platforms	x	✓	✓	✓	✓	✓	x	x	x	✓	x	x	✓	7
I5. ↑ Proactiveness	✓	x	✓	✓	✓	x	x	✓	✓	✓	ND	ND	✓	8
Codes														
Proactiveness is a requisite of being entrepreneur	✓	✓	x	x	x	x	x	x	x	x	x	x	✓	3
I6. ↑ Risk-taking	✓	✓	x	✓	✓	x	✓	✓	x	x	x	x	ND	6
Codes														
Remote work led to an increased quantification of processes, which allowed to take more calculated risks.	✓	✓	x	✓	x	x	x	x	x	x	x	✓	x	4
I7. Changes if going back before Covid was possible	✓	x	✓	x	✓	x	✓	x	x	x	x	✓	✓	6
Codes														
Anticipating the implementation of Remote work practices	✓	x	x	x	✓	x	x	x	x	x	x	✓	✓	4
I8. Agree with Survey Results	✓	x	x	x	x	x	✓	✓	✓	x	x	✓	✓	6
Codes														
Proactiveness as the main driver of EO	x	✓	✓	✓	x	x	x	x	x	x	x	x	x	3
Innovation as the main driver of EO	x	x	x	x	x	✓	x	x	x	✓	✓	x	x	3

Notes: The symbols ✓ and x 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.

Figure 9 illustrates the results regarding the remote work apps reported by the interviewees to drive the 3 studied EO dimensions.

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 (green line in Figure 9).

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 anticipating future company needs by searching out new opportunities (blue line in Figure 9).

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. This statement is

corroborated by the almost non-existing red line of Figure 9.

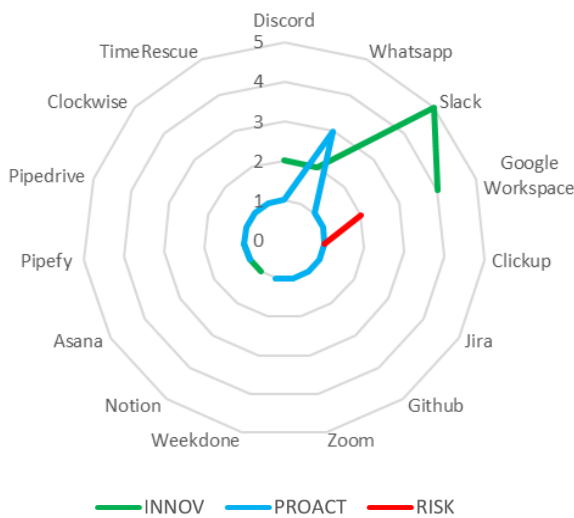


Figure 9 - Remote Work Apps reported to drive EO dimensions, according with the interview results.

5. CONCLUSIONS

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 84 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 national-wise. 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.

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