

# Reinterpreting excellence for sustainable competitive advantage: the role of entrepreneurial culture under information technological turbulence

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## Abstract

**Purpose** – This study aims to understand the culture of excellence by examining the role of entrepreneurial culture in shaping how firms achieve sustainable competitive advantage (CA). This study takes into consideration the firms' capability to transform the entrepreneurial culture into a sustainable CA by generating product development and adapting the information technological turbulence.

**Design/methodology/approach** – This study first gathers evidence from literature then carries out a detailed study to propose a structural equation model followed by an online survey that supports empirical evidence. This empirical test involves a data set with 782 usable responses following the 4,000 emails sent to the respondents and removed data due to the missing values. The population data are taken from the firm directory in Surabaya City that the Indonesian Ministry of Trade and Industry published.

**Findings** – There is a strong tendency that entrepreneurial culture is imperative for firms to attain sustainable CA by supporting new product development. The results show that product development provides a partial mediating effect, which indicates that entrepreneurial culture may affect the sustainable CA directly and with the product development support. This study also touches on dynamic capability by proposing a scenario approach that suggests that firms should refine the entrepreneurial culture to adapt to the information technological turbulence.

**Originality/value** – This study extends the understanding of the culture of excellence by underpinning the dynamic capability theory, which argues that entrepreneurial culture is a valuable resource, which helps firms achieve sustainable CA by promoting product development.

**Keywords** Organisational behaviour, New product development, Sustainable competitive advantage, Entrepreneurial culture, Information technological turbulence

**Paper type** Research paper

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## Introduction

Business excellence is primarily associated with the signals of culture emerging from high creativity (Bottling, 1997). Entrepreneurial culture attributes demonstrate how firms respond to change by raising the dichotomy between stability and flexibility (Chen *et al.*, 2020). Moreover, management philosophies for organisational excellence continuously promote sustainability value by addressing social and environmental problems (Urlick *et al.*, 2017). The management model for businesses excellence enables an enterprise to responsibly generate sustainable innovation and competitive products by involving relevant activities that ensure task completion to transform the vision into real achievement (Ferdowsian, 2016). However, the role of entrepreneurial culture varies for different excellence characteristics, one of which is adaptive culture (Kassem *et al.*, 2019).

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On the other hand, adopting greater sustainability in business activities may impose a rising cost saving. This approach can also eliminate risks and generate a positive impact on firm credibility, which helps firms establish a reputation to attract valuable resources (Chouinard *et al.*, 2011). A green approach in an entrepreneurial culture with pressure from the stakeholders demonstrates a long term commitment to promote sustainable competitive advantage (Papadas *et al.*, 2019). The routine excellence activities become a central element of firm capabilities, which make organisation attain an evolutionary fit that calls for attention as the content of capabilities (Zahra, 2021). Hence, the question is how entrepreneurial culture shapes the likelihood of achieving sustainable development goals (George *et al.*, 2021).

The COVID-19 has brought a dramatic business environment by disrupting the business networks that imply the flow of knowledge and technological capital, which call for quick reform (Aghion *et al.*, 2021). Moreover, the pandemic has disrupted the business environment in multiple ways, including the changes in work settings that encourage firms to change the entrepreneurial culture to adopt social media and ubiquitous technologies (Swain *et al.*, 2020). It appears that many firms experience excellent performance during the pandemic by adopting the information technology that generates various innovative solutions, whilst others suffer from the lockdown economy. Hence, the pandemic modelling should prepare the worse scenario following the large and wide range effect of COVID-19 (Ammirato *et al.*, 2020).

Although new technologies pose significant opportunities, the capability to benefit from the emerging technology varies across the firms, which raises a question on how firms resolve uncertainty around emerging technology (Kapoor and Teece, 2021).

This article seeks to understand the culture of excellence by examining the role of entrepreneurial culture in shaping the way firms achieve sustainable competitive advantage. Hence, the first research questions whether entrepreneurial culture affects sustainable competitive advantage through product development. The second research question is whether information technological turbulence shapes the way entrepreneurial culture influences sustainable competitive advantage. This article develops a structural equation model to explain the effect of information technological turbulence on the relationship between entrepreneurial culture and sustainability of the firms. This article consists of five sections that begin with an introduction and a literature review in the next section to provide a foundation for the proposed model. Section three focusses on the research method, which involves the research design, measures, data collection and analysis. The next chapter provides the results of the hypothesis tests, followed by a discussion that distinguishes between the literature and research findings. The last section highlights the research limitation, contribution and future direction for further studies.

## Literature review

### *Culture of excellence and dynamic capability theory*

This study underpins the dynamic capability theory to understand the culture of excellence. The dynamic capability theory seeks to understand how firms seize business opportunities and achieve competitive advantage through deploying intangible and tangible assets (Teece, 2009). The concept of business excellence is a holistic approach that presents the firm capability to generate innovative solutions by managing a business organisation (Kassem, 2019). Hence, firms' growth and survival demonstrate the adapting capability to deal with market failures, which involves deploying valuable, rare, inimitable and non-substitutable resources by creating distinct business models to enable excellence in meeting the dynamic market (Barney, 1986; Teece, 2014).

Entrepreneurial culture falls into two parts, namely, culture and entrepreneurial behaviour. Culture is a collective phenomenon that makes the members of a group or a community

distinguish from others that involves a complex set of unique values, peculiar beliefs, remarkable symbols and assumptions (Barney, 1986; Hofstede *et al.*, 2010). The concept of entrepreneur narrowly refers to an individual who organises a new business entity, which extends to personal characteristics and other psychological propensities (Baumol, 2021). Hence, entrepreneurial culture of excellence encourages their employees to excel and deliver outstanding performances through various types of innovation (van Gorp *et al.*, 2017).

Dynamic capability is the capability to create excellent working conditions for all employees to enhance the capability to take a perilous project by generating radical innovation (Ceglinski, 2020). The process involves blending values, ideas and assumptions to determine the interaction with the structure and the decision-making process by generating behavioural norms (Affuah, 2003; Hofstede *et al.*, 2010). Most studies in strategic management adopt the concept of firm performance from accounting and financial literature to understand how business organisations generate value (Barney, 2020). After that, the sustainable business principles of excellence require a clear entrepreneurial vision transition for people and the planet, which seems to be relevant for firms that produce goods or services that meet higher on the Maslow hierarchy of needs (Isaksson, 2021).

### *Entrepreneurial culture and sustainable competitive advantage*

Sustainability is about how a business organisation demonstrates a capability to generate environmental and social impact. Business excellence represents excellent organisations with the capability to achieve and maintain excellent performance to meet the expectations of various stakeholder groups (Teece, 2014). The concept of sustainability has come into the evolutionary process from reducing ecological footprint through the innovation process (Chouinard *et al.*, 2011). Hence, business excellence presents how a firm generates sustainable innovation and competitive products by transforming the sustainable vision into real achievement (Ferdowsian, 2016).

Entrepreneurial culture plays a pivotal role in a sustainable competitive advantage for some reasons. Firstly, effective resource deployment helps firms enjoy a genuinely sustainable competitive advantage by enhancing their capability to promote learning processes better than competitors. The knowledge becomes specific and cannot generate similar value in different organisation cultures (Hatch and Dyer, 2004). The alliance leverage allows firms to gain knowledge acquisition to value new product development (Buccieri *et al.*, 2020). Various dimensions of an entrepreneurial culture strongly influence how businesses enhance their capability to gain a sustainable profit and generate environmental impact (George *et al.*, 2021).

Secondly, promoting sustainable competitive advantage may come from the stakeholder through building a close relationship capability (Chouinard *et al.*, 2011). Entrepreneurial culture is collective action in the business organisation, which promotes entrepreneurial activities, including the attempt to take a risk by redeploying valuable resources to attain long-run business excellence and avoiding the loss of competitive advantage (Zahra, 2005; Teece, 2019; Yang *et al.*, 2020). Firms with an ethical culture continuously seek to take the high risk of innovation by developing a comparable relationship capability with a stakeholder group (Jones *et al.*, 2018). Hence, the culture of excellence for sustainability becomes a key resource to firm performance (Isaksson, 2021):

*H1.* Entrepreneurial culture has a positive impact on sustainable competitive advantage.

### *Product development and sustainable competitive advantage*

Product development is a part of innovation excellence, which plays a pivotal role in sustainable competitive advantage. A firm with innovation excellence demonstrates a

dynamic capability that entails business model competence, transactional competence and incentive alignment (Teece, 2007). Product strategy sets out the organisation direction to generate product excellence by allowing the stakeholders to get involved in the decision-making process. The investment in research and development in business excellence presents total size instead of relative to the firm scale. In contrast, firms with a lack of competitive advantage tend to be reluctant to allocate enormous resources (Winter, 2018). Hence, product excellence is achievable when the system supports the professional practice and friendly environments (Hickey, 2019).

The rational reason behind the firms' commitment to promoting sustainability shows that individual values are essential resources for business excellence that sheds light on the broader potential social and economic impact (Spence *et al.*, 2011). The way firms generate value from innovation presents the capability to carry out efficient transaction costs and allocate resources (Teece, 2009). Hence, the concept of sustainability has been emerging from cost reduction to innovation, then transforming into a decision-making process (Chouinard *et al.*, 2011). The supply chain partners help firms embrace green innovation to achieve sustainable competitive advantage (Lisi *et al.*, 2019). The motivation to generate innovation demonstrates the learning experience to help others and commercialisation (Chen *et al.*, 2020).

Firms enhance their capability to generate new products to deal with multiple product life cycles through the emerging approach with individual or firm-centric processes that allow them to share valuable resources (Teece, 2009). At the initial level, firms may consider institutions as barriers for a fundamental proposition to sustainable innovation (Liu *et al.*, 2018). Firms create more sustainable design innovations to gain support from a broader target audience with a more extensive portfolio. This process demonstrates firms' dynamic capability in size and scope following the vibrant market to underlying firms' value proposition, which should meet economic viability (Brockhaus *et al.*, 2019):

H2. Product development has a positive impact on sustainable competitive advantage.

### *Entrepreneurial culture and product development*

Business excellence is a way that determines the culture in the long term (Bolboli and Reiche, 2014). The entrepreneurs generate the organisational culture to promote innovative product development by enhancing the integration between the technology push and the demand-pull in the innovation (Danish *et al.*, 2019; Dawid *et al.*, 2020). Corporate entrepreneurship is a process of continuous innovation within an existing organisation that prevails the entrepreneurial culture. Firms demonstrate interdependence and coordination by promoting a respecting culture (Cheng and Groysberg, 2020). Hence, it is essential to develop entrepreneurial culture involving various stakeholders to motivate employees and enhance team performance simultaneously (Lasrado and Kassem, 2021).

The culture of excellence springs from personal excellence in the organisation that seeks to present the best to excel to focus on a positive vision and staying committed to achieve the goals (Orlick, 2016). Entrepreneurial culture is an intangible resource that plays a pivotal role in promoting sustainable operational excellence by motivating the stakeholders and enhancing the firm capability to go beyond the limit to become more resilient (Kaupp, 2018; Carvalho *et al.*, 2020). Entrepreneurial culture demonstrates how firms gain benefit by seizing the business opportunities that spring from dynamic technology to support new product development (Audretsch *et al.*, 2021). The capability to embrace business excellence motivates the employees to exceed that excellence, but stiff competition encourages the firms to recognise the weaknesses, which helps firms to assert excellent superiority (Johnson, 2020).

The adaptable culture demonstrates the capability to foster innovation and enhance the learning process by focussing on building internal capabilities to generate profitability and

efficiency (Kassem *et al.*, 2019). At the entry level, firms tend to adopt a culture that supports improvement potentials through self-assessment. Mature organisation concerns with detailed improvement potentials by closing the cultural gap to maintain sustainable competitive advantage (Bolboli and Reiche, 2014). Hence, an excellent business shows the capability to excel in superior performance by involving the stakeholders to stay focus on the critical components of business excellence (Lasrado and Kassem, 2021). Firms require skillful staff to help compete with the dynamic technological turbulence for effective innovation in product development, whilst less technological turbulence allows the firms to save their resource (Martin *et al.*, 2020):

*H3.* Product development provides mediating effect between entrepreneurial culture and sustainable competitive advantage.

### *Information technological turbulence*

The entrepreneurial culture encourages the firms to undertake various projects to promote high-tech environment products that make the workers acquire a different level of technological environments with various turbulence levels (Chen *et al.*, 2018). Some mass information technology products provide a solution for free, whilst customised technological products can be a high-cost investment that leads to spillover (Akcigit *et al.*, 2020).

The digital transformation capability shows that firms continuously redesign an excellent culture by embedding the collective actions of human resources in the digital technological networks (Garbellano and Da Veiga, 2019). Firms' dynamic capability demonstrates how entrepreneurial culture quickly adopts the information technological turbulence to achieve competitive advantage (Schilke, 2014). The entrepreneurial culture allows the organisation to change, responding to the technology disruption that influences the interpersonal relationship at the workplace (Swain *et al.*, 2020).

The literature presents various approaches to understanding technological acceptance, such as technology readiness assessment and the technology acceptance model (Rondan-Cataluña *et al.*, 2015). The technology readiness assessment approach seeks to generate various readiness levels from basic concept to full deployment (Redo-Sanchez *et al.*, 2013). The technology acceptance approach identifies the ease of understanding and usefulness of the technology from users' point of view in various contexts (Lederer *et al.*, 2000), such as increasing experience, computer self-efficacy and perception (Venkatesh and Bala, 2008).

The stiff competition amongst digital firms imposes the information technological turbulence in several innovations, such as artificial intelligence, social networks, virtual reality, computing cloud and enterprise application, attract more new users (Varian, 2020). The success of the firms to exploit the dynamic technology demonstrates the capability of firms to use business opportunities by looking at different points of view (Teece, 2009). Firms with dynamic capability excellently identify, efficiently acquire and dramatically transform a novelty idea through the technological capability to meet the dynamic market demands (Salisu and Abu Bakar, 2020). Firms may feel desperate to follow their competitors who move ahead adopt a new information technology that implies losing the competitive advantage (Dyer *et al.*, 2020):

*H4a.* Dynamic information technology fosters the impact of cultural intelligence on sustainable competitive advantage.

Not all technologies are applicable for specific industries, especially in a fragmented and insufficient mature industry that promote sustainable competitive advantage (Lisi *et al.*, 2019). Firms may suffer from the overwhelmed rather than getting complimented on adopting the information technological turbulence (Sharma and Kumar, 2020). It appears that there is a gap of priorities amongst the different stakeholders, which challenges the acceptability of dynamic information technology. For example, the technology innovators

may consider blasting emails from social media to provide crucial high-level information, whilst the firms did not view the bulk message in social media as essential information (Kong *et al.*, 2020).

A business may enjoy the comfort zone, the culture of independence and a high level of certainty. However, the mechanism of institutional change needs to be flexible (Hickman and Silva, 2018). The effectiveness of new technology involves a few areas of knowledge and innovation approach, where the limited information or limited value implies a lack of integration in diverse knowledge (Wu *et al.*, 2019). The firms may exploit enormous resources from various stakeholders to raise expectations following high uncertainty (Yang *et al.*, 2020).

Information technological turbulence directly relates to the digitised data, which reshaping the decision-making process and business transactions (Brennan *et al.*, 2019). Innovative behaviour is related to an entrepreneurial culture, which characterised by the learning process, indicating an openness towards change through innovation and resilience again a dynamic business environment (Cheng and Groysberg, 2020). Hence, the emerging technology risk perception raises a critical issue of social communication, which involves technological opportunities for established firms (Li *et al.*, 2018). The pressure of stakeholder support raises a sense of social obligation to achieve a sustainable competitive advantage, which poses a substantial cost of failure (Pratono *et al.*, 2020):

*H4b.* High information technology turbulence poses a negative effect on the relationship between cultural intelligence and sustainable competitive advantage.

## Research method

This article proposes a structural equation model, which involves the mediating variable of product development and the moderating variable of information technological turbulence to extend how the entrepreneurial orientation influences sustainable competitive advantage. The model focusses on whether the entrepreneurial culture as the independent variable serves as a significant predictor for sustainable competitive advantage by searching for relationships between the variable to reduce many measure variables to small composite factors. This study conducted a small business enterprise survey, followed by an empirical analysis that adopts a partial least square (PLS) approach to test the proposed hypothesis. We also develop scenarios to understand how entrepreneurial culture achieving sustainable competitive advantages in various contexts.

## The measures

This study measures the four constructs indirectly with a set of measuring variables that serve as proxy indicators that will put forward the best fit for the proposed model to generate accurate predictions. The model involves four constructs that the authors adopt from previous studies, entrepreneurial culture, sustainable competitive advantage, product development and information technological turbulence. The constructs entail several measurement variables, which is also called items. Each measuring item represents a single separate aspect derived from a larger abstract concept. The combining items indirectly measure the concepts by assuming that the items represent various conceptual constructs to reduce the measurement error (Hair *et al.*, 2014).

This study adopts the construct of sustainable competitive advantage from the work of de Guimaraes *et al.* (2018). The construct incorporates the element of environmental sustainability in product development, strategic advantages over their direct competitors, entrepreneurial social responsibility and ecological sustainability. The constructs present firms' environmental practices before their competitors, which prompt impacts on environmental sustainability. Hence, this study adopts the measure of entrepreneurial

culture from [Danish et al. \(2019\)](#), highlighting the role of business sustainability. The construct of entrepreneurial culture entails four items, namely, openness to change, society role in a new idea, creativity and innovator recognition. The construct of entrepreneurial culture presents a motive to run a business, to innovate or to develop a new technology ([Danish, 2019](#)).

This study uses the measurement items of product development capability introduced by [Schilke \(2014\)](#), which attempts to figure out how a firm conducts innovation projects by introducing new products. The measure shows that new product development involves a new generation of products, product range, new market and new technology. The measure of information technological turbulence was adopted from [Jaworski and Kohli \(1993\)](#) and [Pratono and Mahmood \(2014\)](#). The construct presents a rapid change in information technology, opportunities provided by the technology, new product and new idea come from the technology.

### *Data collection*

The study targeted small and medium enterprises in Indonesia. The population data are taken from the firm directory in Surabaya City that the Indonesian Ministry of Trade and Industry published. The directory reveals the 39,784 registered firms between 2018–2019 that meet the definition of small medium enterprises (SMEs) following the Indonesia Law No 2008. The regulation considers a firm a small-scale enterprise if the business organisation has a net asset between IDR50m and IDR10bn and annual sales range from IDR300m to IDR50bn. The surveyors informed the targeted respondents that the research participation was voluntary and automatically entered a database. This survey involved sending 4,000 emails to the targeted respondents, which finally end up with a data set of 782 usable responses after cleaning up data.

This study conducted an online survey by sending emails to randomly selected respondents. The survey adopts a fully self-administered approach, which allows the respondents to fill the questionnaire by themselves without interviewers. The questionnaires were delivered with an instruction that the researchers would process all data collection anonymously to make respondents honest in sharing their information. The authors translate the questionnaire and test it through a pilot project that falls into two parts. In the first part, the authors invite some experts from the local universities to make sure that the questionnaire is relevant for the local respondents. The second part involves distributing the questionnaire to ensure that a respondent spends sufficient time filling the questionnaire.

### *Analysis*

This study uses the PLS-structural equation modelling approach, which allows the researchers to estimate the structural path at the complex model with four constructs and item variables without imposing a normal distributional assumption on the data. The characteristic of this approach shows statistical power, which is quite relevant to explore less developing theory. Hence, the analysis falls into two parts, namely, assessing the reflective measurement model and the path analysis. The measurement model analysis focusses on empirical measures of the relationship between measurement items and the constructs. This approach involves the reliability and validity of each construct, which consists of several measurement items.

The second part of the analysis focusses on the structural equation model that represents the proposed hypothesis. This approach begins with an analysis of path coefficient and  $R^2$  values, followed by unobserved heterogeneity. This section includes mediating effect of product development and the moderating effect of information technological turbulence. The analysis adopts the variance accounted for (VAF) to identify the level of mediating effect. The following step concerns examining the moderating impact by adding interaction

effect to understand the effect of information technological turbulence on the connection between entrepreneurial culture and sustainable competitive advantage.

The next step generates four scenarios from the empirical framework to update strategies and policies accordingly. The analysis uses the independent variable as the main driving force of sustainable competitive advantage and information technology as the external driving force. The intersection between two driving forces determines four types of scenarios, which allows the authors to propose a strategic approach following the four main constructs, namely, entrepreneurial culture, product development, sustainable competitive advantage and information technological turbulence.

## Results

The first step of analysis focusses on examining the reflective measurement model. [Table 1](#) shows that a reliability and validity test of the established measure is acceptable. The literature suggests that the minimum value of reliability is 0.6 for exploratory studies, whilst the value of reliability should be 0.70 for established measures. Cronbach's alpha measures the internal consistency reliability with unweighted items, which generates a value between 0.831 and 0.88. Another measure is composite reliability, which produces higher values than CA. The values of composite reliability (CR) with weighted items vary from 0.660 to 0.746. The result of the reflective model indicates that four constructs meet the standard for acceptable in exploratory research.

[Table 2](#) displays the reflective measurement model assessment. The literature suggests that the value of outer loadings should be above 0.708, showing that the constructs gain supports from more than 70% of the indicators' variance. The results show that the outer loading values vary from 0.741 to 0.887, which indicates that the constructs explain more than 74% of the measure variables' variance. The highest level of outer loadings occurs at a sustainable competitive advantage. The results explain that the reliability of each measured variable is acceptable. [Table 2](#) also displays the variance inflation factor (VIF) values, which identifies potential collinearity issues. The results indicate that VIF values are lower than 3, confirming that collinearity is not the main issue.

[Table 3](#) displays the standard assessment criteria. The standardized root-mean-square residual (SRMR) shows the difference between the observed covariance matrices is 0.069 or lower than 0.08, which indicates a model fit is acceptable. [Figure 1](#) shows that the  $R^2$  for the dependent variable of sustainable competitive advantage is 0.484, which suggests that the variance of exogenous variables explains 48% of the dependent variable, which was quite relevant for behaviour studies. However, the concept of model fit measures is not applicable in PLS, as algorithm value does not minimise the divergence process between the observed and estimated covariance matrices ([Hair et al., 2019](#)). Hence, [Figure 1](#) shows the path values, which indicate the level of relationship between the constructs.

[Table 4](#) displays the bootstrapping results for path analysis, which indicates that entrepreneurial culture provides a positive impact on product development with a standard deviation value of 0.049, a  $t$ -statistic value of 11.188 and an error probability close to 1%. The results also confirm that entrepreneurial culture significantly impacts sustainable competitive advantage with a standard deviation value of 0.056, a  $t$ -statistic value of 5.127 and a  $p$ -value of 0.00. [Figure 1](#) shows that the variance of product development is 29% explained by entrepreneurial behaviour. Hence, the path coefficients show that entrepreneurial culture has a higher impact on product development (0.544) than on competitive advantage (0.288).

The product development has a significant impact on sustainable competitive advantage with a standard deviation value of 0.050,  $t$ -statistics value of 2.507 and a  $p$ -value of 0.00. [Table 5](#) display the direct effect of cultural intelligence on competitive advantage is 0.88, whilst the indirect effect is  $0.544 * 0.126 = 0.0685$ . Hence, the total effect of cultural



**Table 1** Construct reliability and validity

<i>Constructs</i>	<i>Cronbach's alpha</i>	<i>Composite reliability</i>	<i>Average variance extracted (AVE)</i>
Entrepreneurial culture (EC)	0.825	0.885	0.658
Firm competitive advantage (CA)	0.886	0.922	0.746
Information technological turbulence (IT)	0.872	0.912	0.723
Product development (PD)	0.831	0.885	0.660

**Table 2** Outer loadings and VIF

<i>Items</i>	<i>Measured variables</i>	<i>VIF</i>	<i>Loading</i>
EC01	Our firm is open and responsive to change	1.623	0.741
EC02	Changes in society often give us new ideas for products and services	1.971	0.823
EC03	Our firm encourages creativity	2.199	0.796
EC04	Our firm publicly recognises those who are innovative	2.66	0.879
F01	We have gained strategic advantages over our competitors	2.056	0.840
F02	Our new products are offered respecting the entrepreneurial social responsibility	2.26	0.856
F03	Our new products incorporate knowledge and concepts of environmental sustainability	2.493	0.877
F04	Our sales growth is relatively higher than direct competitors	2.556	0.882
IT01	Information technology in our industry is changing rapidly	2.193	0.849
IT02	Information technology changes in our industry provide big opportunities in our business	2.217	0.845
IT03	A large number of new products have been made possible through the information technological breakthrough	2.51	0.876
IT05	Technological changes in our industry generate new ideas for product supply	1.981	0.831
PD01	Our firm introduces a new generation of products	2.167	0.887
PD02	Our firm extends product range	1.749	0.796
PD03	Our firm opens up new markets	1.729	0.734
PD04	Our firm enters new technologic field	1.991	0.825

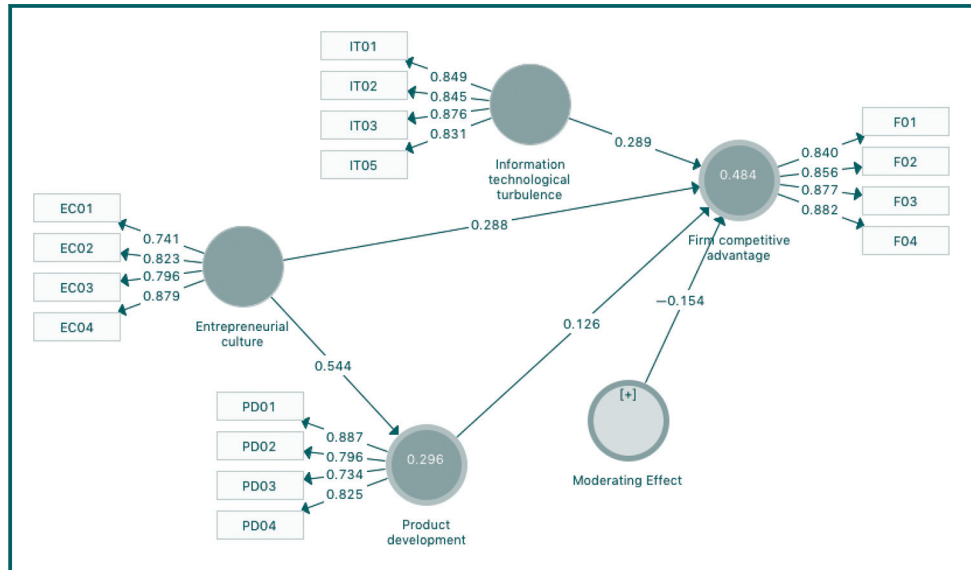
**Table 3** Goodness of fit

<i>Goodness of fit</i>	<i>Saturated model</i>	<i>Estimated model</i>
SRMR	0.069	0.080
d_UIS	0.648	0.879
d_G1	0.394	0.398
d_G2	0.319	0.318
Chi-square	730.2	714.418
NFI	0.807	0.811

intelligence and product development on competitive advantage is  $2.88 + (0.544 * 0.126) = 0.356$ . As both product development and entrepreneurial culture have a significant impact on sustainable competitive advantage, the results indicate that product development plays a significant role as a complementary or partial mediating variable. The value of  $VAF = (p_{12} \times p_{23}) / (p_{12} \times p_{23} + p_{13}) = (0.554 \times 0.126) / (0.554 \times 0.126 + 0.288) = 0.07 / 0.35 = 0.20$ , shows that product development provides a significant partial mediating effect.

The information technological turbulence provides moderating effect on the relationship between entrepreneurial culture and sustainable competitive advantage. The information technological turbulence has a significant impact on competitive advantage with a standard

**Figure 1** Path algorithm analysis



**Table 4** Bootstrapping path analysis

The paths	Original sample	Sample mean	Standard deviation	T-statistics	P-values
EC -> CA*	0.288	0.285	0.056	5.127	0.000
EC -> PD*	0.544	0.547	0.049	11.188	0.000
IT -> CA*	0.289	0.294	0.041	6.987	0.000
ME -> CA*	-0.154	-0.155	0.036	4.351	0.000
PD -> CA**	0.126	0.123	0.050	2.507	0.013

Notes: \*Significant at alpha 1%, \*\*significant at alpha 5%

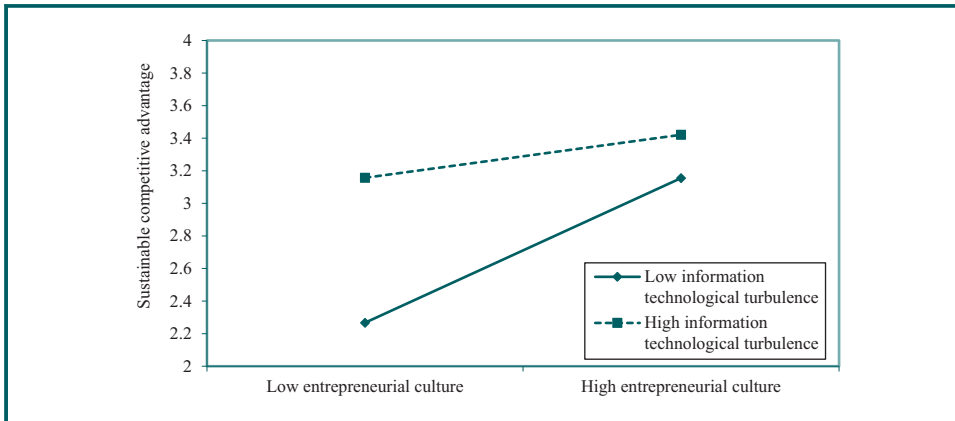
**Table 5** Total effects and indirect effects

Constructs	Total effects		Indirect effects
	CA	PD	CA
EC	0.356	0.544	0.068
IT	0.289		
ME	-0.154		
PD	0.126		

deviation value of 0.041, a *t*-statistic value of 6.987 and a *p*-value of 0.00. The interaction effect between information technological turbulence and entrepreneurial culture (ME) has a significant impact with a standard deviation value of 0.036, a *t*-statistic value of 4.351 and a *p*-value of 0.00. Figure 2 shows that product development under high information technological turbulence contributes a higher impact on sustainable competitive advantage than during low information technological turbulence.

Table 6 shows four scenarios of entrepreneurial culture under information technological turbulence. The first scenario is the best context, which indicates firms enjoy a high sustainable competitive advantage by maintaining their high entrepreneurial culture under

**Figure 2** Moderating effect of information technological turbulence



**Table 6** Proposed excellence strategies under information turbulence scenarios

Driving force	Low technological turbulence	High technological turbulence
High entrepreneurial culture	Maintaining entrepreneurial culture to generate product development to gain a highly competitive advantage	Valuing entrepreneurial culture to promote product development to maintain sustainable competitive advantage
Low entrepreneurial culture	Enhancing entrepreneurial culture to promote product development, which helps the firms to achieve a high sustainable competitive advantage	Fostering entrepreneurial culture by promoting partnership to generate product development for sustainable competitive advantage

light turbulence. The second scenario occurs when a firm experiences a low entrepreneurial culture. The light turbulence provides an opportunity that allows firms to achieve sustainable competitive advantage by developing their entrepreneurial culture. Another scenario shows that firms struggle to maintain their competitive advantage under high turbulence. The worse scenario occurs with a firm that experiences low entrepreneurial culture under high technological turmoil. The following section provides theoretical implications and suggests managerial strategies.

## Discussion

### *Theoretical implication*

This article extends the discussion about the dynamic capability theory by arguing that entrepreneurial culture is a valuable resource, which helps firms achieve sustainable competitive advantage by promoting product development. The results confirm that entrepreneurial culture provides a fertile ground for business excellence, supporting a sustainable business model (Lombardi, 2019). The results show that product development provides a partial mediating effect, which indicates that entrepreneurial culture may affect the sustainable competitive advantage directly and with support of product development. Hence, product development partially fulfils the function of entrepreneurial culture to promote sustainability. The results address the research question comes to how entrepreneurial culture shapes the likelihood of achieving sustainable development goals (George *et al.*, 2021).

Secondly, this study extends the discussion over strategy for a culture of excellence by providing four scenarios that allow firms to establish flexible strategies to respond to information technological turbulence. The previous study highlights the dichotomy between online and offline activities that has been rising during the pandemic (Litt *et al.*, 2020). This study provides evidence that entrepreneurial culture demonstrates valuable resource that helps firm gain sustainable competitive advantage at various levels of information technology turbulence. The impact of entrepreneurial culture on the competitive advantage is less effective during the high information technological turbulence than during the low turbulence. Sustaining a culture of excellence relative to entrepreneurial culture entails less uncertainty in both moderate information technological and entrepreneurial business-model change.

The COVID-19 has encouraged firms to adopt social media and ubiquitous technologies (Swain *et al.*, 2020). The results respond to the question of how firms resolve uncertainty under emerging technology (Kapoor and Teece, 2021). By traditional definition, entrepreneurial culture is associated with a premise about how firms make the place. However, the pandemic has encouraged the firms to adopt information technology that allows the firms to implement a remote work setting. The process changes the concept of technological acceptance that brings new complexity for usefulness and acceptability in the entrepreneurial cultural context. This study argues that firms develop a culture of excellence by enhancing the entrepreneurial culture inherent in remote work settings. The process demonstrates the dynamic capability in which a firm promotes product development under information technological turbulence. As such, the entrepreneurial cultural bears the capability to quickly adapt to new dynamic markets and product development that keep up agile and future-oriented scenarios becomes essential.

### *Managerial implication*

This article provides some advice for business organisational context. Firstly, a culture of excellence attributes firm capability to respond to change by raising the dichotomy between stability and flexibility. Hence, firms should not consider that dynamic capability provides a ubiquitous effect to meet the signals of entrepreneurial culture from high creativity. As business excellence emerging from high creativity, the innovation in information technology during the turbulence may offer significant opportunities that allow the firm to attain excellence. Even though some of the routine activities attempt to develop the entrepreneurial culture, which concerns seizing the opportunity, it is essential to remind the firms to foresight the dynamic business environment to achieve sustainable competitive advantage. This study shows that dynamic information technology helps firms enhance new product development, but excess is detrimental to creativity performance.

Secondly, a firm may need pressure from the stakeholders to pay more attention to the entrepreneurial culture of excellence, which attempts to promote sustainable competitive advantage. The light information turbulence is the best time for firms to achieve sustainable competitive advantage by fostering an entrepreneurial culture. Hence, firms should refine the entrepreneurial culture to deal with the excess of information technological turbulence at the proper level. The construct of entrepreneurial culture shows that firm should be open and responsive to change. Every staff must have access to the decision-making process that supports new product development. The firms also need to encourage creativity and innovation by allowing the staff to share their ideas. They may enjoy higher sales growth over their direct competitors by generating products that incorporate the concept of environmental sustainability (Table 6).

The worse scenario demonstrates firms with poor entrepreneurial culture in high information turbulence. The firms should allocate more valuable resources to promote entrepreneurial culture than during the light turbulence, even just maintaining their competitive advantage. They need to put much more effort to create new products and extend the product range

for new markets, especially when the dynamic technology allows other firms to generate new products and seize the market. The firms may adopt a strategic leadership approach to take the initiative for corporate social responsibility. In contrast, other firms prefer to promote the social responsibility approach by integrating their strategy with the stakeholders. In some cases, integration is a more effective strategy to encourage innovation in the long term than firms that focus on competitive strategy (Waldman *et al.*, 2020).

### *Limitation and research agenda*

This study focusses on entrepreneurial culture in business organisations. The following research is encouraged to explore a more complex issue, such as a set of values, symbols and beliefs at a different firm that defines how firms conduct a business. Secondly, this study uses one respondent who becomes a decision maker in each firm. We assume that he or she understands the corporate culture at his or her firm. Future research should explore various stakeholders to understand the organisation culture, such as the employees, customers, suppliers and competitors. Finally, this study partially explores firms in a specific country that support sustainable competitive advantage. There is an opportunity to explore the entrepreneurial culture in the industrial context and under which condition the culture leads to regional growth. This study generates information technological turbulence. Future research should examine different types of technological turmoil, such as big data, cryptocurrency, blockchain and crowdsourcing. The process challenges the concept of technological acceptance that brings new complexity in the entrepreneurial cultural context.

### **Conclusion**

This article extends the understanding of the culture of excellence by underpinning the dynamic capability theory, which argues that entrepreneurial culture is a valuable resource, which helps firms achieve sustainable competitive advantage by promoting product development. The pandemic has encouraged firms to adopt information technology that allows them to implement a remote work setting. This study argues that firms with a culture of excellence demonstrate the dynamic capability to generate product development under information technological turbulence.

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