

# The role of competitive environment and strategy in the supply chain's agility, adaptability and alignment capabilities

Role of  
environment  
and strategy on  
SCM

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## Abstract

**Purpose** – This paper analyses the way that the industry's competitive environment and the company's strategy influence the implementation of the supply chain's (SC's) triple-A capabilities (agility, adaptability and alignment). Two competitive environment variables are analysed: competitive intensity of the industry and complexity of the SC. Two opposing competitive strategies are also considered: cost and differentiation.

**Design/methodology/approach** – The hypotheses have been tested using data gathered via a questionnaire given to 277 Spanish manufacturing companies, and structural equation modelling has been used for the analysis.

**Findings** – The results show that competitive intensity is the most influential factor followed by business strategy. SC complexity does not seem to affect agility. Moreover, although the competitive environment variables affect the business strategy, the latter has no mediating effects between the competitive environment and SC agility, adaptability and alignment capabilities.

**Originality/value** – This study presents new insights into the environmental and strategic drivers linked to the implementation of SC agility, adaptability and alignment capabilities and offers guidelines to managers involved in SC management.

**Keywords** Competitive environment, Business strategy, Triple-A supply chain, Supply chain agility, Supply chain adaptability, Supply chain alignment

**Paper type** Research paper

## Introduction

The recently revitalised (Lee, 2021) triple-A supply chain (SC) conceptual framework developed by Lee (2004) emphasises the importance of orchestrating the agility, adaptability and alignment

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capabilities for SC effectiveness, which is essential for today's SCs (Cohen and Kouvelis, 2020). However, the contingency theory (CT) (Lawrence and Lorsch, 1967) states that contextual variables can affect the level of achievement or implementation of tools and business practices. Therefore, knowledge of the SC context is a key element for their adequate management.

Concerning contextual drivers, one of the most relevant aspects of the competitive environment is the intensity of the competition faced by the company. Among the consequences of intense competition are short product life cycles, product design sophistication, consistently high quality, cost reductions and customisation (Fynes *et al.*, 2005). All these create a more volatile, turbulent, unpredictable and demanding market environment that seems to foment SC agility, adaptability and alignment (Lee and Ra, 2016). Another important characteristic of a competitive environment is the complexity of the SCs in which companies operate. Greater complexity is usually associated with greater uncertainty, which heightens the requirement to develop agility, adaptability and alignment capabilities when competing.

On the other hand, companies try to successfully address the competitive environment by designing an appropriate strategy. Thus, firms seek to gain a competitive advantage by developing their strategies in line with their respective environments. According to Fisher (1997), certain/predictable products require efficient SCs, whereas, uncertain/unpredictable products require the SCs to be responsive. According to the dynamic capabilities view (DCV) (Teece *et al.*, 1997), as a set of complex capabilities might be difficult to develop and therefore difficult to replicate, the triple-A can generate a competitive advantage for the firm (Whitten *et al.*, 2012; Machuca *et al.*, 2021). Therefore, it seems reasonable to assume that the type of competitive strategy adopted by an organisation can shape the capabilities of the SC that it seeks to develop.

The triple-A SC framework has been mainly analysed with the focus on its impact on performance (e.g. Machuca *et al.*, 2021; Gligor *et al.*, 2020; Alfalla-Luque *et al.*, 2018; Attia, 2016). This study contributes to SC management (SCM) research by analysing new drivers related to the competitive environment, in particular SC complexity and competitive intensity, and strategies as antecedents of the triple-A SC capabilities and by identifying the individual roles that these drivers have on each of the triple-A capabilities. Therefore, this study addresses three relevant research questions: (1) How does a company's competitive environment influence its triple-A SC capabilities? (2) How does the type of competitive strategy affect triple-A SC capabilities? (3) Does strategy play a mediating role between competitive environment and triple-A SC capabilities?

The paper is organised as follows. Section 2 reviews prior studies on triple-A SC and the drivers analysed in this study. Section 3 describes the methodology used. Section 4 presents the results. Section 5 discusses them. Section 6 states the main contributions and implications, identifies some limitations and offers suggestions for further research.

## Theoretical background and hypotheses

### *Theoretical framework*

This paper builds on two theories frequently applied in SCM and operations management (MacCarthy *et al.*, 2016; Defee *et al.*, 2010) and, specifically, in the triple-A SC research (e.g. Whitten *et al.*, 2012; Alfalla-Luque *et al.*, 2018; Dubey *et al.*, 2018; Machuca *et al.*, 2021): CT (Lawrence and Lorsch, 1967) and the DCV (Teece *et al.*, 1997).

Lee (2004) established that SC efficiency is necessary, but only for companies that build agile, adaptable and aligned SCs (triple-A SC) to outstrip the competition. Nevertheless, CT suggests that firms align their performance priorities with their contextual factors. Hence, the context should play a role (i.e. as a driver or barrier) in the triple-A SC capabilities. Although many contextual factors might exist, Chi *et al.* (2009) highlight four key dimensions that shape a firm's environment: the degree of dynamism, complexity, diversity and munificence. Roscoe *et al.* (2020), Gligor (2016) and Gligor *et al.* (2015) have analysed some of these

contextual factors, but only in relation to SC agility. This work will examine SC complexity and competitive intensity (inversely related to munificence) as antecedents of the triple-A capabilities.

A further theoretical foundation of this study can be found in the DCV framework. The traditional concept of dynamic capabilities, which were understood to be developed internally within the firm, has been extrapolated to the external level of the firm as “dynamic SC capabilities” (Aslam *et al.*, 2018; Dubey *et al.*, 2018). However, due to the emerging application of this concept to the SC context, the amount of research is limited and the literature on their theoretical underpinnings, in particular their antecedents, is still in the nascent stages (Aslam *et al.*, 2020). Whitten *et al.* (2012) argued that agility, adaptability and alignment are organisational dynamic capabilities that lead to competitive advantage and are developed and updated to respond to changes in customer demand and the structures of markets and economies. Consequently, the value of dynamic capabilities is dependent on the context. In this line, Barreto (2010) concluded that research in the field of DCV should focus on the internal and external factors that can enable firms to realise the potential of their dynamic capabilities or prevent them from doing so. With respect to internal factors, the previous research states that strategic orientation helps build dynamic capabilities (Zhou and Li, 2010; Tuominen *et al.*, 2004) since it guides a firm’s interactions with its SC partners and thus influences the relative emphasis that companies put on achieving dynamic SC capabilities (Zhou and Li, 2010).

#### *Triple-A supply chain*

Gaining a competitive advantage is a priority for firms to survive in the highly competitive global context (Marin-Garcia *et al.*, 2018), where competition is not company-based, but SC-based. Therefore, SCs must be designed to achieve advantages over their competitors. According to Lee (2004, 2021), achieving a sustainable competitive advantage requires a triple-A SC. Agility, adaptability and alignment are capabilities that have been defined in a variety of domains (marketing, manufacturing, organisational, strategic, etc.) and are currently being developed in the SC domain.

*SC agility* has been defined as the capability to rapidly detect and respond to short-term changes in real demand and supply to generate or maintain a competitive advantage (Alfalla-Luque *et al.*, 2018). An agile SC can adapt to market variations efficiently, respond to final demand quickly, produce and deliver products on time and cost-efficiently and generate an inventory reduction and external integration (Gligor and Holcomb, 2014; Swafford *et al.*, 2006). *SC adaptability* can be defined as the capability to adapt strategies, products and/or technologies to structural market changes (Alfalla-Luque *et al.*, 2018). Unlike agility, which is primarily related to decisions at the SC’s tactical and operational levels, adaptability is a strategic-level attribute (Mak and Max Shen, 2020). A complex and uncertain market environment (economic, political, and social changes, demographic trends, changing consumer needs, global context and technological advances) requires an adaptable SC to improve the chance of survival (Tuominen *et al.*, 2004). Finally, *SC alignment* is the capability to share information, responsibilities and incentives with SC members to coordinate activities and processes (Alfalla-Luque *et al.*, 2018). This holistic focus considers the SC as a single entity (Lee, 2004) and implies strategic collaboration between the different members, with coherent objectives, strategies and processes (Flynn *et al.*, 2010).

Most of the previous research focuses on the impact of triple-A SC capabilities on performance, but only a small number of articles are focused on triple-A SC drivers (e.g. Dubey *et al.*, 2018). Feizabadi *et al.* (2019) confirm the lack of a comprehensive triple-A SC framework and stress the need for research focused on the drivers of triple-A SC. In this sense,

the present study analyses the roles played by the industry's competitive intensity, the SC's degree of complexity and the company's competitive strategy.

*Competitive intensity and the triple-A SC capabilities*

The literature states that, far from being atomistic entities, firms are embedded in a network of relationships that influence their competitive behaviour (Moyano-Fuentes and Martínez-Jurado, 2016; Ketchen *et al.*, 2004). What stands out in this network is the struggle between firms to obtain the limited resources and information required for survival, which is known as competitive intensity (Carroll and Hannan, 2000). A higher degree of competitive intensity involves highly competitive pressures, fast and unpredictable competitive moves and monitoring competitors (Hallgren and Olhager, 2009). Collectively, these factors create a volatile and demanding market environment in which customers find greater numbers of potential choices available and are free to switch to other firms (Heirati *et al.*, 2016).

Fynes *et al.* (2005) found that in contexts of high competitive intensity, companies need to continuously monitor market changes and manage the SC accordingly. SCs operating in highly competitive industries are likely to have a greater need to ensure a sustainable competitive advantage at the SC level than those operating in stable industries. In other words, competitive intensity should be positively related to all the triple-A SC capabilities.

In settings of high-competitive intensity, firms need to adapt to changes in demand and modify their products (Fynes *et al.*, 2005) and delivery times accordingly. The characteristic turbulence of this business environment leads to an agile SC being an essential feature of management, not only for the individual chain constituents but for the entire SC. Agile SCs outperform less-agile SCs by "assisting firms in improving their capability of collaboration, process integration and information integration" (McCullen *et al.*, 2006). So, agile SCs provide value by mitigating risks in the competitive landscape and through rapid response measures (Braunscheidel and Suresh, 2009). Therefore, the following hypothesis is proposed:

*H1a.* Competitive intensity is positively related to SC agility.

On the other hand, competitive intensity is an external driver that can be used to act on strategic positioning (Hallgren and Olhager, 2009) as it can influence SC adaptability, that is, the ability to reshape the SC to add value for the customer (Ketchen *et al.*, 2008). SC adaptability emphasises the need to sense changes in the SC and to be flexible when addressing them (Eckstein *et al.*, 2015). Since SC adaptability prepares SC members to adjust to the situation and gain the desired competitive advantage (Dubey *et al.*, 2018), an adverse environment of high competitive intensity would be expected to be positively related to SC adaptability. Consequently, the following hypothesis is formulated:

*H1b.* Competitive intensity is positively related to SC adaptability.

Lastly, competitive intensity determines inter-firm knowledge acquisition and has led organisations to reassess the need for cooperative, mutually beneficial SC partnerships to improve business performance (Flynn *et al.*, 2010). An intense rivalry environment encourages SC partners to seek an opportunity for collaboration to develop competitiveness (Wu *et al.*, 2017). The goal is to achieve effective and efficient flows of information, products, services and money to provide maximum value to customers (Moyano-Fuentes and Martínez-Jurado, 2016). Furthermore, information flow integration provides the basis for financial and physical flow integration (Sacristán-Díaz *et al.*, 2018). A context of high competitive intensity is what makes the benefits of collaboration with SC partners more positive (Heirati *et al.*, 2016), so the following hypothesis is formulated:

*H1c.* Competitive intensity is positively related to SC alignment.

### *Supply chain complexity and the triple-A SC capabilities*

Complexity is inherent in management, but the shift from managing an organisation internally to managing the SC entails a major increase in the level of complexity that needs to be addressed. Blecker *et al.* (2005) state that, in most cases, SCs operate in dynamic environments with multiple connections between companies, so they are exposed to many sources of complexity. There is also a consensus that SCs have become more complex over recent years (Bode and Wagner, 2015).

The term complexity is a multidimensional and multidisciplinary concept, so there is no commonly accepted definition (Blecker *et al.*, 2005). Following Manuj and Sahin (2011), SC complexity can be defined as “the structure, type and volume of interdependent activities, transactions, and processes in the supply chain that also includes constraints and uncertainties under which these activities, transactions and processes take place” (p. 523). According to Bode and Wagner (2015), two qualities of complexity (structure and behaviour) are usually distinguished. The first is static complexity (also called structural or detail complexity) and refers to the number and variety of elements that define the system. The second is dynamic complexity (or operational complexity) and refers to the interactions between the elements of the system.

Despite prior research on SC complexity being relatively scarce, Blome *et al.* (2014) indicate that the predominant, overall conclusion on the SC's upstream side is that greater supply complexity negatively influences performance. Manuj and Sahin (2011) warn that a lack of understanding of the drivers of complexity and poorly designed and executed strategies to address complexity in SCs often lead to undesirable outcomes. Bode and Wagner (2015) synthesise this in three outcomes: a decrease in operational performance, more complicated decision-making and the triggering of disruptions. The present study argues that the triple-A SC capabilities can also be affected by SC complexity.

Several authors claim that complexity and agility are inversely related. The main argument is that a less complex firm is easier to change and consequently more agile, so complexity has been used as a surrogate measure for agility (Sherehiy *et al.*, 2007; Arteta and Giachetti, 2004). This argument can be extended to the SC, where Christopher (2000) states that complexity is argued to be a barrier to achieving SC agility. Likewise, Prater *et al.* (2001) state that agility should decrease as the exposure of the SC to uncertainty and complexity increases. Therefore, we propose the following hypothesis:

*H2a.* SC complexity is negatively related to SC agility.

As for SC adaptability, some authors propose that SC complexity can lead organisations to develop adaptability capabilities (Manuj and Sahin, 2011), and, as globalisation increases the complexity that affects the SC, adaptability is increasingly crucial (Hoole, 2005). Meanwhile, other authors state that complexity hinders the ability of a firm to react to change by reconfiguring its products, processes or organisational structure (Sherehiy *et al.*, 2007). Given these contradictory antecedents, we tentatively propose the following hypothesis:

*H2b.* SC complexity is positively related to SC adaptability.

Regarding SC alignment, Fawcett and Magnan (2001) consider network complexity to be a barrier, and alignment mechanisms to be one of the most important bridges to effectively achieving SC integration. Gimenez *et al.* (2012) consider SC integration is only effective in a context characterised by high supply complexity. In the same line, Wong *et al.* (2015) find that SC information integration is more useful when firms work with many partners to market a wide variety of products, i.e. in the case of high market complexity. Hence, we hypothesise that:

H2c. SC complexity is positively related to SC alignment.

*Competitive strategy and the triple-A SC capabilities*

Sousa and Voss (2008) highlight the role of strategic context as one of the contingency factors traditionally considered in operations management and state the relevance of the fit between the production system and the organisation's priorities. In contrast, as stated previously, research in the DCV field suggests that both external and internal factors need to be focused on to enable firms to realise the potential of their dynamic capabilities (Barreto, 2010). Among these internal factors, the choice of competitive strategy, in the Porterian sense of orientation towards cost leadership or differentiation, could benefit or hinder the development of the triple-A capabilities. Three different types of SC strategy are usually identified: lean, agile and leagile SCs, depending on whether the chain focuses on efficiency, differentiation or a combination of both (Christopher *et al.*, 2006).

The connection between the company's competitive strategy and SC strategy has been analysed by various authors, who highlight that a fit between competitive strategy and SCM positively impacts firm performance (Hofmann, 2010). In this regard, a lean SC would be appropriate for a cost-leadership competitive strategy, whereas an agile SC would be suitable for a differentiation competitive strategy in which speed is the priority (Mason-Jones *et al.*, 2000).

Gligor *et al.* (2015) state that SC researchers (e.g. Sebastiao and Golicic, 2008; Christopher *et al.*, 2006) connect efficiency and waste minimisation strategies with lean management and suggest that agility is not linked to efficiencies to the same extent. In this regard, Hallgren and Olhager (2009) empirically find that, as suggested, agile manufacturing is negatively associated with a cost-leadership strategy. Thus, when a company follows a cost-leadership strategy, a lean SC strategy and lower levels of the triple-A SC capabilities should be expected. However, SC research provides no definitive empirical evidence to indicate that agile SCs cannot also be efficient, and arguments exist that suggest that the main difference between lean and agility appears to be related to the flexibility performance dimension, not cost (Gligor *et al.*, 2015). Indeed, Qi *et al.* (2011) conclude that cost leaders tend to implement both lean and agile SC strategies, although their emphasis on an agile strategy is significantly greater in a volatile environment than in a stable environment. More recently, Qi *et al.* (2017) found that a lean SC is appropriate for firms with higher priorities on cost, quality and delivery strategies, but not flexibility. Therefore, the literature suggests that a cost strategy could be negatively related to the triple-A SC capabilities.

In contrast, Hallgren and Olhager (2009) investigate internal and external factors that drive the choice of lean (focused on efficiency) and agile (focused on flexibility) operations capabilities and their findings point to agile manufacturing being directly affected by a differentiation strategy. Indeed, empirical evidence exists that firms focusing on a differentiation strategy emphasise the agile SC strategy (Qi *et al.*, 2011) and that an agile SC is appropriate for firms competing on the flexibility strategy (Qi *et al.*, 2017). Thus, when a company follows a differentiation strategy, an agile SC strategy should also be required and, consequently, a higher level of the triple-A SC capabilities should be expected. So, the literature leads us to propose the corresponding hypothesis:

H3. A more differentiation-oriented business strategy (vs. cost) is positively related to the implementation of triple-A SC capabilities (H3a: agility, H3b: adaptability and H3c: alignment).

On the other hand, according to Porter (1980), a company's strategy is expected to respond to its competitive environment, and therefore, competitive intensity and SC complexity are expected to influence the competitive strategy's orientation. So, the impact of both of the

environmental variables on triple-A capabilities may be mediated by the strategy adopted by the company. Consequently, we add two exploratory mediation hypotheses:

- H4. Business strategy plays a mediating role in the influence of competitive intensity on the triple-A SC capabilities (H4a: agility, H4b: adaptability and H4c: alignment)
- H5. Business strategy plays a mediating role in the influence of SC complexity on the triple-A SC capabilities (H5a: agility, H5b: adaptability and H5c: alignment)

Based on all the above, our research model is presented in Figure 1.

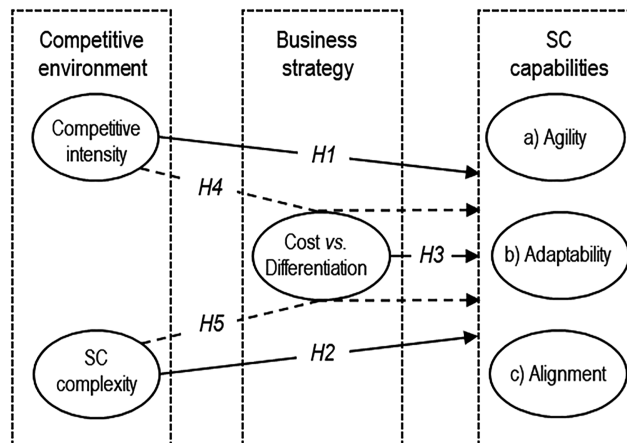
## Methodology

### *Population, questionnaire and data gathering*

The hypotheses were tested using data gathered via a questionnaire with items drawn from the literature and measured on Likert scales. A draft version of the questionnaire was tested by a panel of five internationally recognised experts, and a pilot study was then conducted with five heads of SCM to ensure that the item definitions were meaningful and comprehensive. This minimised response bias and ensured the quality and validity of the survey instrument.

A population of 2,650 Spanish manufacturing companies with at least 50 employees (to guarantee concern for SCM in the company (Sacristán-Díaz *et al.*, 2018)) was established as the object of the study. The population framework was obtained from the SABI (Iberian Balance Sheet Analysis System) website. Companies were classified into sectors according to the CNAE catalogue (Spanish Standard Industrial Classification).

The data gathering method consisted of a telephone survey using a computerised system (computer-aided telephone interviewing, CATI) to contact all the companies in the sample. In addition, a web questionnaire was designed by the mid-point of the expected fieldwork period to make it easier for any remaining interviewees to respond. The fieldwork was carried out in 2018 during the January–July period. The final sample comprised 277 valid questionnaires (10.5% response rate), with a sample error of 5.6%, for a confidence level of 95% for  $p = q = 0.5$ . This is an adequate sample for detecting small effect sizes ( $f^2 = 0.02$ ) with the usual significance ( $\alpha = 0.05$ ) and statistical power ( $1 - \beta = 80\%$ ) levels in business studies for a model with 3 predictor variables (G\*Power 3.1.9.7).



**Figure 1.**  
Research model

Table 1 shows the firm distribution in both the population and the sample according to the CNAE sector classification and a similar distribution of companies across the various sectors.

No evidence of response bias was found in a comparison of respondents with non-respondents. No specific characteristics were observed in firms that decided not to participate and no pattern in the reasons that they gave to justify their refusal to take part. The first 40 responses and the last 40 responses were also compared, and no late response bias was found. Finally, the telephone survey responses and the web questionnaire responses were compared, and no significant differences were found for any of the study variables. With respect to common method variance, a full collinearity test (Kock, 2015) was conducted using WarpPLS 7.0 (Kock, 2020), and the obtained variance inflation factors (VIFs) ranged from 1.018 to 1.488, well under the level of 3.3 that would indicate problems. In sum, the data and analysis prove that the sample used in the study was randomly obtained and that it statistically represented the population.

### Measures

The measures used in this study are all based on previous studies of similar topics to ensure their content validity. All the variables were targeted at one of three different respondents: SC or logistics manager, operations manager and CEO.

*Competitive intensity.* Competitive intensity was captured using the items adapted from Hallgren and Olhager (2009). Respondents were asked to indicate their opinions on a set of statements on a five-point Likert scale ranging from “strongly disagree” to “strongly agree”.

*SC structural complexity.* Based on other studies (Roh *et al.*, 2014; Bozarth *et al.*, 2009), static or structural external complexity was measured by the number of suppliers and customers. As usual, these variables have been transformed with logarithms.

*Competitive strategy.* Following the Hallgren and Olhager (2009) study, cost leadership and differentiation (flexibility-based) have been measured using two items for each competitive strategy. Respondents were asked to indicate the relative importance of the four items (market and manufacturing goals) as an order-winning factor on a five-point Likert scale ranging from “absolutely crucial” to “least important”. The two cost items were reversed to build this scale, so a low value indicates a cost strategy and a high value indicates a differentiation strategy.

**Table 1.**  
Sample, population  
distribution of  
companies and  
response rate by  
industry

Sector	Population		Number	Sample	
	Number	%		%	Response rate%
Food products and tobacco	543	20.49	48	17.33	8.84
Chemicals and pharmaceutical products	422	15.92	48	17.33	11.37
Manufacture of metal products	322	12.15	43	15.52	13.35
Manufacture of machinery and equipment	275	10.38	34	12.27	12.36
Motor vehicles	273	10.30	23	8.30	8.42
Meat industry	158	5.96	6	2.17	3.80
Electrical machinery and materials	141	5.32	14	5.05	9.93
Manufacture of beverages	106	4.00	7	2.53	6.60
Furniture industry	82	3.09	8	2.89	9.76
Informatics, electronics and optics products	81	3.06	13	4.69	16.05
Manufacture of other transport material	77	2.91	12	4.33	15.58
Shoes and leather	63	2.38	5	1.81	7.94
Other manufacturing industries	60	2.26	10	3.61	16.67
Fabrics and textile	47	1.77	6	2.17	12.77
Total	2,650	100	277	100	10.45



*Triple-A SC capabilities.* SC agility items have been adapted from previous research on this topic (Qi *et al.*, 2011; Tachizawa and Gimenez, 2010). SC adaptability and alignment scales have been adapted from Marin-Garcia *et al.* (2018). All items have been measured using a five-point Likert scale ranging from “strongly disagree” to “strongly agree”.

### Analysis

The research model was tested using PLS-SEM (partial least squares-structural equation modelling) with WarpPLS 7.0 (Kock, 2020). PLS-SEM is a non-parametric, multivariate approach based on iterative ordinary least squares (OLS) regression that seeks to maximise the explained variance of endogenous latent constructs. PLS-SEM was chosen because, in this study, we are more interested in maximising the predictability of the dependent variables and understanding the variation in these explained by the dependent variables (i.e. PLS-SEM) than in evaluating how well the model fits our data set (CB-SEM). WarpPLS also allows the use of non-linear estimation algorithms, which are usually closer to reality.

## Results

### Measurement model

Evaluation of the goodness of the measurement model usually includes three criteria (Hair *et al.*, 2017): internal consistency or reliability, convergent validity and discriminant validity. Some items in the original questionnaire were removed in this evaluation process following the Hair *et al.* (2017, pp. 112–115) criteria. Internal consistency has been evaluated by composite reliability, which ranges between 0.75 and 0.90 and always exceeds the minimum of 0.70 (see Table 2). Convergent validity at the construct level is measured by average variance extracted (AVE), which is above 0.50 in all the constructs except for business strategy, which is very close to this value (see Table 2).

Discriminant validity of the constructs has been verified with the Fornell-Larcker criterion, according to which the square root of each construct’s AVE must be higher than its correlation with the other constructs. Table 3 shows that this criterion has been met. Additionally, discriminant validity is proven through the heterotrait-monotrait (HTMT) ratios (shown in the upper part of Table 3), and these are well below the most conservative threshold of 0.85 (Hair *et al.*, 2019).

In view of the above, the measurement model can be stated to be acceptable.

### Structural model

Once the measurement model has been validated, the structural model is evaluated and the research hypotheses are tested. The first measure used to validate the model as a whole is standardized root mean squared residual (SRMR). In this case, the value is 0.095, which is below 0.1 and can be considered acceptable in the context of PLS (Kock, 2020).

As for the relationships in the structural model (the hypotheses), it can be observed in Table 4 that competitive intensity has a positive and significant impact ( $p < 0.001$ ) on all the triple-A SC capabilities (H1a, H1b and H1c). SC structural complexity, however, positively affects SC adaptability and alignment – H2b and H2c ( $p < 0.05$  and  $p < 0.01$ ) – but not SC agility – H2a – even though the sign of the coefficient is negative, as hypothesised. Regarding business strategy, all three relationships are positive and significant, especially the relationships with SC agility and alignment ( $p < 0.001$ ), and also with adaptability ( $p < 0.01$ ). However, neither of the mediation relationships are significant (H4 and H5), despite the strategy being significantly influenced by the two environmental variables.

Next, we evaluate the coefficients of determination of the endogenous constructs. The capabilities that are best explained by the model are SC alignment ( $R^2 = 0.18$ ) and SC

Latent variable	Item	Loadings	VIF	Composite reliability	AVE
Competitive intensity	A11a	0.784	1.562	0.812	0.525
	A11b	0.854	1.795		
	A11c	0.589	1.157		
	A11d	0.640	1.219		
SC complexity	A2	0.777	1.046	0.753	0.604
	A7	0.777	1.046		
	A12ar	0.781	1.374		
Business strategy	A12br	0.673	1.200	0.790	0.487
	A12c	0.640	1.184		
	A12d	0.689	1.230		
	C2a	0.714	2.052		
SC agility	C2b	0.731	1.913	0.873	0.533
	C2c	0.709	1.512		
	C2d	0.708	1.805		
	C2e	0.745	1.915		
	C2f	0.773	1.771		
	C3c	0.704	1.543		
SC adaptability	C3d	0.714	1.549	0.846	0.580
	C3e	0.819	2.351		
	C3f	0.803	2.301		
	C4c	0.779	1.847		
SC alignment	C4d	0.789	2.080	0.897	0.594
	C4e	0.833	2.420		
	C4f	0.716	1.617		
	C4g	0.712	1.586		
	C4j	0.787	1.899		

**Table 2.**  
Reliability and  
convergent validity of  
latent variables

**Note(s):** All factor loadings are significant at  $p < 0.001$

**Table 3.**

AVE square root  
(diagonally),  
correlations between  
constructs (lower  
triangular part) and  
HTMT (upper  
triangular part)

	1	2	3	4	5	6
1. Competitive intensity	0.725	0.281	0.214	0.272	0.461	0.451
2. SC complexity	0.139	0.777	0.254	0.133	0.243	0.131
3. Business strategy	-0.079	0.044	0.698	0.133	0.099	0.125
4. SC agility	0.195	0.026	0.072	0.730	0.389	0.514
5. SC adaptability	0.319	0.122	0.009	0.300	0.762	0.552
6. SC alignment	0.346	0.071	0.016	0.435	0.440	0.771

adaptability ( $R^2 = 0.15$ ). The value for SC agility ( $R^2 = 0.08$ ) is practically half that of the other two capabilities.

The  $f^2$  has been used to analyse the size of the effects (Table 4, last column). This is related to the practical significance of the coefficients rather than their statistical significance. As can be seen, the size of the effect of competitive intensity on SC adaptability (0.10) and SC alignment (0.11) is small, and even smaller on SC agility (0.05). The effect of business strategy is quite small on all three As (0.04, 0.02 and 0.4 on agility, adaptability and alignment, respectively). The effect of SC structural complexity on SC adaptability and alignment is also close to the minimum (0.02 and 0.3, respectively).

Finally, the Stone-Geisser  $Q^2$  values, which measure out-of-sample predictive power, are above zero for all the endogenous constructs, which provides support for the predictive relevance of the model (Table 4).

Direct effects	Coeff	Std. Dev	p-value	LCI 95%	UCI 95%	f <sup>2</sup>
H1a: Competitive intensity → SC agility	0.208	0.058	<0.001	0.094	0.322	0.045
H1b: Competitive intensity → SC adaptability	0.309	0.057	<0.001	0.197	0.421	0.104
H1c: Competitive intensity → SC alignment	0.323	0.057	<0.001	0.212	0.435	0.113
H2a: SC complexity → SC agility	−0.055	0.060	0.180	−0.171	0.062	0.005
H2b: SC complexity → SC adaptability	0.121	0.059	0.021	0.005	0.236	0.021
H2c: SC complexity → SC alignment	0.159	0.059	0.003	0.045	0.274	0.033
H3a: Business strategy → SC agility	0.193	0.058	<0.001	0.079	0.307	0.038
H3b: Business strategy → SC adaptability	0.162	0.059	0.003	0.047	0.277	0.024
H3c: Business strategy → SC alignment	0.189	0.058	<0.001	0.075	0.303	0.036
Competitive intensity → business strategy	−0.116	0.059	0.025	−0.232	−0.001	0.012
SC complexity → business strategy	0.131	0.059	0.013	0.016	0.246	0.016
Indirect effects	Coeff	Std. Dev	p-value	LCI 95%	UCI 95%	f <sup>2</sup>
H4a: CI → strategy → SC agility	−0.022	0.023	0.163	−0.067	0.023	0.005
H4b: CI → strategy → SC adaptability	−0.019	0.028	0.255	−0.074	0.036	0.006
H4c: CI → strategy → SC alignment	−0.022	0.028	0.218	−0.077	0.033	0.008
H5a: SC-C → strategy → SC agility	0.025	0.029	0.191	−0.032	0.082	0.002
H5b: SC-C → strategy → SC adaptability	0.021	0.032	0.253	−0.042	0.084	0.004
H5c: SC-C → strategy → SC alignment	0.025	0.032	0.223	−0.038	0.088	0.005
Model estimation	R <sup>2</sup>	R <sup>2</sup> adjusted		Stone-geisser's Q <sup>2</sup>		
Competitive strategy	0.027	0.020		0.031		
SC agility	0.078	0.068		0.087		
SC adaptability	0.148	0.139		0.143		
SC alignment	0.182	0.173		0.177		

**Note(s):** CI: competitive intensity; SC-C: supply chain complexity; LCI: lower confidence interval; UCI: upper confidence interval. Values of f<sup>2</sup> higher than 0.020, 0.150 and 0.350 can be interpreted as small, medium and large size effects, respectively

**Table 4.**  
Structural model  
results

## Discussion

This research shows that the contextual variable with the strongest influence on the triple-A SC capabilities is competitive intensity (H1), which affects all three capabilities and has effects on SC adaptability and SC alignment that are approaching medium size. Thus, companies respond to higher competitive intensity with higher levels of SC agility, adaptability and alignment to add greater value for customers. A high level of competitive intensity encourages what Ketchen *et al.* (2008) call “best value SC”.

As for the other analysed competitive environment variable – SC structural complexity (H2) – it can be seen that the higher the numbers of suppliers and customers in the SC, the more the companies seek to increase their SC adaptability and alignment capabilities, but SC agility is not affected. These results are in line with some previous studies. For example, Gimenez *et al.* (2012) found that SC integration (related to alignment) is only effective in buyer–supplier relationships characterised by high supply complexity. As for agility, Roscoe *et al.* (2020) found that SC complexity seems to have a limited impact on the effectiveness of internal process connectivity to enable SC agility. However, our results partially contradict Blome *et al.* (2014) as supply complexity negatively affects SC flexibility, which is related to SC agility. Some theoretical models (Serdarasan, 2013; Manuj and Sahin, 2011) show that other strategic and tactical variables can be used to manage complexity, and, perhaps because of this, the relationship between SC complexity and the triple-A SC capabilities is weaker.

The obtained results also support our hypothesis (H3) regarding the expected influence of the company's business competitive strategy on the levels of the triple-A SC capabilities; the more differentiation-oriented the business strategy, the higher the implementation of the triple-A SC capabilities. These results build on those of other authors (Sebastiao and Golicic, 2008; Christopher *et al.*, 2006) by highlighting the fact that cost strategy is much more rigid than differentiation strategy. Regarding the relationship between differentiation strategy and the triple-A SC capabilities, these results are also in line with the findings of other research (Qi *et al.*, 2011, 2017; Hallgren and Olhager, 2009). However, these works focus on a single dimension (agility), while our work takes a more holistic approach and considers the effect of strategy on all three As.

Companies that seek competitiveness through triple-A SC capabilities need to be aware that the competitive environment and a differentiation-oriented strategy are drivers of these capabilities.

One interesting finding of our study is that company strategy does not seem to play any mediation role between the environmental variables and the triple-A capabilities (H4 and H5 are rejected). This means that the competitive environment directly affects the triple-A, irrespective of the company strategy adopted and even though the environment influences the strategy in a differentiated way. Greater competitive intensity seems to be associated with a more cost-oriented strategy. However, greater SC structural complexity is positively related to a more differentiation-oriented strategy.

### Conclusions and further research

Triple-A is essential for SC success (Cohen and Kouvelis, 2020), and it has become even more relevant (Erhun *et al.*, 2020) due to the increasing turbulence and uncertainty in today's markets and economies. The major contribution of the present research is to empirically analyse the drivers that achieve triple-A SC capabilities through the lens of the CT and the DCV. This study, therefore, responds to the calls for further research focused on the drivers of the triple-A SC (Feizabadi *et al.*, 2019); more contingency-based research to evaluate the fit between the environment, strategies and practices in the SCM context (Sousa and Voss, 2008); and, from the DCV, to analyse both the external and internal contextual factors on which the validity and effectiveness of the organisational capabilities might depend (Barreto, 2010). This work goes further by identifying how some contingent factors and competitive strategy are linked to the triple-A SC capabilities. The study results not only confirm the CT-based hypotheses that the context affects the triple-A capabilities but are also in line with the DCV in stating that these capabilities are dependent on the context.

Our findings have some interesting implications for managers. They show that when competitive intensity and SC structural complexity are high, triple-A SC capabilities may be necessary. They also show that the competitive strategy that the company pursues can determine the development of the triple-A capabilities. If the company focuses its competitive strategy on cost leadership, it will find it more difficult to develop agility, adaptability and alignment. It is also important to note that the influence of the competitive environment does not depend on the chosen strategy. So, SC managers should develop and manage SC agility, adaptability and alignment in light of external circumstances (i.e. competitive intensity and SC complexity) and the competitive strategic orientation of the company.

Individual analyses of the triple-A SC capabilities have determined the influence that the different drivers have on each of these. This will allow managers to take the most appropriate approach to improve any of these capabilities. As the previous literature concludes, each of the triple-A SC capabilities has a specific effect on the different performance measures

(Alfalla-Luque *et al.*, 2018), which may lead managers to prioritise one over the others according to their business objectives.

This research has several limitations that can be viewed as directions for future research. The first is related to the use of a focal firm and its perceptions of SC relationships. A more general view of the SC involving informants from different companies would enable fuller and more accurate results to be obtained. Another limitation may be the way that some variables have been measured, especially SC complexity, which is a multifaceted concept, and competitive strategy, which is a construct that is difficult to approximate. Furthermore, the data that are used from Spanish industrial sectors, so it might be interesting to conduct a cross-country analysis to test this model for other countries.

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## Appendix

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# What colour are you? Smartphone addiction traffic lights and user profiles

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What  
 smartphone  
 addiction  
 colour are you?

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## Abstract

**Purpose** – The key concern nowadays is smartphone addiction and user profiles. Following the risk and protective factors framework, the authors aim to characterize smartphone users according to two levels: (1) individual: referred to the use (i.e. boredom proneness, compulsive app downloading smartphone addiction) and (2) microsystem: referred to family and peers (i.e. family harmony and phubbing). Besides, the authors will derive useful managerial implications and strategies.

**Design/methodology/approach** – First, an extensive literature revision and in-depth interviews with experts were employed to identify the addiction-related variables at the individual and microsystem level. Second, information was collected from a sample of 275 Spanish smartphone users, and a K-means clustering algorithm was employed to classify smartphone users.

**Findings** – The proposed traffic lights schema identifies three users' profiles (red, yellow and green) regarding their smartphone addiction and considering individual and microsystem critical variables.

**Originality/value** – This study proposes a practical and pioneer traffic lights schema to classify smartphone users and facilitate each cluster's strategies development.

**Keywords** Smartphone addiction, Compulsive app downloading, Phubbing, Family harmony, Boredom proneness, Profiles, Cluster

**Paper type** Research paper

## 1. Introduction

Currently, the smartphone is becoming an indispensable device for people's daily activities and functions. There are 3.5 billion smartphone users globally, representing 44.9% of the world population (Statista, 2020). 94% of the young (18–29-year-olds) world population own a smartphone (Turner, 2020). An average smartphone user spends 3 h per day on their smartphone and checks it 63 times a day (Milijic, 2019; Turner, 2020). During the first half of 2020, first-time app downloads grew up 28.8%, and consumers spent \$26.4 billion in the global app ecosystem (Sensortower, 2020). Besides, social media and applications are currently used as a marketing channel (Rita *et al.*, 2021), which involves a challenge to satisfactorily and ethically address users of technologies.

Smartphones are, in fact, critical devices for the world population to the point of engendering hitches. Its use is worldwide and involves calling, texting, using an application (app), reading news, checking social networking, handling e-mail, listening to music, watching TV or gaming (Busch and McCarthy, 2021). Besides, in specific moments such as in quarantines (i.e. due to COVID-19), smartphone usage has increased for shopping or attending classes (Sensortower, 2020). In this context, the COVID-19 crisis could be leading people to

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smartphone addiction since time spent connected to smartphones has increased on average one hour per day due to lockdowns (Smartme Analytics, 2020). Consequently, the COVID-19 crisis is added to the circumstances that can aggravate the smartphone addiction problem.

Smartphone addiction has attracted the interest of several researchers who have analysed it in different disciplines such as education or health (e.g. Yang *et al.*, 2019; Mahapatra, 2019). Nowadays, addiction is not just related to substance abuse, but it is also related to Internet or smartphone overuse (Kwon *et al.*, 2013), and it implies a challenge for society, education, and business managers. However, an agreed smartphone user classification according to addiction levels and risks and protective factors and corresponding practical recommendations is lacking; it is crucial to derive managerial strategies to address each cluster. One exception is Kiss *et al.* (2020), who identified four users' profiles according to their digital devices usage.

The risk and protective factors framework (Jessor, 1992) within the social-ecological approach by Bronfenbrenner (2002) applied to study behavioural disorders (such as smartphone addiction), helps to understand complex interactions between inter- and intra-individual factors (Hong and Garbarino, 2012). In this sense, this paper seeks to propose an innovative traffic lights schema to classify smartphone users according to crucial risk (boredom proneness, addiction and compulsive app downloading and phubbing) and protective factors (family harmony) at individual and microsystem levels. The final aim is to derive practical strategies and recommendations for companies involved. Two research questions are proposed:

*RQ1.* Are there (and how many) different clusters of smartphone users according to risk and protective factors?

*RQ2.* What social and managerial challenges and implications can be derived from current smartphone use and users?

These findings will enrich existing knowledge through the following contributions: offering an easily understood classification of smartphone user profiles to derive strategies and face addiction levels, using individual and microsystem behavioural variables that involve risk and protective ways facing addiction. To the best of our knowledge, this is the first academic study with a recent broad sample of Spanish smartphone users and proposing business strategies for each cluster with experts' help.

## **2. Smartphone addiction, user profiles, individual and microsystem level variables**

### *2.1 Smartphone addiction and user profiles*

Smartphone addiction can be regarded as "excessive use of smartphones in a way that is difficult to control and whose influence negatively extends to other life fields" (Gökçeşlan *et al.*, 2018, p. 640). The World Health Organization has not still recognized smartphone addiction as such. There is some agreement regarding the fact that mobile addiction involves excessive or problematic smartphone use, and it is broadly understood as a behavioural addiction (Yen *et al.*, 2009; Billieux *et al.*, 2008; Mahapatra, 2019). Researchers have addressed the issue of smartphone addiction (Roberts *et al.*, 2015; Lian and You, 2017), and others prefer to speak about mobile phone dependence (Seo *et al.*, 2015) or problematic smartphone use (Busch and McCarthy, 2021; Elhai *et al.*, 2016). Some authors state that individuals are not really addicted to the smartphone device but functions supplied by the device and applications (apps) (Sha *et al.*, 2019). Mobile ubiquity has led to better access to information, increased connectedness and several conveniences that also increase smartphone usage (Handa and Ahuja, 2020).

As for the smartphone user profiles, there are few recent studies considering clustering for this kind of addiction. While there is more literature on Internet addiction user profiles, smartphone user profiles lack the extent of our knowledge. Moreover, some studies only

distinguish addicts vs non-addicts (e.g. Shu and Chieh-Ju, 2007). Vaghefi and Lapointe (2016) classified individuals into five types (i.e. addicts, fanatics, highly engaged, regular and thoughtful users), considering their dependence and self-regulation regarding smartphone use, their information technology addiction and liability to addiction. Kayri and Günüç (2016) also offered a typology according to Internet addiction and socioeconomic level and found three clusters (i.e. no addiction, risk of addiction and addiction).

To develop a set of profiles that would capture students' addiction to digital devices and their usage relative to risk, Kiss *et al.* (2020) identified four distinct user profiles through cluster analysis. The first cluster was labelled as strongly protected sensation-seekers who were more prone to problematic use with moderately high protection levels but with the highest scores on the boredom proneness and sensation-seeking scales. The second cluster consisted of more balanced and non-vulnerable users, who achieved average scores on both risk and protective factors scales. The third cluster was labelled protected, conscious users prone to problematic use with lower levels of problematic use and risk factors and higher protective factors levels. The fourth cluster was labelled as strongly problematic, unprotected users, who achieved the highest scores of problematic use, and they were the less protected and had the lowest protective factors scores.

## 2.2 The risk and protective factors framework and addiction-related variables at the individual and microsystem level

The risk and protective factors framework provides a theoretical background for researching problematic behaviours among youth (Jessor, 1992). This framework, employed initially on medicine and psychiatric research (O'Connell *et al.*, 2009), applies a socio-psychological and epidemiological perspective to explain the whole complex of personal, social and other environmental factors that can explain and even prevent behavioural disorders amongst youngsters (Jessor, 1992).

A later approach to this framework (i.e. social-ecological approach) suggests that four contextual domains help determine predictors of behavioural problems and addictions (Bronfenbrenner, 2002). These four domains are recalled by Hong and Garbarino (2012) as personal level (individual), microsystem level (family and peers), exosystem level (community) and macrosystem level (societal). The personal level refers to individual youth characteristics (i.e. psychological characteristics). The microsystem level refers to the individual direct environment (e.g. home) and comprises interpersonal relationships. Thus, at this level, family, school and compeers are the primary microsystem elements for youth. In this work, we are going to focus on these two levels as they are where most problems regarding incorrect use of smartphones appear and then are translated to a broader social level (i.e. exosystem and macrosystem levels; not considered in this study).

There are opposing factors in each level that can lead and mitigate the development of some behavioural disorders, called risk and protective factors (Jessor, 1992). A risk (protective) factor is understood as an individual attribute or environmental context that increases (reduces) the possibility of addiction, behavioural problem or disorder (Clayton, 1995). This research focuses on risk and protective factors to classify smartphone users at the individual and microsystem levels. Table 1 shows several factors at the individual level have more incidence to explain smartphone addiction, and studies about the effect of factors at the microsystem are scarce and related to the context in which the individual behaves. The methodology section explains how experts helped us select the most mentioned risk and protective factors.

Next, we are dealing with the factors considered at the individual level (compulsive app downloading and boredom proneness) and at the microsystem level (phubbing and family harmony), taking into account the literature revision and experts' opinions and considering that they can have implications for society and management.

**Table 1.**  
Risk and protective  
factors of smartphone  
addiction

Level	Risk	Protective
Personal level (individual)	<ul style="list-style-type: none"> <li>• Fear of missing out (FoMO) (Handa and Ahuja, 2020; Wolniewicz <i>et al.</i>, 2020)</li> <li>• Boredom proneness (Kiss <i>et al.</i> 2020; Regan, <i>et al.</i> 2020)</li> <li>• Body dissatisfaction (Liu <i>et al.</i>, 2020a)</li> <li>• Female gender (Choi <i>et al.</i>, 2015)</li> <li>• Alcohol use (Choi <i>et al.</i>, 2015)</li> <li>• Smoking (Choi <i>et al.</i>, 2015)</li> <li>• Anxiety (Choi <i>et al.</i>, 2015)</li> <li>• Depression (Choi <i>et al.</i>, 2015)</li> <li>• Impulsivity (Regan <i>et al.</i> 2020)</li> <li>• Nomophobia (Regan <i>et al.</i> 2020)</li> </ul>	<ul style="list-style-type: none"> <li>• Resilience (Choi <i>et al.</i>, 2015; Kiss <i>et al.</i> 2020)</li> <li>• Self-control (Kim <i>et al.</i>, 2018; Ekşi <i>et al.</i>, 2020; Kiss <i>et al.</i> 2020)</li> <li>• Self-esteem (Kiss <i>et al.</i>, 2020)</li> <li>• Character strengths (Choi <i>et al.</i>, 2015)</li> <li>• Mindfulness (Regan, <i>et al.</i> 2020)</li> <li>• Conscientiousness (Lian and You, 2017)</li> <li>• Virtues (Lian and You, 2017)</li> </ul>
Microsystem level (family and peers)	<ul style="list-style-type: none"> <li>• Being phubbed (Chotpitayasunondh and Douglas, 2016; Xie <i>et al.</i>, 2019)</li> <li>• parental neglect (Kwak <i>et al.</i>, 2018)</li> <li>• Domestic violence (Jeong <i>et al.</i>, 2020)</li> <li>• Family dysfunction (Liu <i>et al.</i>, 2020b)</li> </ul>	<ul style="list-style-type: none"> <li>• Family harmony (Kim <i>et al.</i>, 2018; Ekşi <i>et al.</i>, 2020)</li> <li>• Parent–child attachment (Xie <i>et al.</i>, 2019)</li> <li>• Teacher support (Jeong <i>et al.</i>, 2020)</li> </ul>

*2.2.1 Individual level: compulsive downloading and boredom proneness.* 2.2.1.1 Compulsive downloading. Younger users are predisposed to compulsive phone usage. Okazaki *et al.* (2019, p. 2) highlight that compulsive technology-related uses and “compulsive buying have become an important societal issue that needs to receive more attention from social marketers and policymakers”. Notwithstanding, research suggests that smartphone addictive behaviours are closely associated with other behavioural disorders (Pourrazavi *et al.*, 2014). Parylak *et al.* (2011) propose that smartphones also incite some compulsive behaviour regarding the technology sphere. Following Hsiao (2017, p. 276), *compulsive app downloading* could be understood as “the individual’s lack of control over [downloading] mobile app and the tendency to spend too much time and effort on mobile apps”. This concept is novel, since to the best of our knowledge, compulsive buying literature has not spoken about compulsive “buying” [downloading] of apps since there is an abundance of free app version in the apps’ market (Tang *et al.*, 2019). Compulsiveness involves the consumer propensity to impetuous, non-reflexive, immediate and kinetical app download (Rook and Fisher, 1995; Altintas *et al.*, 2010). This behaviour could respond to the individuals’ inability to control a desire triggered by smartphone addiction symptoms (Altintas *et al.*, 2010). Compulsive app downloading could reflect compulsion and, a ritual answer to uncontrolled thoughts about obtaining products [apps] (Okazaki *et al.*, 2019, p. 3) that might be due to smartphone addiction and which involves a challenge for businesses that develop apps and want to be socially responsible (Mrad and Chi Cui, 2020).

2.2.1.2 Boredom proneness. As Kiss *et al.* (2020) state, psychological factors, such as boredom, serve as useful tools for providing information to better understanding the role of risk factors when dealing with the youth’s problematic use of digital devices. Wolniewicz *et al.* (2020) consider boredom proneness a trait-based tendency to experience a lack of interest, indifference or apathy. Individuals who experience high levels of leisure boredom may engage in deviant activities such as substance use (Leung, 2007). Kiss *et al.* (2020) has suggested that having an abundance of time is central to boredom. Leisure boredom might be related to other forms of addiction and has been implicated in deviant activity involvement, particularly drug use and delinquency. Increasingly, the cell phone allows adolescents, while having not much to do, to be engaged in several activities, such as texting in SMS, gaming, shopping, accessing the Internet, reading online news, shooting and viewing pictures or

video, among others. Not surprisingly, literature found that the higher the level of boredom a person experiences, the higher the likelihood of being dependent on the smartphone (Leung, 2007), recycling and clothing disposal (Kwon *et al.*, 2020) and shopping impulsively (Sundstrom *et al.*, 2019; Bozaci, 2020).

**2.2.2 Microsystem level: phubbing and family harmony.** 2.2.2.1 Phubbing. Phubbing is the act of ignoring someone by using the smartphone instead of interacting face-to-face with others (Chotpitayasunondh and Douglas, 2016). “The person engaging with a smartphone instead of paying attention to another person or persons during social interaction is called a phubber, while the person(s) who is/are being phubbed, that is, phone snubbed, during the social interaction is called the “phubbee(s)” (Al-Saggaf and O'Donnell, 2019, p. 132). When someone is phubbed, he/she reports less trust in the phubber, a decreased perceived quality of communication and diminished satisfaction with the relationship (Chotpitayasunondh and Douglas, 2016). Phubbing is considered an irritating and impolite act (Miller-Ott and Kelly, 2017) and, people who have been phubbed described strategies to evade face-to-face lost contact. Sometimes this action (phubbing) is used to compensate for the related needs and avoid the sense of social exclusion (David and Roberts, 2017). Xie *et al.* (2019) find that individuals' mobile phone addiction suffers intensification after facing phubbing. Existing research on phubbing highlighted several factors that could cause one to use their smartphone while having a face-to-face conversation with others, including smartphone addiction, SMS (texting) addiction, social media addiction, Internet addiction and to some extent, game addiction (Wolniewicz *et al.*, 2020). Phubbing can also affect concentration and relations among education stakeholders when the mobile device is used for non-academic purposes (Hall-Newton *et al.*, 2019).

2.2.2.2 Family harmony. Regarding the microsystem level, the family environment is related to several behavioural problems, including problematic smartphone use (O'Connell, 2009; Altintas *et al.*, 2010; Busch and McCarthy, 2021). Family harmony plays a role against the development of psychopathology and represents a resource to face life stress (Kavikondala *et al.*, 2016). Family harmony is defined as “a value that expresses the closeness, cooperation, and relationships among family members and contributes to the individuals' well being” (Ekşi *et al.*, 2020, p. 3).

Buctot *et al.* (2020) affirm that individuals that show smartphone addiction also show a problematic relationship with family mainly due to users' diverted attention, and they try to hide their abusive use from family. Thus, the youth's family background is crucial in determining youth's behaviour regarding smartphone use (Buctot *et al.*, 2020). Family models and norms influence the development of addictions and, not receiving open and mutual communication with the family or close support negatively affect youth's behaviour (Yen *et al.*, 2007; Kavikondala *et al.*, 2016) and exacerbate the problematic technology use (Ekşi *et al.*, 2020) and affect learning good or bad consumption habits (Scholderer and Grunert, 2001; Kleinschager and Morrison, 2014; Essiz and Mandrik, 2021). Moreover, Dinc (2015) suggests that an intimate atmosphere where youths often see their family members using smartphones contributes to smartphones' extensive use amongst youngsters. Lee and Lee (2017) found that parental attachment is negatively associated with smartphone use addictive tendency, acting protectively.

### 3. Methodology

#### 3.1 Study sample and measures

The selected sample comprised Spanish smartphone users. Although 44.9% of the world population owns a smartphone (Statista, 2020), this percentage is much higher in Spain (74.3%). Spain was the European country with the highest penetration of smartphones. Spain occupies the fifth position in 10 countries ranking with higher smartphone usage

(Turner, 2020). According to a recent report, 45.3% of young Spaniards between 18 and 24 years old declare themselves addicted to their smartphone (Rastreator, 2019). It reflects that 25.6% of the Spanish population consider mobile addicts, and 77.3% affirm they could not live without a smartphone.

Following our purpose of identifying types of smartphone users regarding their risk to become smartphone addicts, we employed a targeted non-probability sampling method with Prolific platform (i.e. 18–25-year-olds, resident in Spain and gender-balanced sample). Prolific is a crowdsourcing website (<http://www.prolific.ac>) supported by the University of Oxford that allows collecting data via online surveys. Participants were offered compensation of €2.23 for filling the survey. 275 valid questionnaires were obtained, with a response rate of 91.6%. The sample profile is slightly predominantly masculine (58.1%), between 18 and 22 years old (66.9%), studying university degrees (66.5%) and spending an average of 4.94 (SD: 3.28) hour per day using their smartphone. According to the secondary data available about the Spanish youth population smartphone use and addiction, the sample profile and the national profile are similar. 46.7% of the young Spanish males between 16 and 25 years old (41%) with middle and high education (93.9%) spent daily using their smartphone an average of 3.5 h (De-Sola *et al.*, 2019; Ditrendia, 2019).

As previously said and apart from literature revision, in-depth interviews lasting an average of one hour following a semi-structured questionnaire were maintained with six experts on addiction and smartphone use. Experts from different disciplines (management, marketing, psychology, sociology and education) help us to confirm the main risk and protective behavioural factors causing addiction and included in individual and microsystem levels. The interview was divided into three key open questions with the purpose to (1) list the risk and protective behavioural factors related to smartphone addiction; (2) classify factors on individual and microsystem level; and (3) suggest some smartphone addiction profiles. After obtaining the interviews information, a hybrid thematic analysis was followed for coding (Fereday and Muir-Cochrane, 2006). This approach integrates data-driven inductive coding with theory-based deductive coding. We employ the Atlas.TI qualitative software and two researchers analysed the transcripts independently and subsequently compared their findings. Areas of disagreement were resolved by discussion. The open question related to the most critical variables that can enhance smartphone addiction shows that boredom, phubbing and compulsive behaviour were the most mentioned variables. The critical factor preventing addiction was a unanimous answer related to family (i.e. communication among family, family norms or family environment), considered in the validated family harmony concept.

Later on, prior literature was employed to develop the survey instrument. Smartphone addiction was measured using the SAS short-scale validated by López-Fernández (2017), boredom proneness was measured with the scale employed by Al-Saggaf *et al.* (2019), family harmony with the scale of Kavikondala *et al.* (2016), phubbing using the scale from Franchina *et al.* (2018) and compulsive downloading adapting the scale used by Okazaki *et al.* (2019). We use five-point Likert scales from strongly disagree (1) to agree strongly (5).

### 3.2 Data analyses

Data analyses were conducted using IBM SPSS statistics 26 and LISREL 8.7. First, the exploratory factor analysis (EFA) was run to test constructs unidimensionality. The varimax rotation revealed that the five studied constructs have eigenvalues higher than 1 and a total explained variance of 55.14%. At this stage, Harman's single-factor test was employed to address CMB's issue (Malhotra *et al.*, 2006). Attending Fuller *et al.* (2016), Harman's test suggests a problem with CMB if the first factor accumulates more than 50% of the variance. The exploratory factor analysis loaded with all of the items onto one factor shows that a unique unrotated factor explained 20.2% of the data variance. Thus, we discard CMB problems.

Second, a confirmatory factor analysis (CFA) revealed the measurement model convergent and discriminant validity. The results of the adjusted and re-specified model are shown in Tables 2 and 3. Three items were suppressed since they did not show the required standards to be considered reliable and valid following Bagozzi and Yi (2012). The reliability of the final scales was corroborated with the values of the alpha Cronbach's coefficient ( $>0.7$ ), the coefficient of composite reliability ( $>0.6$ ) and average variance extracted ( $>0.5$ ) (Bagozzi and Yi, 2012) (see Table 2). Regarding the discriminant validity of the constructs, the results show that the root of the variance extracted in all cases is larger than the correlations between constructs (Farrell, 2010) (see Table 3). The measurement model shows an acceptable fit: a  $\chi^2$  (df: 372) of 703.8 ( $p = 0.00$ ), a comparative fit index (CFI) of 0.93 and a root mean square error of approximation (RMSEA) of 0.05.

In the following section 4, results are explained.

## 4. Results

### 4.1 Cluster analysis

As previous authors have recently performed (Kiss *et al.*, 2020) in smartphone addicts, we run a K-means clustering algorithm to classify smartphone users into different groups depending on their smartphone addiction and individual and microsystem levels related factors. We used the five-factor punctuations (F1: Smartphone addiction; F2: Boredom proneness; F3: Family harmony; F4: Phubbing; F5: Compulsive app downloading) formerly validated as input variables. The K-means clustering algorithm requires, as an input, the number of output clusters to produce. To reduce the possible optimal number of clusters, we run the analysis based on our understanding of how smartphone addicts have been classified in the past ( $N = 2$  to  $N = 5$ ) (Shu and Chieh-Ju, 2007; Vaghefi and Lapointe, 2016; Kayri and Günüç, 2016; Kiss *et al.*, 2020). The number of clusters that offers better results was  $K = 3$ , attending the group size, the degree of significance of each factor, and the final centre values (FCV).

Furthermore, attending Punj and Stewart (1983), Kodinariya and Makwana (2013) and Krzanowski and Lai (1988) recommendations, the model selection of the optimal number of clusters was implemented in two phases. We followed the standard practice of generating all possible classifications in the first phase, ranging from  $K = N$  to  $K = 1$ . Then, we compare the set of candidate models quality criterion by two-steps cluster analysis employing SPSS. In the second phase, we select the most appropriate model based on Akaike's Information Criterion (AIC). Figure 1 displays a graph showing how the curve has an elbow that nearly flattens after  $k$  equals three, thus corroborating  $K = 3$  as the optimal number of clusters.

The analysis of variance (ANOVA) corroborates that the five factors (F1 to F5) are significant at a level of 95% to characterize the groups. The  $F$ -statistic values indicate that family harmony and phubbing behaviour produce the most extensive and smallest variations between groups. Table 4 shows the ANOVA analysis results and three conglomerates information.

The depth interviews with experts disclose that they consider helpful the employment of the traffic lights schema proposed by us as researchers. They consider colours (red, yellow and green) useful to classify smartphone users by their risk to develop smartphone addiction for two reasons: (1) it is a universal language of signals across different countries and (2) it is an easy way for the user to identify the risk to become smartphone addict regardless any personal characteristic. Also, the traffic light schema of three colours (green, yellow and red) perfectly matches the number of groups found by this research (3). Thus, each colour will be described attending their punctuation of the risk and protective factors going from green (low risk of smartphone addiction), to yellow (middle risk of smartphone addiction) to red (high risk of smartphone addiction). The following description attends to the information displayed in Table 4.

**Table 2.**  
Descriptive statistics,  
EFA and CFA results

Factor	Cod	Items	Media	SD	Weight	$\lambda$	$t$	$R^2$
F1: Smartphone addiction (7.7% of variance; $\alpha$ : 0.741; CR: 0.885; AVE: 0.500)	SAS1	I miss planned work due to smartphone use	2.28	1.16	0.400	0.740	10.02	0.548
	SAS2	I have a hard time concentrating in class while doing assignments or working due to smartphone use	3.73	1.15	0.545	0.521	11.15	0.272
	SAS3	I have felt pain in the wrists or at the back of the neck while using a smartphone	2.65	1.38	0.436	0.490	11.23	0.240
	SAS4	I am not able to stand not having a smartphone	2.99	1.18	0.400	0.652	10.60	0.425
	SAS5	I am feeling impatient and fretful when I am not holding	2.72	1.17	0.701	Deleted		
	SAS 6	I am having my smartphone in my mind even when I am not using it	2.03	1.07	0.632	0.727	10.02	0.528
	SAS7	I will never give up using my smartphone even when my daily life is already greatly affected	2.67	1.22	0.414	0.639	10.67	0.409
F2: Boredom proneness (13.6% of variance; $\alpha$ : 0.853; CR: 0.935; AVE: 0.670)	SAS8	I am continually checking my smartphone so as not to miss conversations between other people on social networks	2.58	1.19	0.588	0.738	9.90	0.545
	SAS9	I use my smartphone longer than I had intended	3.3	1.22	0.622	Deleted		
	SAS10	The people around me tell me that I use my smartphone too much	1.90	1.07	0.413	0.668	10.49	0.447
	BP1	I often find myself at "loose ends", not knowing what to do	3.38	1.24	0.566	0.772	10.47	0.596
	BP2	I find it hard to entertain myself	2.49	1.19	0.785	0.837	9.63	0.701
	BP3	Many things I have to do are repetitive and monotonous	3.16	1.12	0.538	0.659	11.04	0.434
	BP4	It takes more stimulation to get me going than most people	2.72	1.31	0.583	0.712	10.81	0.507
F3: Family harmony (20.3% of variance; $\alpha$ : 0.926; CR: 0.973; AVE: 0.720)	BP5	I do not feel motivated by most things that I do	2.72	1.19	0.753	Deleted		
	BP6	It is hard for me to find something to do or see to keep me interested in most situations	2.57	1.25	0.812	0.893	8.24	0.797
	BP7	Much of the time, I just sit around doing nothing	2.45	1.34	0.717	0.823	9.85	0.678
	BP8	Unless I am doing something exciting, even dangerous, I feel half-dead and dull	1.92	1.11	0.574	0.724	10.75	0.507
	FH1	My family functions well for all members	3.66	1.20	0.784	0.851	10.32	0.725
	FH2	My family's day-to-day interactions are peaceful	3.69	1.14	0.808	0.843	10.39	0.711
	FH3	Family members accommodate each other	3.42	1.23	0.860	0.890	9.61	0.791
F4: Phubbing (5.5% of variance; $\alpha$ : 0.790; CR: 0.983; AVE: 0.740)	FH4	I am proud of my family	3.90	1.14	0.813	0.856	10.23	0.733
	FH5	My family is harmonious	3.49	1.23	0.944	0.959	5.69	0.920
	PO1	I use my smartphone during a conversation in a bar or restaurant	2.69	1.01	0.733	0.857	7.27	0.734
	PO2	I engage with my smartphone during a conversation	2.09	1.01	0.642	0.793	8.79	0.628
	PO3	I check social media on my smartphone during a personal conversation	2.26	1.14	0.681	0.788	8.88	0.621
	CD1	My smartphone has unopened/unused apps in it	3.25	1.48	0.374	0.722	10.33	0.521
	CD2	Others might consider me a "downloading app-aholic".	1.41	0.771	0.531	0.699	10.41	0.489
F5: Compulsive app downloading (8.6% of variance; $\alpha$ : 0.733; CR: 0.913; AVE: 0.640)	CD3	Much of my life centres on downloading apps	1.23	0.624	0.543	0.700	10.40	0.490
	CD4	I download apps in my smartphone that I do not need	1.98	1.20	0.706	0.774	9.66	0.600
	CD5	I download apps in my smartphone that I did not plan to download	2.25	1.28	0.602	0.746	10.00	0.556
	CD6	I consider myself an impulse downloader of apps	1.66	1.07	0.669	0.805	9.19	0.648



*Cluster 1: green smartphone users.* Smartphone users included in this first cluster show higher positive scores in family harmony (FCV = 0.59237) and the higher negative punctuation in smartphone addiction (FCV = −0.38367) and also in other factors [boredom proneness (FCV = −0.58406), phubbing behaviour (FCV = −0.35244) and compulsive downloading (FCV = −0.42467)] than other groups. This description could fit with smartphone user that are not at risk of developing smartphone addiction. These punctuations

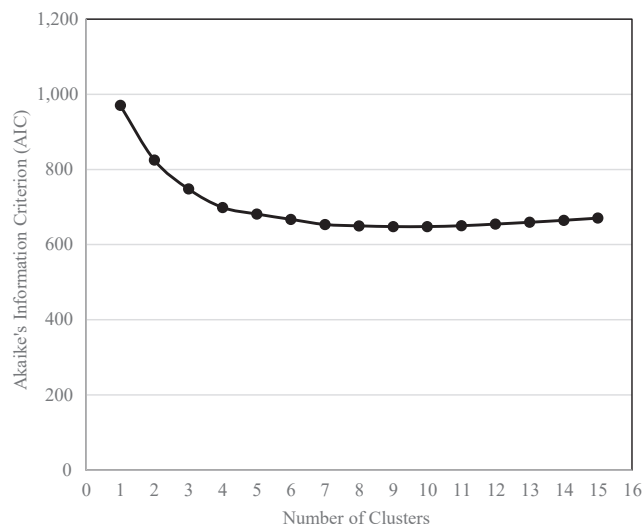
What  
smartphone  
addiction  
colour are you?

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	F1	F2	F3	F4	F5
F1	<i>0.707</i>				
F2	0.597	<i>0.821</i>			
F3	−0.171	−0.313	<i>0.848</i>		
F4	0.701	0.515	−0.127	<i>0.858</i>	
F5	0.679	0.611	−0.177	0.646	<i>0.799</i>

**Note(s):** Values below the diagonal show correlations between constructs, values on the diagonal (in italic) show the square root of AVE. F1: Smartphone addiction; F2: Boredom Proneness; F3: Family harmony; F4: Phubbing; F5: Compulsive app downloading

**Table 3.**  
Discriminant validity  
matrix



**Figure 1.**  
Number of clusters vs.  
AIC criterion

Factor	F	Sig. (95%)	Final centre value (FCV)			Distance from conglomerate centres		
			Green	Red	Yellow	Green (n = 125)	Red (n = 81)	Yellow (n = 69)
F1	58.03	0.000	−0.3837	0.8430	−0.2946	Green	2.62	1.97
F2	66.39	0.000	−0.5841	0.7446	0.1840			
F3	156.45	0.000	0.5924	0.1193	−1.213	Red	2.62	2.57
F4	56.77	0.000	−0.3524	0.8383	−0.3456			
F5	88.87	0.000	−0.4247	0.9705	−0.3700	Yellow	1.97	2.57

**Note(s):** F1: Smartphone addiction; F2: Boredom Proneness; F3: Family harmony; F4: Phubbing; F5: Compulsive app downloading

**Table 4.**  
ANOVA results and  
conglomerates  
information

reveal that smartphone users in this first cluster tend to be embedded in a family framework where harmony stands out. This family characteristic may prevent these users from developing smartphone addiction, boredom, phubbing others and compulsive downloading. This group represents 45.5% of the total sample.

*Cluster 2: red smartphone users.* The second cluster includes people who show higher positive punctuations in smartphone addiction (FCV = 0.84299), boredom proneness (FCV = 0.74456), phubbing behaviour (FCV = 0.83829) and compulsive downloading (FCV = 0.97052). This description corresponds to a smartphone user type that in fact, are addicted. Red smartphone users tend to quickly get bored, phub others by using their smartphone, download apps compulsively, and be considered addicts to smartphone use. This group represents 29.5% of the total sample.

*Cluster 3: yellow smartphone users.* The smartphone users included in this third cluster show higher negative punctuations in family harmony (FCV = -1.21324). This punctuation could place the users in this cluster at a medium risk of developing smartphone addiction since their family framework might not protect them from this behavioural disorder. These users' punctuations also disclose that yellow smartphone users are prone to be bored (FCV = 0.18403), and it seems that this could be the open door to engage with the smartphone. This group represents the smallest group and represents 25% of the total sample. Although they are not addicted at this moment (FCV = -0.29455), and they do not show dangerous behaviours such as compulsive app downloading, we consider they are at risk of addiction.

#### 4.2 Clusters' demographic and smartphone use characterization

The information of the final centre values for each of the three clusters concerning the five factors (Table 4) facilitates describing differences between clusters and characterizing them considering different smartphone users' individualities (Table 5). Table 5 displays data that reveal the frequency of each group studied features and statistical post-hoc tests (Chi-square and ANOVA test) to discard or appreciate differences among groups regarding sample characteristics and smartphone usage (Pallant, 2001).

Specifically, it offers information about their demographic and socioeconomic characteristics of gender, education, average school performance and the age when receiving the first smartphone. Attending prior literature, different profiles of smartphone use could be identified in the function of the employed characteristics (i.e. gender, education, academic performance and age) (Busch and McCarthy, 2021). In addition, the daily media usage time via mobile and the number of downloaded apps are two objective variables related to smartphone addiction that are also mentioned as relevant to characterize smartphone addicts in previous studies (Noe *et al.*, 2019). Also, it is hard to ignore the situation of the pandemic that we live in nowadays, which may raise smartphone use (Smartme Analytics, 2020). Thus, we decide to include this variable too.

Thus, Table 5 displays in the first three rows the proportion of three sample characteristics (i.e. gender, education and rise in smartphone use during COVID-19 crisis) in the function of the cluster of membership. The education and the rise in smartphone use during COVID-19 crisis are the two characteristics that show significant differences between smartphone users profiles proportions attending the Chi-square test (Pallant, 2001). The third, fourth, fifth and sixth rows show four objective sample characteristics (i.e. age, daily media usage time via mobile, number of downloaded apps and average school performance) regarding the proportion of each cluster. The age, daily media usage time via mobile and the number of downloaded apps are the three objective characteristics that show significant differences between smartphone users attending the ANOVA test developed (Pallant, 2001). The difference between smartphone users' profiles attending their demographic and smartphone use characteristics is detailed in the following epigraph.

Sample characteristics		Percentage per cluster			$\chi^2$ Pearson (sig.)
		Green smartphone users	Red smartphone users	Yellow smartphone users	
Gender	Male	59.2	60.5	54.4	3.7 (0.460)
	Female	40.8	39.5	45.6	
Education	Secondary school	0.8	3.7	0.0	26.0** (0.004)
	High school	5.7	13.6	2.9	
	Vocational school	4.1	17.3	16.2	
	University degree	74.0	56.8	64.7	
	Postgraduate/PhD	2.4	0.0	1.5	
	Not studying	13.0	8.6	14.7	
Rise in smartphone use during Covid-19 crisis	No increase	31.2	16.0	23.2	22.3** (0.001)
	Less than 1 h	16.8	9.9	29.0	
	Between 1 and 2 h	30.4	35.8	33.3	
	More than 2 h	21.6	38.3	14.5	

	Green smartphone users	$\bar{6}$ (SD) Red smartphone users	Yellow smartphone users	$F$ (sig.)
Age	21.5 (2.12)	20.8 (2.26)	21.8 (1.99)	4.5** (0.012)
Daily media usage time via mobile	4.4 (3.14)	5.9 (3.45)	4.8 (3.09)	5.9** (0.001)
Number of downloaded apps	24.5 (25.02)	31.8 (36.7)	19.3 (15.1)	4.0** (0.019)
Average school performance	9.1 (11.1)	9.9 (13.4)	7.8 (1.13)	0.821 (0.441)

**Note(s):**  $\bar{6}$ : mean; SD: Standard deviation. \*\* 95% level of confidence

**Table 5.**  
Descriptive  
information about  
clusters

#### 4.3 Cluster descriptions and differences

This epigraph presents a description of each cluster according to the characteristics that show significant differences between groups (Table 5). Each cluster previously associated with colour regarding their smartphone addiction and considering individual and microsystem critical variables will be characterized by the main features of each profile. This practice of cluster characterization relative to certain sociodemographic and smartphone use variables is well accepted and employed in previous literature (Kiss *et al.*, 2020).

*Cluster 1: green smartphone users.* This group has a majority of males (59.2%) with an average age of 21 and a half. This group has the highest percentage of people studying university degrees (74%) in comparison with other groups ( $\chi^2$ : 26;  $p < 0.000$ ). Regarding their smartphone usage, green smartphone users spend significantly less time using their smartphone in comparison with red users ( $\bar{6}$ : 1.5;  $p < 0.000$ ) and yellow users ( $\bar{6}$ : 0.4;  $p < 0.000$ ), and this group also has the highest percentage of people (31.2%) that do not notice any increase in their smartphone use time during COVID-19 crisis in comparison with other groups ( $\chi^2$ : 22.3;  $p < 0.000$ ).

*Cluster 2: red smartphone users.* This cluster includes a large majority of males (60.5%). They are on average younger than 21 years old, and also, they are significantly younger than green users ( $\bar{6}$ : 0.7;  $p < 0.000$ ) and than yellow users ( $\bar{6}$ : 1;  $p < 0.000$ ). This cluster includes a high percentage of individuals studying high or vocational school (30.9%) in comparison with other groups ( $\chi^2$ : 26;  $p < 0.000$ ). Regarding red users' smartphone usage, this group spends significantly more time using their smartphone in comparison with green users ( $\bar{6}$ : 1.5;  $p < 0.000$ ) and yellow users ( $\bar{6}$ : 1.1;  $p < 0.000$ ). This group reveals to download significantly more apps than green users ( $\bar{6}$ : 7.3;  $p < 0.000$ ) and than yellow users ( $\bar{6}$ : 12.5;  $p < 0.000$ ). Moreover, a higher percentage (74.1%) of individuals in this group affirms that their use of

smartphone has increased more than 1 h per day during the COVID-19 crisis in comparison with other groups ( $\chi^2$ : 26;  $p < 0.000$ ).

*Cluster 3: yellow smartphone users.* This group includes similar percentages of both genders (54.4% is male, and 45.6% is female). This third group has a higher percentage of people that affirm not being studying (14.7%) in comparison with other groups ( $\chi^2$ : 26;  $p < 0.000$ ). Yellow smartphone users are the group that download significantly fewer apps in comparison to green users (6: 5.2;  $p < 0.000$ ) and red users (6: 12.5;  $p < 0.000$ ). Moreover, this group also has the highest percentage of people (29%) that affirm to have boosted their smartphone usage time during the COVID-19 crisis less than 1 h, in comparison with other groups ( $\chi^2$ : 22.3;  $p < 0.000$ ).

## 5. Discussion

Smartphone addiction constitutes a social and managerial challenge (Mrad and Chi Cui, 2020) and can also be a dangerous issue due to overuse, abuse or addiction and doing business. The smartphone has become one of society's most widespread and influential technological innovations (Busch and McCarthy, 2021). This study proposes an easy, innovative schema of smartphone users according to their level of addiction and related variables. Therefore, this paper's main contributions are four: (1) Drawing on multidisciplinary literature and applying a framework from epidemiology to analyse an important social issue with rich managerial practical implications. (2) The proposed traffic lights model use the risk and protective factors framework by considering critical variables at the individual (boredom proneness, compulsive app downloading) and microsystem level (phubbing and family harmony). To the extent of our knowledge, this is one of the first studies that offer a typology of Spanish smartphone users considering risk and protective variables from different disciplines to the extent of our knowledge. (3) The study answers the gap of needed studies with primary smartphone users' information since most existing studies are quickly getting obsolete and are based on Internet addiction and technology uses. In fact, smartphone addiction is changing exponentially every year. For example, the study by Kayri and Güneç (2016) offered a typology according to the level of Internet addiction and found 9% addicts, while our study shows almost 30% of addict smartphone users). Finally, (4) it helps policymakers and managers design strategies to address each of the three clusters to overcome smartphone addiction's potential adverse effects and derive recommendations for managers. We have revised the literature and have obtained the help of experts in smartphone use and overuse to offer an easily applicable typology of users (i.e. green, yellow and red smartphone users).

As mobile technology continues growing its popularity, marketing academics and managers, policymakers and society must comprehend the effect that technologies exert on individual behaviours. First, the literature is unclear whether certain constructs can be related and explain smartphone addiction (Busch and McCarthy, 2021). In this sense, the interviews with experts give us clues that disclosed boredom, phubbing, compulsive behaviour and family bond as the most critical variables related to smartphone addiction that could help classify smartphone users. To the extent of our knowledge, only the study by Kiss *et al.* (2020) classifies smartphone users according to their addiction and other variables, and ours is the first contemplating three groups, which help not only to distinguish addicts (red users) vs non-addicts (green users) but also individuals at risk of addiction (yellow users). Answering RQ1, our study offers a broad classification of smartphone users considering risk and protective factors involved at individual and microsystem levels, and each cluster corresponds to one colour of a called traffic-lights schema (i.e. green, red and yellow). In this sense, green users fit with smartphone users that are not at risk of developing smartphone addiction (this first cluster mainly shows higher positive scores in family harmony and higher negative punctuation in smartphone addiction than other groups). Red users comprise

individuals who tend to get bored quickly, phub others by using their smartphone, download apps compulsively and be considered addicts to smartphone use (this second cluster includes people who show higher positive punctuations in smartphone addiction, boredom proneness, phubbing behaviour and compulsive downloading). Finally, yellow users are the ones who are not addicted at this moment, but they are at risk of addiction (this third cluster shows higher negative punctuations in family harmony, although they are not addicted at this moment, they are prone to get bored, and it seems that this could be the open-door to engage with the smartphone addiction). Precisely, our results show that the construct of family harmony is the most relevant – one of the factors we have studied here – when addressing addiction and explaining different smartphone user behaviours, as Buctot *et al.* (2020) suggest. Boredom proneness and compulsive app downloading also help classify individuals into a group of less or more risk of addiction, as they have been identified as essential variables when dealing with smartphone overuse and dependence (Leung, 2007; Parylak *et al.*, 2011).

With these results in mind and together with experts' in-depth insights and with the aim of addressing RQ2, some proposed strategies for each group can be the following. In the case of *green smartphone users*, the primary strategy should be to reinforce family bonds since it acts as an essential protective factor to prevent young people from developing an addiction, so they keep free of smartphone addiction. It is better than users are selective when buying apps that are useful for them instead of compulsively downloading many apps that take up space on their smartphone and are not used after installation. Managers can address families as influencers to promote good use and shopping habits with the smartphone using communication campaigns. Green users do not use the smartphone so much. Thus, they are fewer potential smartphone shoppers. Following Mrad and Chi Cui (2020), the prevailing negative connotation of addictive consumption poses a constant challenge to firms' efforts to promote products without risking marketing ethics problems that undermine consumers' quality of life.

On the opposite side, the *red users* should be provided with or should look for leisure activities (i.e. sports, walks, reading books, face-to-face talks) to address boredom proneness and avoid compulsive apps' downloading with their smartphones. Managers could promote that these users buy these products offline. Moreover, phubbing should be socially condemned as the social group can play an essential role in individual behaviour. With this problematic group, the family should establish communication norms, and the smartphone must not be involved to construe a good and healthy family harmony and maybe practice parental mediation. They are a big group of young people with bad smartphone use habits that should be tackled urgently to avoid growing up with those habits that worsened during the COVID-19 crisis. Although they buy a lot, they buy compulsively, and this is bad in the long run as it can derive in dissatisfaction and not making practical use of their smartphone. As Sundstrom *et al.* (2019) affirm, retailers should choose a strategy based on customer value and satisfaction, as boredom can derive in price competition and instead satisfy customers by providing an opportunity to become less bored. In this line of thought, and as Bozaci (2020) states, there is a need to manage boredom, which is one of the most important problems facing people today, as it is one of the triggering variables for smartphone addiction and impulse buying. As he suggests, people should be educated in areas appropriate to their abilities and interests so that they can comprehend the meaning of their behaviours or tasks and focus more on their activities to reduce their problematic use of smartphones and increase their ability to make more conscious fulfilling purchases. Parents and educational institutions, managers and employees can take precautions in reducing boredom. Policymakers should promote healthy smartphone use using campaigns as long as they download apps; this can be the means to address them, for example, developing educational apps that show how to use the smartphone properly.

Lastly, at risk of addiction, *yellow users* can also benefit from leisure alternative activities, reinforcing family bonds and avoid being addict users in the future. Therefore, they should avoid boredom as it leads to addiction and search for other activities such as sports or cultural activities. Moreover, as Kleinschafer and Morrison (2014) propose, household members should establish norms to socialize among them to the intergenerational transmission of desirable behaviours.

Anyway, several of the described strategies can be used differently to help the three groups face a real/potential smartphone addiction, i.e. schools can promote talks with experts, teachers, parents and youngsters to speak about smartphone risks and healthy uses. Institutions can offer training courses regarding correct smartphone use for users of different ages, education level and home situations. Apart from the family and school, smartphone content and app developers should reflect on the need to offer not only entertaining contents but also useful tools to avoid useless downloads. In addition, they could design apps that help to foment a correct use of smartphones and provide practical cues to self-regulate smartphone use time and applications (i.e. to address youth addiction to smartphones, a game app could be developed where the avatar gets tired after a certain time playing is better than forbidding the smartphone as a punishment). As other authors have suggested (Camoiras-Rodriguez and Varela, 2020), mobile retailers need to conduct market segmentation when trying to increase their customer base and choose their potential customers according to their personalities, but also to their device use and profile.

Table 6 reflects a sum up of the main social and managerial challenges deriving from the variables used in this study to characterize clusters.

Nevertheless, further research is needed since certain *limitations* of this study must be recognized. The present study considers a specific demographic group (i.e. young people), it would be interesting to replicate the study with a larger sample, with adolescents, older adults or parents. In addition, the platform (prolific) employed may be conditioning the sample since people enrolled in this kind of webs might have a specific profile that may not represent the whole population. Thus, future studies should consider new demographic profiles, but other

Risk or protective factor	Main social challenge	Main managerial challenge
Compulsive downloading	To design entertaining apps that are socially responsible and do not contribute to spending much daily time in youth's life	The roles of marketers nowadays should focus not only on making profits over the short-term but also on offering healthy, responsible, and ethical products and services (i.e. apps, contents) for individuals, improving their quality of life and benefiting society
Boredom	To manage boredom proneness as it leads to addiction. Promote healthy leisure activities (e.g. sports, cultural activities)	The managers need to be capable of detecting points to manage boredom proneness as it leads to impulse buying and not satisfactory shopping
Phubbing	To promote face-to-face communication and active listening to lead to healthy and close friendly relationships To help to avoid social exclusion	Marketers should be aware of new social dynamics that affect how individuals interact with others and may affect their relationships with others (including brands, salesman and business)
Family harmony	To promote adequate family communication, socialization and norms as they affect attitudes and behaviours	Influencers and family networks could be employed to counsel that people learn good/practical smartphone use habits (including shopping, recommending, etc.)

**Table 6.**  
Social and managerial  
challenges deriving  
from risk and  
protective factors

ways to collect the information would be recommended (i.e. face-to-face). This study follows a cross-sectional design and the exclusive consideration of a single country (Spain); those are methodological shortcomings that restrict the generalization of the results. Future studies could study cross-national samples or collect longitudinal data. This study has focused on the individual and microsystem levels, but in the future other variables referring to the exosystem and macrosystem levels should be included in the smartphone user characterization, additional risk and protective factors, for example, perceived social support and social capital. Finally, future studies could develop a causal model to know how these risk and protective factors and addiction can precisely affect shopping.

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# How the response to service incidents change customer–firm relationships

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## Abstract

**Purpose** – This paper analyzes previously unmeasured effects of a response to a service incident called “benevolent” within the customer–firm relationship.

**Design/methodology/approach** – A questionnaire was administered to telecommunication customers in a Western European country, and the model was estimated using partial least squares (PLS).

**Findings** – This study shows that the customer–firm relationship is surprisingly affected by the response to expected incidents that the customer interprets as acts of benevolence or opportunism. This research also shows that the firm’s incident response interpreted as benevolence or opportunism has an effect that merely positive or negative events do not. Acts of benevolence response towards an incident positively affect customer–firm relationship quality, and expectations of such acts may lead to an upward spiral in customer commitment.

**Originality/value** – While benevolence trust has been proposed and studied before, the response to incidents interpreted as benevolent or opportunistic and their consequences have been under-studied, hence exhibiting a research gap.

**Keywords** Customer relationships, Service incidents, Expectancy and disconfirmation, Benevolence, Opportunism

**Paper type** Research paper

## Introduction

In product exchange, the stakeholders start to interact in relationships. The energy and closeness of a relationship between two parts are referred to as relationship quality (Tajvidi *et al.*, 2021). In a business context, relationship quality is related to the level of trust, satisfaction and commitment between a firm and a customer (Xie *et al.*, 2017), leading to successful relational exchanges. Relationship marketing research has found that a positive relationship between the firm and a customer will reduce uncertainty, increasing exchanges between parts guided by relational norms (Gummesson, 2017; Steinhoff *et al.*, 2019). High-quality relationships between parts have become deeply relevant for firms in achieving success.

Recently, relationship quality has been under the interest of researchers. For instance, Tajvidi *et al.* (2021) aimed to understand the factors that affect consumers’ intention to engage



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in co-creation activities, with results revealing that interactivity between stakeholders positively affects social support. Chi *et al.* (2020) investigated the relationship between customers and the firm from a social perspective, concluding that customer perceptions contribute to evaluating service quality. Boonlertvanich (2019) studied the causal relationships between service quality, customer satisfaction, trust and loyalty, finding that service quality affects attitudinal behavioral loyalty.

Although there is a growing body of literature exploring the relationship quality between firms and customers, no study aimed to understand the impact of the customer perception of an incident and the firm's response towards such incident being interpreted as benevolent or opportunistic on the consequences to the relationship quality between these parts. Given the recent importance given to academia to this subject and the importance of understanding how an incident impacts the customer–firm relationship, this study aimed to uncover the impact of a service incident and the firm's benevolence response and surprise on the relationship quality between the parties. An *incident* can be defined as an unexpected event that provokes the degradation of the quality of service (Ho *et al.*, 2020). The firm's act of benevolence facing an incident is interpreted by a customer as an indication of caring and willingness to sacrifice its outcomes (Fazal-e-Hasan *et al.*, 2020). The obverse of benevolence is opportunism, which is also addressed in this study. Data were collected from 224 individuals who lived at least a service incident during the previous year to achieve this purpose. Using partial least squares (PLS) for data analysis, we enriched the relationship quality between firms and customers.

## Theoretical background

### *Relationship quality theory*

Relationship quality aims to capture and keep customers through the close connection between service relationships to organizational outcomes (Macintosh, 2007), based on the premise that the customers' evaluation of the service performance has a significant impact on the customers' satisfaction and retention. The relationship quality theory consists of three constructs (Tajvidi *et al.*, 2021): trust, satisfaction and commitment. These are the attributions made by customers regarding events that occur in a firm–customer relationship. An extensive literature has been attempting to explain customer satisfaction, trust and commitment. Customer satisfaction has been studied as a central variable in marketing outcomes (Makanyeza *et al.*, 2016; Xu and Li, 2016) in recent years (El-Adly, 2019; Lucini *et al.*, 2020; Rita *et al.*, 2019) and is defined as the emotional evaluation of the firms' performance (El-Adly, 2019). Trust and commitment have been two central constructs of interest since marketing began to consider relationships central to profitability (Dawson *et al.*, 2017; Goutam and Gopalakrishna, 2018). Trust refers to the compliance to rely on a business partner in a relationship based on confidence (Iglesias *et al.*, 2020), while commitment is the wish to maintain a relationship (Keiningham *et al.*, 2017). One can say that supplier performance (Sáenz *et al.*, 2018), mutual dependence, attributions, expectancies, disconfirmations, perceptions of equity (Oliver and DeSarbo, 1988), perceived value (Agustin and Singh, 2005), and other constructs affect satisfaction, trust and commitment.

### *Expectation and disconfirmation*

Superior performance can lead to high levels of customer satisfaction, influencing the relationship between the customer and the firm (Martinaityte *et al.*, 2019). Performance is constituted of positive, negative and neutral events. Positive events contribute to incremental relationship development, whereas adverse events can dramatically impact a relationship. Moreover, how the firm deals with the client regarding those events will also determine the

relationship quality. Such relationship events disconfirm relational expectations (positive or negative) (Harmeling *et al.*, 2015).

Over time, a series of merely satisfactory transactions with a product can increase satisfaction and commitment (Harmeling *et al.*, 2015). However, expectations and their disconfirmations play a prominent role in satisfaction judgments (Bravo *et al.*, 2017). Expectations are positively related to satisfaction. Positive disconfirmations (pleasant surprises) raise satisfaction, whereas negative disconfirmations lower it. Unexpected incidents cause an “updating” in satisfaction, while incidents within expectations cause little change (Mattila, 2003). The key to satisfaction change is the “disconfirmation of expectations” experience.

However, expectations are in constant flux, adjusted by events like experiences with the product or supplier, marketing communications and changing awareness of alternatives (Payne *et al.*, 2017). Positive and negative disconfirmations affect satisfaction and make adjustments in expectations, which in turn affect repurchase intentions or commitment in a service context (Yi and La, 2004). A pleasant surprise makes a customer more satisfied and raises expectations about the supplier, leading to repurchase intentions. An unpleasant surprise has the opposite effect. Cai and Chi (2021) discussed the implications of these effects, which may be that raising expectations only sets up the firm for later negative disconfirmation experiences by its customer base.

Finally, as Howard and Barry (1990) evidenced, an unexpected and favorable event (winning a prize, in their experiment) tends to shift evaluations of a product from being based on the attributes of that product to the effect generated as a result of the pleasant surprise. This suggests that a firm might positively evaluate consumers with astutely chosen positive surprises. Managing customers’ expectations of future benefits is the basis of positive customer emotion and is crucial to their satisfaction and commitment (Hsieh and Yuan, 2021).

#### *Benevolence and opportunism*

*Benevolence* in response to an incident is an action that firms can use to help strengthen customer relationship quality. The act of benevolence implies genuine caring and kindness towards a customer, resulting in feelings of respect, indebtedness, respect and liking (Hiller *et al.*, 2019). Ganesan and Hess (1997) distinguished credibility trust and benevolence trust, where the former is an assessment of how a firm will deliver on its promises in the future, and the latter is an assessment of the degree it cares about the customer and is willing to make sacrifices for the customer. Opportunism is the obverse of benevolence and is the assessment by the customer that the firm does not care about the customer and will take advantage of the relationship (thus making the customer sacrifice for the benefit of the firm) if the opportunity presents itself. *Opportunism* is defined as “*self-interest seeking with guile*” (Paswan *et al.*, 2017). The customer observes the act of a firms’ opportunism as deceitful behavior.

Generally, benevolence is the firms’ initiative to advocate for customers’ well-being to avoid disadvantageous circumstances (Nguyen, 2016). It informs customers that the firm has pro-customer actions facing an incident. Although benevolence towards an incident may lead to a financial loss, it leads to customer trust and increases relationship quality (Aljarah, 2020). Moreover, benevolence has an impact on increasing customer trust and commitment. Trust is considered crucial for decision-making in risky situations since customers’ reluctance is determined by a lack of trust in the firm (Chaouali *et al.*, 2016; Svare *et al.*, 2020). Customer commitment generates satisfaction, increases relationship quality and results in the customers’ preference for the brand, vetoing competitors (Béal and Sabadie, 2018). Customer commitment can be most effectively built through acts that the customer perceives as coming from a benevolent firm.

*Positive, negative, benevolent and opportunistic response to an incident*

Positive and negative incidents have been studied in the context of service failures; the most significant effect of adverse incidents over positive ones is well-known (e.g. Allen *et al.*, 2019; Tontini *et al.*, 2019). Incidents have an irregular impact on the relationship strength, whether positive or negative (Allen *et al.*, 2020). From the customers' point of view, a positive incident benefits the customer. However, a negative incident reveals as a cost to the customer. Although it would be expected that a negative incident would lower the relationship strength, literature has speculated that customers understand and forgive when a first negative experience occurs (Christodoulides *et al.*, 2021; Tsarenko and Rooslani Tojib, 2011).

In addition, very little has been done to understand the impact of a firms' response considered benevolent or opportunistic to an incident caused to the relationship quality between the parties. Nevertheless, the act of benevolence usually results in forgiveness (Sajtos and Chong, 2018) and an opportunistic act turns into revenge and avoidance (Grégoire *et al.*, 2009).

**Conceptual model and hypotheses**

Our model is based on specific service incidents. We consider the effect of an incident on the change in the relationship quality (trust, satisfaction and commitment) between the customer and the firm (Tajvidi *et al.*, 2021). We hypothesize that the positivity or negativity of an incident and the benevolence or opportunism of the firm's response to that incident affect relationship quality. However, the extent of the surprise, or expectancy-disconfirmation of the incident, may produce a curious effect (Harmeling *et al.*, 2015). In other words, under conditions of great surprise, the positivity/negativity of the incident may have an enhanced effect on relationship quality. However, the effect on relationship quality of the benevolence/opportunism attributed to the firm's response to the incident may not be significantly enhanced. The situation is exactly reversed when the surprise is low: the positivity/negativity of the incident has a more negligible effect on relationship quality, but benevolence/opportunism response might have a more enhanced effect on relationship quality.

*Constructs and definitions*

*Relationship quality.* Grounded on relationship quality theory, we refer to customer-perceived changes in the three central relationship quality variables (satisfaction, trust and commitment) as a second-order construct called "relationship quality." While these constructs have different roles in understanding a relationship (El-Adly, 2019; Iglesias *et al.*, 2020; Keiningham *et al.*, 2017), we consider them as common indicators of a higher-level construct that indicates the relationship quality between the customer and the firm. This is a broad-brush approach to relationship quality that later research may articulate into different effects.

*Positivity.* This is defined as the customer's perception of the extent of the positivity or negativity of an incident.

*Benevolence.* Based on the incident, this is the extent to which the customer attributes the firm's response as benevolent or opportunistic.

*Surprise.* This is the extent to which the customer's expectations were confirmed or disconfirmed.

*Research hypotheses*

From the customers' point of view, the quality of the relationship between customer and firm is very much a forward-looking construct mainly based on the past behavior of the firm and the attributions made to it. When consumers consider whether they will continue to do business with the firm, they project its behavior into the future. Has the firm behaved

satisfactorily in the past? Can the customer infer that it is trustworthy? Would it take advantage of the customer? Shall the customer continue to do business with it or survey the market for another supplier? Furthermore, answers to these questions are dynamic, changing over time as incidents accumulate.

Positive and negative incidents have an irregular impact on relationship quality. Positive incidents reveal a benefit for the customer, leading to a positive affective reaction (Ramseook-Munhurrin, 2016; Zhu *et al.*, 2019). In turn, a firm's benevolence response towards an incident indicates that the firm is concerned with the well-being of its customers (Nguyen, 2016). This approach also leads to a positive affective reaction from the customer. Therefore, we hypothesize that:

*H1.* The positivity of an incident positively influences the relationship quality.

*H2.* The benevolence response towards an incident influences the relationship quality.

Nonetheless, there is a moderating effect of surprise or expectancy-disconfirmation of the incident. Usually, a positive incident is good for the relationship, while a negative incident is not. However, if it does not surprise the customer, it is just standard good or bad service.

A positive incident that surprises the customer indicates that more excellent performance may be expected in the future (Lenz *et al.*, 2017), thus enhancing the relationship quality. A surprising failure is an indication that poorer service may be expected (Endrikat, 2016), thus lowering the relationship quality.

Notwithstanding, when the customer faces a surprising positive incident, a twofold enhancement of the relationship quality occurs (Sajtos and Chong, 2018) since the positive incident alone would have an enhanced effect on the relationship quality, increased by the surprising effect.

In turn, facing a surprising negative incident, the customer would feel doubly frustrated, negatively influencing the relationship quality.

Thus, we hypothesize:

*H3a.* Higher levels of surprise facing an incident will positively influence the relationship quality.

The act of benevolence regarding a firm's incident will increase the relationship quality (Nguyen, 2016). However, when the firm promotes the element of surprise, it would be expected that the relationship quality would have a double effect, increasing the relationship quality. In turn, if the firm's act facing the incident is viewed as opportunistic and surprising, the opposite double effect will occur (Paswan *et al.*, 2017). However, if the opportunistic act is not a surprise, we can expect resignation toward the relationship and hatred toward the firm. In addition, one can expect the consumer to minimize contact with the firm, but each additional incident will confirm the customer's powerlessness afresh (Bunker and Ball, 2009), leading to further declines in relationship quality. So, we hypothesize:

*H3b.* Higher levels of surprise facing a benevolent response towards an incident will influence the relationship quality.

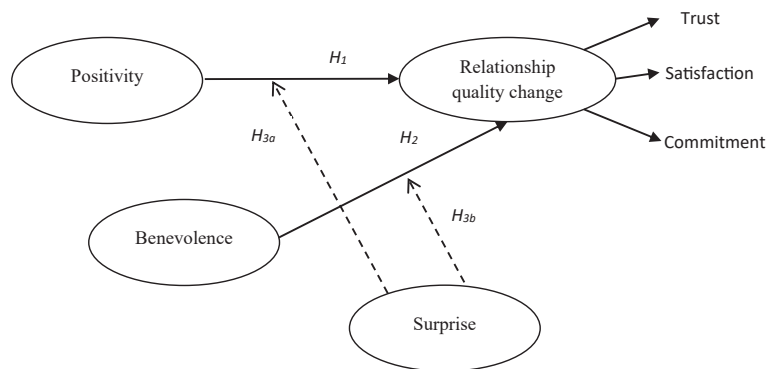
Figure 1 presents the conceptual model and the associated research hypotheses that will be tested.

## Research methodology

### *Data collection*

The quantitative research phase of this study was conducted by administering a questionnaire, through computer-assisted telephone interviewing, to telecommunication customers (mobile phone and cable TV customers) in a Western European country.



**Figure 1.**  
Conceptual model

Respondents were randomly selected through random digit dialing using the ranges of all available mobile and landline telephone numbers. After being identified as a customer of one of the telecommunication companies, the interviewees were asked about at least one service incident during the previous year. Only customers with specific and identifiable service incidents were selected to be interviewed.

After identifying service incidents, the questionnaire queried the respondents' perception regarding the characteristics of the incident, including positivity, level of benevolence-opportunism in the response towards such incident, level of surprise (expect-non-expected) and attributions made by the respondent. The questionnaire also queried clients' perceptions of the incident's relationship quality.

The sample was stratified by industry (mobile and cable TV) and by type of service incident and response (positive, negative, benevolent and opportunistic) to guarantee an adequate sample size for each group. Along with the type of incident, a detailed description was collected. After data collection, the detailed description of all incidents was facially validated by independent marketing academics and telecom professionals. All records whose incidents were not found adequately described or did not correspond to the type of incident selected by the customer were discarded. This resulted in discarding 30 records. The sample size was 224 individuals (119 mobile telecommunication customers and 105 cable TV customers). All groups corresponding to the types of incidents and responses were also well represented (57 observations with positive non-benevolent incidents, 54 with negative non-opportunistic incidents, 70 with benevolent incidents and 43 with opportunistic incidents).

The socio-demographic characteristics of the respondents are presented in Table 1. The socio-demographic profile is consistent with the known structure of the population and was validated by industry managers as consistent with industry data.

### Measures

The questionnaire construction design followed the methodological approach of Malhotra (2019). First, exploratory research, through a focus group, was applied to university students who were customers of the selected industry and experienced at least one incident. Through a semi-structured approach, we aimed to understand how people experienced service incidents, how they distinguished them, the most relevant characteristics of each incident, their interpretation of the firm's response towards the incident, and if such incidents and responses affected their relationship with the supplier. According to the results obtained in the first stage, the incidents were classified into four groups on a second stage. This stage led to a preliminary version of the scales. A qualitative pre-test was conducted through a pilot survey

	(%)
<i>Gender</i>	
Male	51.8
Female	48.2
<i>Age of respondent</i>	
<30 years	23.7
30–39 years	21.4
40–49 years	18.8
≥50 years	34.4
Missing	1.8
	100.0
<i>Education level of respondent</i>	
Basic education or less	13.4
High school education	46.4
University education	37.5
Missing	2.7
	100.0
<i>Occupation of respondent</i>	
Employer	2.7
Self-employed	8.9
Worker on behalf of others	55.8
Unemployed	4.0
Housewife	3.6
Retired	10.3
Student	12.1
Missing	2.6
	100.0

**Table 1.**  
Sample characteristics

directed to 28 customers of both industries on a third stage. Minor refinements were introduced in the phrasing and order of the questions and the filtering of the questionnaire. In the fourth stage, the final version of the questionnaire was presented to academia and industry independent experts (expert judgment), who validated it. Other forms of validity (convergent, discriminant and nomological) were also accessed.

All constructs in the proposed model (positivity of the incident, level of benevolence-opportunism in the response, surprise and customer–firm relationship change) were based on reflective multi-item scales. All indicators were measured with a ten-point rating scale, with one representing the lowest and ten the highest. Table A1 of Appendix presents a detailed list of indicators used in the measurement model.

### *Estimation*

The structural model consists of three latent variables (Figure 1). The model was estimated using the complete dataset ( $n = 224$ ) of telecommunication customers and four subgroups. The first two subgroups represented a split of the data set by industry: mobile telecommunications and cable TV. The other two subgroups were obtained by dividing the original data set into customers with a high (above average) level of surprise (unexpected incidents) and a low (below average) level of surprise (expected incidents). These two segmentations were used for subgroup analysis (Arnold, 1982; Kohli, 1989; Sharma *et al.*, 1981) to assess the moderating effects of industry and level of surprise on the model structure. The contrast between high and low surprise groups is evident in Table 2, which shows each group's mean and standard deviation of surprise indicators.

The model was estimated using PLS. This option is mainly motivated by the nature of the data (Hair *et al.*, 2017). We measure categorical variables with an unknown non-normal frequency distribution, which is usually negatively skewed. In this context, PLS can be a preferable alternative to the use of maximum likelihood methods, comparisons between maximum likelihood methods, and PLS can be found in the studies by Fornell and Bookstein (1982), Dijkstra (1983), Chin (1998) and Vilares *et al.* (2010). All data analyses were done using SmartPLS and SAS system.

Table 2 presents both means and standard deviations in high and low surprise groups.

## Analysis

### *Descriptive analysis*

Means and standard deviations of original variables can be found in Table 3. The dataset means varied between 5.83 for  $x_{11}$  (how positive–negative the customer considers the event) and 6.79 for  $x_{31}$  (how much the event surprised the respondent). The highest means were found in surprise indicators and the lowest in positivity construct. Standard deviations varied between 2.47 for  $x_{31}$  (how much the event surprised the respondent) and 3.24 for  $x_{12}$  (how pleasant-unpleasant the customer considers the event). Surprise indicators were the ones that globally showed the lowest variability. Although the means for most of the measures were located just slightly to the right of the center of the scale, suggesting a slightly negatively skewed distribution, the standard deviations suggest a large variability in all indicators associated with a non-normal distribution.

### *Reliability and validity*

We started by examining the model constructs' reliability and convergent validity measures (Table 4). All Cronbach's alphas (Cronbach, 1951) exceeded the 0.7 thresholds (Nunnally, 1978) and were consistently higher than 0.93. Without exception, latent variable composite reliabilities (Werts *et al.*, 1974) were higher than 0.96, showing a high internal consistency of

Construct	Indicators	High group		Low group	
		Mean	Std. dev	Mean	Std. dev
Surprise	$y_{31}$	8.27	1.54	5.09	2.25
	$y_{32}$	8.26	1.43	4.65	2.17

**Table 2.**  
Means and standard  
deviations in high and  
low surprise groups

Construct	Indicators	Mean	Telecom	Loading
			Std. deviation	
Positivity	$x_{11}$	5.83	2.81	0.970***
	$x_{12}$	5.86	3.24	0.970***
Benevolence	$x_{21}$	5.85	2.81	0.970***
	$x_{22}$	6.21	2.72	0.972***
Surprise	$x_{31}$	6.79	2.47	–
	$x_{32}$	6.58	2.56	–
Change in relationship	$y_{11}$	5.97	2.89	0.968***
	$y_{12}$	6.00	2.96	0.979***
	$y_{13}$	6.20	2.83	0.956***

**Note(s):** \*\*\*Significant at < 0.001 level

**Table 3.**  
Means, standard  
deviations and  
standardized loadings  
of manifest variables

indicators measuring each construct and thus confirming construct reliability. The average variance extracted (AVE) (Fornell and Larcker, 1981) was equal to 0.94 for the three constructs, indicating that the variance captured by each latent variable was significantly larger than variance due to measurement error, thus demonstrating a high convergent validity of the constructs. Computing standardized loadings also confirmed the reliability and convergent validity of the measurement model for indicators (Table 3) and Bootstrap *t*-statistics for their significance (Anderson and Gerbing, 1988). All standardized loadings significantly exceeded the 0.7 thresholds, and they were found, without exception, significant at a 0.1% significance level, thus confirming a high convergent validity of the measurement model.

Discriminant validity was assessed, determining whether each latent variable shared more variance with its measurement variables than other constructs (Chin, 1998; Fornell and Bookstein, 1982; Fornell and Larcker, 1981). By comparing the square root of the AVE for each construct with the correlations with all other constructs in the model (Table 5), we could observe that the square roots of AVE were consistently higher than the correlations between constructs. This fact allowed us to conclude that all the constructs showed evidence for acceptable validity. Discriminant validity was also assessed at the indicator level, comparing its construct with all possible cross-loadings (Gefen and Straub, 2005). All loadings were found more significant than the respective cross-loadings over all other constructs, thus confirming discriminant validity at the item level.

We used an unrelated theoretical construct to assess possible standard method bias, measured using the same scale as the research indicators. Category involvement with restaurants was used as a marker variable. A high correlation between the study's focal construct (customer–firm relationship) and the marker construct would indicate common method bias as they should be theoretically non-correlated. The correlation between category involvement and customer–firm relationship was 0.15, showing no evidence of common method bias. Additionally, this marker construct was included as an antecedent of the customer–firm relationship in our structural model. The estimated effect (0.05) was not significant at the 5% significance level. In summary, these tests suggested that common method bias was not involved in the study's results.

#### *Model estimation*

Table 6 shows results of model estimation for the global telecommunications sample as well as for the two industry subgroups (mobile telecommunications and cable TV) and the two

**Table 4.**  
Reliability and validity  
measures

Constructs	Cronbach's alpha	Telecom Composite reliability	Average variance extracted
Benevolence	0.94	0.97	0.94
Positivity	0.94	0.97	0.94
Satisfaction	0.97	0.98	0.94

**Table 5.**  
Correlations between  
latent variables and  
square roots of average  
variance extracted

	Positivity	Telecom Benevolence	Satisfaction
Positivity	<i>0.97</i>	0.83	0.87
Benevolence		<i>0.97</i>	0.87
Satisfaction			<i>0.97</i>

**Note(s):** Numbers shown in italic face denote the square root of the average variance extracted

surprise subgroups (low surprise (expected) incidents and great surprise (unexpected) incidents). The proposed model showed a high explanatory power for relationship quality, with a determination coefficient ( $R^2$ ) of 0.83 for the global sample. The  $R^2$  was always higher than 0.78 (low surprise group) at the subgroup level, with a maximum of 0.87 (high surprise group). Globally, results showed an excellent explanatory power consistent among subgroups and therefore provided strong support for the nomological validity of the proposed model.

Table 6 presents parameter estimates of the proposed model and respective significances. For the global sample, we can observe that the path coefficient estimates for positivity (0.48) and benevolence (0.47) were highly significant at ( $p < 0.001$ ) in explaining relationship quality. Therefore, hypotheses *H1* and *H2* were fully supported. Both positivity of the incidents and the level of perceived firm's benevolence towards the incident affected customer–firm relationships in the same magnitude. This result aligns with Ramseook-Munhurrin (2016) in their research on customers' waiting for experiences in service encounters, concluding that customers seem to be pleased and happy when there is a firm's benevolent reaction towards an incident. Moreover, the influence of the firms' benevolence on the relationship quality is confirmed by Nguyen (2016), who suggested that benevolence enhances customer loyalty.

A subgroup analysis by industry (mobile and cable TV) was also performed to validate the estimated model structure. Results showed that positivity and benevolence effects were significant in both segments. Both positivity and benevolence showed significant effects on relationship quality in both industries. The effects of positivity were 0.46 and 0.50 for mobile and cable TV, respectively, while benevolence effects were 0.50 and 0.44. To assess the stability of the model structure in both subgroups, we performed a Chow test (Chow, 1960) (Table 6). When comparing mobile and cable TV customers, the Chow test ( $F$  value 0.24,  $p = 0.78$ ) provided no evidence that the forms and slopes of the two models were significantly different. So, evidence showed that the effects of positivity and benevolence remained significant and that the structure of the model was consistent in both industries.

Furthermore, the model explanatory power was similar in both industries, supporting *H1* and *H2*. This result is aligned with the work of Sajtos and Chong (2018) that examined the benevolent outcome of service failures in six different experimental conditions. This suggests that the firm's benevolence towards an incident positively affects the relationship quality in multiple contexts. When the act of the firm is seen as opportunistic facing a firm's incident, the client may respond with acts of revenge or avoidance (Grégoire *et al.*, 2009), resulting in a decrease of the relationship quality between the parts regardless of the context.

A subgroup analysis for customers experiencing a low and high level of surprise incidents was performed to assess the moderating effect of surprise on positivity and benevolence on relationship quality and test hypotheses *H3a* and *H3b* (Cf. Table 7).

The Chow test ( $F$  value 3.48,  $p < 0.05$ ) provided evidence that the forms and slopes of the two models were significantly different in high and low surprise groups (see Table 6). To

Sample type	Benevolence		Positivity		Global significance	
	Parameter estimate	<i>t</i> -statistics	Parameter estimate	<i>t</i> -statistics	Adj. $R^2$	<i>F</i> statistics
Total telecom sample	0.47	7.71	0.48	7.93	0.83	549.07
High surprise	0.35	4.59	0.61	8.29	0.87	407.33
Low surprise	0.59	6.54	0.35	3.72	0.78	183.59
Mobile	0.50	6.07	0.46	5.61	0.84	306.21
Cable TV	0.44	4.51	0.50	5.24	0.82	238.56

**Table 6.**  
Unstandardized  
parameter estimates

assess statistical differences in individual effects (for positivity and benevolence), we used unpaired *t*-tests. The *t*-test for positivity (difference 0.26, *t* value 2.19) and the firm's benevolence towards the incident (difference −0.24, *t* value 2.03) was both significant at  $p < 0.05$ , hence providing evidence that individual effects were different in both groups and supporting hypotheses *H3a* and *H3b*. These results are in line with previous findings. When a company is inherently associated with negative actions and engages with meaningful activities, it creates a positive surprise, affecting the relationship quality (Lenz *et al.*, 2017; Schepers *et al.*, 2012). In turn, the aggregated effect of benevolence and surprise will promote a double positive effect on the customer, increasing relationship quality (Nguyen, 2016).

The estimated effect of positivity on relationship quality was 0.61 in the high surprise group and 0.35 in the low surprise segment. Also, the difference of estimated benevolence response effect between high and low surprise groups was significant, with the effect of 0.35 for the high surprise group and 0.59 for the low surprise group. Therefore, we have strong evidence of a moderating effect of the level of surprise associated with service incidents over the positivity relationship quality and the benevolence-response quality effects. The effect of positivity was more significant for unexpected incidents, while a benevolence response towards an incident was more significant when expected. Meaning that positive unexpected incidents provoke satisfaction, confirming the results of previous studies (Cai and Chi, 2021; Yi and La, 2004). An unexpected positive incident may reflect itself in higher expectations about the firm that may lead to customer loyalty and repurchase intentions. The same happens when a firms' benevolent response to an incident is expected. The firm, by sacrificing its short-term outcomes in favor of the customer will lead to forgiveness (Sajtos and Chong, 2018) and help strengthen customer relationship quality (Hiller *et al.*, 2019). Moreover, the benevolence act in response to a firms' incident will increase customer trust and commitment (Chaouali *et al.*, 2016; Svare *et al.*, 2020).

To further understand the role of incidents' surprise level in explaining the customer–firm relationship quality, we revised our structural model, including the surprise construct as an antecedent of relationship quality. The effect of surprise on the focal construct was −0.045 and was found non-significant ( $p > 0.05$ ), supporting that the level of surprise associated with service incidents acted as a pure moderator of the relationships between positivity, benevolence and relationship quality.

### Conclusion

This research was motivated by the existing ambiguity in current knowledge about the effects of several service incidents on customer–firm relationship quality and the lack of empirical validation. Additionally, we aimed to address a theoretical and open question of whether incidents must be unexpected to affect customer–firm relationship quality significantly.

Our study offers empirical support for the significant effects of incident positivity and benevolence towards an incident on the customer–firm relationship and a moderating effect

Groups	Benevolence		Positivity		Global significance
	Between groups difference	<i>t</i> -statistic	Between groups difference	<i>t</i> -statistic	
Industry (mobile – TV)	0.06	0.47	−0.04	−0.32	0.24
Level of surprise (high – low)	−0.24	−2.03*	0.26	2.19*	3.48*

**Note(s):** \*Significant at  $< 0.05$  level

**Table 7.**  
Subgroup analysis

of the level of surprise on these effects. Positive and negative incidents will significantly affect relationship if unexpected, whereas the benevolent or opportunistic response to incidents will have a more significant influence if expected by customers. Thus, these results provide substantial theoretical and managerial implications (Table 8).

Customer expectations are vital to increase or decrease satisfaction (Hult *et al.*, 2019; Qazi *et al.*, 2017), influencing relationship quality. Unexpected positive incidents drive up satisfaction. Unexpected negative incidents drive it down. Presumably, expected incidents did very little. This appears to be false.

Positive surprises are usually complex and expensive to generate. Negative surprises occur all the time, despite efforts to prevent them (Endrikat, 2016). Keeping customers satisfied by avoiding negative surprises is a constant but fundamental struggle. Also, positive surprises can be generated with a positive return on investment (Sajtos and Chong, 2018).

Just as important are the typical cases of service incidents that do not surprise customers. Although most service incidents do not surprise the customer, they may generate an impression of firms' benevolence or opportunism. Ordinary service incidents are thus an opportunity to improve the relationship or damage it, but the key is not the mere positivity of the incident but the apparent response of benevolence to an incident (Mancilla, 2013). If the company regularly conveys that it cares about a customer's business and sacrifices a little for it, then that becomes an expectation for the customer – "normal is caring about me" – and the relationship improves with each benevolent response to an incident. Nevertheless, if the "normal" in a relationship is opportunism – "this company regularly takes advantage of me" – then the customer expects it, and another opportunistic response to an incident confirms the expectation and drives the relationship down further.

#### *Theoretical and managerial implications*

Our study adds to academia by showing that attributions of the benevolence and opportunism responses in expected incidents drive changes in satisfaction, trust and commitment to the same extent as unexpected positive and negative incidents. This shows an unexpected effect of expected events in a relationship.

Moreover, this study contributes additionally to firms by highlighting the importance of understanding what is perceived as expected and unexpected because relationships may proceed in either upward or downward spirals *even if nothing unexpected happens*. To reverse a downward spiral, companies need to do something surprisingly positive and change customer expectations from opportunistic treatment to benevolent treatment when facing an incident.

<i>Positive incidents</i>	<i>Benevolent incidents</i>
Have a positive effect on customer–firm relationship	Have a positive effect on customer–firm relationship
Improvement in customer–firm relationship is larger if the event is unexpected	The effect is larger for expected benevolent incidents
Positive surprises can be used to reverse a downward spiral in customer–firm relationship	Expected benevolence can be a valuable tool to create an upward spiral of relationship improvement
<i>Negative incidents</i>	<i>Opportunistic incidents</i>
Have a negative effect on customer–firm relationship	Have a negative effect on customer–firm relationship
Damage on customer–firm relationship is larger if the event is unexpected	The effect is larger for expected opportunistic incidents
If not avoided, negative surprises may stop an upward spiral in customer–firm relationship	Expected opportunism risks creating a downward spiral degrading customer–firm relationship

**Table 8.**  
Effect of service  
incidents on customer–  
firm relationship

*Limitations and further research*

This study's data reflect a single point in time. Further research that follows customers through several time points in which an assortment of events occur would help delineate the explanatory power of multiple events of positive, negative, benevolent and opportunistic types. Future studies should consider the relationship length and past experiences to understand the relationship quality better. Understanding the types of incidents that generate benevolent and opportunistic attributions in various industries may be essential for future research. Finally, it will be important in future work to look for differential effects on satisfaction, trust and commitment of different types of benevolent and opportunistic events on the customer–firm relationship.

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### Appendix Measurement model

Construct	Measure
Positivity	$x_{11}$ Using a scale from 1 to 10, where 1 means "very negative" and 10 means "very positive", how do you classify the event that you mentioned?
	$x_{12}$ Using a scale from 1 to 10, where 1 means "very unpleasant" and 10 means "very pleasant", how do you evaluate the event that you mentioned?
Benevolence	$x_{21}$ In what way do you think that this event shows that the service provider cares or does not care about you as a customer? Using a scale from 1 to 10, where 1 means "service provider does not care about you as a customer" and 10 means "service provider has a genuine concern with you"
	$x_{22}$ In what way do you think that this event shows that the service provider cares or does not care about keeping you as a customer? Using a scale from 1 to 10, where 1 means that the "service provider just cares the profits and does not care about keeping me as a customer" and 10 means "service provider cares in keeping me as a customer and does not just care about the profits"
Surprise	$x_{31}$ Using a scale from 1 to 10, where 1 means "nothing surprised" and 10 means "very surprised", how did this event surprise you?
	$x_{32}$ Using a scale from 1 to 10, where 1 means "very expected" and 10 means "very unexpected", how expected (unexpected) do you consider the behavior that caused this event?
Relationship quality change	$y_{11}$ Using a scale from 1 to 10, where 1 means "a very negative way" and 10 means "a very positive way", how do you classify the way this incident affected your trust in the service provider?
	$y_{12}$ Using a scale from 1 to 10, where 1 means "a very negative way" and 10 means "a very positive way", how do you classify the way this incident affected your satisfaction with the service provider?
	$y_{13}$ Using a scale from 1 to 10, where 1 means "a very negative way" and 10 means "a very positive way", how do you classify the way this incident affected your loyalty to service provider as a customer?

**Table A1.**  
Indicators of the  
measurement model

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# Predicting intention to follow online restaurant community advice: a trust-integrated technology acceptance model

Online  
community  
advice

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## Abstract

**Purpose** – This research investigates consumer intention to follow online community advice. Applying the technology acceptance model (TAM) to the context of online restaurant communities, the study empirically examines the effects of perceived usefulness, perceived ease of use, attitude and trust on the intention to follow online advice.

**Design/methodology/approach** – The data were collected from 360 members of online restaurant communities on Facebook and analyzed using structural equation modeling (SEM).

**Findings** – The findings revealed that trust, perceived usefulness and attitude are key predictors of the intention to follow online restaurant community advice.

**Originality/value** – Extant research on the influence of online reviews on consumer behavior in the restaurant industry has largely focused on the characteristics of the review, reviewers or readers. Moreover, other studies have investigated consumers' motivations to write online restaurant reviews. This study, however, takes a different approach and examines what drives consumers to follow the advice from online restaurant communities.

**Keywords** Online reviews, Restaurants, Trust, Online communities, Technology acceptance model (TAM)

**Paper type** Research paper

## 1. Introduction

The advent of Web 2.0 and the ensuing growth of user-generated content (UGC) have transformed the way individuals search for and share information. The interactive nature of social media has given consumers opportunities to communicate with firms and with one another, creating UGC (Arora and Sanni, 2019). In computer-mediated environments, consumers share opinions, knowledge and personal experiences by posting reviews of products, services and brands on social networking sites (SNSs), third-party review sites or firms' own websites (Kannan and Li, 2017). Before purchasing, consumers evaluate products by checking online reviews as a trustworthy information source (Filieri *et al.*, 2018).

Online reviews hold an undeniable importance in the hospitality industry (Liu and Park, 2015), and in the restaurant sector in particular (Dixit *et al.*, 2019). Because of the intangible, experiential nature of hospitality services, it is challenging to evaluate their quality before consumption (Liu and Park, 2015; Ruiz-Mafe *et al.*, 2020). This uncertainty felt by consumers in their decisions causes them to seek information (Yang *et al.*, 2018).



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UGC platforms represent valuable information sources as customers consult them before visiting restaurants for recommendations and after to share feedback (Yang, 2017). Furthermore, because of intense competition in the restaurant industry, marketers integrate UGC in their marketing strategy to attract and retain customers (Jalilvand *et al.*, 2017). In fact, restaurant owners report that social media and online listing services are the most effective marketing channels for promoting their businesses (TripAdvisor, 2017).

In UGC context, trust is vital as reviewers' identity and motivation are unknown to consumers (Filieri *et al.*, 2018). Review readers have no prior interactions with reviewers which complicate the development of trust between them (Filieri, 2016). Furthermore, fake reviews by managers or paid customers have cast a shadow over the quality and reliability of UGC (Filieri *et al.*, 2015). Thus, consumers assess reviewers' trustworthiness to decide whether to consider this information in their decisions (Ismagilova *et al.*, 2020a).

The intention to follow the advice was introduced by McKnight *et al.* (2002a), who found that trust in e-vendors is a key determinant of consumers' intention to follow their advice. Later, Casaló *et al.* (2011, p. 624) defined the intention to follow online travel community advice as "the intention to behave in a determined way, according to the comments, recommendations and suggestions of other community members."

We aim to enrich the understanding of what drives consumers to adopt an advice obtained from social media communities for restaurant reviews. By applying the technology acceptance model (TAM) in the context of online restaurant communities, this study investigates the effects of perceived usefulness, perceived ease of use, attitude and trust on the intention to follow online advice.

This work contributes to the literature in several ways. First, research on information and communication technologies in the hospitality industry has focused on the hotel sector (Moreno and Tejada, 2019). Comparatively, academic contributions within the restaurant sector are insufficient. Likewise, DiPietro (2017) argued that because of the prevalence of social media in the restaurant business, this area requires further research. Unlike hotels' star rating system, restaurants are not rated by official organizations based on uniform standards, leading consumers to rely more on online reviews (Ruiz-Mafe *et al.*, 2020). Thus, there is a need for a thorough understanding of the factors shaping consumers' intention to follow online restaurant advice.

Second, existing studies on the influence of electronic word-of-mouth (eWOM) on consumer behavior in the restaurant industry have focused largely on examining the specific characteristics of the review (e.g. review rating, length, argument quality and valence), reviewers (e.g. expertise, identity disclosure, and reputation), or readers (e.g. readers' construal levels) (e.g. Bigne *et al.*, 2020; Chen and Farn, 2020; Hernández-Ortega, 2020; Huang and Liang, 2021; Ruiz-Mafe *et al.*, 2020; Srivastava and Kalro, 2019; Zhang *et al.*, 2021). Furthermore, researchers have paid attention to studying consumers' motivations to write online restaurant reviews and drivers of eWOM intentions (e.g. Dixit *et al.*, 2019; Jalilvand *et al.*, 2017; Yang, 2017). However, there is little consensus on what drives a consumer to follow peers' online advice, especially in online communities (Casaló *et al.*, 2011; Ruiz-Mafe *et al.*, 2020). The intention to follow online advice is a strong indicator of future behavior (McKnight *et al.*, 2002a). Given the increasing competition in the restaurant industry, identifying the key precursors of the intention to follow online advice is essential.

Third, although researchers have considered the role of trust in social media, the influence of trust on consumer intention to rely on these platforms needs more research (Alalwan *et al.*, 2017). A meta-analysis by Ismagilova *et al.* (2020a) noted that few studies have examined the relationship between trustworthiness and eWOM adoption. Accordingly, we bridge this gap by integrating trust into the TAM to examine its influence on consumers' attitude and intention to follow online advice.

The paper is structured as follows: the next section provides a review of the related literature from which the research hypotheses are developed. Then, the research methodology is presented. The findings of the study are reported next. The final section discusses the results and their implications and concludes with research limitations and future research.

## 2. Theoretical background and hypotheses development

### 2.1 Online reviews

eWOM exists in online consumer opinion platforms, online communities and SNSs (Cheung and Lee, 2012; Litvin *et al.*, 2008). eWOM in the form of online reviews include consumers' unbiased advice, opinions and comments (Hernández-Ortega, 2020). Online review is defined as "any positive, neutral, or negative online review about a product or service created and published on a consumer review website by a potential, former, or actual customer." (Filieri, 2015, p. 1262).

Reviewing the recent hospitality literature on online reviews, particularly on restaurants, we concluded that there are two streams of research. The first stream has examined the impact of online reviews on consumers' responses to the review (e.g. review credibility and helpfulness) or other behavioral responses (e.g. purchase intention) using three factors: source characteristics (reviewers), characteristics of the review (message) and characteristics of information receivers (review readers) (Zhang *et al.*, 2021). The second research stream has focused on investigating consumers' motivations to write online restaurant reviews and drivers of consumers' eWOM intentions.

Concerning source characteristics in the first research stream, researchers have studied the following: the effect of reviewers' identity disclosure, reputation, expertise, age, gender and contribution badge on the helpfulness/usefulness of online reviews (Liu and Park, 2015; Srivastava and Kalro, 2019); the influence of source trustworthiness, expertise and homophily on consumers' purchase intentions (Filieri *et al.*, 2018); the impact of source credibility on information diagnosticity (Filieri, 2015) and the moderating effects of reviewer's experience, cognitive effort in writing a review and online status on online review rating behavior (Li *et al.*, 2020).

Regarding review characteristics, studies have investigated the following: the effect of textual features (i.e. attribute salience, review valence and content concreteness) on the trustworthiness of consumer reviews (Huang and Liang, 2021); the impact of positive valence intensity on consumers' post consumption responses, namely, attitude and repurchase intention (Hernández-Ortega, 2020) and the influence of manifest/quantitative factors (i.e. review rating, word count and review length) and the latent/qualitative content factors (i.e. argument quality and message valence) on review helpfulness (Srivastava and Kalro, 2019).

Moreover, research on review characteristics has showed that eWOM metrics (e.g. volume, valence and composite valence – volume and variance) influenced the sales of products and services (Babić Rosario *et al.*, 2016; Yang *et al.*, 2018; Ye *et al.*, 2011; You *et al.*, 2015). Similarly, the literature revealed that review volume and ratings positively influenced restaurant profitability (Wang *et al.*, 2021) and online popularity (Zhang *et al.*, 2010). Furthermore, some studies have analyzed the pictorial content of online reviews and its influence on purchase intention (Bigne *et al.*, 2020) and perceived helpfulness of UGC (Bigne *et al.*, 2021). Another group of studies have focused on the effect of positive and negative emotions embedded in online reviews on their perceived helpfulness (Chen and Farn, 2020; Ismagilova *et al.*, 2020b).

Finally, from the information receivers' perspective, Zhang *et al.* (2021) examined how readers' construal levels influenced their perceived usefulness of online reviews. Further, Ruiz-Mafe *et al.* (2020) analyzed the intention of TripAdvisor users to follow its advice

through the interrelationships between the cognitive cues of online reviews (i.e. perceived helpfulness and persuasiveness) and readers' emotions (i.e. pleasure and arousal). Results showed that review persuasiveness and helpfulness had positive effects on reader's pleasure and arousal, which determined the intention to follow TripAdvisor advice.

In the second stream, researchers in the restaurant industry have paid significant attention to studying consumers' motivations to write online reviews and the drivers of eWOM intentions (e.g. Dixit *et al.*, 2019; Jalilvand *et al.*, 2017; Yang, 2017). For instance, Dixit *et al.* (2019) reported that ego involvement, taking vengeance, perceived behavioral control and subjective norms predicted the intention to write online restaurant reviews. Furthermore, Jalilvand *et al.* (2017) identified four factors (i.e. food quality, personal interaction quality, physical environment quality and perceived value) that influenced eWOM intentions through relationship quality dimensions. Moreover, Yang (2017) emphasized that perceived usefulness and altruism had significant effects on restaurant customers' eWOM intention.

### *2.2 Technology acceptance model*

TAM proposed that a user's decision to adopt a technology is influenced by their intention. The intention is jointly determined by attitudes toward using the technology and perception of its usefulness. Two major beliefs about a new technology, namely, perceived usefulness (PU) and perceived ease of use (PEOU), jointly determine a user's attitude toward adopting it. Further, TAM hypothesizes that PEOU is an antecedent of PU (Davis *et al.*, 1989).

In the hospitality sector, researchers have applied TAM to examine user acceptance and use of technology-related applications, including adoption of online reviews (Ayeh *et al.*, 2016), intention to participate in online community (Agag and El-Masry, 2016), restaurant eWOM intentions (Yang, 2017) and restaurant visit intentions (Salehi-Esfahani and Kang, 2019).

Although the hospitality literature confirms the importance of PU and PEOU in predicting technology acceptance, the results differ on their relative influence on attitude and intention (Ukpabi and Karjaluoto, 2018; Wang and Jeong, 2018). Yang (2017) found that PU was the strongest determinant of intention to spread eWOM about restaurants, with PEOU having an insignificant effect on intentions. In addition, Salehi-Esfahani and Kang (2019) reported that PU influenced attitudes toward restaurant review websites more strongly than PEOU. In contrast, Ayeh *et al.* (2016) showed that PEOU had a stronger effect on attitudes, whereas PU had a stronger impact on intentions.

PU is one of the two beliefs of TAM that determine user attitude (Davis *et al.*, 1989). Wang and Jeong (2018) argued that enhancing the efficiency and effectiveness of Airbnb led to positive attitudes toward it. Likewise, PU was a major predictor of customers' attitudes toward social media restaurant reviews (Popy and Bappy, 2020). Moreover, Salehi-Esfahani and Kang (2019) found that PU of restaurant review websites positively influenced attitudes toward them. Similarly, we expect that:

*H1. PU has a significant positive effect on attitude toward online advice.*

PU has a direct effect on intention (Davis *et al.*, 1989). The authors argued that employees developed intentions toward using job-related technologies that were instrumental in achieving desired outcomes regardless of their attitudes. An extensive body of the literature has supported this relationship. Particularly, Yang (2017) found that consumers were encouraged to engage in eWOM on restaurant review websites if they perceived them as useful. Moreover, Hajli (2018) found that social media enhanced information usefulness, leading to social WOM adoption. Therefore, we propose that:

*H2. PU has a significant positive effect on intention to follow online advice.*



The literature has emphasized PEOU's role as a key determinant of PU. For example, Liu *et al.* (2017) and Salehi-Esfahani and Kang (2019) found that PEOU of restaurant review websites influenced customers' usefulness perceptions. Thus, we hypothesize that:

*H3.* PEOU has a significant positive effect on PU of online restaurant community.

Davis *et al.* (1989) found that PEOU was less influential than PU in affecting attitude. Previous studies came to the same conclusion (e.g. Ayeh *et al.*, 2013; Nedra *et al.*, 2019). In contrast, Popy and Bappy (2020) found that PEOU was stronger than PU in predicting attitudes toward social media restaurant reviews. We propose that:

*H4.* PEOU has a significant positive effect on attitude toward online advice.

The path between PEOU and intention is not one of the proposed paths of TAM. However, King and He (2006) found that the relationship between PEOU and intention was significant in Internet applications, highlighting its importance in determining online intentions. Ayeh *et al.* (2013) confirmed this finding as PEOU had a significant direct effect on intention to use consumer-generated media (CGM). In contrast, Yang (2017) found that PEOU of restaurant review websites did not influence eWOM intentions. Accordingly, this relationship requires further investigation.

*H5.* PEOU has a significant positive effect on intention to follow online advice.

Attitude toward using a technology was included in the original TAM; however, Davis *et al.* (1989) reported that attitude was a partial mediator of beliefs on intention. This led to its removal as they found that the three-construct model was more parsimonious and equally powerful. Nevertheless, Rondan-Cataluña *et al.* (2015) argued that attitude becomes more powerful when using TAM to study voluntary intentions. Moreover, Ingham *et al.* (2015) argued that attitude played a more vital role in explaining consumer behavior than it did in work-related technology acceptance. Previous studies found that attitude explained the intention to use Instagram (Nedra *et al.*, 2019), Airbnb (Wang and Jeong, 2018), restaurant review websites (Salehi-Esfahani and Kang, 2019) and social media restaurant reviews (Popy and Bappy, 2020). Thus, we hypothesize that:

*H6.* Attitude has a significant positive effect on intention to follow online advice.

### 2.3 Trust

Individuals with shared interests come together in online communities to exchange knowledge in a regular and organized way over the Internet (Ridings *et al.*, 2002). They are regarded as valuable and credible repositories of information for consumers and as influential marketing and promotion channels for firms (Li and Chang, 2016). The shared interest encourages members to reveal information about their preferences that traditional marketing fails to capture (de Valck *et al.*, 2009). The importance of trust in online communities stems from certain factors characterizing them (Ridings *et al.*, 2002). Members cannot communicate face to face, making it difficult to expect how others might behave. Thus, dependence on trust is more crucial online as it can mitigate uncertainty (Li and Chang, 2016). Trust has a profound effect on the success of online communities as it is the driving force for more participation and engagement (Hajli, 2018).

Trust is mostly measured as a set of beliefs about the trust object (Ingham *et al.*, 2015). Oliveira *et al.* (2017) found that ability, benevolence and integrity explained a substantial sum of variance in trust. They are the most commonly used beliefs in trust research (Mayer *et al.*, 1995). Thus, trust here is examined as a single-dimensional construct reflecting beliefs in the competence, benevolence and integrity of an online community.

The hospitality literature has confirmed the positive effect of trust on relationship commitment between hospitality SNSs and members (Li and Chang, 2016), restaurant customers' attitudes (Popy and Bappy, 2020), eWOM credibility and usefulness (Ismagilova *et al.*, 2020a), and restaurant visit and recommendation intentions (Anaya-Sánchez *et al.*, 2019).

Particularly, research on trust in online communities has investigated drivers of website trust (e.g. Anaya-Sánchez *et al.*, 2019; Filieri *et al.*, 2015). For instance, Filieri *et al.* (2015) revealed that information quality, Website quality and customer satisfaction significantly influenced trust toward CGM websites. Moreover, scholars have examined the consequences of trust as Popy and Bappy (2020) showed that trust in social media restaurant reviews positively influenced attitude toward them. In addition, studying tourists' trust in review websites while traveling, Anaya-Sánchez *et al.* (2019) found that website trust explained the intention to visit and to recommend a restaurant online and offline.

Focusing on the trust-attitude relationship, Casaló *et al.* (2011) found that trust influenced attitudes toward online travel community advice. Similarly, Ayeh *et al.* (2013) combined TAM with trustworthiness to investigate travelers' intention to use CGM. Results showed that trustworthiness strongly influenced attitude. Furthermore, Agag and El-Masry (2016) reported a significant path from trust in online travel community to attitude toward it. Consequently, we hypothesize that:

*H7. Trust has a significant positive effect on attitude toward online advice.*

McKnight *et al.* (2002a) confirmed that trusting beliefs in e-vendors predicted consumers' intention to follow their advice. However, there is a scarcity of research on the relationship between trust and eWOM adoption (Ismagilova *et al.*, 2020a). Among the few studies that examined this relationship, Casaló *et al.* (2011) revealed that trust positively influenced the intention to follow online travel community advice. Likewise, Jalilvand *et al.* (2017) revealed that trust toward restaurants positively influenced customers' WOM intentions. In contrast, Ayeh *et al.* (2016) showed an insignificant relationship between trust and online reviews adoption intentions. We propose that:

*H8. Trust has a significant positive effect on intention to follow online advice.*

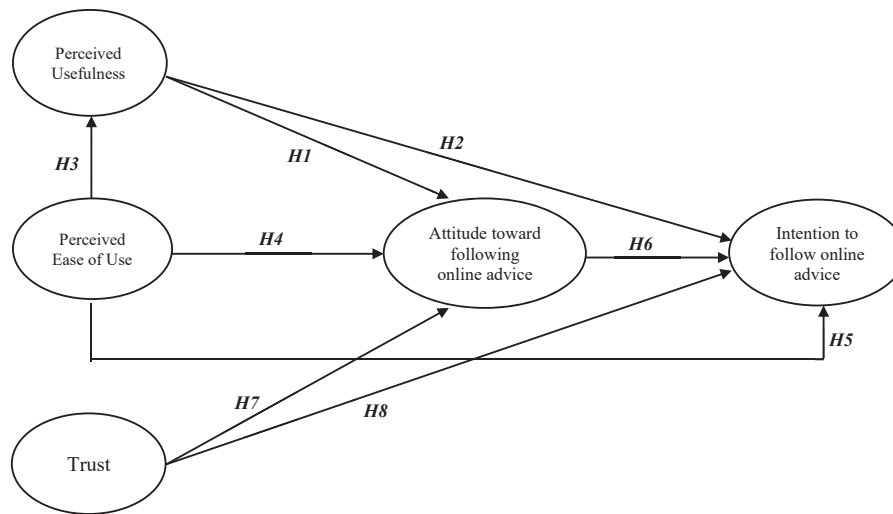
Based on the developed hypotheses, Figure 1 demonstrates the study's conceptual model.

### 3. Methodology

#### 3.1 Sampling and data collection

Because of the absence of dedicated restaurant review websites (e.g. Yelp) in Egypt, consumers depend mainly on reviews on SNSs. SNSs are the second most used channel for brand research, whereas recommendations and comments on social media are the second most used source for new brand discovery in Egypt (Hootsuite and We Are Social, 2021a). Furthermore, Egypt has witnessed increasing rates of social media adoption. Compared with a global rate of 54%, social media penetration in Egypt stood at 47% in 2021 (Hootsuite and We Are Social, 2021a). As of 2021, there are 45 million Facebook users (Hootsuite and We Are Social, 2021b), making it the most popular SNS in Egypt (Alexa, 2021).

SNSs can provide venues for the creation of online communities (Le, 2018). Accordingly, this research focuses on third-party online communities on Facebook or Facebook pages for restaurant reviews. Food enthusiasts create pages that are dedicated to sharing their restaurant experiences. Any Facebook user can be a member/fan of these communities by simply "liking" the page. Hospitality studies have devoted significant attention to online reviews posted on online platforms such as TripAdvisor and Yelp to examine their influence on consumers' decisions (e.g. Huang and Liang, 2021; Ruiz-Mafe *et al.*, 2020; Srivastava and



**Figure 1.**  
Research model

Kalro, 2019). However, few studies have examined online reviews posted on SNSs like Facebook, despite their importance as an eWOM source (Ladhari and Michaud, 2015).

Convenience sampling was used to collect data from three of the most popular restaurant review pages in Egypt, namely, Egyptian Foodies, Engezni and elmenus. The reviews come from two sources. The page creators write reviews based on their experiences. In addition, they encourage members to send their restaurant reviews and recommendations to be featured on the platform and shared with their 2.5 million fans to help improve dining decisions. The reviews combine textual and visual information (photos/videos).

As the scales used to operationalize the constructs are adopted from multiple sources, we performed a pretest to refine the scale items (Hair *et al.*, 2010). Furthermore, we asked a few academics to review the questionnaire.

For the pretest, data were collected from undergraduate and postgraduate university students using self-administered questionnaires. They were chosen as 60% of Facebook users in Egypt are aged between 18 and 34 (Statista, 2021). Thus, this age group makes up roughly two-thirds of the Facebook users in Egypt. In addition, previous eWOM research often used a sample of university students to collect data (e.g. Chen and Farn, 2020; Zhang *et al.*, 2021).

Only students who are members of the selected pages were asked to complete the questionnaire and provide feedback on the items' wording. A total of 47 responses were collected, and the data were analyzed using SPSS version 25. Cronbach's alpha was computed to estimate reliability. Results showed that all constructs demonstrated acceptable internal consistency. Accordingly, all items were kept for further analysis.

The required sample size for structural equation modeling (SEM) depends on several factors including model complexity (the number of constructs and their items) and item communality (the square of standardized loadings) (Hair *et al.*, 2010). They suggested a minimum sample size of 300 for models with seven constructs or less and item communalities below 0.45. Given that there are five constructs in our model, each represented by four or more items, we decided to collect more than 300 questionnaires to account for any incomplete responses.

For the main study, data were collected using a web-based survey developed using KwikSurveys. The questionnaire was designed in English. However, as the study is

conducted in Egypt, it was translated to Arabic. Finally, it was translated back to English to ensure there are no significant differences between the two versions in accordance with the back-translation technique (Brislin, 1970).

An introduction was provided to explain the research purpose to participants. Participation was voluntary where links to both versions were posted on the three pages. A screening question was used to ensure that only the page members can answer the survey. The questionnaire was divided into two sections. The first included statements used to measure the research constructs. The second section contained questions about gender, age group, reading review frequency and membership length. Within two months, we received 540 online responses. The final sample consisted of 360 useable questionnaires, whereas 180 incomplete responses were discarded. This translated to a response rate of 66.67%.

### 3.2 Measurements

The constructs were measured using scales adapted to the context of online restaurant communities (see Appendix). PU was measured using a six-item scale from Davis (1989) and Casaló *et al.* (2011). Seven items from Davis (1989) were used to measure PEOU. Trust (TRU) was operationalized using a thirteen-item scale from McKnight *et al.* (2002b). Attitude (ATT) was represented by four statements from Taylor and Todd (1995). Finally, a four-item scale was adapted from McKnight *et al.* (2002a) and Casaló *et al.* (2011) to operationalize the intention to follow advice (INT). All items were rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The five-point scale format is employed to minimize the respondents' level of frustration, resulting in a higher response rate and quality (Babakus and Mangold, 1992).

## 4. Results

The profile of the sample is as follows: females comprised 73.3% of the sample. Most participants (54%) were in the age group of 21 to less than 31 years and 25% were 31 years and above. In addition, 34.4% read reviews "every few days," whereas 22.8 and 21.1% read reviews "several times a day" and "once a day," respectively. Further, 61.1% of respondents had been members of their preferred community for more than a year.

The data were analyzed using SEM. A two-step approach was employed in this study (Anderson and Gerbing, 1988). The first step used confirmatory factor analysis (CFA) to evaluate the measurement model. The second step involved examining the structural model.

### 4.1 Measurement model

To test for normality, skewness and kurtosis were computed for all items. Following Kline's (2011) guidelines, values in Table 1 showed no departure from normality.

A CFA was performed for each construct using AMOS 22 based on the maximum likelihood estimation method. Following Schumacker and Lomax's (2010) suggestion, PU, PEOU and trust models were specified to obtain a better model fit. Based on the CFA results, eleven items were removed (Appendix). The remaining items were retained for further analysis.

The scales showed an acceptable fit to the data (Table 2) (Hair *et al.*, 2010). All latent constructs exhibited acceptable levels of reliability and validity. Cronbach's alpha ranged from 0.74 to 0.86, whereas composite reliabilities (CR) were between 0.74 and 0.87, higher than the 0.70 threshold (Hair *et al.*, 2010). Moreover, convergent validity was established as all items' loadings were statistically significant and above 0.50 (Hair *et al.*, 2010). In addition,

Construct	Item	Mean	SD	Skewness	Kurtosis
PU	PU1	3.96	0.74	−0.787	1.573
	PU2	3.79	0.88	−0.728	0.718
	PU4	3.86	0.88	−0.744	0.677
	PU5	3.90	0.78	−0.614	0.797
PEOU	PEOU2	4.20	0.70	−0.879	1.837
	PEOU4	3.92	0.85	−0.543	0.165
	PEOU5	4.10	0.80	−0.914	1.290
	PEOU6	3.95	0.80	−0.504	0.228
	PEOU7	4.25	0.66	−0.853	2.200
TRU	TRU5	3.38	0.91	−0.154	−0.187
	TRU6	3.77	0.83	−0.539	0.310
	TRU7	3.53	0.82	−0.217	0.425
	TRU8	3.71	0.79	−0.679	0.866
	TRU10	3.81	0.85	−0.529	0.181
	TRU13	3.61	0.87	−0.398	0.175
ATT	ATT1	3.95	0.76	−0.847	1.706
	ATT2	3.51	0.87	−0.200	0.170
	ATT3	3.92	0.82	−0.782	1.112
	ATT4	3.97	0.78	−0.771	1.292
INT	INT1	3.67	0.85	−0.814	1.238
	INT2	4.10	0.69	−0.485	0.563
	INT3	3.69	0.80	−0.562	0.936
	INT4	3.72	0.83	−0.422	0.278

**Table 1.**  
Descriptive statistics  
and normality tests

the average variance extracted (AVE) equaled 0.5 or higher, except for PU (0.42). However, AVE is a more conservative measure of convergent validity than CR (Fornell and Larcker, 1981). Based on CR values alone, we can conclude that a construct's convergent validity is adequate.

Finally, an evidence of discriminant validity was provided as the AVE values of any two constructs were higher than the squared correlation between them (Fornell and Larcker, 1981). Thus, each construct correlated more strongly with its own items than with any other construct in the model. Table 3 presents the squared correlation coefficients among the constructs and their AVEs.

#### 4.2 Structural model

Overall model fit analysis indicated a satisfactory fit (Table 4). Once an acceptable fit is obtained, SEM is used to determine the model's explanatory power, size of path estimates and significance of hypothesized paths (Ayeh *et al.*, 2013). The model explains intention to follow online community advice at a high level, accounting for 74% of its variance. Moreover, it explains 51% of the variance in attitude and 30% of the variance in perceived usefulness. Table 4 shows results of hypothesis testing by SEM.

Findings revealed that all hypotheses are supported except for H5. Perceived usefulness has a significant impact on attitude ( $\beta = 0.321$ ,  $p < 0.01$ ) and on intention ( $\beta = 0.312$ ,  $p < 0.001$ ). Similarly, perceived ease of use significantly influences perceived usefulness ( $\beta = 0.547$ ,  $p < 0.001$ ) and attitude ( $\beta = 0.192$ ,  $p < 0.05$ ). Therefore, H1, H2, H3 and H4 are supported. Contrary to H5, the effect of perceived ease of use on intention is insignificant ( $\beta = -0.058$ ,  $p > 0.05$ ), thus not supporting H5. Further, H6 is supported as the relationship between attitude and intention is significant ( $\beta = 0.228$ ,  $p < 0.01$ ). Consistent with H7 and H8, trust has significant effects on attitude ( $\beta = 0.310$ ,  $p < 0.001$ ) and intention ( $\beta = 0.467$ ,  $p < 0.001$ ).

Construct	Item	Factor loading	Cronbach's alpha	CR	AVE	Model fit
PU			0.74	0.74	0.42	$\chi^2 = 1.037$ ; df = 2; $\chi^2/\text{df} = 0.519$ ; GFI = 0.999; AGFI = 0.993; CFI = 1; NFI = 0.996; TLI = 1; RMSEA = 0.000
	PU1	0.680				
	PU2	0.679				
	PU4	0.595				
	PU5	0.620				
PEOU			0.81	0.80	0.50	$\chi^2 = 12.733$ ; df = 4; $\chi^2/\text{df} = 3.183$ ; GFI = 0.986; AGFI = 0.949; CFI = 0.985; NFI = 0.978; TLI = 0.961; RMSEA = 0.078
	PEOU2	0.662				
	PEOU4	0.644				
	PEOU5	0.733				
	PEOU6	0.590				
TRU			0.86	0.87	0.53	$\chi^2 = 15.435$ ; df = 9; $\chi^2/\text{df} = 1.715$ ; GFI = 0.986; AGFI = 0.968; CFI = 0.993; NFI = 0.983; TLI = 0.988; RMSEA = 0.045
	TRU5	0.593				
	TRU6	0.800				
	TRU7	0.742				
	TRU8	0.840				
ATT			0.83	0.82	0.55	$\chi^2 = 0.512$ ; df = 1; $\chi^2/\text{df} = 0.512$ ; GFI = 0.999; AGFI = 0.993; CFI = 1; NFI = 0.999; TLI = 1; RMSEA = 0.000
	ATT1	0.623				
	ATT2	0.619				
	ATT3	0.860				
	ATT4	0.819				
INT			0.79	0.79	0.50	$\chi^2 = 3.464$ ; df = 2; $\chi^2/\text{df} = 1.732$ ; GFI = 0.995; AGFI = 0.975; CFI = 0.996; NFI = 0.992; TLI = 0.989; RMSEA = 0.045
	INT1	0.742				
	INT2	0.612				
	INT3	0.776				
	INT4	0.665				

**Table 2.**  
CFA results

	PU	PEOU	TRU	ATT	INT
PU	<i>0.42</i>				
PEOU	0.178**	<i>0.50</i>			
TRU	0.307**	0.216**	<i>0.53</i>		
ATT	0.241**	0.176**	0.284**	<i>0.55</i>	
INT	0.332**	0.155**	0.444**	0.287**	<i>0.50</i>

**Note(s):** Diagonal values (in italic) are constructs' AVEs

\*\*Correlation is significant at the 0.01 level (2-tailed)

Path	Path coefficient	CR	Sig
H1 PU → ATT	0.321	3.275**	Supported
H2 PU → INT	0.312	3.490***	Supported
H3 PEOU → PU	0.547	7.161***	Supported
H4 PEOU → ATT	0.192	2.575*	Supported
H5 PEOU → INT	−0.058	−0.909	Not supported
H6 ATT → INT	0.228	2.997**	Supported
H7 TRU → ATT	0.310	3.453***	Supported
H8 TRU → INT	0.467	5.454***	Supported

**Table 4.** Structural model results  
 Model fit:  $\chi^2 = 285.677$ ; df = 214;  $\chi^2/\text{df} = 1.335$ ; GFI = 0.937; AGFI = 0.918; CFI = 0.979; NFI = 0.923;  
 TLI = 0.976; RMSEA = 0.031  
**Note(s):** \*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$

## 5. Discussion and conclusion

This research proposed and empirically tested a conceptual framework to explain consumer intention to follow online restaurant community advice. Based on the literature, identifying the antecedents of following an online advice calls for a model that combines the following: (1) characteristics of the technology facilitating the knowledge exchange (TAM) and (2) factors related to the uncertainty in the online environment (trust). Therefore, we proposed a trust-integrated model based on the TAM to accomplish that objective. The results revealed several key insights.

First, as hypothesized, perceived usefulness and perceived ease of use had significant effects on attitude toward following online advice. Although an easy-to-use online platform leads to favorable attitudes toward its advice, consumers place more importance on useful information. Similarly, Salehi-Esfahani and Kang (2019) found that perceived usefulness of restaurant review websites influenced users' attitudes more strongly than perceived ease of use. In contrast, Popy and Bappy (2020) showed that perceived ease of use was more critical in forming attitudes toward using social media reviews for choosing restaurants.

Our findings revealed that perceived usefulness was a direct antecedent of intention (Davis *et al.*, 1989). Specifically, consumers are more likely to follow online restaurant community advice if they think it is useful. This result supports Liu *et al.* (2017) and Yang (2017), who showed that perceived usefulness determined restaurant review websites' adoption intentions and restaurants' eWOM intentions, respectively. Furthermore, perceived ease of use had its strongest influence on perceived usefulness, suggesting that it is a key determinant (Davis *et al.*, 1989). This implies that the ease of obtaining valuable restaurant advice from online communities drives members' usefulness perceptions. This finding mirrors past restaurant research (Liu *et al.*, 2017).

Contrary to prediction, perceived ease of use showed an insignificant negative effect on intention. This can be justified by the fact that 61% of the respondents had been members of online communities for more than a year. Hence, they were familiar with them, and usability did not influence their intentions. In fact, Ashraf *et al.* (2014) argued that perceived ease of use influenced intention when users did not have much experience with a technology but failed to do so when they became familiar with it. Similarly, Yang (2017) highlighted the insignificant effect of perceived ease of use on restaurant eWOM intentions. Conversely, Liu *et al.* (2017) supported its direct influence on consumers' intention to adopt restaurant review websites. Moreover, our findings confirmed that attitude predicts voluntary intentions (Rondan-Cataluña *et al.*, 2015), which is consistent with prior restaurant research (Popy and Bappy, 2020; Salehi-Esfahani and Kang, 2019).

Finally, our findings indicated that trust in online community is a crucial factor that leads to positive attitude toward following its advice, reinforcing Popy and Bappy's (2020) results in the context of social media restaurant reviews. Further, results revealed that trust in online communities is a significant direct determinant of the intention to follow online restaurant community advice.

In this study, trust influenced intention more strongly than TAM constructs and was the second strongest determinant of attitude in the context of online restaurant communities. Comparing our result with previous hospitality research revealed contrasting findings. Reviewing UGC adoption in travel planning studies, Ukpabi and Karjaluoto (2018) reported that trust was the strongest determinant of attitude, followed by perceived ease of use and perceived usefulness. As for intention, the authors found that attitude showed the strongest influence, followed by perceived usefulness and trust. Likewise, Casaló *et al.* (2011) found that attitude was the strongest determinant of intention to follow online advice.

The direct positive effect of trust on intention agrees with Anaya-Sánchez *et al.* (2019) and Jalilvand *et al.* (2017), who showed that trust predicted restaurant online and offline recommendation intentions. However, this result disagrees with Ayehe *et al.* (2016), who did

not support the direct effect of trust on travelers' intention. In conclusion, while previous restaurant research on online reviews adoption labeled attitude (Popy and Bappy, 2020; Salehi-Esfahani and Kang, 2019) or perceived usefulness (Liu *et al.*, 2017) as the strongest determinant of intentions, we extend the literature by revealing that trust is the strongest predictor of the intention to follow online restaurant community advice.

### 5.1 Theoretical implications

Several contributions to theory stand out from our study. First, it answers the calls of DiPietro (2017) and Moreno and Tejada (2019), who revealed that little is known concerning UGC in the restaurant industry compared with hotels, despite its significant role in assisting consumers in making decisions based on online community members' shared experiences. Hence, this work advances the literature by applying the TAM to the context of online restaurant communities to identify the key precursors of the intention to follow online advice.

Second, we contribute to the emerging body of the literature as most studies have focused on the impact of online restaurant reviews on consumer decisions from the perspective of review characteristics or the features of reviewers and readers (e.g. Bigne *et al.*, 2020; Chen and Farn, 2020; Hernández-Ortega, 2020; Huang and Liang, 2021; Ruiz-Mafe *et al.*, 2020; Zhang *et al.*, 2021). In addition, researchers have examined what motivates customers to write online restaurant reviews and what drive customers' eWOM intentions (e.g. Dixit *et al.*, 2019; Jalilvand *et al.*, 2017; Yang, 2017). This study, however, took a different approach and examined what induces review readers to follow an online advice.

Third, to the best of our knowledge, this research is one of the few to integrate trust into the TAM to explain the extent to which consumers can trust online restaurant community advice and act upon it. The findings contribute to the literature by identifying trust as the most significant driver of consumers' intention to follow online advice, capturing more variance in intention than the technology acceptance factors.

Finally, this study focused on third-party online communities on Facebook for restaurant reviews. Researchers' attention has been mostly drawn to examining online reviews from dedicated online opinion platforms (e.g. TripAdvisor and Yelp) to investigate their influence on consumers' decisions (e.g. Huang and Liang, 2021; Ruiz-Mafe *et al.*, 2020; Srivastava and Kalro, 2019). However, little is known about online reviews written on SNSs such as Facebook (Ladhari and Michaud, 2015).

### 5.2 Managerial implications

Although the focus of the study was on third-party online communities, our findings present practical implications for both restaurant managers and online community administrators.

A predominant finding of this study is that consumers trust online reviews on third-party online communities, and it is the most relevant determinant of their intention to follow the advice. Accordingly, restaurants should encourage their customers to write reviews not only on their own online platforms but also on third-party online communities. Although dissatisfied customers do not hesitate to write online reviews to voice their disappointment, satisfied customers are often unwilling to share their experiences (Huang and Liang, 2021). Therefore, restaurants do not only have to continuously deliver positive dining experiences but should also ensure that these experiences are translated to positive reviews. This can be achieved by offering customers rewards such as discounts or loyalty points to motivate them to share their experiences.

Simultaneously, restaurant marketers should closely monitor consumer reviews on these platforms. They should pay attention to consumers' online feedback and respond to reviews



as research reveals that 90% of global diners view online reviews as important when choosing a restaurant, with 63% revealing they are more likely to visit restaurants that respond to reviews (TripAdvisor, 2020). Online reviews reveal a great deal of information about consumers' needs and wants and allow restaurants to provide a more personalized dining experience. Furthermore, monitoring online opinions could reveal weak areas in customers' dining experiences that require improvements and inform restaurants of how they fare against competition.

Consumers have the power to influence peer decisions through eWOM as conventional marketing methods are becoming less influential. Marketers should take advantage of consumers' role as co-promoters of their services and integrate this free advertising in their marketing and communication strategies. Thus, we recommend that restaurants should identify key opinion leaders who frequently contribute to third-party platforms. Opinion leaders exert considerable influence on the decisions of their audience especially when it comes to experience-based services (Ladhari and Michaud, 2015). Once identified, they should be invited to new restaurant openings or when introducing new menus and be encouraged to write honest reviews about their experiences. When these reviews are shared, restaurants would gain exposure on a wide scale because of the popularity of these third-party online communities. In addition, restaurants can display reviews posted by opinion leaders and other satisfied guests on their own websites and social media channels or any offline promotional activities to encourage potential customers to visit them.

As for online community administrators, our results suggest that they should create a trustworthy environment and foster online trust among members. For example, reviews sent by users should be carefully evaluated to ensure the quality and honesty of information posted on the platform. Furthermore, managers can enhance members' trust in the online community by showing them the feedback of satisfied users who adopted the advice in their dining decisions. This could lead to more positive attitudes and would significantly influence their intention to follow the advice.

Finally, taking into consideration the findings of this study, online community designers should focus on creating a user-friendly interface to enhance usefulness perceptions. One way is to make the reviews more searchable. For instance, reviews can be segmented based on type of cuisine or restaurant location by adding hashtags to enable members to easily retrieve reviews that fit their preferences. Another way is to set criteria for writing useful reviews that members can adhere to. Particularly, they can advise members to share more detailed information about different aspects of their experiences including food quality, menu variety, service, atmosphere and location. Moreover, they can encourage reviewers to provide both positive and negative aspects of their dining experience as two-sided reviews are more helpful (Filieri *et al.*, 2018).

### 5.3 Limitations and future research

This work is subject to limitations that serve as directions for future research. First, this work investigates third-party online communities that share consumer-generated restaurant reviews. Future research can test the validity of our model in restaurants' own online platforms and compare the results. Second, the study is conducted in Egypt, which limits the generalizability of our results. Future research can use a sample of respondents with different cultural backgrounds to examine the influence of cultural differences on drivers of the intention to follow online advice. Finally, future research can consider the inclusion of additional constructs to contribute to the unexplained variance. It would be interesting to propose external factors to explain perceived usefulness and perceived ease of use or to propose antecedents for trust in online community.

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## Appendix

Construct	Item	Source
<i>Perceived usefulness</i>	<i>The online community</i>	Davis (1989); Casaló <i>et al.</i> (2011)
PU1	Helps me choose a restaurant more efficiently	
PU2	Helps me solve doubts when I plan to visit a restaurant	
PU3	Enables me to obtain valuable restaurant advice more quickly*	
PU4	Improves my restaurant-related choices	
PU5	Is effective in obtaining valuable restaurant advice	
PU6	Is useful while choosing a restaurant in general*	
<i>Perceived ease of use</i>	<i>The online restaurant community is</i>	Davis (1989)
PEOU1	Simple to use*	
PEOU2	Clear	
PEOU3	Understandable*	
PEOU4	Flexible to interact with	
PEOU5	Easy to navigate	
<i>Trust</i>	<i>I believe that the online community</i>	McKnight <i>et al.</i> (2002b)
TRU1	Is honest*	
TRU2	Is genuine*	
TRU3	Is sincere*	
TRU4	Is competent at providing valuable restaurant advice*	
TRU5	Is interested in my well-being	
TRU6	Is effective at providing valuable restaurant advice	
TRU7	Is truthful in dealings with me	
TRU8	Is capable of providing valuable restaurant advice	
TRU9	Is qualified to provide valuable restaurant advice*	
TRU10	s knowledgeable about food and restaurants	
TRU11	Would act in my best interest*	
TRU12	Would do their best to help me whenever needed*	
TRU13	Would keep their commitment to provide useful reviews	
<i>Attitude</i>	<i>Following the online community advice is a</i>	Taylor and Todd (1995)
ATT1	Good idea	
ATT2	Wise idea	
ATT3	Likable idea	
ATT4	Pleasant idea	
<i>Intention</i>		McKnight <i>et al.</i> (2002a); Casaló <i>et al.</i> (2011)
INT1	I would feel comfortable behaving according to the online community advice	
INT2	I would take into account members' suggestions	
INT3	I would feel secure following members' suggestions	
INT4	I Would rely on members' recommendations	
<b>Note(s):</b> *Deleted		

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# Can hotel employees arise internal whistleblowing intentions? Leader ethics, workplace virtues and moral courage

Internal  
whistleblowing  
among  
employees

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## Abstract

**Purpose** – This study investigates the relationship between leaders' ethical behaviors and internal whistleblowing among hotel employees through the mediation role of organizational virtuousness. According to the conceptual framework, ethical leadership creates a virtuous workplace and encourages whistleblowing.

**Design/methodology/approach** – A survey approach with responses of 442 employees from Egyptian five-star hotels was used. Structural equation modeling (SEM) was used to test the hypotheses proposed based on leader-member exchange (LMX) and ethical leadership theories.

**Findings** – Ethical leadership has a favorable impact on organizational virtuousness and, as a result, has a significant impact on whistleblowing intention. The ethical leaders-subordinates' intents to whistleblow association partially mediated organizational virtuousness. To assist them in reporting ethics violations, most hotel employees require organizational characteristics, such as organizational climate and psychological empowerment, in addition to individual characteristics, such as moral bravery and ethical efficacy.

**Originality/value** – The conceptual framework of this paper adds a new guide for future research related to the hospitality literature, which is how employees' intent to internal whistleblowing. As such, senior



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## Introduction

The need to understand the reasons for whistleblowing's existence within hotel organizations motivates recent efforts to investigate some related whistleblowing activities (Yu *et al.*, 2019). Furthermore, they have argued that a lack of organizational and contextual clarity creates a virtuous workplace for whistleblowers (Nisar *et al.*, 2019); unless they believe management is enabling these acts (Farooqi *et al.*, 2017). The growing prevalence of this phenomenon, as documented in worldwide evidence in many organizations (Cheng *et al.*, 2019), contributes to a risky condition, which threatens their employees' psychological health (May-Amy *et al.*, 2020). Whistleblowing is very important, particularly in the hospitality industry (Rabiul *et al.*, 2021), where many tourists and travel agents cannot disregard unethical issues that may occur during their workplace or entertainment (Nicolaides, 2019), especially in developing countries.

In Egypt, the tourism industry is considered a key engine for economic and employment growth (Elbaz and Haddoud, 2017). Recently, official government regulations and practices have mandated that organizations evidence whistleblowing in routine activities (Elhoushy and El-Said, 2020), encourage their employees to report wrongs (Farooqi *et al.*, 2017) and implement daily activities in order to correct mistakes quickly and effectively (Sobaih, 2018). As such, trust in leaders is crucial in persuading employees that there will be no repercussions if they report problems, which is compatible with typical Arab cultural qualities (Hassan *et al.*, 2020). Thus, rather than individual attributes such as moral courage and ethical efficacy, Arab hotel employees require organizational features, such as organizational climate and psychological empowerment, to aid them in reporting ethics transgressions (Cheng *et al.*, 2019).

The factors of cultural differences have confirmed the role of enhancing the understanding of this difference during the reporting of whistleblowing in different cultural contexts (Tavakoli *et al.*, 2003). The literature has also confirmed the importance of considering seriously the cultural influences and effects on an individual's tendency to whistleblow. Furthermore, cross-cultural differences and ethical whistleblowing perceptions influence whistleblowing proclivity (Chiu, 2003). It is common for leaders to consider their followers to be in-group members, and the social exchange connection between them is marked by mutual trust as well as support and respect. A low-quality leader-member exchange (LMX) regards followers as "out-group members" (Tran *et al.*, 2021), so the connection is diametrically opposed (Eşitti and Kasap, 2020). The primary goal of recent research was to investigate the antecedents of people's behavior in relation to the relationship and effect of whistleblowing with moderating factors on an individual's ethics (May-Amy *et al.*, 2020), as well as to support the main predictors in the workplace that influence whistleblowing intentions.

Similarly, addressing the relationship between some of these constructs has taken great concern from them (Park and Blenkinsopp, 2009), which also discussed the relationship between ethical leadership, whistleblowing and organizational virtuousness. It is necessary to have ethical leaders in various organizations, especially after the psychological feelings of hotel employees have been destroyed due to the COVID-19 outbreak (Fu, 2020). These leaders motivate their subordinates to do the right things and to be goodwill ambassadors in the workplace (Elhoushy and El-Said, 2020; Rabiul *et al.*, 2021). Although such complex issues have been studied in advanced countries, little research has been conducted in a context with different cultural differences in the developing countries (e.g. Egypt) (see Elbaz and Haddoud, 2017; Zaim *et al.*, 2021), which this implies as a further research gap. Hence, this reduces the



risks associated with organizational interactions with direct leaders (Tran *et al.*, 2021). Thus, it is based on LMX theory, that is, an exchange relationship between leaders and their subordinates (Graen and Uhl-Bien, 1995). This theory addresses mainly the differences in nature between the different groups, which in turn relate to the likely organizational outcomes, such as effectiveness.

Further, the essence of this theory is also its focus on the quality of leader–member relationships to gain favorable results for subordinates and the organization (Bauer and Erdogan, 2015). This theory discusses critical leadership issues and provides debates on this concept, which is a process that is concerned with communication between the leaders and their followers that also gives critical value to this relationship over leadership studies. The previous empirical studies examined some critical and integrated contemporary concepts across different industries and both developed and developing contexts. They have also addressed an integrative model as the suggested conceptual model in this research (e.g. Afsar *et al.*, 2020; Sun and Yoon, 2020; Tarkang-Mary and Ozturen, 2019). Mostly, these studies provided future direction for potential future work to integrate new applications as well as construct new ones that would help to fulfill the existing research gap in this area.

The management practices of the hotels are interested in running business-honest operations, and they strive to avoid unlikely behaviors (Kalemci *et al.*, 2019). Hotel employees are also expected to handle ethical leadership practices (Nazarian *et al.*, 2021; Wood *et al.*, 2021), which also promote a supportive organizational culture to do the right things during the course of actions while respecting the different factors that might promote a justification of unethical practices (Nicolaidis, 2019; Simões *et al.*, 2019). Therefore, the current research intends to bridge a new and different complex association that has been conceptualized into a unique single model to identify the effects of ethical leadership on organizational virtuousness, hence the effect of the last factor on the intention to engage in internal whistleblowing acts. The findings of these studies also showed significant impact among the respective variables (Rabiul *et al.*, 2021), but still lack the ability to incorporate new concepts with different roles, e.g. mediating or moderating, particularly in the hotel industry. Hence, the research question that triggered this work is as follows: what constitutes the role of organizational virtuousness in the relationship between ethical leadership and internal whistleblowing in a different contextual setting in the hospitality industry in Egypt?

The possible contributions of this research study further include a moderating effect of a term (moral courage) that was not examined in this role with the different determined variables such as internal whistleblowing and organizational virtuousness. In this relationship, the moral courage variable can offer new additional valuable insights and beneficial outcomes that can help in a better understanding of this relationship in a complex business setting and match with the previous results to enrich the limited findings in this field. Moreover, the theories addressed in the study model also expand the poor understanding of variables' effects on each other and provide a clear and deep grasp of individuals and organizational practices. The structure of the paper includes a section of literature review to develop the hypothesis and then the method used to conduct this work and a section of analysis to provide the key findings, which include measurement model analysis and structural model analysis. After that, the study discusses the key findings for implications and concludes with a conclusion with future suggestions for new studies, with a mention of the limitation of the current study.

## Literature review

### *Leader–member exchange and ethical leadership theories*

LMX is considered one of the intrinsic theories for studying leader–subordinate relationships in business organizations (Eşitti and Kasap, 2020) and is favored among various leadership theories for four main reasons. First, LMX is the only theory that focuses on the individual

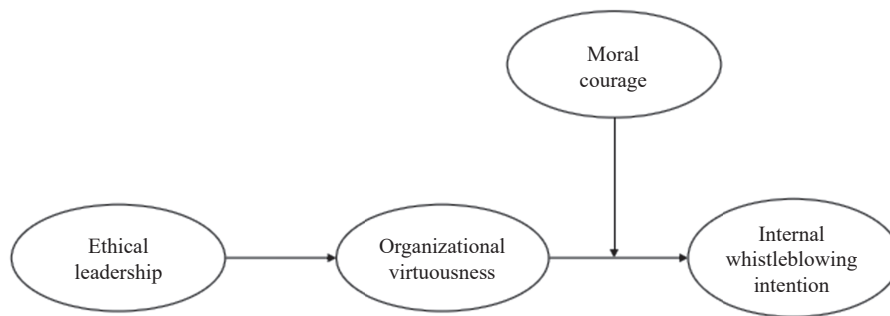
dyadic relationship between each leader and follower (Graen and Uhl-Bien, 1995), thus suggesting that the same leader can develop various types of relationships with different followers (Dansereau *et al.*, 1975). Second, this theory provides a powerful and meaningful explanation of the hypothesized relationship between leadership antecedents and outcomes (Chang *et al.*, 2020). Third, its usefulness has been tested in a variety of cultural contexts (Rockstuhl *et al.*, 2012; Magnini *et al.*, 2013; Kim *et al.*, 2017). Fourth, this theory is “*particularly relevant to the hospitality and tourism industry due to its labor-intensive and service-focused nature*” (Chang *et al.*, 2020, p. 2,155). Finally, official government regulations and practices have mandated that organizations demonstrate whistleblowing in routine activities in Egypt (Elhoushy and El-Said, 2020), encourage their employees to report wrongdoing (Sobaih, 2018) and implement daily activities to quickly and effectively correct mistakes (Wood *et al.*, 2021).

LMX theory is based on the idea that differential in-role definitions in exchanges between leaders and subordinates inevitably result in role development (Graen and Uhl-Bien, 1995). As a result, it is vital to analyze the nature of the roles inside organizations, as well as the processes by which they are defined and evolve as members participate in decision-making (Schriesheim *et al.*, 1999). Focusing on this theory, we investigate the behavior of ethical leaders that influences internal whistleblowing among hotel employees through applying moral courage and virtuousness in the workplace. The development of LMX relationships is based on physical and intangible exchanges between the leader and the follower (Tran *et al.*, 2021). For example, a leader may offer knowledge and assistance to a follower in exchange for the follower’s doing well and demonstrating devotion to the leader.

Ethical leadership refers to the presentation of normatively proper behavior through personal acts and interpersonal interactions (Nazarian *et al.*, 2021), as well as the encouragement of such behavior by followers through two-way communication, reinforcement and decision-making (Fan *et al.*, 2021). This is called ethical leadership theory (ELT) (Brown *et al.*, 2005). This concept includes two key components: demonstrating ethical behavior and promoting ethical behavior (Dhar, 2016). According to the first component, ethical conduct is not confined to display (Khliefat *et al.*, 2021), but there is an essence of sharing and distributing beyond the manifestation of attitudes, values and behavior centered on moral and ethical elements. The second component discusses leaders’ proactive roles in encouraging ethical conduct among their subordinates. Hence, a leader is supposed to diffuse such behavior through effective communication, encouraging followers through positive and negative reinforcement mechanisms, decision-making and personal example (Hassan *et al.*, 2020).

In recent years, the growth of ethical principles in organizations has stimulated greater attention to the impact of morality in business environments (Wood *et al.*, 2021). Moreover, the characteristics of dominant organizational leadership practices shape leaders’ goals and behaviors (Newstead *et al.*, 2021), which could have a significant effect on certain organizational outcomes, such as followers’ behaviors (Suifan *et al.*, 2020). There are fundamental characteristics of ethical conduct in the concept of a moral leader (Schwepker and Dimitriou, 2021), which are consistent across leadership and organizational behavior studies (Sharma *et al.*, 2019). Initially, leaders appear to exhibit normative ethical behavior and are considered role models for their followers (Fan *et al.*, 2021). However, they also support ethical behaviors related to their followers through developing appropriate values, practices and norms (Schwepker and Dimitriou, 2021).

Otherwise, leadership styles do not only focus on leaders’ personalities but also have an ethical focus on the consequences of particular behaviors or actions (Javed *et al.*, 2017). Moreover, vastly different leadership styles have not dealt with the main description of virtuous subordinates’ personalities (Paniccia *et al.*, 2020). Figure 1 presents the conceptual framework for the assumed relationships from the lenses of both the LMX and ELT theories.



**Figure 1.**  
Conceptual framework

### *Organizational virtuousness*

Being virtuous refers to striving to be the greatest possible version of oneself or business (Khasawneh *et al.*, 2020). Virtuousness in organizations is unique to humans, and it reflects circumstances of thriving, ennobling, vitality and personal flourishing, which contributes to health, happiness and resilience in the face of hardship (Cameron *et al.*, 2004). Organizational virtues are considered a vital element in organizational outcomes and improved performance in contemporary business settings (Searle and Barbuto, 2011). Thus, characteristics are connected with virtues because good ethics are established by moral practices and habits (Kurian and Nafukho, 2021; Newstead *et al.*, 2021). Nowadays, the virtues are appreciated in the behaviors of individuals in relation to their attitudes in different work environments (Simões *et al.*, 2019). Organizational virtuousness was examined with intervening factors in the daily work routine (Berry, 2004).

Despite the key role of ethical leadership and organizational virtuousness in many leadership practices and outcomes (see Gukiina *et al.*, 2018; Hur *et al.*, 2017; Peng and Kim, 2020; Sun and Yoon, 2020; Wood *et al.*, 2021; Zaim *et al.*, 2021), few studies have addressed the positive relationship between ethical leadership and organizational virtuousness (e.g. Zhang and Liu, 2019). This most likely results from the fact that these concepts remain only loosely defined (Khasawneh *et al.*, 2020). Therefore, studies need to address virtues and their extended traits and examine their influence and outcomes in business settings (Nazarian *et al.*, 2021). Otherwise, recent studies have focused on ethical leadership in the hospitality sector in different countries. For instance, Javed *et al.* (2016) addressed the moderating role of ethical leadership between Islamic work ethics and adaptive performance among Pakistani hotel employees. Bhatti *et al.* (2020) linked ethical leadership with knowledge sharing between supervisors and subordinates in Pakistani hotels.

Otherwise, ethical leadership is linked to employee performance in Pakistani tourist companies (Shafique *et al.*, 2018) and among Egyptian travel agents (Elbaz and Haddoud, 2017). Gürlek (2021) focused on Machiavellianism's role in unethical behaviors among managers and employees in Turkish hotels. Besides, Erkutlu and Chafra (2017) investigated the moderating role of behavioral integrity between leader narcissism and subordinate embeddedness among Turkish hotel employees, suggesting that the creation of a supportive context is crucial to organizational practices and activities in the Egyptian hospitality sector. Hence, this paper assumes that

*H1.* Ethical leadership has a positive effect on organizational virtuousness.

### *Internal whistleblowing intention*

Internal whistleblowing intention is defined as the actions an individual takes to report unethical behavior to higher management in their organization (Nisar *et al.*, 2019). These actions mainly depend on the legal principles applied in hotel organizations (Yu *et al.*, 2019),

which allow employees to disclose these negative behaviors (Oelrich, 2021). However, highlighting whistleblowing presents a revenge risk in organizations (Rabie and Abdul Malek, 2020). Employees may only be willing to take this risk once they feel sufficiently confident that they can safely disclose whistleblowing (Park and Blenkinsopp, 2009) or when they trust in the management's ability to tackle this issue seriously and confidentially (Wood *et al.*, 2021).

Ethical principles are close to organizational virtuousness (Nazarian *et al.*, 2021; Schwepker and Dimitriou, 2021). These principles were practiced within service organizations to create a positive organizational image (Farooqi *et al.*, 2017; May-Amy *et al.*, 2020). Therefore, one may predict that ethics influences the reporting of wrongdoing in organizations (Ahmad *et al.*, 2014), enabling whistleblowers to spot disruptive acts that threaten corporations' competitiveness and sustainability (Tarkang-Mary and Ozturen, 2019). Furthermore, it has been indicated that people are particularly interested in detecting any kinds of ethical issues in an organization that has supportive leadership practices (Hur *et al.*, 2017) and provides principles that govern both the work and group environment. Besides, internal whistleblowing intention is related to worthy practices and leader traits, possibly affecting employees' abilities to report violations to top management that would affect the workplace's reputation (Khelifat *et al.*, 2021).

Several predictors can also affect internal whistleblowing intention, especially related to personal and organizational factors (Oelrich, 2021). In recent years, it has been reported that ethical leaders are able to develop a principle-based organizational environment that can support and facilitate whistleblowing (Dinc *et al.*, 2018), through guaranteeing that hotel employees will be protected against retaliation (Fan *et al.*, 2021). Many studies have indicated that organizational virtuousness plays an important role in improving and developing moral leadership within service organizations, encouraging employees to engage in internal whistleblowing (Ahmad *et al.*, 2014; Bhal and Dadhich, 2011). A supportive organizational environment can help to maintain a completely ethical context (Gukiina *et al.*, 2018) and encourage whistleblowers to respond to the ethical issues that can emerge in corporations (Farooqi *et al.*, 2017), potentially diminishing the likelihood of retaliation (Nisar *et al.*, 2019). Compared to Cheng *et al.* (2019), this study relies on organizational virtuousness as a mediator between ethical leadership and internal whistleblowing intention, thus assuming that

H2. Organizational virtuousness has a positive effect on internal whistleblowing intention.

H3. Organizational virtuousness mediates the relationship between ethical leadership and internal whistleblowing intention.

#### *The moderating role of moral courage*

Moral courage is defined as the possibility to adapt and use internal ethics and principles to do right towards others, regardless of the risk of another person retaliating (Sekerka *et al.*, 2009; Sekerka and Bagozzi, 2007). Moral courage refers to the efforts made to cultivate organizational outcomes (Kurian and Nafukho, 2021) that would facilitate positive thinking and reduce the negative aspects of an organization's culture, including gossip and hypocrite (Ugwu, 2012). It also bridges solid organizational values (Kalemcı *et al.*, 2019). Moreover, moral courage leads to moral and organizational values that can enable sustainable success (Tarkang-Mary and Ozturen, 2019). Similar debates suggest that organizational politics has a significant impact on individual behaviors, such as internal whistleblowing intentions (Oelrich, 2021). Thus, this effect can extend to changes in organizational virtuousness (Paniccia *et al.*, 2020). More generally, this concept offers meaningful insights (Newstead *et al.*, 2021). Additionally, it emphasizes a person's courage to tackle the challenges and concerns associated with following an organization's policies (Comer and Schwartz, 2017).

Some empirical research has revealed that an organization's internal practices influence many organizational aspects (Fan *et al.*, 2021; Kalemci *et al.*, 2019). Thus, an organization's outcomes will be superior or inferior based on an individual's confidence and moral courage with respect to their organization's leaders and values (May *et al.*, 2014; Kurian and Nafukho, 2021). Accordingly, this study proposes to examine the moderating effects of moral courage, which could represent important individual traits related to organizational virtuousness and internal whistleblowing intention. Thus, this research assumes that

- H4. Moral courage moderates the relationship between organizational virtuousness and internal whistleblowing intention.

## Method

### *Survey development*

All constructs were adopted using multiple items from the existing literature. A seven-point Likert scale ranging from (1 = *strongly disagree* to 7 = *strongly agree*) was used for the scales.

Ethical leadership was measured on a ten-item scale adapted from Brown *et al.* (2005) to assess employees' perceptions regarding ethical behavior of their leaders. One of its sample items stated: "My leader disciplines employees who violate ethical standards." This scale was shown to be reliable by recent studies (see Bhatti *et al.*, 2020; Fan *et al.*, 2021; Schwepker and Dimitriou, 2021).

Organizational virtuousness was measured by using a 15-item scale adopted from Cameron *et al.* (2004), consisting of five pillars: optimism, trust, compassion, integrity and forgiveness. Each of the sub-dimensions of this construct includes three items. Employees were presented with statements like "We are optimistic that we will succeed, even when faced with major challenges." In earlier research studies of Gukiina *et al.* (2018) and Sun and Yoon (2020), this scale has shown strong dependability and reliability in the hospitality literature.

Moral courage was measured with four items developed from May *et al.* (2014). Sample items stated "I would only consider joining a just or rightful cause if it is popular with my co-employees and supported by important others." This scale has demonstrated high reliability and validity (Cheng *et al.*, 2019; Comer and Schwartz, 2017).

Internal whistleblowing intention was measured with four items derived from Park and Blenkinsopp (2009). One of its sample items stated: "I use the reporting channels inside of the hotel." Recent research (e.g. May-Amy *et al.*, 2020; Yu *et al.*, 2019) confirmed the reliability and validity of this scale.

### *Sampling*

A nonprobability convenience sampling technique was applied chiefly in defining the sampling stages and selecting the respondents (Aaker *et al.*, 1995). The participants were selected from employees of five-star hotels in Egypt. This is due to the various barriers that employees in Egypt's hospitality business confront that prevent them from reporting internal whistleblowing intents to their bosses, for instance, gender discrimination, cultural friction and workplace relationships (Sobaih, 2018). As such, confidence in leaders is critical in convincing employees that they will not suffer consequences if they report irregularities, which is consistent with typical Arab cultural traits (Hassan *et al.*, 2020). Thus, Arab hotel personnel require organizational characteristics, such as organizational climate and psychological empowerment, to assist them in reporting ethics infractions rather than individual characteristics, such as moral bravery and ethical effectiveness (Wood *et al.*, 2021). This study population was restricted to employees in vital main departments (i.e. room division, sales and marketing, food and beverages, etc.), since they have high emotional demands, long working hours and excessive workloads (Khelifat *et al.*, 2021). These employees were chosen from 30 five-star hotels located in Sharm El-Sheikh, Greater Cairo and

Luxor, which are equivalent to 13, 11 and 6 hotels, respectively. According to the Egyptian Ministry of Tourism and Antiquities (EMTA), these cities have the most hotels, resorts and tourist attractions in Egypt.

#### *Procedures*

An analytical approach was used given that the scope of this study was hotel employees' perceptions of ethical leadership and its impact on internal whistleblowing intentions. A reverse-translation approach was used, with a series of stages (Brislin, 1970). The survey questionnaire was translated from English to Arabic, including all measurement questions to suit the bulk of the study population. To avoid translation errors, the translated version was compared to the original text. Seven proofreaders retranslated the statements from Arabic to English to assess the survey content. Therefore, the survey included 33 items, as well as a section on the sample's characteristics and a brief introduction to the research. As a result, a pilot test was conducted on 50 staff from five-star hotels in Egypt prior to the major data gathering procedure. As a result, 36 people responded, representing a response rate of 72%.

Four members of the Egyptian Hotels Association (EHA) regional office and two human resource (HR) managers from the targeted hotels aided the authors in reaching these employees. Using the Google Form platform, a brief link with the specified questionnaire purpose and contents was created and delivered to them. As a result, participants suggested making minor changes to some items in this questionnaire, such as reformulating items 4, 6 and 7 to make the ethical leadership construct clearer and placing 6 months to 1 year within the professional experience category, and their suggestions were taken into consideration.

#### *Data collection*

Due to the COVID-19 outbreak and most hotels' taking precautionary measures in response, the questionnaires were distributed over a prolonged period on Google Form. As such, 930 copies of the intended questionnaire were distributed, an average of 31 copies per target hotel from mid-February to late June 2021. Hence, 634 of them were received, but after processing the collected data and removing responses with significant outliers, the final sample reached 442 responses, with a response rate of 48%. When the given population size reaches one million as a maximum threshold, the appropriate sample size is 384 responses (Krejcie and Morgan, 1970). Accordingly, the sample size of this study could be considered sufficient for conducting various statistical methods.

#### *Common method variance*

Since all responses were given by the same respondent, as well as using self-reported measures of some constructs, we used a set of procedural and statistical remedies to address the possibility of common method variance (CMV) (Podsakoff *et al.*, 2012). Procedurally, the questionnaire is pretested to avoid ambiguous items and complex grammatical structures. All items were simple and concise. All respondents were assured that there was no right or wrong answers. All constructs were randomly entered into the survey to prevent respondents from inferring a cause-effect relationship among the items and constructs in the survey. Considering the statistical remedy, exploratory factor analysis (EFA) was performed using SPSS v.25. The results for Harman's one-factor test reflected a good model fit in which all the items were pooled into a single factor (48.15%) of total variance. Based on these arguments, CMV is not a great issue in this study.

### **Results**

#### *Demographics of respondents*

Respondents' profiles are presented in Table 1. Of the respondents, 91.6% were male, and 77.6% were single, this result might interpret in light of the men most likely to participate in

Categories		Frequency	%	Internal whistleblowing among employees
Gender	Male	405	91.6	211
	Female	37	8.4	
Marital status	Single	343	77.6	
	Married	99	22.4	
Age	<30	226	51.1	
	30 to <40	104	23.5	
	40 to <50	71	16.1	
	≥50	41	9.3	
Educational level	M.Sc./Ph.D	9	2.0	
	Diploma	44	10.0	
	Bachelor	220	49.8	
	High school	154	34.8	
	Preparatory school	11	2.5	
	Other	4	0.9	
Professional experience	6 months to <1 year	151	34.2	
	1 to <3 years	70	15.8	
	3 to <5 years	153	34.6	
	≥5 years	68	15.4	
Department	Room division	97	21.9	
	Food and beverages	170	38.5	
	Sales and marketing	105	23.8	
	Other	70	15.8	

**Table 1.**  
Respondents  
profile ( $n = 442$ )

the studies than women and share their perceptions toward the issues (Elhoushy and El-Said, 2020). In terms of age, 51.1% of the respondents were under 30 years, followed by 23.5% were 30 to <39 years. The respondents' educational levels were as follows: 49.8% had a bachelor's degree, and 34.8% had completed high school. Moreover, 34.6% of them had 3 to <5 years of professional experience and 34.2% had 6 months to <1 year. The respondents were working in the following departments: 38.5% in food and beverages, 23.8% in sales and marketing and 21.9% in the room division.

#### *Measurement model*

Construct validity was evaluated using confirmatory factor analysis (CFA). In the factor analysis, varimax rotation and principal component analysis (PCA) were used to determine the key components with their respective indicators from the 33 items, comprising ethical leadership, internal whistleblowing intention and moral courage (first-order constructs), and organizational virtuousness (second order, with five sub-constructs). The organizational virtuousness construct included five dimensions, namely optimism, trust, compassion, integrity and forgiveness, each containing three items, as presented in Table 2.

The factor loadings for all measurements achieved acceptable and satisfactory levels (greater than 0.60), according to the Kaiser–Meyer–Olkin (KMO) test (0.83–0.96,  $p < 0.001$ ). In addition, the reliability of the measurement scale was satisfactory according to the Cronbach's alpha test, which revealed satisfactory and acceptable results, ranging from 0.92 to 0.97. Thus, the values of skewness and kurtosis ranged between 2 and 5. The normality test showed a normal distribution of data, in which the skewness values for each measurement were less than the threshold absolute values (Blanca *et al.*, 2013). Hence, the test results confirmed that the data were normally distributed.

The CFA results and reliability were checked for all latent constructs. No items showed factor loadings lower than 0.6 at a significance level of  $p < 0.001$ , requiring elimination from further analysis. The convergent validity through two main tests, namely composite reliability (CR) and average variance extracted (AVE), was evaluated for all latent constructs,

Constructs	Statements	Factor loadings	Alpha	CR	AVE
Ethical leadership	Conducts personal life in an ethical manner	0.62	0.93	0.93	0.57
	Defines success not just by results but also the way that they are obtained	0.75			
	Listens to what employees have to say	0.75			
	Disciplines employees who violate ethical standards	0.73			
	Makes fair and balanced decisions	0.71			
	Can be trusted	0.76			
	Discusses business ethics or values with employees	0.84			
	Sets an example of how to do things the right way in terms of ethics	0.80			
	Has the best interests of employees in mind	0.78			
	When making decisions, asks what is the right thing to do	0.78			
Optimism	A sense of profound purpose is associated with what I do this hotel	0.90	0.97	0.97	0.78
	In this hotel, I am dedicated to doing good in addition to doing well	0.95			
	I am optimistic that I will succeed, even when faced with major challenges	0.90			
Trust	Employees trust one another in this hotel	0.83	0.92	0.96	0.86
	We are treated with courtesy, consideration, and respect in this hotel	0.86			
Compassion	We trust the leadership of this hotel	0.92			
	Acts of compassion are common this hotel	0.84			
	This hotel is characterized by many acts of concern and caring for employees	0.85			
Integrity	Many stories of compassion and concern circulate among hotel members	0.93			
	Honesty and trustworthiness are hallmarks of this hotel	0.82			
	This hotel demonstrates the highest levels of integrity	0.95			
	This hotel would be described as virtuous and honorable	0.88			
Forgiveness	We try to learn from our mistakes in this hotel, consequently, missteps are quickly forgiven	0.96			
	This is a forgiving, compassionate hotel in which to work	0.94			
	We have very high standards of performance, yet we forgive mistakes when they are acknowledged and corrected	0.88			
Internal whistleblowing intention	I report it to the appropriate persons within the hotel	0.82			
	I use the reporting channels inside of the hotel	0.97			
	I let upper level of management know about it	0.97			
	I tell my supervisor about it	0.94			
Moral courage	I would stand up for a just or rightful cause, even if the cause is unpopular and it would mean criticizing important others	0.89	0.95	0.93	0.77
	I will defend someone who is being taunted or talked about unfairly, even if the victim is only an acquaintance	0.95			
	I would only consider joining a just or rightful cause if it is popular with my co-workers and supported by important others	0.94			
	I would prefer to remain in the background even if a co-worker is being taunted or talked about unfairly	0.72			

**Table 2.**  
Constructs and  
respective indicators



as presented in Table 3. The CR values of the four latent constructs of ethical leadership, organizational virtuousness, internal whistleblowing intention and moral courage were 0.93, 0.96, 0.96 and 0.92, respectively. Thus, all values of CR exceeded the suggested minimum value of 0.6. The values of AVE were also checked and were found to range between 0.92 and 0.93, making them acceptable because the ideal values of this test should be greater than 0.5 (Fornell and Larcker, 1981). Thus, all latent constructs of the model had acceptable convergent validity. Moreover, all the values of the square root of AVE in bold were greater than the construct correlations; thus, discriminant validity was achieved.

#### Structural model

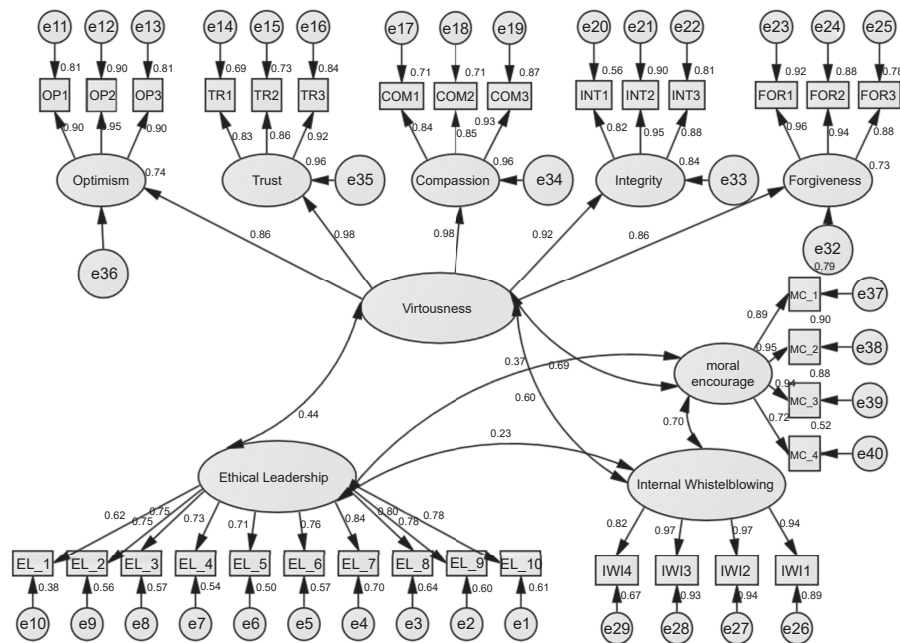
The results showed that the proposed structural model fit the dataset ( $\chi^2/\text{df} = 3.301$  ( $<5$ ), RMSEA = 0.068 ( $\leq 0.08$ ), CFI = 0.946 ( $>0.9$ ), TLI = 0.933 ( $>0.9$ ), GFI = 0.848 ( $<0.9$ ), AGFI = 0.817 ( $<0.98$ )). Only the last two indices did not reach the lower cut-off, which was acceptable in the newly developed model, thus the model did not need to be modified. The other indices of the model results confirmed the model fitness, as they indicated that it was acceptable and satisfactory (Awang *et al.*, 2015). All important indices that needed to be assessed are presented in Table 3.

Structural equation modeling (SEM) was adopted to test the hypothesized structural model, as illustrated in Figure 2. Table 4 shows the results of the structural model, which included standardized estimates of the path coefficients. Ethical leadership ( $\beta = 0.600$ ,  $t = 8.528$ ,  $p < 0.001$ ) was found to have positive effects on organizational virtuousness, in support of H1. Furthermore, organizational virtuousness ( $\beta = 0.587$ ,  $t = 12.709$ ,  $p < 0.001$ ) had positive effects on internal whistleblowing intention, in support of H2. The structural model explained R<sup>2</sup>'s 36% variance in internal whistleblowing intention. According to Hayes and Rockwood (2017), the effect size of mediation is used to estimate the significance and magnitude of indirect effects. Thus, the results showed significant paths for direct and indirect effects, and AMOS's outputs provided the standardized coefficients for paths 1 and 2, as presented in Table 4.

According to covariance-based-SEM, there were two types of mediation, namely partial and full. If only the indirect effect path is significant, full mediation has occurred, whereas if both direct and indirect paths are significant, partial mediation has occurred (Nitzl *et al.*, 2016). Therefore, the path analysis's results present the relationship between ethical leadership and internal whistleblowing intention through organizational virtuousness ( $\beta_1 = 0.600$ ,  $p < 0.001$  and  $\beta_2 = 0.578$ ,  $p < 0.001$ ). Accordingly, H3 was supported. Thus, this result indicates that organizational virtuousness partially mediates the relationship between ethical leadership and internal whistleblowing.

Construct	1	2	3	4
1. Ethical leadership	0.75			
2. Organizational virtuousness	0.44	0.93		
3. Moral courage	0.37	0.69	0.87	
4. Internal whistleblowing intention	0.23	0.60	0.70	0.92
CR	0.93	0.96	0.92	0.96
AVE	0.57	0.84	0.76	0.85
Mean	5.19	4.64	4.87	5.51
SD	0.932	1.449	1.408	1.399
Model fit	Data $\chi^2/\text{df} = 3.301$ ( $<5$ ), RMSEA = 0.068 ( $\leq 0.08$ ), CFI = 0.946 ( $>0.9$ ), TLI = 0.933 ( $>0.9$ ), GFI = 0.848 ( $<0.9$ ), AGFI = 0.817 ( $<0.9$ )			

**Table 3.**  
Correlations, validity  
and items reliability



**Figure 2.**  
Results of standardized  
path coefficient  
estimates of  
hypothesized model

H	Path	Coefficients	SE	<i>t</i> -value	<i>p</i> -value	Result
H1	Ethical leadership → Organizational virtuousness	0.598	0.070	8.527	0.000	Supported
H2	Organizational virtuousness → Internal whistleblowing intention	0.590	0.047	12.679	0.000	Supported
H3	Ethical leadership → Organizational virtuousness	Path 1 = 0.600	Path 1 = 0.070	Path 1 = 8.528	Path 1 = 0.000	Supported
	Ethical leadership → Internal whistleblowing intention	Path 2 = 0.578	Path 2 = 0.046	Path 2 = 12.709	Path 2 = 0.000	

**Table 4.**  
Hypothesis testing  
results

Regarding testing, the moderation effect of moral courage in the organizational virtuousness–internal whistleblowing intention relationship revealed a chi-square difference of 1.549 between the constrained and unconstrained models. To attain the moderation role of moral courage, the difference value should be greater than the chi-square value at one degree of freedom (3.84). Thus, H4 was not supported. This is due to differences in these studies compared to previous similar studies (see Comer and Schwartz, 2017; May *et al.*, 2014), which provide respondents' diverse perceptions of the measuring factors and issue being addressed.

## Discussion

To the best of our knowledge, this is the first study to investigate the mediating effect of organizational virtuousness in the relationship between ethical leadership and internal

whistleblowing. It also examined the moderating role of moral courage in the relationship between organizational virtuousness and internal whistleblowing. The associated results revealed that when the leaders controlled for internal whistleblowing, workplace virtues mediated this relationship, and moral courage moderated this relationship as well. Providing psychological support to subordinates, as part of ethics, may promote ethical practices and improve workplace virtues by establishing a bridge to understanding.

The findings of this study and its theoretical contributions to the behavioral sciences literature are addressed based on the hypothesized model with comparisons to existing research. In addition, the managerial contributions of these results, limitations and recommendations for further research are discussed below. Our results also demonstrated that the followers would have intentions as well as the ability to detect wrongdoings when their leaders play the role of model, and they positively support the ethical practices and behaviors. The results indicated that ethical leadership is significantly associated with organizational virtuousness in hotel settings. Organizational virtuousness is a significant element of organizational outcomes and improved performance in contemporary business settings (Searle and Barbuto, 2011; Sun and Yoon, 2020). In response, the results of this research have confirmed a positive relationship in this regard. This finding indicates that ethics represents one of the cornerstones of a compatible and virtuous work environment. Several predictors can also affect internal whistleblowing intention, especially related to personal and organizational factors in business organizations (Chiu, 2003).

This study's results have confirmed that organizational virtuousness is significantly associated with internal whistleblowing intention in the hotel context (Cheng *et al.*, 2019). Therefore, it is likely that organizational ethics affects employees' willingness to report wrongdoing (Ahmad *et al.*, 2014; Tavakoli *et al.*, 2003). Furthermore, the results have revealed that organizational virtuousness partially mediates the relationship between ethical leadership and internal whistleblowing intention. This is consistent with previous studies that have indicated that organizational virtuousness plays an important role in improving and developing moral leadership within organizations, facilitating hotel employees' internal whistleblowing intentions (Bhal and Dadhich, 2011).

This paper has also attained a result that completely differs from previous studies that moral courage cannot moderate the relationship between organizational virtuousness and whistleblowing intention. Many studies have confirmed that moral courage depends on employees' ethics and principles with respect to doing the right thing, regardless of the risk of retaliation (e.g. Kurian and Nafukho, 2021; Wood *et al.*, 2021). A number of reasons, including employees' fear of being personally targeted by their supervisors or co-workers, can explain this study's distinctive result. This is consistent with other studies that have claimed that whistleblowing is tedious in conflict situations (Pianalto, 2012). Our findings are in line with empirical studies (e.g. Cheng *et al.*, 2019), which revealed a moderating role of moral courage and its effect on internal whistleblowing and had an indirect effect on the relationship between ethical leadership and whistleblowing, but with a different mediation effect of the employee-perceived organizational politics. In addition, other findings support the role of organizational ethics in supporting moral courage as a leadership practice (Sekerka *et al.*, 2009).

In addition, previous studies have investigated the moderating role of moral courage in other contexts than the hotel setting (Comer and Schwartz, 2017; May *et al.*, 2014). This result can also be interpreted as evidence that the availability of organizational virtuousness does not require moral courage among employees for them to report violations in the workplace (Kurian and Nafukho, 2021). Consequently, trust in leaders plays a key role in assuring employees that they will not face issues if they report violations, consistent with typical Arab cultural characteristics (Farooqi *et al.*, 2017; Hassan *et al.*, 2020). Hence, Arab hotel employees need organizational traits, like organizational climate and psychological empowerment, to

support them in reporting ethics violations more than individual traits, like moral courage and ethical efficacy.

### Conclusion

Ethical leadership is one of the behavioral trends that many businesses aim to follow in order to respect others' ideas and moral ideals, as well as their dignity and rights. Individuals' safety and motivations are fundamental to ethical behaviors. The lack of regulatory clarity fosters an environment where breaches are common and individuals are scared to report them. Through the mediation role of organizational virtuousness, this study analyzes the link between leaders' ethical actions and internal whistleblowing among hotel employees in Egypt. The conceptual framework states that ethical leadership fosters a virtuous environment and promotes whistleblowing. Ethical leadership improves organizational virtuousness. As a result, it has a considerable influence on whistleblowing intentions. As such, most hotel employees require organizational factors, such as organizational culture and psychological empowerment, as well as individual attributes, such as moral boldness and ethical efficacy, to aid them in reporting ethical transgressions.

### *Theoretical implications*

These findings add important contributions to the literature regarding the crucial role of ethical leadership in employees' whistleblowing intentions in the following ways. First, this research has demonstrated how ethical behavior among leaders can act as a powerful catalyst for employees to whistleblow to their managers or supervisors (Cheng *et al.*, 2019; Zhang and Liu, 2019). The impact of ethical leadership on several employee outcomes has also been discussed in past studies, including employee creativity (Javed *et al.*, 2017), knowledge sharing (Bhatti *et al.*, 2020), job performance (Simões *et al.*, 2019) and organizational identification (Sharma *et al.*, 2019). However, the impact of this leadership style on internal whistleblowing intention has not been discussed separately in the business context (Kurian and Nafukho, 2021; Tran *et al.*, 2021).

Moreover, internal whistleblowing intentions from external sources are radically different in terms of motives and circumstances. Therefore, it was necessary to discuss internal whistleblowing intentions separately, specifically in the hotel sector. Consequently, this research used an advanced field design to consider the beneficial effects of ethical leadership on internal whistleblowing intention, drawing on ELT and LMX theories. Second, the past five years have witnessed a remarkable interest in leadership patterns and internal whistleblowing intentions. However, most scholars have not discussed the intermediary mechanisms that translate the focal role of ethical leadership as an enabler of employees' internal whistleblowing intentions. Ethical leadership has been shown to influence internal whistleblowing intention through collective moral potency and personal identification (Peng and Kim, 2020), turnover intention through organizational identification (Suifan *et al.*, 2020), while whistleblowing has been measured through job stress (Rabie and Abdul Malek, 2020) and through organizational politics (Cheng *et al.*, 2019).

Given the above, it is suggested that organizational virtuousness can act as a mediator between ethical leadership and internal whistleblowing intention. To the authors' knowledge, no similar research has yet been conducted on how organizational virtuousness affects this dynamic. Hence, we can regard organizational virtuousness as the degree to which an employee perceives an individual that allows for the generalization and preservation of virtuous behavior and cultural traits in the workplace (Chiu, 2003). By tracking field survey data, organizational virtuousness should be deemed a critical influence on internal whistleblowing intention. Finally, the integrative mediation model test provides strong evidence of the extent to which organizational virtuousness mediates the relationship

between ethical leadership and internal whistleblowing intention. Internal whistleblowing intention is a purposeful behavior to avoid the risk of harming a virtuous workplace (Farooqi *et al.*, 2017).

#### *Managerial implications*

The findings imply several managerial contributions to promoting internal whistleblowing intentions (May-Amy *et al.*, 2020). First, hotel organizations' management should adopt ethical leadership traits, such as listening to what subordinates have to say, making fair and balanced decisions, being trustworthy and discussing work ethics with subordinates. Second, the results can assist the Egyptian Hotel Board of Directors with developing management systems by preventing violations that may harm an organization's reputation. Hence, it is evident that providing a virtuous workplace dominated by optimism, trust, compassion, integrity and forgiveness will play a critical role in maintaining violation-free work environments where any violations will be reported ethically.

Third, it is necessary to focus on leaders' ethical behavior and virtues in the workplace (Kurian and Nafukho, 2021) rather than on individual traits to report internal violations in hotel settings. Therefore, senior management should act as a moral role model to inspire employees to be virtuous. Finally, hotels can make concerted efforts to adopt measures for creating virtuous work environments (Rabiul *et al.*, 2021). For instance, hotel management should encourage employees to participate in the organizational hierarchy.

#### *Limitations and future research directions*

Despite the fact that this paper offers useful theoretical and practical contributions, it has several limitations. First, the data analysis relied on a representative sample drawn from employees of five-star hotels in Egypt, which may reduce the results' generalizability. Future researchers could use a multi-level approach with regard to reporting internal violations. It can also be used in more than one developing country throughout the world to broaden the reach of the study findings to the widest potential audience, for instance, the Middle East and North Africa (MENA) countries. Besides, these results are extrapolable to other areas with similar economies, such as Morocco and Tunisia.

Second, emphasis was placed on hotel employees in the front office, food and beverages, marketing and sales, without addressing human resources, finances, and so forth. Future researchers should keep various administrative levels like chief executive officers, senior managers and supervisors in mind. This is congruent with Hofstede's theory, which gives a comprehensive framework for recognizing cultural variations across groups, which may aid in predicting whistleblowers' behavioral intentions (Chiu, 2003; Tavakoli *et al.*, 2003). Third, the current study relied on a questionnaire-based quantitative approach and did not address depth-interviews and focus groups as qualitative approaches. Therefore, future researchers should perform mixed-methods research. Finally, the authors did not consider the negative impact of the variables affecting employees' psychological health. In the coming research, variables related to hotel employees' negative qualities should be measured with ethical leadership acting as a predictor for fear of COVID-19, employee depression and workplace hazing.

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# Linking human resources practices to employee engagement in the hospitality industry: the mediating influences of psychological safety, availability and meaningfulness

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## Abstract

**Purpose** – Drawing on self-concept theory, this study evaluates the mediating effects of employees' psychological states on the relationship between human resources (HR) practices and employee engagement. **Design/methodology/approach** – Through random sampling, 434 customer-contact frontline employees from five-star hotels in Malaysia participated in the cross-sectional survey.

**Findings** – The results produced by the Smart-PLS (partial least squares) indicate that HR practices positively and significantly influence employees' psychological states of safety, meaningfulness and availability. All these psychological states also exert positive influences on employee engagement (organisational and work engagement). Safety and availability mediate the links between HR practices and employee engagement, but not meaningfulness.

**Practical implications** – HR practices and employees' psychological states are necessary in ensuring positive employee outcomes and improving customer service provision.

**Originality/value** – The findings contribute to the further extension of self-concept theory and employee engagement by incorporating the mediating roles of employees' psychological states in the relationships between HR practices and employee engagement.

**Keywords** Human resource practices, Meaningfulness, Safety, Availability, Work engagement, Organisational engagement

**Paper type** Research paper



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## Introduction

Highly engaged employees often result in reduced turnover intention, better customer service delivery, improved financial performance, decreased job stress and increased psychological well-being (Harter *et al.*, 2020; Memon *et al.*, 2020). Despite the importance of employee engagement, only 15% of employees are engaged worldwide (Harter and Rubenstein, 2020), including 19% in Southeast Asia countries such as Malaysia (Gallup, 2017). The hospitality industry in Malaysia contributes to the country's gross domestic product consistently: it was the third largest in foreign revenue earnings with 86.1bn in 2019 (The Star, 2019; Trading Economics, 2020). As such, it is imperative to focus on increasing employee engagement, especially among frontline customer-contact employees who significantly affect the success of the hotel industry owing to their direct and frequent interactions with customers (Rabiul *et al.*, 2021; Rabiul and Yean, 2021).

To increase employee engagement, studies have shown that human resource (HR) practices and employees' psychological states play significant roles (Alfes *et al.*, 2020; Guan and Frenkel, 2018; Memon *et al.*, 2020; Zhang *et al.*, 2018). Several studies have identified that HR practices influence employee engagement using different mediating mechanisms such as psychological empowerment, organisational commitment, job satisfaction and psychological capital (Aktar and Pangil, 2018; Huang *et al.*, 2017; Karadas and Karatepe, 2019). Although these studies contributed to the employee engagement literature, a few gaps remain unexplored.

First, the existing studies failed to systematically investigate the effects of HR practices on employees' psychological states (meaningfulness, safety, availability) which lead to greater employee engagement. Although different psychological states exist (e.g. Hyland, 1990; Kahn, 1990; Rabiul *et al.*, 2021) in the literature, we investigate Kahn's (1990) three psychological states as mediators between HR practices and employee engagement. Kahn (1990) showed the importance of psychological states by stating, "people employ and express or withdraw and defend their preferred selves on the basis of their psychological experiences of self-in-role" (p. 702). Moreover, prior studies claimed that psychological states of meaningfulness, safety and availability are the underlying mechanisms to increase positive outcomes among employees (Basit, 2017; Chen *et al.*, 2016a; Fletcher, 2016; Wang *et al.*, 2019). Self-concept theory (Aryee *et al.*, 2012; Rabiul *et al.*, 2021) suggests that individuals will generate positive feeling in the workplace when they receive the necessary support from organisations. As such, when HR practices from the organisations are available, employees will experience positive psychological states of availability, safety and meaningfulness of work. Consequently, employees will express positive attitudes towards their work roles (work engagement) and organisations (organisational engagement).

Second, earlier studies focussed primarily on increasing employees' work engagement (Guan and Frenkel, 2018; Karadas and Karatepe, 2019; Memon *et al.*, 2020; Zhang *et al.*, 2018), while ignoring organisational engagement (Fletcher and Schofield, 2019). As employees need to perform multiple roles in the organisation, both organisational and work engagements are important (Saks, 2006, 2017). According to Saks (2017), work engagement is "the relationship between an employee and his or her job" and organisational engagement is an "individual's role, responsibility, and tasks associated with one's membership in an organisation" (p. 79). Limited studies (e.g. May *et al.*, 2004) have examined three psychological states together to understand the importance of these states in engaging employees at work. Therefore, delineating on self-concept theory (Rabiul *et al.*, 2021), the present research examines the mediating effects of an employee's perceived psychological states (e.g. meaningfulness, safety and availability) on the relationship between HR practices and employee engagement (work and organisational engagement) in the hotel industry in Malaysia.

This study adds value to the literature in two ways. First, it enriches self-concept theory and employee engagement by investigating the mediating influence of employees' three

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psychological states between HR practices and employee engagement. Second, the findings contribute to the hospitality literature on engaging employees through good HR practices and improving employees' psychological feeling of meaningfulness, safety and availability at one's workplace.

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## Literature review

### *Employee engagement*

Kahn was the first scholar who introduced the term "work engagement" in 1990 (May *et al.*, 2004; Saks, 2006). According to Kahn (1990), *personal engagement* or employee engagement was defined as "the simultaneous employment and expression of a person's 'preferred self' in the task behaviours that promote engagement to work and to others, personal presence (physical, cognitive, and emotional), and active, full role performance" (p. 700). Since then, employee engagement has attracted the attention of many business organisations and academicians. Building on the ideas of Kahn (1990), Saks (2006) identified two types of personal engagement: job engagement and organisational engagement. Similarly, Schaufeli and Salanova (2011) stated that "employee engagement is a broader concept and may also include the relationship with the employee's professional or occupational role and with his or her organisation" (p. 40). Nevertheless, this study prefers to use work engagement, which some called job engagement (Saks, 2006) or work engagement (Schaufeli and Salanova, 2011), while Saks (2017) used the terms interchangeably.

Work engagement refers to "a positive, fulfilling work-related state of mind that is characterised by vigour, dedication, and absorption" (Schaufeli *et al.*, 2006, p. 702). Vigour explains about individuals' high-level mental resilience and physical energy to perform the work role even in difficulties (Dollard and Bakker, 2010; Karadas and Karatepe, 2019). Dedication refers to individuals' affective belief in work role where they experience the sense of pride, enthusiasm, challenge and significance (Rabiul and Yean, 2021; Schaufeli and Salanova, 2011). Absorption, on the other hand, is about a pervasive and persistent state of mind concerning one's work role and the inability to detach from it (Bakker and Demerouti, 2017).

Organisational engagement refers to an individual's "role, responsibility, and tasks associated with one's membership in an organisation" (Saks, 2017, p. 79). Specifically, it describes the extent to which an employee engages in activities that are more related to organisational activities but not the work role (Saks, 2006; Schaufeli and Salanova, 2011). In other words, organisational engagement occurs due to employees' satisfaction, enthusiasm and commitment to the organisation (Kim and Koo, 2017).

### *HR practices*

Two well-known HR practices included in the management literature are called "soft" and "hard" practices (Cregan *et al.*, 2021; Jensen *et al.*, 2011; Muthuku, 2020). Control-oriented or "hard" HR practices concentrate on controlling employees through the application of procedures and rules (Cregan *et al.*, 2021; Gould-Williams and Davies, 2005; Jensen *et al.*, 2011). Soft HR or commitment-oriented practices, on the other hand, focus on increasing employees' motivation and developing strong commitment towards organisations (Aktar and Pangil, 2018; Johari *et al.*, 2013; Gurlek and Uygur, 2021). Soft HR practices provide high quality and flexible work performance by involving employees in the decision-making process, building trust in their managers and expressing concerns for employees (Elrehail *et al.*, 2020; Gurlek and Uygur, 2021; Mowbray *et al.*, 2020). Given the nature of the work environment in the hotel industry, the combination of both soft and hard HR practices may be more effective to engage employees in works rather than utilising them separately.

Moreover, the collective efforts of HR practices will augment the effects on employees' psychological states, which then increases work engagement (Karadas and Karatepe, 2019; Kloutsiniotis and Mihail, 2020).

However, there is no universal specific set of HR practices that are suitable for every organisation (Kloutsiniotis and Mihail, 2020). Thus, this study proposes that soft HR practices could improve the psychological states of employees and foster greater work and organisational engagement (Agarwal and Farndale, 2017; Basit, 2017; Chen *et al.*, 2016a; Elrehail *et al.*, 2020; Gurlek and Uygur, 2021). HR practices (e.g. training and development, employee participation, rewards and cognition, career advancement, appraisal system, job security, recruitment process and teamwork) are vital for employees' growth (e.g. Alfes *et al.*, 2020; Karadas and Karatepe, 2019; Mowbray *et al.*, 2020; Murphy *et al.*, 2018).

#### *HR practices and psychological states*

According to Saks and Gruman (2014), psychological meaningfulness "involves the extent to which people derive meaning from their work and feel that they are receiving a return on investments of self in the performance of their role" (p. 160). It refers to individuals' experiences at work that are meaningful, valuable and worthwhile (Fletcher and Schofield, 2019; Kahn, 1990). In general, individuals judge themselves by their job and their efforts (Edmondson, 1999; Steger *et al.*, 2013). Work becomes meaningful once it facilitates individuals to achieve one or more elements of meaning, which matches the purpose of the individual such as personal growth, self-realisation, challenge, autonomy or competence (Edmondson and Lei, 2014; Fletcher and Schofield, 2019; Kahn, 1990).

The HR practices considered in this study are related to psychological meaningfulness. For example, training helps employees to develop necessary skills to further their career development (den Hartog *et al.*, 2013). Other aspects, including employee participation in decision-making, are related to self-value; job security ensures career stability; and recruitment is related to self-realisation (den Hartog *et al.*, 2013; Karadas and Karatepe, 2019). Appraisal, reward and recognition are related to increased social and socio-economic status, which could be psychologically meaningful (Elrehail *et al.*, 2020). Teamwork also could enhance meaningfulness because of the collegiality among the team members and all are having similar purpose. In sum, combined HR practices might make employees to feel dignity and respect for their work which would likely generate meaningfulness. This is suggested by self-concept theory (Aryee *et al.*, 2012; Shamir *et al.*, 1993) which posits that individuals have a sense of experience of positive self-concept (meaningful work) due to having organisational supports (HR practices). Thus, we proposed:

*H1. HR practices positively and significantly influence employees' psychological meaningfulness.*

Kahn (1990) defined psychological safety is "as feeling able to show and employ one's self without fear of negative consequences to self-image, status, or career" (p. 708). It refers to a supportive, open and trustworthy work environment where employees feel safe to take risks and make trivial errors without fear of severe punishment (Rabiul *et al.*, 2021; Lyu, 2016). This also means that employees who express their views openly to their superiors will not feel threatened with adverse consequences (Agarwal and Farndale, 2017; Dollard and Bakker, 2010; Edmondson, 1999). A psychologically safe environment will not affect employees' careers, self-image or status in harmful ways (Lyu, 2016).

HR practices (job security, training, appraisal, rewards, recruitment and teamwork) create a supportive work environment and remove insecurities and anxieties (Agarwal and Farndale, 2017; Edmondson, 1999). Some scholars in their meta-analyses (e.g. Carmeli and Gittel, 2009; Frazier *et al.*, 2017) reveal that collective appropriate HR practices (e.g. appraisal,

job security, training, rewards, recruitment, teamwork and participation) generate a sense of psychological safety at work by building relationships with employees. For example, through participation, employees can voice their opinions concerning future growth and career development opportunities to their superiors (Mowbray *et al.*, 2020). All employees feel safe at work due to collective HR practices (training, recruitment process and teamwork) that help employees to focus on collective goals and avoid conflict (Agarwal and Farndale, 2017; Carmeli and Gittell, 2009; Frazier *et al.*, 2017). Edmondson and Lei (2014) claim that employees will have a sense of security and establish positive relationships with their employers when their personal interests and future career development are adequately addressed. Positive attitudes towards HR practices generate psychological safety that leads to personal growth and development (Edmondson, 1999). All these HR practices generate psychological safety in different ways which is consistent with self-concept theory (Aryee *et al.*, 2012). Therefore, it is proposed:

*H2. HR practices positively and significantly influence employees' psychological safety at the workplace.*

Kahn (1990) defined psychological availability as "individuals' sense of having the physical, emotional, or psychological resources to personally engage in a particular moment" (p. 714). May *et al.* (2004) further describe psychological availability as a persons' ability to perform work with cognitive, emotional and physical engagement. Positive supports from organisations such as training, career development opportunity, job security, appraisal, rewards and recognitions and fair recruitment process will develop self-concept that makes employees become confident of performing their work at any given situation (Gurlek and Uygur, 2021; Karadas and Karatepe, 2019).

HR practices play both an extrinsic and an intrinsic motivational role because they help employees grow actively by developing their skills and confidence, which makes them more psychologically available to perform the tasks (Bakker and Demerouti, 2017; Chen *et al.*, 2016b; Karatepe and Karadas, 2019). Wang and Xu (2017) found that HR practices enhance employees' ability to perform tasks. For example, a proper recruitment system results in the hiring of capable employees. Moreover, feedback systems result in the recognition of employees' strengths and weaknesses, which can be developed through training. Employee participation, job security, teamwork, appraisal, rewards and recognition of good works provide intrinsic motivation and foster employees' psychological availability (Wang and Xu, 2017; Zirar *et al.*, 2020).

Overall, in line with self-concept theory (Aryee *et al.*, 2012; Rabiul *et al.*, 2021) that in a work environment where available appropriate HR practices (training, job security, appraisal, career advancement and rewards and recognition) are offered by the organisation, employees will display positive energy and psychological availability, either intrinsically or extrinsically (Karadas and Karatepe, 2019). Thus, we propose the following:

*H3. HR practices positively and significantly influence employees' psychological availability.*

#### *Psychological meaningfulness and employee engagement*

Meaningfulness is associated with a variety of personal and organisational consequences that are related to an employees' success at work (Mostafa and Abed El-Motalib, 2018; Steger *et al.*, 2013). Low meaningfulness results in apathy and detachment (Fletcher and Schofield, 2019; May *et al.*, 2004). In contrast, high meaningfulness results in high commitment and involvement towards the work (Chen *et al.*, 2011). Psychologically meaningful work generates personal growth and satisfaction, which leads employees to be more committed to engage fully at work (Elrehail *et al.*, 2020; Kunie *et al.*, 2017; Steger *et al.*, 2013).

Meaningful work provides extrinsic and intrinsic motivation, which may influence employees to engage at work with full dedication, absorption and vigorousness. Several empirical studies confirmed that psychological meaningfulness is positively linked to employees' engagement at work and other positive employee outcomes (Fletcher and Schofield, 2019; May *et al.*, 2004; Mostafa and Abed El-Motalib, 2018; Rabiul *et al.*, 2021). Therefore, we propose:

*H4–H5.* Psychological meaningfulness positively and significantly influences (H4) work engagement and (H5) organisational engagement.

*Psychological safety and employee engagement*

In a psychologically safe work environment, individuals have a sense of confidence that they “will not be embarrassed, rejected, and punished by someone for speaking up” (Edmondson, 1999, p. 355). Without psychological safety, working environments are ambiguous, unpredictable and threatening (Kahn, 1990; May *et al.*, 2004). Hence, employees may feel anxiety and fear in a situation in which they need to ask for help, feedback or propose ideas (Agarwal and Farndale, 2017; Dollard and Bakker, 2010; Edmondson, 1999; Kahn, 1990).

In contrast, Edmondson (1999) states that in psychologically safe environments, employees have “a sense of confidence that the team will not embarrass, reject, or punish someone for speaking up” (p. 354). As such, perceived psychological safety enhances interpersonal relationships among employees through a supportive, open, trustworthy, flexible and non-threatening environment (Rabiul *et al.*, 2021; Lyu, 2016). In such an environment, employees have the opportunity to share their personal opinions to their superiors and build trust with senior management, which may lead to engagement at work (Harter *et al.*, 2020; Kirk-Brown and Van Dijk, 2015; Robinson *et al.*, 2004). A study by Basit (2017) of Malaysian hospital employees showed that psychological safety positively influenced work engagement. Accordingly, we propose:

*H6–H7.* Psychological safety positively and significantly influences (H6) work engagement and (H7) organisational engagement.

*Psychological availability and employee engagement*

Availability denotes an individual's belief of having physical, emotional and mental resources to perform the assigned tasks in a particular moment (Kahn, 1990). More specifically, it refers to the emotional, physical and psychological assets which an individual possesses that are required to do the job at any moment without interruption (Binyamin and Carmeli, 2010; May *et al.*, 2004). Individuals' own evaluation of their personal resources (physical, emotional and mental) to perform the given tasks while considering various social distractions is also vital (Fletcher and Schofield, 2019; Kahn, 1990). Although physical availability varies, individuals' strength, stamina and flexibility could influence their work-related engagement (Frazier *et al.*, 2017; Edmondson, 1999). Moreover, individuals need to be both emotionally and mentally prepared for work. Kahn (1990) notes that without the positive feeling of having psychological availability, individuals are more probable to disengage from their appointed work roles. Therefore, we proposed the following:

*H8–H9.* Psychological availability positively and significantly influences (H8) work engagement and (H9) organisational engagement.

*Psychological states (meaningfulness, safety and availability) as the mediators between HR practices and employee engagement*

Training and development are among the facilities provided by various organisations to further grow employees' skills and abilities (Agarwal and Farndale, 2017). Employees with



sufficient skills and knowledge will experience less anxiety and emotional exhaustion than their less-competent counterparts. This increases feelings of meaningfulness, safety and availability, which lead to stronger work and organisational engagement (Dollard and Bakker, 2010; Gurlek, 2020). Once employees experience these psychological states, they are more likely to engage at work (May *et al.*, 2004). This is because employees who perceive their work as meaningful will have positive attitudes towards their future professional development; thus, they will work harder (Fletcher and Schofield, 2019).

Employee involvement in decision-making processes is another critical indicator of engagement as they feel valued by the organisations (Robinson *et al.*, 2004). Moreover, employee involvement in decision-making creates opportunities to share ideas with superiors, which is positively associated with work engagement (Aon Hewitt, 2018; Robinson *et al.*, 2004). Once an organisation offers a clear advancement process, employees' engagement and motivation at work become more meaningful (e.g. Aktar and Pangil, 2018; Ashton, 2017; Bakker and Demerouti, 2017; Huang *et al.*, 2017). This is consistent with self-concept theory (Aryee *et al.*, 2012; Rabiul *et al.*, 2021) – that positive support from HR practices is associated with the development of positive self-concept (meaningful work), which leads to greater work and organisation engagement.

Employees with perceived safety will be confident to perform works as they have sufficient skills and knowledge (Frazier *et al.*, 2017) which can be done through training and development. Employees are committed at work, express a positive attitude and are satisfied owing to career advancement opportunities (Aktar and Pangil, 2018; Ashton, 2017; Huang *et al.*, 2017). Job security is conceptualised as the degree to which employees expect to stay at their jobs over an extended period (Aktar and Pangil, 2018; Gould-Williams and Davies, 2005; Kirk-Brown and Van Dijk, 2015). Job security is an extrinsic factor that motivates employees to reach their full potential (Ashton, 2017; Bakker and Demerouti, 2017; Karadas and Karatepe, 2019). Having a secure job means employees will feel psychologically safe and engage in their work role (Aktar and Pangil, 2018; Kahn, 1990). Likewise, in line with self-concept theory (Aryee *et al.*, 2012; Rabiul *et al.*, 2021) that individual employees may grow positive self-concept and confidence (psychological availability) to perform the job task having the appropriate HR practices from the organisation.

In sum, employee involvement, appraisal, career advancement opportunity, job security, training, development and rewards and recognition create psychological states of meaningfulness, safety and availability among employees that eventually lead to greater work and organisational engagement (Fletcher and Schofield, 2019; Kunie *et al.*, 2017; May *et al.*, 2004; Mostafa and Abed El-Motalib, 2018; Robinson *et al.*, 2004). Hence, the following hypotheses were proposed:

- H10–H11.* Psychological meaningfulness mediates the link of HR practices and employees' (H10) work engagement and (H11) organisational engagement.
- H12–H13.* Psychological safety mediates the link of HR practices and employees' (H12) work engagement and (H13) organisational engagement.
- H14–H15.* Psychological availability mediates the link of HR practices and employees' (H14) work engagement and (H15) organisational engagement.

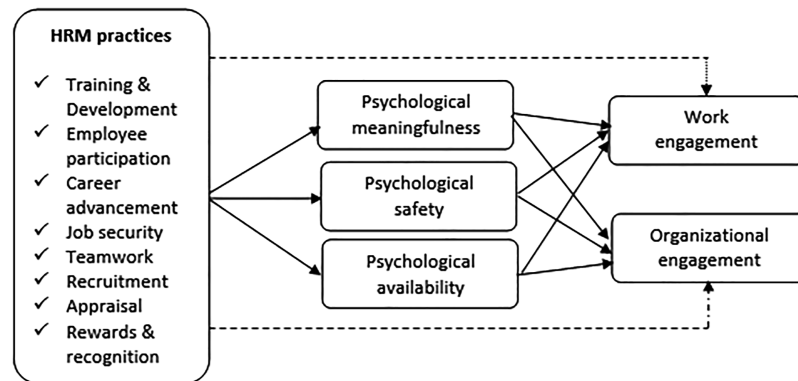
The research framework is shown in Figure 1.

## Method

### Measurements

Frontline hotel employees expressed their opinions about organisations' HR practices, facilities and their psychological states and work engagement based upon a continuous scale

**Figure 1.**  
Conceptual model



**Note(s):** (—) Solid indicates direct and (---) dotted line indicates indirect hypotheses

(1 = *strongly disagree* to 7 = *strongly agree*). Unidimensional HR practices (ten items) adapted from Jensen *et al.* (2011) and Gould-Williams and Davies (2005) were used. A sample item was, “I feel my job is secure in this hotel”. Earlier researchers (den Hartog *et al.*, 2013; Huang *et al.*, 2017) found that this scale had good reliability.

Psychological meaningfulness (six items; sample item, “the work I do on this job is meaningful to me”) and psychological availability (five items; sample item, “I am confident in my ability to deal with problems that come up at work”) were adapted from May *et al.* (2004). These scales have shown good reliability and validity (Chen *et al.*, 2011; Fletcher, 2016; Rabiul *et al.*, 2021; May *et al.*, 2004).

Edmondson (1999) developed a seven-item scale for psychological safety (sample item, “It is safe to take a risk in this team”). Chen *et al.* (2016a), Rabiul *et al.* (2021) and Wang *et al.* (2019) confirmed it had high reliability and validity.

Work engagement (nine items; sample item, “at my job, I feel strong and vigorous”) was adapted from Schaufeli *et al.* (2006). Organisational engagement (six items; sample item, “I am highly engaged in this organization”) was adapted from Saks (2006). Earlier studies (Fletcher and Schofield, 2019; Karadas and Karatepe, 2019; Rabiul and Yean, 2021; Saks, 2006) confirmed the reliability and validity of these scales.

#### *Sample and data collection*

This study surveyed full-time customer-contact frontline employees with a minimum of one year experience at five-star rated hotels in West Malaysia. According to the Ministry of Tourism, Arts and Culture (MOTAC) Malaysia, as of 14 June 2019, there are 107 five-star hotels (MOTAC, 2019). This study surveyed employees at 95 five-star hotels located in West Malaysia, following an earlier study by Kim and Koo (2017), to capture an adequate sample size and best represent the country’s hotel industry. Customer-contact frontline employees in five-star hotels are more likely to have interactions with customers to maintain service standards (Kim and Koo, 2017). Of the 95 five-star hotels, 80 are located in six states including Kuala Lumpur ( $n = 31$ ), Selangor ( $n = 16$ ), Penang ( $n = 10$ ), Melaka ( $n = 8$ ), Pahang ( $n = 8$ ) and Kedah ( $n = 7$ ). After contacting HR departments for permission, we obtained positive responses from 43 hotels and continued with the data collection.

Given the unknown population in the Malaysian hotel industry, we employed Krejcie and Morgan’s (1970) recommendations. They suggested that a sample size of 384 cases is adequate to test hypotheses for a population of  $\geq 10,000,000$ . Over 16 weeks – from June to

September 2019, 900 survey questionnaires were distributed. In the first 11 weeks, we obtained 354 responses which were not enough with our expectation for further analysis; thus, we gave HR managers more time (3–5 weeks) to seek additional responses. Finally, we obtained 549 responses over 16 weeks. After removing incomplete questionnaires, 434 valid and complete responses were analysed. We had a minimum of eight (8) responses and a maximum of 17 responses from a particular hotel, respectively.

*Outlier, non-response bias, common method variance (CMV) and multicollinearity tests*

For outlier treatment, Mahalanobis distance was tested at the 0.001 significance level. The Mahalanobis distance test was 12.36, which is lower than Lynch's (2013) Chi-square ( $\chi^2$ ) distribution value of 18.47. Thus, no outliers were detected in the dataset. Additionally, non-response bias is a concern for social science research (Hair *et al.*, 2014). The findings may not be generalisable if opinions differ substantially between the participants and non-participants (Armstrong and Overton, 1977). Hence, non-response bias was checked using Levene's test for equality variance (Hair *et al.*, 2014). There was no significant difference between early (271 participants) and late (163 participants) responses.

Moreover, CMV is a concern in self-reported surveys; thus, various remedial procedures were adopted to lower the effects of CMV. First, to avoid potential bias, survey boxes were provided at every participating hotel to enable employees to submit completed questionnaires confidentially. Questionnaires were handed to participants directly by the researchers' own representatives rather than by HR staff. We also utilised statistical remedies to ensure CMV was not present in the data. The Harman single-factor test revealed that a single factor explained 26.83% of the total six-factor variance 64.73%, which is much lower than the standard 50%. Thus, no CMV existed in the dataset (Podsakoff and Organ, 1986). According to Hair *et al.* (2019), latent variables have no multicollinearity issues if the VIF values are less than 3.0 (see Table 1).

## Results

*Demographics of participants and descriptive statistics of variables*

A total of 434 cases were valid (256 women, 59%). All participants were Malaysian including 43% Chinese-Malay, 39% Malay, 10% Indian-Malay, and the remaining 8% were mixed races. Most participants had a minimum of one year to a maximum of seven years of experience: 12.4% were managerial level, 33% were supervisory level and 53% were general level. More than 47% of participants worked in the front of the hotel such as guest service assistants, front office executives and concierge. Nearly 30% worked in the food and beverage department. The remaining 23% of respondents were from sales, marketing and housekeeping departments. Table 2 illustrates that organisational engagement and psychological meaningfulness have the lowest and the highest mean values, respectively. Psychological availability has the highest correlation with work engagement.

Variables	1	2	3	4	5	6
1. Psychological safety					1.187	1.187
2. HR practices	1.00		1.00	1.00		
3. Psychological meaningfulness					1.312	1.312
4. Psychological availability					1.315	1.315
5. Work engagement						
6. Organizational engagement						

**Table 1.**  
Inner variance inflation  
factor (VIF)

### Measurement model

It is necessary to evaluate the measurement model in PLS-SEM before hypothesis testing (Hair *et al.*, 2019). Following recommendations by Cheah *et al.* (2018) concerning a reflective model, a consistent algorithm was performed in Smart-PLS. The results in Figure 2 indicate that all items were loaded between 0.476 and 0.945 and average variance extracted (AVE) ranged from 0.537 to 0.623.

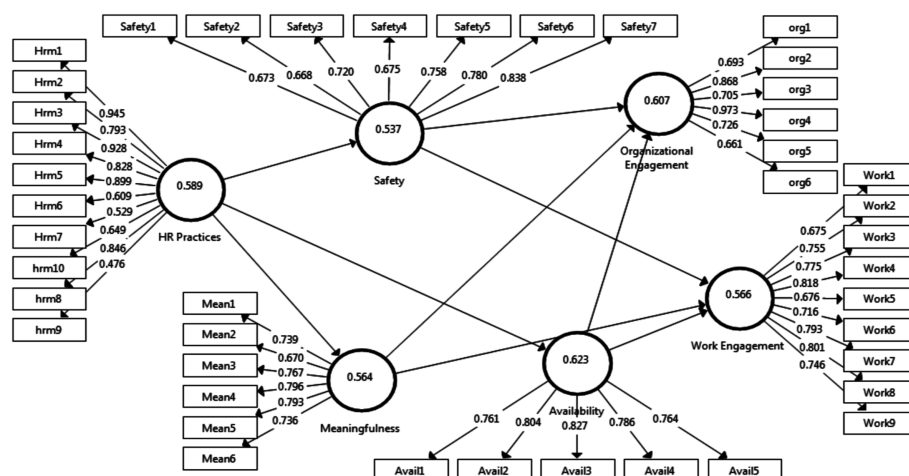
In line with Hair *et al.* (2014), 43 items were kept (see Figure 2) to fulfil the measurement requirements. The composite reliabilities (CRs) were as follows: HR practices (0.931), psychological safety (0.890), psychological meaningfulness (0.886), psychological availability (0.892), work engagement (0.921) and organisational engagement (0.901). Thus, convergent validity of the latent variables was confirmed to meet the following criteria: AVE > 0.50, CR > 0.70 and loading > 0.40 (Cheah *et al.*, 2018; Hair *et al.*, 2014).

Discriminant validity was confirmed through cross-loading, loading for individual items and heterotrait-monotrait (HTMT) ratio. Loading and cross-loading refer to the fact that indicator loading for primary constructs should be greater than the other constructs (Cheah *et al.*, 2018; Hair *et al.*, 2014). Table 3 indicates that the maximum value of the HTMT ratio was 0.479, which is lower than the 0.85 suggested by Hair *et al.* (2019). Loading for the primary construct was higher than the other constructs; thus, discriminant validity was confirmed for all latent variables (Cheah *et al.*, 2018).

**Table 2.**  
Bivariate relationship,  
mean and standard  
deviation (SD)

Variables	Mean	SD	1	2	3	4	5	6
1. HR practices	4.515	1.217	1					
2. Psychological meaningfulness	5.366	0.965	0.127**	1				
3. Psychological safety	5.286	0.930	0.245**	0.294**	1			
4. Psychological availability	4.957	1.179	0.233**	0.396**	0.300**	1		
5. Work engagement	4.968	1.058	0.336**	0.382**	0.324**	0.434**	1	
6. Organizational engagement	4.662	1.364	0.208**	0.237**	0.246**	0.261**	0.333**	1

**Note(s):**  $n = 434$ . \*\*. Correlation is significant at the 0.01 level (two-tailed)



**Figure 2.**  
Measurement model

### Fit indices

Blinding folding was applied to identify the predictive relevance ( $Q^2$ ). The results suggest that  $Q^2$  is greater than zero; thus, the model has predictive power (Hair *et al.*, 2014). The coefficients of determination ( $R^2$ ) were 0.302 for work engagement and 0.130 for organisational engagement. Accordingly, exogenous variables (three psychological states, HR practices) explained 30.2 and 13% of the variance in endogenous variables.  $R^2$  values of 0.67, 0.33 and 0.19 are described as substantial, moderate and weak, respectively (Hair *et al.*, 2019). Therefore, the model had a weak influence on endogenous variables.

### Structural model

This Smart-PLS analysis employed consistent bootstrapping with more than 5,000 samples, following recommendations by Cheah *et al.* (2018). All nine direct hypotheses (H1–H9) and four indirect hypotheses (H12–H15) were supported (see Table 4 for *t*-value, *p*-values). For example, the findings indicate that HR practices positively influence meaningfulness ( $\beta = 0.147$ ,  $p < 0.01$ ), safety ( $\beta = 0.272$ ,  $p < 0.001$ ) and availability ( $\beta = 0.262$ ,  $p < 0.001$ ) in employees. However, only H10 and H11 were not supported (see Table 4 for *t*-values and *p*-values).

### Discussion and conclusion

As anticipated by self-concept theory (Aryee *et al.*, 2012; Shamir *et al.*, 1993), appropriate HR practices promote positive self-concept (meaningfulness, safety and availability) among employees. Although these three psychological states are significant predictors of employee engagement, meaningfulness did not have the mediation influence that safety and availability did.

As expected, H1–H3 were supported. Once employees received training, career development opportunities, rewards, feedback opportunities, and there was a fair recruitment process, they looked at their work as meaningful and safe (Agarwal and Farndale, 2017; Chen *et al.*, 2016a; Kirk-Brown and Van Dijk, 2015). Moreover, HR facilities also develop confidence among employees to perform their work roles (Binanmin and Carmeli, 2010).

Likewise, as anticipated, H4–H9 were supported. Meaningfulness, safety and availability positively influence work engagement and organisational engagement. Several studies have confirmed that employees' perception of a psychologically safe work environment, meaningful work and available personal resources promote positive employee behaviour such as greater organisational and work engagement (Chen *et al.*, 2011; Fletcher, 2016; Fletcher and Schofield, 2019; Memon *et al.*, 2020).

Concerning mediation, contradictory to earlier expectation, psychological meaningfulness did not mediate the link between HR practices and work engagement nor organisational

Variables	1	2	3	4	5	6
1 Psychological safety						
2 HR practices	0.269					
3 Psychological meaningfulness	0.332	0.140				
4 Psychological availability	0.337	0.257	0.444			
5 Work engagement	0.357	0.365	0.422	0.479		
6 Organizational engagement	0.273	0.227	0.264	0.292	0.366	

**Table 3.**  
HTMT (heterotrait–  
monotrait) ratio

**Table 4.**  
Direct and indirect  
relationships

	$\beta$	$t$ -values	$p$ -values	LL	UL	Supported
<i>Direct relationships</i>						
H1	0.147	2.835	$p < 0.01$	0.037	0.242	Yes
H2	0.272	5.585	$p < 0.001$	0.168	0.361	Yes
H3	0.262	5.872	$p < 0.001$	0.170	0.345	Yes
H4	0.219	3.333	$p < 0.001$	0.089	0.342	Yes
H5	0.135	2.180	$p < 0.05$	0.012	0.254	Yes
H6	0.169	3.069	$p < 0.01$	0.058	0.273	Yes
H7	0.173	3.010	$p < 0.01$	0.062	0.287	Yes
H8	0.321	5.424	$p < 0.001$	0.207	0.441	Yes
H9	0.179	3.197	$p < 0.01$	0.067	0.289	Yes
<i>Indirect or mediated relationships</i>						
H10	0.032	1.902	$p > 0.05$	0.007	0.072	No
H11	0.020	1.531	$p > 0.05$	0.002	0.053	No
H12	0.047	2.457	$p < 0.05$	0.015	0.089	Yes
H13	0.046	2.410	$p < 0.05$	0.014	0.087	Yes
H14	0.084	3.459	$p < 0.001$	0.043	0.137	Yes
H15	0.047	2.502	$p < 0.05$	0.016	0.089	Yes
<b>Note(s):</b> $n = 434$ . CIBC = confidence interval bias corrected, $\beta$ = path coefficient. LL = lower limit, UL = upper limit						

engagement. Thus, H10 and H11 were not supported. According to Steger *et al.* (2013) and Rabiul *et al.* (2021), meaningfulness differs from one person to another owing to the differences in their expectations and lifelong planning. For example, HR practices may not always facilitate meaningfulness among employees. Moreover, meaningful work is linked to intrinsic and extrinsic motivation and individuals' weaknesses and strengths (Fletcher and Schofield, 2019).

As anticipated, H12–H15 were supported. Psychological safety mediates the effects of HR practices on both work engagement and organisational engagement. Similarly, psychological availability also mediated the link between HR practices and work engagement and organisational engagement. So far, only a limited number of studies have investigated the roles of psychological safety and availability as mediating mechanisms between HR practices and work and organisational engagement. According to self-concept theory (e.g. Mostafa and El-Motalib, 2018; Shamir *et al.*, 1993), employees who received supportive HR practices experienced positive influences on their self-concept; therefore, they had increased confidence to perform their job duties (Bakker and Demerouti, 2017; Kahn, 1990).

#### *Theoretical contributions*

The above findings contribute to self-concept theory (Shamir *et al.*, 1993) in which employees' perceived appropriate HR practices act as the catalyst for creating psychological states of meaningfulness, safety and availability. The findings validate earlier investigations (e.g. Agarwal and Farndale, 2017; Binyamin and Carmeli, 2010; Chen *et al.*, 2016a; Wang *et al.*, 2019) in the hotel industry in Malaysia. This contributes to self-concept theory (Shamir *et al.*, 1993) that appropriate HR practices promote one's positive self-concept about their work role, workplace safety and their work-related confidence.

Meaningfulness, safety and availability were significant predictors of organisational and work engagement. To our knowledge, our study is the first to investigate these three psychological states and positively link them to organisational engagement. Thus, this study validates Kahn's (1990) belief that psychological states are the prerequisite of engaging employees at both the work and organisational level, in the Asian context.

Our findings also contribute to the HR literature by establishing psychological states as the underlying mechanisms among the relationships between HR practices and employee engagement. This study has successfully extended the self-concept theory. Individuals' positive self-concept is generated by available appropriate HR practices by organisation, which in turn generates positive work behaviour in a motivational way.

#### *Practical implications*

Concerning practical implications, hospitality organisations need to focus on appropriate HR practices in the hotel industry in Malaysia. Training and personal development, recruitment processes, career opportunities, involving employees in decision-making and providing rewards for good work are key measures to enhance employees' perceptions of availability, safety and meaningfulness in the workplace. It is important for hoteliers to provide the above facilities with proper policy implementation. In fact, these psychological states have a key impact on both organisational and work engagement. Highly engaged employees often display less turnover intention, deliver better customer service, have better financial performance, experience less job stress and display healthy psychological well-being as compared to their counterparts (Harter *et al.*, 2020; Gallup, 2017; Memon *et al.*, 2020).

Hospitality organisations could design the workplace to make it more meaningful and safer by aligning with employees' interests. Individuals' mental, physical and emotional confidence are important for them to provide better customer service. Rewards and recognition might enhance emotional well-being and foster performance (Johari *et al.*, 2013;

Xu *et al.*, 2020). Employees may feel emotionally drained and detached from their work if there is a lack of available resources (Karadas and Karatepe, 2019; Wang and Xu, 2017). Training can help them improve their knowledge, skills, and capacities – allowing them to perform their duties more efficiently (Alfes *et al.*, 2020). Psychological availability has been linked to individuals' resiliency and ability to perform work efficiently (Agarwal and Farndale, 2017; Binyamin and Carmeli, 2010; Muthuku, 2020). Therefore, hoteliers should enhance employees' individual capacity or self-belief to perform tasks through training and recruiting the right people.

Hoteliers need to implement an appropriate bundle of HR practices to keep employees engaged by developing meaningfulness of work, make them available to perform their work roles by utilising training and career opportunities, retain talented employees through reward and recognition and motivate them by allowing them to participate in decision-making processes (Wang and Xu, 2017; Xu *et al.*, 2020; Zirar *et al.*, 2020). The importance of this is even more explicit in a service-driven hospitality profession. When staff are given the authority to interact with consumers, they have the option to choose how to handle a wide range of requirements, wants, expectations and complaints (Chen *et al.*, 2016b; Gurlek, 2020).

Since psychological safety is a precondition of employee engagement, HR professionals need to ensure the work environment is safe (Carmeli and Gittell, 2009; Fletcher, 2016), which promotes job security and career advancement (Wang *et al.*, 2019). Managers' clarification of work roles, social support, fairness and justice could enhance work environment safety (Jensen *et al.*, 2011; Lyu, 2016; Rabiul *et al.*, 2021; Wang *et al.*, 2019). Frontline employees frequently have interactions with customers; therefore, managers should encourage them to participate in how to provide better customer service (Mowbray *et al.*, 2020).

#### *Limitations and future research directions*

This study had some limitations. First, the findings are limited to five-star quality hotels in Malaysia. Therefore, findings concerning lower-level hotels and other industries may differ. In addition, the cross-sectional design hinders our ability to infer causation; therefore, future studies may wish to use a longitudinal design. Moreover, psychological states may depend on a variety of things and differ from person to person. Therefore, future research should include socio-emotional, economic and physical resources that might influence psychological states that are related to work behaviours. Limited studies have been conducted on the relationship between psychological states and organisational engagement. Future studies should aim to replicate our findings in other industries and investigate the factors that promote meaningfulness at work, such as leadership, HR practices or other contextual factors. Additionally, replicating the study including all types of hotels during the COVID-19 pandemic could help understand the possible influence of the pandemic on the psychological factors.

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# On the role of innovation and market structure on trade performance: is Schumpeter right?

Innovation and  
market  
structure

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## Abstract

**Purpose** – The goal of the paper is to examine the dynamics between innovation, market structure and trade performance. Firstly, the author first investigates the effects of innovation on trade performance. Secondly, the author then examines how market structure affect trade by classifying industries based on their innovation intensity.

**Design/methodology/approach** – The author uses a detailed level data set of eight OECD countries in a panel of 17 industries from the STAN and ANBERD Database. The author employs both a pooled regression and a two-stage quantile regression analysis. The author first investigates the effects of innovation at the aggregate level, and then the author assesses the effects at the disaggregated or firm level.

**Findings** – The author finds that at the aggregate level, innovation and market size have a positive and significant effect on competitiveness in most of the specifications. However, innovation is negatively associated with trade performance in the case of bilateral trade between Spain and the Netherlands. Also, the sectoral analysis provides evidence that the innovation-trade nexus depends on technological classification. The author shows that: (1) the effect of innovation activity on trade performance economic performance is lower for the high technology and high concentration (HTHC) market compared to the low technology (LT) market; (2) the impact of innovation on economic performance is ambiguous for firms in the high technology and low concentration (HTLC) market.

**Research limitations/implications** – Although the database provides a rich data set on industrial data, it fails to provide innovation output such as patent data which may underestimate the innovation activities of firms that do not have a separate R&D records. In the current context of subdued economic growth these research results have important policy implications. Firstly, the positive impact of innovation on trade performance strengthens its role for sustainable development. The negative coefficient on innovation is an indication that research intensity in some cases has not been able to create a new demand capable to boost economic performance.

**Practical implications** – The market classification analysis provides new evidence that innovation in the LT market has the potential to enhance competition. Secondly, market size supports industries that are competing in the international market. Policy makers must therefore put in place incentives to encourage firms to grow in size if they want to remain globally competitive.

**Social implications** – Sustainable development can be supported through investment in research and development in the low technology sector.

**Originality/value** – The study is the first as far as the author knows, to examine the impact of innovation on bilateral trade performance using industry level data from OECD countries. Secondly, the author complements the existing literature by examining how innovation activities (classified as high technological intensive or low technological intensive) affect trade performance.

**Keywords** Trade, Innovation, Trade performance

**Paper type** Research paper

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### 1. Introduction

There is the need for policy makers to understand the mechanisms through which innovation policy can support higher GDP growth especially for the post COVID-19 pandemic period. In that context, the EU leaders have proposed a budget of over US\$ 180 billion for the period 2021–2027 (European Commission, 2020). They stress that spending on innovation and research can enhance productivity. One of the goals of this fund is to create a financing instrument that can support job creation and build a more social and inclusive society.

Despite the needed resources to recover from the coronavirus, some are against this recovery plan. This has sparked a debate on how best the funds need to be allocated to recover from the pandemic and fuel economic growth. The question that arises is how effective innovation policies can ensure a sustainable recovery. Understanding the factors that influence trade performance can provide policy makers new knowledge on how economic growth and standard of living can be sustained.

In early literature, the role of innovation on economic growth has been emphasized on endogenous growth models (Grossman and Helpman, 1991; Romer, 1990). Much of the empirical literature on how technology affects trade documents that innovation is an important determinant of trade performance. For instance, Eaton and Kortum (1996) examine the role of innovation and the diffusion of technology among a panel of OECD countries. They find that technological knowledge contributes to more than half of productivity growth for all the countries examined except the United States. Their study also shows that innovation in Germany, the United States and Japan spur more than half of the growth in OECD countries.

Phelps (2013) argues that prosperity in many advanced economies occurred as a result of widespread technological invention. This translated into a higher standard of living, wealth accumulation and better jobs for people. In the same context, Peters *et al.* (2018) highlight the important role of innovation in contributing to higher productivity in service enterprises. Overall, the empirical literature indicates that technology is an important determinant of trade performance.

Scarpetta and Tressel (2002) examined the impact of innovation activity on multi-factor productivity. They find that productivity convergence across OECD countries is stronger in the services sector compared to the manufacturing sector. They also provide evidence that there is a feeble convergence in productivity in the high-tech industries. Crespi *et al.*, (2014) in their work investigate and compare the determinants of innovation and labor productivity at the firm level in Latin America. They show that innovation activity leads to improvement in the production process.

Although several studies have examined the importance of technology spillover on trade, none of them has given attention to the link between bilateral trade performance and market structure. It has been documented that industries characterized by high research and development outlays such as the electronics sector tend to grow faster than other industries (Fagerberg, 1997). It is important to understand the role of innovation, market structure and trade performance especially with the stagnant growth countries are experiencing.

One of the most important components of global market entry is exporting. It enables market efficiency and flexibility. With the competitive nature of the business environment, exporting has become an essential tool for industries' growth (Golovko and Valentini, 2011). However, there has been no satisfactory theoretical explanation on how success in the export market is determined. It is important to understand the role of innovation, market structure on trade performance especially with the stagnant growth countries are experiencing.

The author expects technology to have different effects on trade depending on each country relative investment in research and development and patents. Also, technological spillover through export varies if countries export or import products with different quality in the same or different industries. Hence in this paper, we study the link between market structure and innovation empirically.

For the modeling analysis, the econometric approach is based on a production function that allows for innovation and market size. The model the author employs resembles that of Sanyal (2004) in which he assesses how relative innovation and factor endowment affects export performance in 10 intra-OECD countries.

Empirical studies on market structure classification have identified three types of market according to the degree of market concentration and the innovation's returns. For example, when the revenue from innovation is moderate, the amount of investment devoted to it will be small. This setting indicates low-tech industries (LT) (see Scarpetta and Tressel, 2002). It represents a market in which firms compete aggressively on price which is approximately equal to the marginal cost.

However, if the revenue from innovation is large, firms will spend large amount in innovation to increase the production process. In such case, the market may react differently, leading to different or one trajectory. When firms embark on different trajectories (product differentiation), it implies that there will always be a demand for a new product and an increasing number of producers. Such industry is referred to as the high-tech low concentration (HTLC) market. In such market each firm has some monopoly power which is reduced because of free entries of new firms. If high revenues from innovation can be obtained through one trajectory, such market is referred as the high-tech high concentration (HTHC) market in which few firms control the market.

Hence the study first contributes to the literature by providing a complete understanding of the effects of innovation on trade performance at the country level. The second objective of the paper is to examine the innovation and trade performance nexus by grouping industries according to their market classification. Also, few studies have examined the relationship between bilateral trade performance and innovation across firms. This is crucial for labor productivity and also for sustainable development in the current context of the world economy.

In determining bilateral trade performance, the author uses the ratio of exports between two countries, namely country  $m$  to country  $n$  over exports from country  $n$  to country  $m$  in a sector  $s$ . The author adds other important determinants of trade flow such as market size and labor cost identified in the general equilibrium model of trade to capture factor endowment and productivity, respectively. The inclusion of these variables has been supported in the literature (see Egger and Pfaffermayr, 2005; Grossman *et al.*, 2006) for a detailed review.

The paper attempts to address two main issues between innovation and trade performance. First, the author investigates the relationship between innovation and trade performance across countries. Generally, studies in the literature have either focused on one or several countries. Because countries have different characteristics in terms of natural endowment and national policies, the author investigates trade performance for each bilateral trade setting. The second issue is related to the differences in innovation intensity across sectors. Therefore, the author argues that it is necessary to group each sector based on their R&D intensity and evaluate their impact on trade. This helps to understand whether industries classified as HTLC, HTHC or LC play an important role in influencing trade performance.

The remainder of the paper is organized as follow: The next section presents evidence on technology innovation and market structure. Section 3 discusses the analytical framework of the model. Section 4 describes the data set and the econometric approach used in the analysis. Section 5 presents the results. Section 6 summarizes the findings and concludes.

## 2. Literature review

### 2.1 Innovation and trade performance

Early empirical studies on trade performance have incorporated innovation as an independent variable in their model. In the Heckscher–Ohlin model of trade, relative factors

determine the pattern of trade. The early work of Fagerberg (1997) shows that technological competitiveness measured by R&D and patents expenditures have a significant effect on the exports of OECD countries. Any factors that boost export demand can also increase growth. The nexus between trade and growth has been examined by research that emphasizes the role of R&D, returns to scale and learning for growth. The work of Lucas (1988) considers significant differences for technological progress which is captured by learning. He shows that countries that specialize in high technology industries tend to benefit from higher growth than those that do not. This approach suggests that the capacity to specialize toward more technological intensive industries is an important factor for trade performance.

Grossman and Helpman (1991) reached a similar conclusion by highlighting the importance of R&D and its spillover effect on trade and economic growth. They show that countries with a large domestic market that spend a large share of their resources to R&D will be more likely to grow faster and specialize in high technological industries.

Since then, a large body of literature has studied the implications of technological adoption and its impact on firms' productivity (see Scarpetta and Tressel, 2002; Griffith *et al.*, 2004; Cainelli *et al.*, 2006; Crespi *et al.*, 2014; Busom and Vélez-Ospina, 2017).

The concern over the years has been the interaction between market structure and the specialization patterns of countries with the aim to understand the driving factors behind a country's trade performance. Madsen (2008) examines the ability of innovation and product variety to explain manufacturing exports. He finds that innovation does not influence total exports from OECD countries but only influences relative performance among countries.

In a study on manufacturing firms in Korea, Hahn and Choi (2017) investigate the bi-directional effect of innovation and export performance. They find that innovation activities influence positively exports and vice-versa. They identify the interactivity between firms and external agents to be one of the possible reasons for this effect.

Recent research on the innovation-trade performance relationship suggests technological innovation is crucial factor in the exporting activities of firms (Azar and Ciabuschi, 2017). This study strengthens the idea that innovation enables firms to gain competitive advantage in the global markets.

Similarly, Wadho and Chaudhry (2018) suggest that export is positively related to innovation performance. The study reveals that manufacturing firms that export to developed countries tend to participate more in innovation activities. They also show that firms that devote substantial investment in innovation are more productive than those with less investment.

Tavassoli (2018) assesses the impact of innovation on exports' behavior of Swedish firms. He shows that innovation output has a positive relationship with firms' exports. This finding is robust whether or not the model includes the firm's specific characteristic such as size, productivity and physical capital.

Further, the introduction of a new product may require new marketing strategies. Lee *et al.*, (2019) reveal that the relationship between new products and the performance of firms rises with marketing innovation. This implies that technological and marketing innovations can strengthen each other, thereby improving firms' performance. On this basis, the author proposes the following hypothesis:

*H1.* There is a positive relationship between innovation and trade performance.

## *2.2 Innovation and market structure in OECD countries*

Before turning to the empirical analysis, this section shows the innovation patterns and market structure in a sample of OECD countries. Innovation is a significant factor for product differentiation as it introduces new features and enables firms to achieve higher product quality. Schumpeter and Opie (1961) argued that innovation activities led individuals to



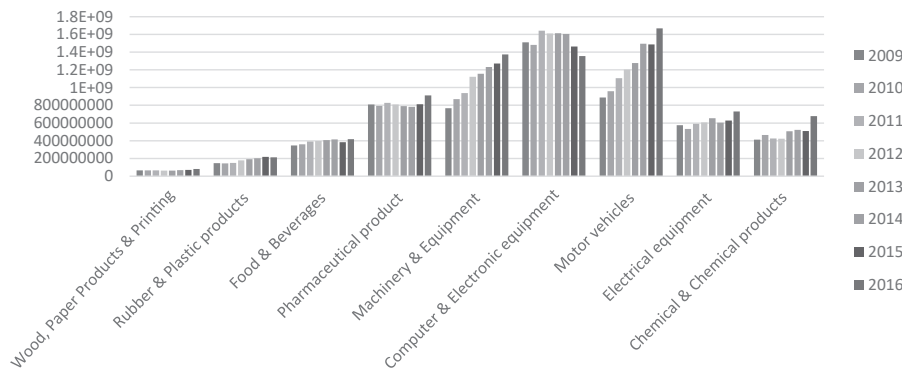
accumulate private properties and consumer preferences cannot cause economic changes. Consumers play a passive role in the economic development process which led him to the conclusion that innovation is the reason for economic change. Hence, innovations are necessary for economic growth. Although there is an extensive literature that has examined the impacts of market structure on economic activity, a definite conclusion has been difficult to establish.

Other studies (Aghion *et al.*, 2005; Gilbert, 2006; Piekola and Rahko, 2020) challenged Schumpeter's theory that monopoly power is more conducive to innovation. Aghion *et al.*, (2014) for instance find that firms that have lower level of competition have a lower incentive to invest in research and development. The author attempts to reconcile these two views by examining the time series evidence of technology in a different market.

Figure 1 below shows the average spending on technology in eight OECD countries over the period 2009–2016. The author chose this period for comparative purposes and present the amount devoted to technology for nine different industries based on market classification. In Figure 1, the HTLC market which is represented by pharmaceutical products, machinery and equipment and computer and electronic products has the highest investment in technology. The HTHC market represented by motor vehicles, electrical equipment and chemical products devotes on average US\$ 800 million. The LT market represented by wood and paper products, rubber and plastic products and food and beverages spends the least on technology.

Another interesting feature the graph reveals is that high concentration industries (monopoly or oligopoly) devote more resources to research and development. This is in line with Schumpeter's view on competitive firms and innovation. The author also observes a rapid increase in innovation activities in most of the industries during the last decade especially in machinery and equipment, and motor vehicles which are highly intensive research activities. Computer and electronic equipment industry on the other hand, display a declining pattern. In this study, the author attempts to examine empirically the impact of innovative activities in high concentration industries by comparing the role of innovation in different market structure.

The author expects the coefficient on innovation to have a positive sign. This is because investment in R&D allows bringing in new products in an industry and enhances the quality of the existing ones, thereby improving economic performance (Crespi *et al.*, 2015). If the level of spending on machines grows over time, and the performance of machines are more efficient



**Figure 1.**  
Investment on research  
and development by  
industries

**Note(s):** The following countries are included in the figure: France, Germany, Italy, Austria, Spain, Netherland, United Kingdom, Finland

than labor employed, then capital stock is expected to increase bilateral trade. Assuming this dynamic is the same for all industries, it has the potential to improve competitiveness in the economy. Capital stock and trade performance are expected to be positively associated. The author also expects a positive nexus between apparent consumption and trade performance. The author follows the convergence hypothesis of (Markusen, 2002) which suggests that a large market size tend to increase the performance of economic activity. A higher labor cost or compensation in the parent market constitutes a barrier to exports in the host market. However, a significant value added supports bilateral trade. Because labor cost can either exceed or be inferior to value added depending on a firm's ability to make profit; the author considers the sign of labor input to be ambiguous.

### 3. Empirical framework

The interest of this paper is based on the relationship between innovation, trade and market structure. Although the link between innovation and trade seems evident, it is difficult to demonstrate. Innovation can be related to trade in the sense that it enables to improve the distribution channel and to access new markets.

The goal of this paper is to understand how relative innovation and resource endowments impact trade performance. The modeling estimation starts with the factors that can impact economic or trade performance in a group of  $Z$  countries ( $i = 1, \dots, Z$ ) and  $J$  industries ( $j = 1, \dots, J$ ). Trade performance in a country is influenced by technological factors and resource endowments. The author also assumes that production in each industry  $j$  and country  $i$  at a time  $t$  takes the following form:

$$Y_{ijt} = F_j A_{ijt} (K_{ijt}, L_{ijt}) \quad (1)$$

where  $K$  stands for physical capital,  $L$  is labor and  $A$  denotes technical efficiency or technology that changes across each industry, country and the time period.

Hence the production function can be re-written as a Cobb–Douglas production function:

$$Y_{ijt}/L_{ijt} = (Y_{ijt}/L_{ijt})^\alpha A_{ijt} \quad (2)$$

The author then estimates a log-linear regression of the Cobb–Douglas function:

$$y_{ijt} = k_{ijt} + a_{ijt} \quad (3)$$

International competitiveness is defined as the ability to sell goods in the international market in the presence of other competitors. Bilateral export has been used in the literature to measure competitiveness. It is defined as the ratio of exports from country  $m$  to country  $n$  over exports from country  $n$  to country  $m$  in an industry  $s$ . The subscript  $m$  refers to the parent country,  $n$  is the bilateral partner or the host country and  $s$  represents the NACE industry.

$$y_{mns}/y_{nms} = f[(k_{ms}/k_{ms}), (a_{ms}/a_{ms}), (l_{ms}/l_{ms})] + u_{ts} \quad (4)$$

Following the model of Sanyal (2004), the dependent variables ( $y$ ) represent trade performance which is defined as bilateral trade, ( $k$ ) which stands for capital stock, captures the capital stock to the number of persons employed in a sector  $s$ , ( $a$ ) is the innovation intensity variable which measures R&D expenditure in a sector  $s$ , ( $l$ ) captures labor input which is defined as labor compensation over value added in a sector  $s$ . The author augments the modeling specification by including apparent consumption at an industry level which represents market size in the analysis. Siedschlag and Zhang (2015) have stressed the importance of size in determining productivity. Market size is an important determinant of intra-firm exports (Markusen and Keith, 2002; Egger and Pfaffermayr, 2005).

$$y_{mns}/y_{nms} = f[(k_{ms}/k_{ns}), (a_{ms}/a_{ns}), (l_{ms}/l_{ns}) + (a_{cms}/a_{cns})] + u_{ts}$$

The log-linear model takes the following form:

$$\ln(y_{mns}/y_{nms}) = \beta_0 + \beta_1 \ln(k_{ms}/k_{ns}) + \beta_2 \ln(a_{ms}/a_{ns}) + \beta_3 \ln(l_{ms}/l_{ns}) + \beta_4 \ln(a_{cms}/a_{cns}) + u_{ts} \quad (6)$$

The literature identifies three main aspects that characterize the market environment of industries. The first element corresponds to the entry barriers such as economies of scale due to technological opportunity. The second issue is related to sunk costs which constitute another barrier to entry. Lastly, products can be differentiated horizontally when consumers are able to attach a value to it.

The author then follows the market classification of (Scarpetta and Tressel, 2002) and identifies three types of industries. For the LT industries, The author includes basic metal and fabricated metal products, coke and refined petroleum products, food products, textile and wearing apparel, wood and paper product and printing, building of ships and boats. Also, the author groups pharmaceutical products and pharmaceutical preparations, audiovisual and broadcasting activities, computer and electronic products, machinery and equipment, manufacturing and telecommunication in the HTLC industry. The author considers chemicals and chemical products, electrical and optical equipment, motor vehicle trailers and semi-trailers, and transport equipment in the analysis of the HTHC industry. Following this reasoning, the regression equation for the market structure becomes:

$$\ln(T_{mns}/T_{nms}) = \beta_0 + \beta_1 \ln(k_{ms}/k_{ns}) + \beta_2 \ln(a_{ms}/a_{ns}) + \beta_3 \ln(l_{ms}/l_{ns}) + \beta_4 \ln(a_{cms}/a_{cns}) + u_{ts} \quad (7)$$

where  $(T_{mns}/T_{nms})$  represent bilateral exports based on market classification as discussed above. Thus, the analytical framework allows us to investigate further the role of diverse patterns of innovation on trade.

#### 4. The data set and methodology

##### 4.1 The data

The sample consists of 17 industries in the manufacturing and business services sector in eight OECD countries over the period 2000–2017. The countries included in the analysis are: France, Germany, Italy, Austria, Spain, Netherland, United Kingdom and Finland. Thus, a total of 1,360 observations in the analysis is obtained. The author attempts to capture the largest possible data for the empirical analysis. However, for the innovation indicator (the main variable) the latest period available from the database starts from the year 2000. The time span covered was chosen mainly because of the availability of innovation data which is proxy as R&D. The raw data from several sources is obtained. The author obtains capital stock, number of employed, labor compensation and value added from the OECD Stan database 2020. Data on R&D by industry is taken from the ANBERD database. The author calculates labor input by dividing labor compensation over value added. Market size for each industry (parent and host) is proxied as apparent consumption. The calculation of the latter is given as gross output minus imports plus exports for each year. Imports and exports flow are extracted from the OECD bilateral trade database. Table A3 in Appendix section provides the definition for the measurement variables.

##### 4.2 Econometric methodology

The goal is to estimate equations (6) and (7) on a pool annual time series for each bilateral setting. Before proceeding with the econometric estimation, the author first checks the

presence of heteroskedasticity in the data. The author considers the following bilateral setting: France–Germany, Italy–Austria, Spain–the Netherlands, the United Kingdom–Finland. The author also employs robust standard error to deal with potential heteroskedasticity in the model. The stationarity of the data is then examined through the implementation of a unit root test. A panel unit root test which shows that the series are stationary is conducted. These findings suggest that we can safely investigate the role of technology on economic performance. The author considers France, Italy, Spain and the United Kingdom to be the parent countries while Germany, Austria, the Netherlands and Finland are the host countries.

Also, the author removed outliers in the sample by focusing on data that departs away from the mean to minimize the risk of a bias estimation. Thus, the author excludes industries with innovation growth rate that are more than five standard deviations away from the mean value in each bilateral trade.

Although the full sample covers the period 2000–2017, the starting period for each country-pair is restricted by the availability of R&D data as noted in the section above. The author obtains a strongly balanced panel data for all the specifications which allows us to make a fair assessment of the effects of innovation activity on export performance. The author first presents the results of baseline regression by using a pooled OLS estimation and a quantile regression to obtain consistent parameters. The literature has well documented the use of pooled OLS in quantitative studies to study the effects of institutional determinants of trade performance and macroeconomic policies. Thus, the intercept terms are restricted to be the same for each country-pair. The coefficients were initially permitted to change across countries. However, the estimated results appear to be insignificant for all the explanatory variables. One possible explanation can be related to the changing patterns of unobserved parameters, which can have an effect on bilateral trade over time and may lead to a biased estimate in the case of fixed-effects model.

The quantile regression model allows estimating the difference between the elasticities of trade performance in each bilateral pair. The author investigates the possible innovation–trade performance nexus using three quantiles ( $\theta = 0.25, 0.50, 0.75$ ). The regression results for the quantile ( $\theta = 0.25$ ) do not lead efficient estimates. Hence, the author reports the 0.50, 0.75 quantile regression only. The quantile regression is used as a sensitivity test because of its ability to consider unobserved heterogeneity in the data. The next section reports the results (see Table 1).

## 5. Estimation results

The author now tests the empirical hypothesis that innovation activity does contribute to a higher trade performance. Table 2 reports the results of estimating equation (6). Even though the data shows a rise in capital stock over time, the log value for capital stock is significantly positive only for column 3. In the remaining specifications cases however, the coefficients are significantly negative. These results appear to be in contradiction with the *a priori* expectation. This calls into question the idea that increasing the investment in capital stock automatically improves the trade performance. The coefficients on apparent consumption are positive and significant at the 1% level for all the estimations. This suggests that market size has a positive effect on trade performance. In other words, the larger the size of a sector, the better its ability to trade. This is in accordance with the literature that finds a positive relationship between firms' size and exports' performance (Nazar and Saleem, 2009). Turning into the labor input coefficients, The author finds a positive and significant relationship in column 1 and 3. Labors are paid based on the value they contribute to the firms. The author also observes a rising trend in value added. These results indicate that workers contribute positively to the advancement of firms.

					Innovation and market structure
Authors	Sample	Methodology	Model	Main results	
Barrère <i>et al.</i> (2022)	Uruguayan Manufacturing Firms (2010–2015)	The relation between innovation and export for a firm located in a developing country to the destination (developed or developing country)	Probit regression model	Innovation precedes exports when the export market is a developing country Firms are not able to adapt with both innovation and export strategies when the export market is a developed country	249
Aghion <i>et al.</i> (2018)	French Manufacturing firms (1994–2012)	Exporters vs. non-exporters	Linear OLS specification	A shock in export demand has a positive impact on innovation in high productivity firms whereas it might negatively impact innovation in low productivity ones	
Caldera (2010)	Spain, 1990–2000	Exporters vs. non-exporters	Probit model	Innovation and productivity enhances the probability of exporting	
Becker and Egger (2013)	Germany 1994–2004	Exporters vs. non-exporters	Matching techniques	Product innovation increases the propensity to export	
Sanyal (2004)	OECD countries, 1980–1998	Bilateral exports	Linear OLS specification	Innovation influences bilateral trade. The effect is higher in the high-technology sectors	Table 1. Empirical studies on the link between innovation, exports and market structure

	(1)	(2)	(3)	(4)
Log (innovation)	0.064*** (0.017)	0.257*** (0.076)	−0.601*** (0.148)	0.468** (0.228)
Log (apparent consumption)	0.090*** (0.017)	0.677*** (0.093)	1.027*** (0.144)	2.346*** (0.360)
Log (capital stock)	−0.088*** (0.029)	−0.481*** (0.118)	0.363** (0.138)	−1.259*** (0.370)
Log (labor input)	0.135*** (0.030)	0.198 (0.217)	0.869*** (0.239)	−0.578 (0.708)
Observations	165	216	130	104
Group	France–Germany	Italy–Austria	Spain– the Netherlands	The United Kingdom–Finland
R-squared	0.330	0.345	0.385	0.525

**Note(s):** \* denotes significant at 10% level; \*\* significant at 5% level; \*\*\* significant at 1% level. Numbers in parentheses indicate robust standard errors

**Table 2.**  
Pooled OLS estimates (the dependent variable is trade performance)

For the variable of interest, the coefficients are significant and positive for column 1, 2, 4 and only negative for column 3. The positive coefficients imply that innovation activity has a positive effect on trade performance. The results from column 3 contrast with the hypothesis testing. This finding however should be cautiously examined because R&D in the pair (Spain–Netherlands) has been declining over time. This trend can be a possible reason for the negative association between innovation and bilateral trade.

Table 3 reports the results using a quantile regression model. Several studies in the empirical literature have used IV regressions or OLS, which assume parameter homogeneity. This may lead to a false conclusion if there is heterogeneity in the data under analysis. Put it differently, a positive effect of innovation on growth found in a bilateral trade may vary in other country-pairs because of different data patterns. Therefore, the author employs a two-stage quantile method to improve the traditional technique. The author presents the results using two quantiles ( $\theta = 0.50, 0.75$ ). One of the important findings is that altering the conditional distribution only significantly affects the sign of the capital stock coefficient for the United Kingdom–Finland bilateral trade. There are no significant changes in the coefficients of the variable of interest (innovation), which only reduces with a higher quantile. The results are similar to the work of (Mohnen and Hall, 2013) which show that innovation leads to better productivity performance. The coefficient on labor input becomes negative and significant in the case of Italy–Austria. This implies a low contribution which can be attributed to the reduction in value added. With regards to apparent consumption, there is positive and significant effect at the 1% level for the 75th quantile of distribution for each country-pair. The results show that on average a 1% increase in economic size leads to (0.2%–1.5%) increase in bilateral exports. Overall, the sensitivity test supports the findings that innovation activity does not always contribute to increase in export performance.

Technological intensity is an important factor of international competitiveness and productivity. However, there are also considerable differences in terms of investment on R&D across industries and sometimes within the same industries. It may be misleading to conclude that all firms commit the same amount on their innovation. The paper attempts to provide evidence on how different market structure affect economic performance. Hence there is the need to further investigate if technological concentration plays a role in influencing trade performance. Table 4 shows the results of estimating equation (7). Different market conditions lead to high or low returns to innovations. This context allows us to examine the effects of market structure on trade performance. For comparative purposes the author considers 14 industries in each sub-group under investigation. The author also aligns the time period (2009–2016) for the analysis in order to evaluate whether high-tech or low-tech industries have different effects on competitiveness. For each bilateral pair France–Germany, Italy–Austria, Spain–Netherlands and the United Kingdom–Finland, the author includes the following industries: (1) For the LT market the author considers Food, Wood, Rubber; Food, Wood, Rubber; Basic metal, Food, Wood, Rubber; Basic Metal, Food, Wood, Rubber. (2) For the HTLC market the author considers Pharmaceutical, Computer; Machinery, Manufacturing; Pharmaceutical, Computer, Machinery, Manufacturing; Pharmaceutical, Computer, Machinery, Pharmaceutical, Computer, machinery. (3) For the HTHC market the author considers Chemical, Electrical, Motor, Transport; Chemical, Electrical, Motor, Transport; Chemical, Electrical, Motor; Chemical Electrical Motor, respectively.

Looking at the results from Table 4, only the innovation coefficients on the LT and HTHC regressions are significant. The author observes a non-significant value on innovation for the HTLC regression, which is consistent with the work of (Cainelli *et al.*, 2006). This is an intriguing result, hence the author tries to replace some the industries initially used to re-examine the innovation-trade performance nexus for this particular market. The author substitutes machinery industry by manufacturing one. The results are provided in Appendix section. The estimated effect of innovation on trade performance is negative and significant (see Table A2). The results provide two reasoning for the HTLC market: (1) innovation investment does not enhance bilateral exports; (2) innovation worsens exports performance. One possible reason for these findings is that firms in this market have reached their production possibilities frontiers. Hence any increase in research becomes either irrelevant or put a downward pressure on the sector's economic growth. Since firms invest large amount on R&D projects, which are considered to be fixed costs in the firms' balance sheet, the rate of

	(1)		(2)		(3)		(4)	
Log (innovation)	0.50	0.75	0.50	0.75	0.50	0.75	0.50	0.75
Log (capital stock)	-1.488 (3.878)	0.166*** (0.043)	0.161*** (0.022)	0.012 (0.025)	-0.146*** (0.006)	-0.330*** (0.032)	0.175** (0.080)	0.036 (0.063)
Log (labor input)	-7.402 (17.563)	0.214*** (0.049)	0.203*** (0.044)	0.3*** (0.032)	0.785*** (0.011)	1.148*** (0.051)	1.570*** (0.090)	1.178*** (0.067)
Log (capital consumption)	2.915 (6.797)	-0.290*** (0.075)	-0.736*** (0.060)	-0.364*** (0.040)	0.481*** (0.017)	0.346*** (0.035)	-1.006*** (0.134)	0.215*** (0.075)
Log (labor input)	4.790 (9.933)	0.286*** (0.290)	-1.387*** (0.080)	-0.386*** (0.046)	0.383*** (0.039)	1.473*** (0.120)	-0.423 (0.261)	0.030 (0.272)
Observations	165	165	216	216	130	130	104	104
Group	France-Germany	Italy-Austria	Spain-Netherlands	Spain-Netherlands	The United Kingdom-Finland			

**Note(s):** \* denotes significant at 10% level; \*\* significant at 5% level; \*\*\* significant at 1% level

**Table 3.**  
Two-stage quantile  
regressions (dependent  
variable is trade  
performance)

**Table 4.**  
Innovation and the  
market structure

	Log (trade performance) LT	Log (trade performance) HTLC	Log (trade performance) HTHC
Log (innovation)	0.596*** (0.179)	0.148 (0.149)	0.138*** (0.035)
Log (apparent consumption)	0.512*** (0.238)	0.481*** (0.106)	0.227*** (0.033)
Log (capital stock)	1.879*** (0.306)	0.265** (0.120)	0.244*** (0.050)
Log (labor input)	0.308 (0.384)	−0.113 (0.220)	−0.406** (0.192)
Observations	112	112	112
R-squared	0.438	0.546	0.789

**Note(s):** \* denotes significant at 10% level; \*\* significant at 5% level; \*\*\* significant at 1% level. HTHC, HTLC and LT stand respectively for High-Technology High Concentration, High-Technology Low Concentration and Low-Technology industries

returns or the firms' sales must be high enough to compensate for these costs. If this is not the case, it will limit the firms' ability to grow and remain competitive.

In the high concentration market, a 1% increase in innovation causes a 0.13% rise in exports. This finding supports the common argument that concentrated market structure complements technological development, with a higher GDP and a higher welfare. In the low technology market, the innovation coefficient is the highest highlighting the potential these low-tech industries can play in the pursuit of sustainable development.

With regards to apparent consumption and capital stock, the coefficients on these variables are positive and significant for all the estimations. This confirms the hypothesis that firm size and capital stock improve economic performance. Also, the coefficient on labor input is only significant in the high concentration market. Even though in the LT and HTLC market, the coefficients are positive and negative, they are not significant. These findings support the hypothesis that labor input has an ambiguous effect on economic performance.

An interesting aspect of the study is the investigation of the dynamics between innovation, market structure and trade performance. The paper highlights the importance of innovation in the LT and HTLC market. A 1% increase in innovation in the LT industry leads to a 0.59% rise in trade performance. This suggests that industries that are not highly R&D intensive contributes strongly to exports growth. The LT industry is a fast-growing sector that offers a high level of market opportunity.

## 6. Conclusion

The paper aims to provide an understanding on the links between innovation, market structure and trade performance. Separating industries based on their level of innovation will help to understand if a particular market has a stronger potential for exports' growth.

In order to classify industries, the author adopts a two-way classification method where industries are grouped based on innovation's profitability and the degree of market concentration. The econometric analyses show the crucial role of innovation in enhancing trade performance at the aggregate level. On one hand, innovation and trade performance are positively associated in three of the specifications. On the other hand, innovation influences trade performance negatively in the case of the country-pair (Spain–the Netherlands). The empirical evidence for the OECD countries used also reveal that market size has a positive and significant effect on bilateral exports. Conversely, the sign of capital stock and labor input are ambiguous.

Regarding market structure, innovation activities improve trade performance in the LT and HTHC market. The results indicate that for the period under study, innovation activities have a higher impact on trade performance in the LT market. Innovation activities in the



HTLC market however are unclear. These findings do not support Schumpeter's theory of innovation that only firms that have market power can support the costs of innovation.

In the current context of subdued economic growth these research results have important policy implications. Firstly, the positive impact of innovation on trade performance strengthens its role for exports' growth. The negative coefficient on innovation should be examined cautiously because innovation investment has been declining in the country-pair (Spain–the Netherlands). The market classification analysis provides new evidence that innovation in the LT market has the potential to enhance trade. Policy makers must also support and encourage firms' growth since they contribute to a country's export growth.

Another interesting aspect of the study is the investigation of the dynamics between innovation, market structure and trade performance. The paper highlights the importance of innovation in the LT and HTLC market. A 1% increase in innovation in the LT industry leads to a 0.59% rise in trade performance. The managerial implication is that industries that are not highly R&D intensive contribute strongly to exports' growth.

One of the limitations of this study is that it uses spending on research and development to capture innovation. However, some industries rely more on R&D activities for developing process innovations. Using only this indicator can produce some measurement errors, because it does not capture innovation output. Thus, it underestimates the innovation activities of firms that do not have a separate R&D records.

Although innovation influences trade, the various lockdown measures and restrictions in different sectors have led countries to re-examine their innovation investment activities. Future study could examine the impact of COVID-19 on innovation and its implications on trade. This would complement the understanding of the relationship between innovation and trade while at the same time provides a more robust framework for policy analysis in times of economic shocks.

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**Further reading**

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**Table A1.**  
Industries considered  
in the sample

Industry name	ISIC code (rev. 3)	Market structure
Food products, beverages and Tobacco	15–16	LT
Basic metal and fabricated metal	27–28	LT
Textile, wearing apparel, leather and related products	17–19	LT
Wood, paper product and printing	20–22	LT
Coke refined petroleum products	23	LT
Basic pharmaceutical products and pharmaceutical preparations	2,423	HTHC
Rubber and plastic products	25	LT
Building of ships and boat	351	LT
Manufacturing c	36	HTLC
Machinery and equipment n.e.c	29–33	HTLC
Audiovisual and broadcasting activities	32	HTLC
Computer, electronic and optical equipment	30–33	HTLC
Communication	32	HTLC
Chemical and chemical products	24	HTHC
Motor vehicles, trailers and semi-trailers	34	HTHC
Electrical equipment	31	HTHC
Transport equipment – air spacecraft and related machinery	34–35	HTHC

**Note(s):** HTHC, HTLC and LT stand respectively for High-Technology High Concentration, High-Technology Low Concentration and Low-Technology industries

**Table A2.**  
Innovation and the  
market structure

	Log (trade performance) LT	Log (trade performance) HTLC	Log (trade performance) HTHC
Log (innovation)	0.596*** (0.179)	−0.554*** (0.114)	0.138*** (0.035)
Log (apparent consumption)	0.512*** (0.238)	0.764*** (0.079)	0.227*** (0.033)
Log (capital stock)	1.879*** (0.306)	0.357*** (0.085)	0.244*** (0.050)
Log (labor input)	0.308 (0.384)	0.244 (0.156)	−0.406** (0.192)
Observations	112	112	112
R-squared	0.438	0.671	0.789

**Note(s):** \* denotes significant at 10% level; \*\* significant at 5% level; \*\*\* significant at 1% level

**Table A3.**  
Variable description

Variables	Definition
Innovation	It measures R&D expenditures undertaken by business enterprises
Apparent consumption	It is defined as gross production minus exports plus imports in each year. It captures market size for each industry
Capital stock	It represents capital stock to the number of persons employed in a sector
Labor input	It measures labor compensation divided by value added