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# DISENTANGLING THE INNOVATION ORIENTATION, INTELLECTUAL CAPITAL, AND DYNAMIC INNOVATION CAPABILITY RELATIONSHIPS IN EMERGING ECONOMY START-UPS

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*Purpose*: Based on the Dynamic Capabilities View (DCV) and Knowledge-based View (KBV), this study investigates the relationships between intellectual capital (IC) resources and dynamic innovation capabilities in the context of new ventures.

*Design/methodology/approach*: Data for the study is collected from 311 start-up firms in Turkey and is analysed via Structural Equation Modelling.

*Findings*: The results indicate that the effects of human capital and social capital on dynamic innovation capability are fully mediated by innovation orientation (IO). Besides, dynamic innovation capability is found to be strongly associated with innovation performance.

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*Practical implications*: In the study, IO is suggested as a useful mechanism for encouraging the deployment of an innovation focus in all functions of a firm for attaining long-term sustained competitiveness. Thereby, the findings are expected to present important implications for start-up founders and policy-makers, by highlighting the importance of knowledge management and investing in human and social capital resources for generating the capability to innovate.

*Originality/value*: The most significant contribution of the study is the development of a model suggesting IO as a mediating variable between the IC resources and dynamic innovation capability relationship in the context of start-up firms. Furthermore, the findings indicate a positive and significant association between the dynamic innovation capability and innovation performance in these economic units.

*Keywords*: Dynamic innovation capability; intellectual capital; innovation orientation; start-ups.

## Introduction

Due to the driving role of innovation as the main source of sustainable competitive advantage and improved company performance (Damanpour *et al.*, 2018; Jiménez-Jiménez and Sanz-Valle, 2011), the development of innovation capability is considered to have strategic importance both for established and young companies (Ilmudeen, 2022; Iranmanesh *et al.*, 2021). Knowledge-based resources are closely linked with innovation capability, as they allow an organisation to adapt and respond to changes in the environment (Abbas *et al.*, 2020; Iqbal *et al.*, 2018; Hadjimanolis, 2000).

The innovation capability of a firm is largely influenced by the quality of the intellectual capital (IC) and the capability to utilise knowledge resources (Subramaniam and Youndt, 2005) as knowledge assets and IC are proposed as the main sources of a firm's innovations (Oliveira *et al.*, 2020; Cabrilo and Dahms, 2018; Jordao *et al.*, 2017; Martín-de Castro *et al.*, 2013). Despite that, there is still limited understanding of the extent to which the human and social capital elements of IC are linked with innovation capability (Zhou *et al.*, 2021; Arvanitis and Stucki, 2012; Bettiol *et al.*, 2016). Thus, this study builds upon the theoretical works of Knowledge-based View (KBV) and dynamic capabilities (DCs) frameworks, which both have advanced the understanding of innovation by focusing on the reconfiguration of existing resources and creation of new resources parallel to the changes in the environment, while highlighting the importance of knowledge creation on innovation (Devece *et al.*, 2021; Asija and Ringov, 2021; Zieba *et al.*, 2017; Bowman and Ambrosini, 2003; Lawson and Samson, 2001). Dynamic capabilities view (DCV) and Resource-Based View (RBV) have both highlighted the integral role of knowledge-based intangible resources and organisational capabilities in establishing sustainable competitive advantage through innovation

(Serrano-Bedia *et al.*, 2018), particularly in the context of start-up firms (Guckenbiehl *et al.*, 2021; Innocenti and Zampi, 2019) and SMEs (Fabrizio *et al.*, 2022). While this is the case, so far there has been comparably less focus on how new ventures and SMEs convert their knowledge-based resources into capabilities (Dejardin *et al.*, 2022; Abbas *et al.*, 2020; Hermans and Kauranen, 2005). Similarly, extant research has mainly explored the link between IC resources and innovation in large and existing companies (Buenechea-Elberdin *et al.*, 2018; Paradkar *et al.*, 2015; Davidsson and Honig, 2003), which has been associated with the newness of the discussion on RBV concerning innovation management in the small company and start-up contexts (Oliveira *et al.*, 2020; Hadjimanolis, 2000). Scholars have frequently mentioned that small businesses, compared to their larger-sized rivals have important challenges due to the scarcity of strategic resources, which in turn negatively impact their competitiveness (Barney and Hansen, 1994; Porter, 1980). Interestingly, while the development of DCs in new firms has captured some level of interest from scholars (McKelvie and Davidsson, 2009), further investigations are needed to understand the role of knowledge assets in the development of dynamic innovation capability in small and medium-sized firms, and particularly start-up firms (Fabrizio *et al.*, 2022; Tidd and Bessant, 2018; Rashidirad and Salimian, 2020). Furthermore, the importance of an innovation orientation (IO) and an innovative culture that leads to the production of innovative products and services has recently been discussed particularly for small businesses and start-up firms, since the empirical research on the IO of new companies and small and medium-sized enterprises (SMEs) remain to be insufficient (Collins and Reutzel, 2017; Pierre and Fernandez, 2018; Rosenbusch *et al.*, 2011).

The present study aims to address these important gaps in the innovation management literature by seeking answers to the main research questions of "How does dynamic innovation capability affect the innovation performance in nascent organisations?" and "What is the role of IO in the relationship between IC resources and dynamic innovation capability?". Developing an innovation culture that supports creativity, new idea generation, and execution (Gatignon and Xuereb, 1997; Zhou *et al.*, 2005) through new knowledge creation and converting this unique feature into a capability lie at the core of IO. Innovation-oriented companies aim to enhance their competitiveness and increase the efficiency in the utilisation of their resources by adopting a more strategic methodology which mainly involves being more sensitive to the needs of the customers. The evolution of RBV and DCV streams facilitated the grounding of the IO concept by linking the resources and capabilities of the organisation to the development of innovation capabilities (Hadjimanolis, 2000). In this regard, the impact of IO on the development and continuation of dynamic innovation capabilities by the provision of a

knowledge framework for improved process development became a topic of discussion (Siguaw *et al.*, 2006). Companies with a high level of IO tend to invest more heavily in the search for resources and capabilities, both tangible and intangible, for developing their innovation capabilities and through that, achieve a vital competitive edge (Mohedano-Suanes *et al.*, 2021).

The research study is conducted on start-ups operating in Turkey for two main reasons. First and foremost, scholars have commented that the extant studies investigating IC resources and innovation capability relationship have largely focused on large and established companies (McKelvie and Davidsson, 2009; Hermans and Kauranen, 2005) operating in developed economies (Buenechea-Elberdin *et al.*, 2018). In addition, Turkey has a dynamic and prospective start-up ecosystem, currently holding 3rd place in the Middle-east and North Africa region, behind Israel and the United Arab Emirates (The State of Turkish Start-up Ecosystem, 2020). The total capital invested in Turkish start-ups was announced as $103M in 2019 with a 61% increase from 2018 (Startup Watch, 2020). Thus, the results of this analysis are expected to provide important insights into the innovation capability generation in the new ventures of emerging and developing economies. In the study, data was collected from 315 start-up firms operating in Turkey, and a novel mediation model was tested via Structural Equation Modelling.

The paper is organised as follows. After the introductory section, the conceptual framework, research model, and proposed hypotheses are presented. Section 3 reports the research methodology and the empirical findings of the model. The theoretical, practical, and policy implications are discussed along with the findings in the final section of the paper.

## Theory and Hypotheses

### IC, IO, and dynamic innovation capabilities

The DCV, which evolved from the RBV highlights the inimitability and scarcity nature and strategic importance of intangible assets, including collective knowledge and capabilities that are regarded as the most valuable assets a company can have (Teece, 2016). Resources and knowledge are crucial for DCs as they stimulate the development of DCs (Bitencourt *et al.*, 2020). In the context of new ventures, the endowment of resources and the development of DCs are suggested to have a positive impact on firm performance (McKelvie and Davidsson, 2009) where the survival rates are significantly low (Geroski, 1995).

The integral role of knowledge in the formation of competitive advantage has long been accepted by leading business scholars (Drucker, 1993; Toffler, 1990).

In this discussion, the former is generally accepted to provide a focus on the RBV for intangible resources and capabilities, in particular the creation, accumulation, and distribution of knowledge in organisations (Martín-de Castro *et al.*, 2013). In that respect, the firms that have developed a core innovation capability (Saunila, 2020; Birchall and Tovstiga, 2005) integrate their key capabilities and resources to stimulate innovation (Rajapathirana and Hui, 2018; Lawson and Samson, 2001). The innovativeness of an organisation is closely associated with having related competencies and capabilities (Paradkar *et al.*, 2015). While the outcomes of innovative activity might be unclear, organisations can develop significant expertise and insight regarding the innovation process (Nelson and Winter, 1982) and develop a capability to innovate, which is the competence of a firm to obtain and exploit new knowledge through the creation of new products and services, thereby creating an advantage for the company and its stakeholders by delivering superior customer value (Weber and Heidenreich, 2018). For competing in turbulent markets, companies devise and implement several strategies (Teece, 2016; Lawson and Samson, 2001), and the development of innovation capability is considered an effective strategy for achieving competitiveness (Saunila and Ukko, 2012). The capability to innovate is in general considered a DC, as innovation capability is not a routine but a higher-order capability, that integrates and configures the other integral organisational resources and capabilities required for achieving innovation (El Hanchi and Kerzazi, 2020; Michailova and Zhan, 2015; Lawson and Samson, 2001). The development of dynamic innovation capability is particularly crucial for new ventures (Innocenti and Zampi, 2019). Recent research has indicated that start-up firms can attain sustainable knowledge acquisition and DC development through time (Bettiol *et al.*, 2016), suggesting the influence of knowledge through experience. This finding is relevant to the notion that the creation of new knowledge is closely linked with innovation (Zieba *et al.*, 2017; Nonaka and Takeuchi, 1995). While traditional firms regard innovation as the allocation of limited resources for achieving uncertain results which is a task mainly given to research and development departments, successful innovator start-ups see innovation as collective new knowledge creation and learning mechanism for achieving long-term competitive advantage (İqbal *et al.*, 2018; Hsu and Wang, 2012; Lawson and Samson, 2001). However, the development of dynamic innovation capability in new firms is not easy due to the requirement of building managerial systems that would exceed operating routines and repeatable processes and lead to the stimulation of major innovations (O'Connor, 2008).

According to the DCV, the development of internal and external competencies and effective utilisation of resources is required for achieving sustained competitive advantage in fast-changing and highly competitive business environments (Teece and Pisano, 1994). IC resources are major influencers in the development of DCs (Singh and Rao, 2016; Hsu and Wang, 2012; McKelvie and Davidsson,

2009). Subramaniam and Youndt (2005) referred to the concept of IC as the combination of all the knowledge a company utilises to achieve competitiveness, while similarly, Stewart (1994) defined IC as the sum of knowledge and capabilities within a company which is the source of competitive advantage. Mainly due to the broad coverage of the concept, several categorisations of IC components have been introduced to the literature, including human, structural, and relational capital including customer capital (Bontis, 1998) and organisational and social capital (Subramaniam and Youndt, 2005). Human capital, the most important component of IC resources (Kianto *et al.*, 2017) is an essential factor for the innovativeness of a firm, as the knowledge, skills, experience, and training of managers and employees are utilised for the development of new products, services, and processes are integral for achieving sustainable competitive advantage in rapidly changing business environments (Nguyen *et al.*, 2022; Zhou *et al.*, 2021; Hsu and Wang, 2012). In the start-up context, human capital is considered one of the most important intangible resources to survive the dreaded "valley of death," especially during the early stages. While this is the case, most research conducted on the impact of human capital targeted mostly SMEs, rather than innovative start-ups (Guckenbiehl *et al.*, 2021; De Winne and Sels, 2010). The second major constituent of IC, social capital refers to the combination of relationships and associations of the employees both within the organisation and with external groups (Ul Zia *et al.*, 2022; Xu *et al.*, 2019). The building blocks of social capital can be created by the employees working in the same organisation as they develop and share mutual behaviours, values, trust, understanding, and interconnected human networks (Cohen and Prusak, 2002). In general, scholars have prescribed a positive association between social capital and innovation as social capital would enable the combination of internal and external knowledge resources as well as inter-industry knowledge transfer, which is integral for the development of new products and services (Kianto *et al.*, 2017). Besides, experimentations with unique ideas and formulation of alternative solutions to complex problems can be fostered with the increased cooperation of outside stakeholders and through that, facilitate internal innovation processes (Pérez-Luño *et al.*, 2011). Social capital is also proposed as a major source of strategic resources required for achieving innovativeness (Luk *et al.*, 2008). In the review by Amar and Juneja (2008), innovation is found to be the result of the intended and joint efforts of the whole organisation through the integration of accumulated knowledge, a culture that supports learning and knowledge, and finally garnered social capital, which altogether fosters creativity. Despite these positive prescriptions, empirical studies conducted so far investigating the direct association between human and social capital factors on innovativeness produced mixed results. For instance, the findings of empirical studies conducted by Mazzucchelli *et al.* (2019) and Li *et*

*al.* (2019) implied a positive relationship between human capital-related factors and innovation capability, whereas contrarily, findings reported by Subramaniam and Youndt (2005) and Dess and Shaw (2001) suggested a negative relationship between human capital and radical innovation. Similarly, previous studies indicated both positive and negative results regarding the impact of social capital on innovation both in the established company (Briones-Peñalver *et al.*, 2021; Cuevas-Rodríguez *et al.*, 2014; Edelman *et al.*, 2014) and small business contexts (Konsti-Laakso *et al.*, 2012).

The interrelationships between human and social capital and their role in innovativeness were also studied in several empirical studies. Among these, Dost *et al.* (2016) found that social capital enhanced the impact of human capital on innovation generation, whereas findings of the empirical study by Wu *et al.* (2008) indicated that the positive influence of IC on innovation increased when firms possessed higher levels of social capital. In light of the previous research studies based on KBV and DCV, this model proposes IO as the missing link between the utilisation of human and social capital resources and the dynamic innovation capability in new ventures. IO refers to "A multidimensional knowledge structure composed of a learning philosophy, strategic direction, and transfunctional beliefs that, in turn, guide and direct all organisational strategies and actions, including those embedded in the formal and informal systems, behaviours, competencies, and processes of the firm to promote innovative thinking and facilitate successful development, evolution, and execution of innovations." (Siguaw *et al.*, 2006). A firm with an orientation towards innovation would outcompete its rivals by formulating relevant strategies for developing and introducing innovative new products or services before their competition (Naranjo-Valencia *et al.*, 2011). Companies employ IO for establishing a value system that normatively and materially supports innovation (Stock and Zacharias, 2011), as well as to achieve sustainable competitive advantage by serving as the collective direction and guidance for a company (Talke *et al.*, 2011). The potential of new products and technologies in creating new markets and customers through the timely determination of the needs and behaviours of consumers is well-established in the existing literature (Berthon *et al.*, 1999; Narver *et al.*, 2004). Companies with high levels of IO focus on creativity developing new ideas and the cultivation of long-term customer satisfaction to achieve a successful market performance, which is supported by the findings of empirical studies (Farooq *et al.*, 2021; Lii and Kuo, 2016).

According to Amabile and Conti (1997, p. 116) the motivation to innovate, resources existing in the task domain, and the skills in innovation management are the three constructs of organisational innovation, which are combined to create a climate of IO in an organisation. Knowledge creation is a vital aspect of IO, as the new knowledge directs the strategic positioning of the organisation and the coherency of functional activities for achieving competitive advantage in the market

(Siguaw *et al.*, 2006). The IO of a firm also is closely linked with the management of resources and capabilities (Zhou *et al.*, 2005; Talke *et al.*, 2011), where IC resources play a major role in nurturing a culture of innovation for creating innovative products and services (Berthon *et al.*, 1999; Hurley and Hult, 1998), thus utilise the firms' intangible resources towards this direction (Autry and Griffis, 2008). The management of IC resources towards the development of innovation capability has crucial importance for start-up firms and small businesses compared to large and existing organisations, which are confined to limited resources and have to compete in turbulent environments. IO is integral to SMEs as the strategic prioritisation of innovation would lead to the deployment of resources dedicated to research and development projects and the task of innovation which in turn would foster the creation of innovative products and services (Rosenbusch *et al.*, 2011). An innovation-oriented firm would be more likely to deploy relevant tangible and intangible resources including financial and human capital, for encouraging the generation and implementation of innovation, and for becoming more competitive through the creation of new products, services, or processes. Thus, it can be argued that an orientation to innovate would be required to mediate the relationship between IC resources and dynamic innovation capability in start-up firms, as these companies should possess a focus on innovation to survive in highly challenging business environments with their limited resources. Supporting this prescription, Martín-de Castro *et al.* (2013) found that innovation culture has a moderating impact on the relationship between human capital and product innovation. Hence, the following hypothesis is proposed for testing the mediating effect of IO on the relationships between HC, and SC on the development of dynamic innovation capability in new ventures:

**H1.** IO mediates the effects of human capital (H1a) and social capital (H1b) on dynamic innovation capability.

## Dynamic innovation capability and IO

While the conceptual studies focusing on the associations between intellectual resources and IO are growing within the innovation management literature, empirical studies investigating these associations as well as the influence of IO on the development of innovation capability remain underexplored (Siguaw *et al.*, 2006; Winland and Shepherd, 2003), particularly in the context of small firms and new ventures. As an exception in a recent empirical study on Korean SMEs, Rhee and Stevens (2020) found that an innovation-orientation strategy fostered the development of innovation capability which in turn contributed significantly to the attainment of competitive advantages, leading to increased market share and sales

growth. Similarly, the results of the empirical study on 210 Spanish SMEs indicated that IO mediated the positive association between customer orientation, customer knowledge management practices, and the development of innovation capability (Fidel *et al.*, 2018). As scholars have been calling for fresh empirical evidence to test the relationship between the direct association between the strategic orientation to innovate and the development of dynamic innovation capability in start-up firms (El Hanchi and Kerzazi, 2020), the following hypothesis is developed to be empirically tested:

**H2.** IO predicts dynamic innovation capability in new ventures.

### Dynamic innovation capability and innovation performance

While a positive association between the generation of dynamic innovation capability and innovation performance is implied in prior conceptual studies, the empirical studies that have explored the nature of this relationship so far yielded mixed results (Hurtado-Palomino *et al.*, 2022; Jeng and Pak, 2021; Ferreira *et al.*, 2018; Stock and Zacharias, 2011; Yeşil *et al.*, 2013; Ngo and O'Cass, 2012). The need for fresh empirical findings to these conceptual associations is particularly evident in the context of start-up firms, as the relationship between dynamic innovation capability and innovation performance is integral for these ventures' survival. Start-up firms, similar to SMEs, are regarded to have an insufficiency of resources and a higher need for effective management, referred to as the "liability of smallness" by scholars (Freeman and Engel, 2007), which can hinder the development of innovation capabilities (Hanchi and Kazizi, 2020). Despite that, some empirical studies indicated a negative relationship between firm size and innovativeness, due to the efficiency of smaller firms concerning innovation development (Becheikh *et al.*, 2006). The resource constraints are also valid for developing dynamic innovation capabilities of new ventures, particularly in the early stages. The literature implies that when start-ups are young, developing a DC to innovate is closely associated with leveraging the founder team's resources and personal capabilities in unique ways for the identification opportunities present in the environment, as well as collaborating with external stakeholders for complementary resources (Autio *et al.*, 2011; Berends *et al.*, 2014; Evers *et al.*, 2012; McKelvie and Davidsson, 2009; Zahra *et al.*, 2006). Start-up firms can utilise their enhanced resources, new structures, and formal planning and decision-making routines to develop new capabilities as they grow and mature (Berends *et al.*, 2014; Evers *et al.*, 2012). However, scholars have discussed that at this stage the rigidity and formalisation can create potential barriers to the creation of a dynamic innovation capability, particularly when the strategic orientation to innovate is

lacking and the innovation culture is not deeply rooted in the organisational culture (Freeman and Engel, 2007; Christensen and Overdorf, 2000). Thus, the following hypotheses are proposed to provide fresh empirical evidence for the rather underexplored relationship between dynamic innovation capability and innovation performance in the context of new ventures:

**H3.** Dynamic innovation capability predicts innovation performance in new ventures.

## Methodology

### Sample and survey

The data used in the study were collected from May 2020 to July 2020 from the start-up firms in Turkey, which are members of Start-ups Watch, a start-up ecosystem intelligence platform based in Turkiye. Besides being one of the leading local start-up organisations with over 11.000 new ventures, the organisation also collects, analyses, and reports the most recent data from its members, which is cross-checked with the data from the Chamber of Commerce for accuracy. This study, which investigates the relationships between IC resources, dynamic innovation capabilities, and innovation performance, was conducted on start-ups for two reasons. First, scholars have noted that existing studies investigating the relationship between IC resources and innovation capability have largely focused on large firms operating in developed economies (McKelvie and Davidsson, 2009; Hermans and Kauranen, 2005) (Buenechea-Elberdin *et al.*, 2018). However, by definition, start-ups are new innovation-oriented entrepreneurial ventures that are established by individuals as independent firms and have been operating for less than 10 years (Spender *et al.*, 2017). Our research on such a sample will provide valuable insight into the relationships between proposed study variables. Second, the start-ups involved in our research are based in Turkiye. As a developing country, Turkiye has a dynamic start-up ecosystem, ranking third in the MENA region after Israel and the UAE (Turkey Startup Ecosystem Status, 2020). Therefore, this study is expected to provide important information regarding innovation capability and performance in new ventures of emerging and developing economies. For these reasons, we believe that it is appropriate to include start-ups operating in a developing country in our sample to achieve the study aims.

Our research is cross-sectional in nature. The utilisation of cross-sectional data in DCs research contributes to the literature as it may allow the investigation of the connections between factors that influence DCs (Eriksson, 2013). For data

collection, a total of 1.500 potential respondents were randomly selected from the list of members on the website of the organisation (Startup Watch, 2020).

Because the items were originally in English, we performed two-way translations. The translations were carried out by bilinguals who were proficient in both Turkish and English to guarantee cross-cultural equivalency between the two languages (Brislin, 1980). Question items taken from the literature were first translated from English to Turkish by one person and then translated from Turkish to English by a second person. Thus, it was checked that the meanings of the question items were correctly translated from English to Turkish. Next, the two translators worked together to resolve any disagreements. Before distributing the survey questionnaire to potential respondents, a pilot questionnaire was collected by e-mail from the founders/managers of 45 start-ups to verify the reliability of the measures and scales utilised in the study. In total, 457 completed questionnaires were returned by the founders/managers of potential respondents. Out of these incomplete surveys were taken out, resulting in a final sample of 311 questionnaires, with a 20,7% response rate. The final sample was 86% male and 14% female, with an average founder-manager age of 34 years. 78.1% of the respondents reported themselves as "founders" and 12.5% as "top-level managers". In the sample, 46% of the respondents had a university degree whereas 42% had a graduate school degree.

Table 1 shows start-up demographic characteristics. The average start-up age of the total sample was 1.5 years with 63% start-ups under 3 years of age, 24% between 4 years and 7 years of age, and 13% more than 8 years ago. The start-up

Table 1. Participant start-up demographics.

| Variable | | *N* | % of sample |
|---|---|---|---|
| Firm age | 0–3 years | 196 | 63.0 |
| | > 4 years | 115 | 37.0 |
| Sector (Top 10) | Information Technologies | 51 | 16.4 |
| | Software | 43 | 13.8 |
| | Financial Technologies | 16 | 5.1 |
| | Mobile Game | 12 | 3.9 |
| | Energy | 11 | 3.5 |
| | Educational Technologies | 10 | 3.2 |
| | Digital Media | 10 | 3.2 |
| | Digital Marketing | 8 | 2.6 |
| | E-Commerce | 8 | 2.6 |
| | Consultancy | 7 | 2.3 |
| | Others | 135 | 43.4 |

industry sectors that participated in our research are quite diverse. Considering the top five sectors, 16.4% of start-ups are in information technologies, 13.8% are in software, 5.1% are in financial technology, 3.9% are in mobile games and 3.5% are in energy. Other start-up industry sectors include educational technologies, digital media, digital marketing, e-commerce, consultancy (innovation and investment), and so on.

## Measures

This study used items to operationalise the constructs that were derived from the literature. All constructs were measured using multiple items that are considered to indicate good psychometric properties in prior studies. The scales we used in our study have previously been adapted and validated in many different contexts, including Turkiye. All items related to the study constructs were measured on a seven-point Likert-type scale. Descriptive statistics, intercorrelations, and internal consistency data are presented in Table 2.

*IC.* This study adopts two dimensions of IC including human and social capital. Human capital was assessed through a five-item scale, based on the work of Subramaniam and Youndt (2005). The items assessed the general skill, expertise, and knowledge levels of employees in the firm. A sample item includes "Our employees are highly skilled". Items were rated on a scale that ranged from 1 ("strongly disagree") to 7 ("strongly agree") and then averaged ($\alpha = 0.87$). Similarly, based on the work of Subramaniam and Youndt (2005), social capital was assessed using a five-item scale. These items reflect the general ability to share and leverage knowledge among stakeholders. Items were rated on a seven-point scale (1 = "strongly disagree", 7 = "strongly agree"), and then averaged ($\alpha = 0.88$).

Table 2. Descriptive statistics and intercorrelations for all variables.

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| (1) Human capital | *0.87* | | | | | | |
| (2) Social capital | 0.66** | *0.88* | | | | | |
| (3) Innovation orientation | 0.55** | 0.54** | *0.85* | | | | |
| (4) Dyn. inn. capability | 0.52** | 0.44** | 0.60** | *0.73* | | | |
| (5) Innovation performance | 0.39** | 0.37** | 0.54** | 0.53** | *0.87* | | |
| (6) Firm age | −0.13* | −0.19** | −0.21** | −0.09 | −0.18** | — | |
| (7) Industry | 0.07 | 0.05 | 0.11* | 0.12* | 0.05 | −0.06 | — |
| Mean | 5.57 | 5.61 | 6.05 | 5.04 | 5.34 | 1.50 | 0.58 |
| Standard deviation | 0.95 | 1.08 | 1.00 | 0.82 | 1.06 | 0.71 | 0.49 |

*Notes*: Sample size = 311. Alphas are on the diagonal.
*$p < 0.01$, *$p < 0.05$.

*IO*. The extent of a firm's IO was assessed using a three-item scale from the work of Zhou *et al.* (2005). The respondents were asked to rate the extent to which their firms focus on the openness to innovations in general and in administrative areas on a seven-point scale, ranging from 1 = "strongly disagree" to 7 = "strongly agree". The Cronbach's alpha (0.85) indicated good reliability of this scale.

*Dynamic Innovation Capability.* The use of subjective measures is a common practice in empirical DC studies (Eriksson, 2013). In this study, the dynamic innovation capability of a firm was measured using six items derived from Calantone *et al.* (2002). These items focus on the firm rate of innovation adoption. Items were rated on a seven-point scale, ranging from 1 = "strongly disagree" to 7 = "strongly agree". Cronbach's alpha coefficient of the innovative capability is 0.73.

*Innovation Performance.* Firm innovation performance was assessed through a five-item scale, based on the work of Kianto *et al.* (2017). The respondents were asked to indicate, compared to their competitors, how successfully has their company managed to create innovations/new operating methods in the following areas (1) products and services for customers, (2) production methods and processes, (3) management practices, (4) marketing practices, and (5) business models, over the past year. Items were rated on a seven-point scale, ranging from 1 = "not successful at all" to 7 = "very successful". The Cronbach's alpha (0.87) indicated good reliability of this scale.

*Control variables.* Because firm age and type may influence innovation performance these variables were included as control variables to measure their potential effects. Firm age was measured as the number of years since the firm was established until the year of this study. For firm type, we included a dummy

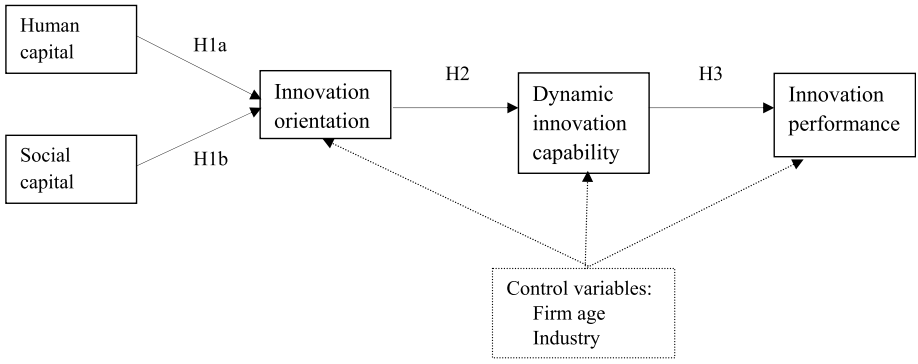



Fig. 1. The conceptual model.

variable that indicates whether the respondent firm belongs to a high-tech industry (1 = yes, e.g., computer and electronic equipment) or otherwise (0 = no, e.g., apparel, furniture).

## Results

As seen in Fig. 1, our research model is a complex model that includes direct and indirect relationships between variables. Structural equation modelling (SEM) allows the development of complex path models with direct and indirect effects and more accurately analysing causal mechanisms in such models. As in our study, SEM is preferred by the researcher because it estimates multiple and interrelated dependencies in a single analysis (McQuitty, 2004).

### Construct validity

A confirmatory factor analysis (CFA) was run to assess the construct validity of the measurement model by assessing its convergent and discriminant validity. LISREL version 8.54 software (Jöreskog and Sörbom, 2003) was used to conduct CFA to assess the goodness-of-fit (GFI) of the measurement model to the data. The measurement model provides a satisfactory fit for the data ($\chi 2(242) = 729.87$, GFI = 0.90, (Bentler's) comparative fit index (CFI) = 0.97, incremental fit index (IFI) = 0.97, root mean square error of approximation (RMSEA) = 0.081). Moreover, all factor loadings were highly significant ($p < 0.01$), the composite reliabilities (CR) of all constructs were above 0.70, and all values of average variances extracted (AVE) were greater than 0.50. Thus, these results were sufficient for demonstrating convergent validity and reliability (Fornell and Larcker, 1981).

To assess the discriminant validity, the square root of each construct's AVE was further compared with the correlations with other latent constructs, to determine whether they are higher than the correlations with other latent constructs. The results indicate that for each construct, the AVE was higher than the correlations with other latent constructs, suggesting that discriminant validity is established (Fornell and Larcker, 1981). On the whole, these results show that the measures in the present study possess satisfactory reliability and validity.

### Evaluation of structural model

The proposed model in Fig. 1 was formulated as a structural equation model and specified and estimated with maximum likelihood estimation as implemented in LISREL version 8.54 software (Jöreskog and Sörbom, 2003). All analyses were

based on the covariance matrix. Two control variables in the proposed model were included and linked directly to IO, capability, and performance.

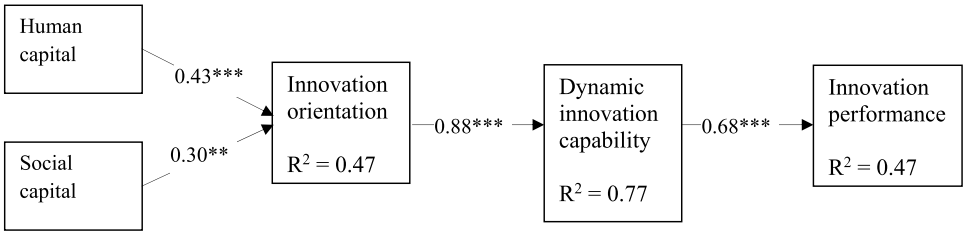
As shown in Fig. 1, it is hypothesised that the effects of human capital and social capital on dynamic innovation capability are fully mediated by IO. Several alternative models were also tested. First, a partially mediated model (suggesting that human capital and social capital have direct effects on dynamic innovation capability in addition to the paths shown in Fig. 1) was examined. Finally, a non-mediated model suggesting that human capital and social capital have direct effects on IO and dynamic innovation capability, but IO does not affect dynamic innovation capability was examined. The fit indexes for all tested models as well as the chi-square difference tests between the alternative model and the fully mediated model are presented in Table 3. The results indicated the best fit for the fully mediated model compared to the other alternate nested models. To examine the relative fit of fully mediated, this model was compared with alternate nested models. There was a significant difference between the fully and non-mediated models ($\Delta\chi2(67) = 2535.27$, $p < 0.001$), as well as between the fully and partially mediated models ($\Delta\chi2(4) = 390.78$, $p < 0.001$). The addition of the paths from human capital and social capital to dynamic innovation capability in the partially mediated model resulted in non-significant parameter estimates. Accordingly, nested model comparisons demonstrated that the fully mediated model showed a better fit than alternate models which supports further analysis. Standardised parameter estimates for the model are presented in Fig. 2. Innovation performance was predicted by dynamic innovation capability ($\beta = 0.68$, $p < 0.001$), and dynamic innovation capability was predicted by IO ($\beta = 0.88$, $p < 0.001$), therefore H2 is supported. IO was predicted by human capital ($\beta = 0.43$, $p < 0.001$) and social capital ($\beta = 0.30$, $p < 0.01$).

The results show that neither human capital nor social capital has a direct effect on dynamic innovation capability. According to Baron and Kenny (1986), these results indicate that IO fully mediates human capital and social capital — dynamic

Table 3. Fit indices for the three models.

| | | | | | | | Model comparison test | | |
|---|---|---|---|---|---|---|---|---|---|
| Model | $\chi^2$ | *df* | RMSEA | GFI | CFI | IFI | Comparison | $\Delta\chi^2$ | $\Delta df$ |
| (A) Fully mediated | 835.08 | 290 | 0.078 (0.072–0.084) | 0.83 | 0.97 | 0.97 | | — | — |
| (B) Non-mediated | 3370.35 | 223 | 0.10 (0.10–0.11) | 0.82 | 0.94 | 0.94 | B versus A | 2535,27 *** | 67 |
| (C) Partially mediated | 1225.86 | 286 | 0.085 (0.081–0.090) | 0.83 | 0.96 | 0.96 | C versus A | 390,78 *** | 4 |

*Note*: RMSEA = root mean square error of approximation with 90% confidence interval; GFI = goodness of fit index; CFI = (Bentler's) comparative fit index; IFI = incremental fit index.
$^{*}p < 0.01$; $^{***}p < 0.001$. $n = 311$.




*Note*: **$p < 0.01$; ***$p < 0.001$; indicators for latent variables are not shown for diagrammatic simplicity.

Fig. 2. Results of LISREL eight tests linking intellectual capital and innovation performance.

innovation capability relationships. Therefore, H1 is fully supported. Because dynamic innovation capability has a positive effect on innovation performance ($\beta = 0.68$, $p < 0.001$), H3 is supported.

About the effects of control variables, the results indicate that firm age negatively affects IO ($\beta = -0.29$, $p < 0.05$), suggesting that newly established firms are more likely to be innovation-oriented. Unexpectedly, firm type (high-tech or other) has no relationship with IO, dynamic innovation capability, and performance.

## Discussion

Start-up firms have significant challenges concerning obtaining and utilising strategic resources, as well as problems in building structured management systems (Freeman and Engel, 2007). Prior studies have shown that these negativities might significantly limit the development of innovation capabilities in small businesses, and in particular new firms (Hanchi and Kazizi, 2020). This is important as the development of dynamic innovation capability and understanding its role in innovation performance are critical for the success and survival of new ventures. More recently, the creation of IO by the effective utilisation of IC resources is being discussed as a major source of innovation and as such competitive advantage. Previously, several factors were identified as the influencers of innovation capability development and higher innovation performance in SMEs. However, while IO was conceptually offered as a major mechanism for developing the capability to innovate, empirical evidence was required to provide evidence for this prescribed relationship. In this regard, the main aim of this research study was to provide new insights into the existing research about the factors that affect the innovation capability development in new ventures by developing a new model that tests the mediating role of IO in the associations between human capital, social capital and DIC. Results of the data analyses confirm that the relationship between human capital social capital and dynamic innovation capability is fully mediated

by IO in the context of new firms. In the fast-growing IC literature, empirical studies conducted so far implied both positive (Mazzucchelli *et al.*, 2019; Li *et al.*, 2019) and negative (Subramaniam and Youndt, 2005; Dess and Shaw, 2001) associations between human capital-related factors and innovation capability. Thus, introducing IO as the missing link between IC resources and the capability to innovate might provide a possible explanation for the contradictory findings of prior research studies.

Also, providing new evidence to the conceptual positive link between the existence of a dynamic innovation capability and innovation performance is another important contribution of the study to innovation management literature, where the empirical findings are limited (Davidsson and Honig, 2003; Paradkar *et al.*, 2015; Buenechea-Elberdin *et al.*, 2018).

Furthermore, the results present a negative association between firm age and IO, indicating that newly established firms are more likely to be innovation-oriented. Another important but surprising result of the study is the finding that firm type (high-tech or other) has no significant association with IO, dynamic innovation capability, and performance. This finding is in contrast with the findings of Buenechea-Elberdin *et al.* (2018) and might be argued to stem from the important role of an innovation focus for start-up firms, regardless of their high or low-tech foundation. The results of the study also support the notion that a holistic and strategic focus on innovation would enhance the deployment of human and social capital resources, which are vital for the development of dynamic innovation capability.

## Implications for Theory

The main contribution of this research is proposing the construct of IO (IO) as the mediating variable between the IC resources and dynamic innovation capability relationship in the context of start-up firms. To the best of our knowledge, this is the first model in the literature investigating the relationship between human and social capital, dynamic innovation capability, and innovation performance, taking IO as the mediating variable. In this novel model, the IO perspective is proposed as a useful mechanism for encouraging the deployment of an innovation focus in all functions of a firm for attaining long-term sustained competitiveness (Siguaw *et al.*, 2006). While the IO concept gained popularity, particularly within the last decade, studies investigating the role of IO in the development of DCs are still lacking in the literature. The findings of this study indicate that the orientation to innovate fully mediates the IC-dynamic innovation capability relationship. In addition, the findings provide empirical support for the prescribed association between dynamic

innovation capability and innovation performance. So far, empirical studies analysing this association have been scarce. Thus, this study is also important for the operationalisation of dynamic innovation capability, which is a developing research area.

The findings of the study also provide new evidence to the conceptual base of the DCs, proposing that intangible capital is a major resource for the development of dynamic innovation capability and innovation performance. Besides providing new empirical evidence to the RBV and DC research, the study also has important theoretical contributions to innovation management literature. The studies conducted so far have offered only a partial understanding of the complex phenomenon of innovation and scholars have called for an integration of various dimensions to get a more complete understanding (Crossan and Apaydin, 2010). Here IO perspective was suggested as a useful mechanism for encouraging the deployment of an innovation focus in all functions of a firm for attaining long-term sustained competitiveness. The findings of the study confirm the underlying mechanisms that link IC resources and the strategic innovation capability development of a firm for improved innovation performance.

Another important theoretical contribution of the study stems from its context. So far, the majority of studies on innovation capability and performance have focused on large companies in advanced economies, which has been frequently criticised by researchers. With its data collected from Turkish start-up firms, the results of this study are expected to provide important insights related to the development of dynamic innovation capability for start-ups in emerging and developing economy contexts.

The final theoretical contribution of the research study is providing new evidence on the controversial relationships between firm age, size, and innovation.

## Practical and Policy Implications

The results present important implications for start-up founders, managers, academics, and regulators as policy-makers. The results of the study confirm that firms that choose to invest heavily in developing their strategic orientation to innovate and devote their human and social capital investments to reaching that objective would more likely develop a stronger dynamic innovation capability and through that, enhanced innovation performance. Therefore, the entrepreneurs or managers of new ventures can utilise these findings to improve the quality of the IC resources of their companies and to create a culture of innovation that does not see innovation as a separate task that has to be executed by one specific team (e.g., research or product development department) but rather as a holistic perspective

that has to be embedded inside the DNA of the organisation, for creating the dynamic innovation capability of the firm and thereby gain long-term competitive advantage (Iranmanesh *et al.*, 2021). Thus, the study confirms the proposition by McKelvie and Davidsson (2009) that the founders and top managers in new ventures should make careful decisions when making resource investments as the prioritisations in these choices and the effectiveness in their deployment would significantly impact how these resources can be transformed into dynamic innovation capability and through that, improved innovation performance. The framework of IO would facilitate the search and exploitation of organisational competencies required to reach innovation goals through launching creative products, services, and processes, which is comparably more important in the context of start-up firms. Hence, the combined knowledge from the motivated, educated, and focused human capital with well-established social capital relationships within an innovation-oriented organisation could be expected to lead to an increase in the development of innovative products, services, and processes. As for policy implications, the clarification of the positive association between IC resources and innovation, as well as dynamic innovation capability and innovation performance are expected to provide important insights for regulators concerning highlighting the role of human capital development and positive network effects in new firms for achieving a better innovation performance.

## Limitations and Implications for Future Research

As the investigation is conducted in a single social, economic, and political context, the repetition of the study in different international settings would help to confirm the generalisability of the results. Also, this study used subjective measures for the analysis of innovation outcomes. In measuring innovation performance, both subjective and objective evaluations have been widely used in the related literature (e.g., Saunila and Ukko, 2012; Buenechea-Elberdin *et al.*, 2018). Replication of this research with objective measures, such as R&D outputs may help to understand whether the personal insights of founders and top managers of start-up firms coincide with actual innovation outputs.

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