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CONTENTS

THE MEDIATING ROLE OF BRAND TRUST IN SOCIAL MEDIA MARKETING ACTIVITIES AND BRAND EQUITY RELATIONSHIP: CASE OF BOTTLED WATER BRANDS IN THE MARKET OF BOSNIA AND HERZEGOVINA

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ABSTRACT

Given the rapid advance and the growing influence of social media, the need to research this unique phenomenon becomes more apparent and urgent. This research examines the influence of social media marketing activities (SMMA) on Brand Equity, in the case of bottled water brands. Additionally, it offers a research model that investigates both direct and indirect effects of SMMA on Brand Equity, where Brand Trust is used as a mediator. A quantitative method was used to investigate the most popular domestic and foreign brands of bottled water in Bosnia and Herzegovina, with all 518 respondents being both bottled water consumers and social media users. Furthermore, exploratory factor analysis and confirmatory factor analysis were performed to assess the reliability of the scales, while structural equation modeling was used to estimate the proposed hypotheses of the research. The obtained measurement results revealed that SMMA have a direct impact on Brand Trust and Brand Equity, keeping in mind that Brand Trust mediates the link between SMMA and Brand Equity. Therefore, the aims of the study are threefold: to increase the knowledge about social media, to shed more light on the relationship between SMMA, Brand Trust, and Brand Equity, as well as to help organizations recognize the benefits of using and investing in social media. Due to the fact that this research was conducted on brands in Bosnia and Herzegovina, research in another country can yield different results, given a different culture, mentality, and general educational and material status.

KEY WORDS

social media marketing activities (SMMA), brand trust, brand equity, structural equation modeling

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1 INTRODUCTION

The Internet and social media have forever changed all segments of people's lives. As a consequence, they have also completely altered modern marketing, making it inconceivable without social media. The importance of social media is best illustrated through figures that are changing and increasing day by day. This study offers a research model that examines both the direct and indirect influence of SMMA on Brand Trust and Brand Equity, where Brand Trust mediates relationships.

In the modern age, human beings are increasing their time online and on social media platforms searching for product services and information, as well as connecting with other users regarding their experiences and interactions with the company they are interested in (Dwivedi et al., 2020). Therefore, Kavota et al. (2020) reported that according to Global Digital Report (2019), the number of active online consumers rapidly increased from 2.485 billion in 2014 to 4.021 billion in 2018. At the end of 2019, this sum was estimated at 4.388 billion, which made up 57% of the world's inhabitants at the time (Kavota et al., 2020). By transmitting data published on the website of statista.com (Statista, 2020) and presenting recent data from the beginning of 2020, Dwivedi et al. (2020) concluded that 4.54 billion individuals were permanent internet consumers, forming 59% of the global population. The number of global internet users has climbed to 4.95 billion at the start of 2022 (We Are Social, 2022).

Until April 2019, the number of social media users was approximately 3.5 billion globally (Prasetyo et al., 2020). There are now over 4.20 billion social media consumers worldwide. This number has increased by 490 million in the last year, making it an increase of more than 13%. The number of active social media users is now making up more than 53% of the world's inhabitants (We Are Social, 2021).

Recently, the most popular social media platforms welcomed a massive influx of new users. For example, Facebook, as the most recognizable medium, reported over 3 billion active users worldwide (Appel et al., 2020). At the beginning of 2022, YouTube had over 2.5 billion active users (We Are Social, 2022). In contrast, Instagram has been recording a significant growth from 802 million active users in 2019 (Prasetyo et al., 2020; We Are Social, 2019), to over 1.478 billion in 2022 (We Are Social, 2022). As for the spending on these platforms, social media marketing services reported spending of $35.98 billion globally in 2018 (Ajina, 2019; Kusumasondjaja, 2018). Facebook had over 50 million listed companies and local businesses on its website in 2015, and more than 88% of them use Twitter for their marketing and advertising activities (Lister, 2017; Constine, 2016).

Overall, social media platforms offer great benefits and opportunities for companies since they attract new consumers and help maintain relationships with existing ones, usually through the daily sharing of information and content (Wardati and Mahendrawathi, 2019). Not only should social media marketing be viewed as a positive influence on consumer behavior (Chen and Lin, 2019; Dann, 2010), but it can also be seen as a force that fosters social connection and interactivity of users (Chi, 2011; Ebrahim, 2019).

The research on the impact of SMMA on Brand Equity is interesting from the aspect of technological progress as well as its topicality for the present time. The significance of this phenomenon lies in its relevance and ability to solve problems that the scientific community is currently facing related to social media usage by brands, especially domestic and foreign bottled water brands in Bosnia and Herzegovina. According to the official statistics of the Foreign Trade Chamber of Bosnia and Herzegovina, the coverage of imports by water exports is 30% (KomoraBiH, 2021).

There is a significant gap in the available research on SMMA of bottled water brands. This gap seems to be even more noticeable in Bosnia and Herzegovina, a country in transition with underdeveloped domestic and highly competitive foreign brands. This research aims to

help fill that gap, along with the gap present in the written academic research of marketing and sales. That is not to say there is a lack of sources in that field. Several papers have examined the influence of SMMA on Brand Equity from a customer's perspective (Ebrahim, 2019; Godey et al., 2016; Kim and Ko, 2010, 2012; Koay et al., 2020; Seo and Park, 2018; Zollo et al., 2020).

Similarly, Cheung et al. (2019) also cite a gap in the available literature, offering a solution in the form of a conceptual model, which would explore the influence of social media marketing components related to brand image and brand awareness as part of brand equity. Ebrahim (2019) explores the role of Brand Trust in mediating the relationship between SMMA and Brand Equity in telecommunications companies in Egypt. In addition to the mentioned companies, the link between SMMA and Brand Equity was researched by the mentioned authors in the fields of luxury fashion and airplane industry. Research regarding the relationship between SMMA and Brand Equity in the case of bottled water brands in Bosnia and Herzegovina remains scarce since it is still unclear how brands cope on social media and how their SMMA affect the consumer, and what is the ratio of use between foreign and domestic brands of bottled water.

The main objective of the research, therefore, is to investigate the influence of SMMA on Brand Equity and the role of Brand Trust on bottled water brands in the market of Bosnia and Herzegovina. Other objectives include:

- Measure, examine, and analyze the impact of SMMA on Brand Trust and Brand Equity;
- Measure, examine, and analyze the mediating influence of Brand Trust between SMMA and Brand Equity.

This research aims to increase the general understanding about the impact of social media on a certain brand, to expand the current literature, and to deepen understanding of the influence SMMA have on Brand Equity through the mediator Brand Trust.

Thus, the research questions proposed in the study are:

- What are the demographic characteristics of the respondents, which are the most frequently used social media platforms, and the most commonly purchased bottled water brands in Bosnia and Herzegovina?
- What is the impact of social media on the brand equity of bottled water brands?
- What is the role of Brand Trust in the relationship between SMMA and Brand Equity?

The research is conducted on the market in Bosnia and Herzegovina and offers answers to questions about the influence of SMMA on Brand Trust and Brand Equity in the case of bottled water brands. It offers a thorough examination of the influence of SMMA on Brand Equity as well as the role of Brand Trust in mediation. Moreover, it helps bottled water brands to position themselves in the market of Bosnia and Herzegovina, mainly in the area of digital marketing on social media. The research helps organizations perceive the benefits of using social media and justify their investment in them. Lastly, it deepens the understanding and supplies scientific literature with research about the impact of social media on the brand.

2 THEORETICAL BACKGROUND

2.1 Social Media Marketing Activities (SMMA)

The number of social media users continues to grow year by year. As a consequence, various types of social media platforms continue to grow, develop, and attract the attention of new users. Therefore, it is safe to say that social media is a part of everyday life that encourages communication and information exchange between consumers (Wardati and Mahendrawathi, 2019).

Before any elaboration on the foundations of SMMA, it is necessary to discuss social

media and social media marketing. To gain a better understanding of this phenomenon, one needs to look at the existing literature. One definition of SMMA defines it as: "an online application program, platform, or media that ease interactions, joint work, or content sharing" (Richter and Koch, 2007; Seo and Park, 2018). However, one could extend this definition to "a platform that facilitates information sharing and participation from users of the media to create and/or distribute the content" (Parveen et al., 2015; Steenkamp and Hyde-Clarke, 2014).

To elaborate further, the part of marketing that deals with the usage of social media for marketing purposes needs to be inspected. Social media marketing has been defined as "commercial marketing events or processes that use social media in an attempt to positively influence consumers' purchase behavior" (Chen and Lin, 2019; Dann, 2010). According to Ebrahim (2019), Pham and Gammoh (2015) defined it as a "company's process of creating and promoting online marketing-related activities on social media platforms that offer values to its stakeholders," and Felix et al. (2017) defined social media marketing as "a pure communications tool to push content to customers, the community, or employees. This defender approach, which the informants did not generally recommend, typically focuses on one or a few stakeholder groups".

Many authors have identified and defined the components of SMMA, one of them being Kim and Ko (2012), who classified SMMA elements into entertainment, interaction, trends, and word-of-mouth (WOM), investigating them in the case of luxury fashion brands. Similarly, Sano (2014) identified SMMA components as: "Interaction, Trendiness, Customization, and Perceived Risk", investigated in the field of insurance services. Therefore, SMMA can be defined as "effective marketing communication methods that capture engaged consumers' perceptions and understanding of activities on social media marketing by five dimensions namely; entertainment, interaction, trendiness, customization and word-of-mouth" (Chen and Lin, 2019; Ebrahim, 2019; Kim and Ko, 2010, 2012; Yadav and Rahman, 2018).

2.2 Brand Trust

Brand Trust is set up as a mediator between the buyer and the seller (Doney and Cannon, 1997). It is defined as "the willingness of a consumer to rely on the ability of a brand to perform as entitled. It thus involves the benevolence of the firm to work in the best interest of its customer to enhance the facets of trust including safety, reliability, and reliability" (Chaudhuri and Holbrook, 2001; Ebrahim, 2019).

In an online context, the role of trust in regards to social media platforms has been extensively researched over the last decade. Khong et al. (2013) claimed that Brand Trust is developing as a significant influence on consumer behavior in organizations and that it is propelled even further by social media. Thus, it has been observed that when users share common information amongst themselves, it affects their trust and decisions (Ebrahim, 2019; Khong et al., 2013). Tatar and Eren-Erdoğmuş (2016) researched the relationship between Brand Trust and Social Media Marketing in the case of hotels, in the field of tourism marketing. Sohail et al. (2020) investigated the impact of Social Media Marketing on Brand Trust in Saudi Arabia. Ebrahim (2019) researched the mediation role of Brand Trust in telecommunications companies in Egypt and concluded that there is a significant influence of Brand Trust as a mediator between SMMA, Brand Equity, and Brand Loyalty.

2.3 Brand Equity

Many researchers have discussed what makes Brand Equity, the way it benefits companies, as well as in what ways it could be constructed with different marketing activities (Christodoulides and de Chernatony, 2010; Godey et al., 2016). Srivastava and Shocker (1991) defined Brand Equity "as the incremental value of the brand," whereas Aaker (1991) defined it as: "a set of brand assets and liabilities associated with a brand, its name, and

symbol, which add or subtract the value given by an item or service to the company or its customers" (Prasetyo et al., 2020). According to Keller (1993), Brand Equity has to be defined along with two other components: brand image and brand awareness. This definition was used in this study.

By exploring the link between social media marketing and brand equity, a significant connection was detected (Bruhn et al., 2012; Godey et al., 2016; Kim and Ko, 2012). Brand awareness refers to "the ability of a consumer to identify a brand in another situation or to memorize the brand" (Rossiter and Percy, 1987; Seo and Park, 2018), while Keller (1993) identified brand image as "the general perception of a brand situated in a consumer's memory and the combination of many brand reminders". In addition, according to Seo and Park (2018), Jung (1994) stated that brand image is: "the meaning of a brand accepted through the sensory organs of consumers."

3 CONCEPTUAL FRAMEWORK AND DEVELOPMENT OF HYPOTHESES

The suggested conceptual model (Fig. 1) is based on examining both the link between SMMA and Brand Equity, as well as the mediating role of Brand Trust in this relationship. Based on previous literature and conducted research, this study explains the impact of SMMA on Brand Equity but also questions the role of Brand Trust in the relationship.

At the very beginning of research in the field of social media as well as measuring SMMA, Kim and Ko (2010) found direct links between the influence of social media marketing on purchase intention and customer relationships in luxury fashion brands. Phan et al. (2011), on the other hand, explored the influence of social media on the marketing of fashion brands, namely Burberry. Furthermore, Kim and Ko (2012) examined the influence of SMMA on luxury brands on consumer-based brand equity and found that SMMA significantly affects relationship value, capital value, and ultimately brand value, as all five components of SMMA are employed in the research.

Later on, Kim and Park (2013) examined the effects of trust in the online environment. Three years later, Godey et al. (2016) conducted a study measuring the marketing efforts of brands on social media based on the holistic approach that includes five elements ("entertainment, interaction, trendiness, customization, and word of mouth"). In their research, Yadav and Rahman (2017) developed a five-dimensional scale with fifteen items measuring customers' perceptions of social media. A year later, they investigated the impact of SMMA on customer loyalty, which represents the fifth dimension of SMMA (Yadav and Rahman, 2018).

Seo and Park (2018) stated that social media, through dynamic and strong consumer participation, has a greater impact on the way consumers behave or think about brands, rather than one-way communication. Similarly, Cheung et al. (2019) proposed a model that improves knowledge about the impact of social media marketing communications on brands. Chen and Lin (2019) found that social identification and perceived value have a direct impact on customer satisfaction. The role in the mediation process of the Brand Trust was examined in a study by Ebrahim (2019), where Brand Trust is presented as a mediator on social media usage among telecommunications companies in Egypt.

Irshad et al. (2020) and Vohra and Bhardwaj (2019) further examined this mediating role of the Brand Trust regarding social media. Koay et al. (2020) investigated the effect of SMMA on consumer-based brand equity at private universities in Malaysia and found that the observed SMMA positively affected the value of the consumer-based brand equity. Lastly, Zollo et al. (2020) investigated the direct and indirect links between SMMA on brand equity among luxury fashion brands. The following

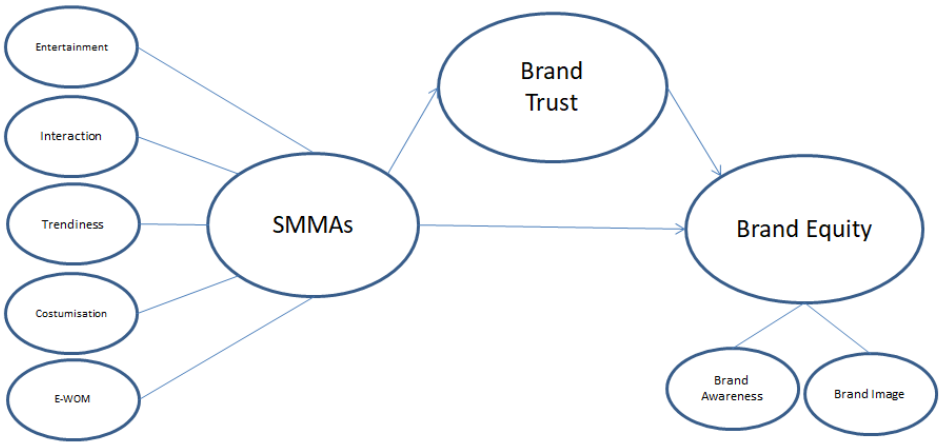

Fig. 1: The proposed conceptual research model

hypotheses have been drawn from the previous literature:

H_1: Brand Trust mediates the relationship between social media marketing activities (SMMA) and Brand Equity.

H_2: Social media marketing activities (SMMA) have a positive influence on Brand Trust.

H_3: Brand Trust has a positive influence on Brand Equity.

H_4: Social media marketing activities (SMMA) have a positive influence on Brand Equity.

This research builds on existing work, and the research model was created as a product of theoretical research on the impact of social media marketing activities (SMMA) on Brand Equity, where Brand Trust is the mediator.

4 RESEARCH METHODOLOGY

This research used a quantitative research method. The created online questionnaire was intended to test all proposed hypotheses. To fulfill one of the basic objectives of this study and which is to investigate the influence of social media marketing activities (SMMA) on Brand Equity, as well as the mediating role of Brand Trust, it was necessary to create a questionnaire that would measure the mentioned constructs. The basis for developing the research model was the relationship between three constructs: Social media marketing activities (SMMA), Brand Trust, and Brand Equity. The authors supported the proposed model with already known literature in which the relationship between SMMA and Brand Equity mediated by Brand Trust was investigated. For social media marketing activities (SMMA) measurement, 5 dimensions of SMMA were used: entertainment, interaction, trendiness, customization, and E-WOM. Social media marketing activities (SMMA) are measured by a scale developed by (Kim and Ko, 2012), which has been supported and verified in many papers (Cheung et al., 2019; Ebrahim, 2019; Godey et al., 2016; Zollo et al., 2020) who investigated the SMMA phenomenon. Brand Trust was measured with items already used in studies (Ebrahim, 2019; Kim and Park, 2013), where it was examined as a mediator. Brand Equity

was measured in the context of two dimensions, brand image, and brand awareness. Items for variable Brand Equity are presented in the authors' articles (Ebrahim, 2019; Godey et al., 2016; Kim and Ko, 2012; Zollo et al., 2020). The proposed questionnaire in the survey was measured using a 5-point Likert scale ranging from (1) = Strongly disagree to (5) = Strongly agree (Lindell and Whitney, 2001; Prasetyo et al., 2020; Zollo et al., 2020). Using SPSS 18 and AMOS 24 software, a quantitative method was used to examine the most popular brands of bottled water in Bosnia and Herzegovina among respondents who are users of social media and consumers of bottled water. Furthermore, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were performed to assess the reliability of the scales, while structural equation modeling (SME) was used to estimate the proposed hypotheses of the research. The variables SMMA, Brand Trust, and Brand Equity were subjected to EFA, CFA, and SME analyses. SMMA has 11 items that were analyzed, namely: Entertainment (Ent_1 and Ent_2), Interaction (Int_1, Int_2, and Int_3), Trendiness (Trend_1 and Trend_2), Customization (Cost_1 and Cost_2), and E-WOM (E_Wom_1 and E_Wom_2), 4 items are examined for Brand Trust (BT_1, BT_2, BT_3, and BT_4) and 7 items are tested for Brand Equity, 3 items of Brand Awareness (BA_1, BA_2, and BA_3) and 4 of Brand Image (BI_1, BI_2, BI_3, and BI_4).

4.1 Data Collection

In this study, individuals living in Bosnia and Herzegovina who consume bottled water and are active users of social media were selected as respondents. The main data from the respondents were collected by distributing an independent questionnaire via social media. Respondents were allowed to choose between 6 (six) popular bottled water brands that are present on the market in Bosnia and Herzegovina. Of the six (6) bottled water brands offered, 3 (three) are domestic and 3 (three) foreign brands. Moreover, respondents were able to choose one brand from the offered brands: Olimpija, Jana, Prolom, Oaza, Vitinka, and Lejla. The link to the questionnaire contained information about the researcher, research topics, and research purpose. The questionnaire contains two key parts; the first part examined users' personal data and background information on social media, and the second part, divided into three subcategories, measured constructive items to test the proposed hypotheses. During the development of the questionnaire, the questions were translated into Bosnian and adjusted. As such, they were presented to a smaller group of respondents in the testing phase. The questionnaire was then set up and distributed to the respondents (Innovation Barometer, 2021). Questionnaires were distributed via social media to respondents from all over Bosnia and Herzegovina in the second part of 2021. A total of 518 valid responses were received, which include 316 female and 202 male respondents and include active social media users and consumers of bottled water of different ages, education, and occupations. The data sample summary is given in Tab. 2. Respondents were tested to choose one of the six (6) brands of bottled water they consumed and noticed on one of the social media platforms.

5 DATA ANALYSIS

5.1 Results

This research used SPSS and AMOS software to analyze the collected data and test the proposed hypotheses. Tab. 1 and 2 show the demographic characteristics of the respondents, 518 of whom answered the questionnaire. Of the total number of respondents, 316 of them, or 61% are female and 39%, 202 are male. The results show that 47% of the respondents are between 18-30 years old, the largest number of respondents comes from Sarajevo, 52.5%, while the rest of Bosnia and Herzegovina make up 48.5%. According to the results, Instagram with

52.9% is the most used social media platform, after Instagram, there is Facebook, with 184 consumers, which is a total of 35.5%. 266 respondents consume domestic water, which is over 51.3%. As many as 152 respondents or 29.3% answered that the most commonly consumed bottled water is Oaza. Over 89.7% of respondents actively use social media daily.

Tab. 1: City of respondents

City	Population	Number of research participants	Percentage share in research
Sarajevo	275,524	272	52.5%
Zenica	110,663	29	5.6%
Ilidža	71,892	13	2.5%
Tuzla	110,979	13	2.5%
Mostar	105,797	16	3.1%
Visoko	39,938	10	1.9%

Tab. 2: Social media users and bottled water consumers

Frequency of social media use		
Daily	476	91.9%
Weekly	7	1.4%
Monthly	0	0.0%
Every 3 months	0	0.0%
By need	35	6.8%
The most commonly used social media platform		
Facebook	184	35.5%
Instagram	274	52.9%
LinkedIn	5	1.0%
YouTube	50	9.7%
Twitter	5	1.0%
The most commonly consumed brand of b. water		
Jana	91	17.6%
Olimpija	117	22.6%
Oaza	152	29.3%
Prolom	44	8.5%
Lejla	105	20.3%
Vitinka	9	1.7%

Factor reliability verification was evaluated using Cronbach alpha to measure the internal consistency. Nunnally (1978) suggested that a group of objects whose Cronbach's alpha coefficient greater than 0.7 can be considered internal consistency (Hadziahmetovic and Dinc, 2020). Results of Chronbach's alpha values revealed that factors ranged from 0.870 to 0.906 signifying that all the factors are very reliable. Items and reliability results are shown in Tab. 3. Moreover, Validity measurement was performed via the AMOS Plugin (Gaskin et al., 2019; Henseler et al., 2015; Hu and Bentler, 1999). The analyzed results, in Tab. 3, show that all constructs have composite reliability greater than (CR) > 0.7, ranging from 0.825 to 0.926, and that indicates internal consistency (Gefen et al., 2000; Koay et al., 2020; Prasetyo et al., 2020). Reflective: all average extracted variance (AVE) > 0.5 indicates convergent reliability (Bagozzi and Yi, 1988; Fornell and Larcker, 1981; Koay et al., 2020). It is particularly important to consider the link between maximum total variance (MSV) and average extracted variance (AVE). To assess discriminant validity, MSV and AVE values were compared, while all AVE values were higher than MSV values and the square root of AVE had a higher value than correlation values for each factor. The above values confirm the discriminatory validity of the extracted factor structure (Hadziahmetovic and Dinc, 2020).

Exploratory factor analysis (EFA, see Tab. 4) was performed in SPSS with Maximum likelihood extraction with Promax rotation to determine the factor loads of each item on the structures suggestions during factor load assessment. According to Hadziahmetovic and Dinc (2020), Hair et al. (1998) proposed to use 0.3 load levels as the minimum load factor and his criterion was used for 518 samples.

The validity of the proposed measured model was evaluated using confirmatory factor analysis (CFA) and maximum likelihood estimation techniques; Moreover, CFA analysis was performed using the AMOS program. The presented measurement model contains all the constructs in the conceptual model: SMMA, Brand Trust, and Brand Equity. Confirmatory Factor Analysis (CFA) was conducted to control whether the number of factors and the values of the load of the measured objects on the factors confirms that the proposed factor structure corresponds to the hypothesized model. First, CFA check the model fit, and

Tab. 3: Reliability and validity test results of the measurement model

Constructs		Source	Reliability (Cronbach alpha)	CR	AVE	MSV
Social Media Marketing Activities (SMMA)	Entertainment Interaction Trendiness Customization E-WOM	Kim and Ko (2012) Godey et al. (2016) Zollo et al. (2020)	0.906	0.926	0.719	0.315
Brand Trust		Kim and Park (2013) Ebrahim (2019)	0.900	0.901	0.696	0.536
Brand Equity	Brand awareness Brand image	Kim and Hyun (2011) Godey et al. (2016)	0.870	0.825	0.702	0.536

Notes: Reliability (Cronbach alpha) > 0.7, Composite reliability (CR) > 0.7, Average variance extracted (AVE) > 0.5, AVE > MSV

Tab. 4: EFA analysis

Factors	Number of items	Number of removed items	Component loading range
Social Media Marketing Activities (SMMA)	11	0	0.375–0.849
Brand Trust	4	0	0.719–0.859
Brand Equity	7	0	0.460–0.844

this research used several indexes that indicate this, namely, the chi-square fit index, GFI (goodness-of-fit) index (Hadziahmetovic and Dinc, 2020; Jöreskog and Sörbom, 1989), CFI – Comparative fit index (Bentler, 1990), RMSEA – Root Mean Square Error of Approximation (Bollen, 1989; Hadziahmetovic and Dinc, 2020), TLI – Tucker Lewis Index (Hadziahmetovic and Dinc, 2020; Tucker and Lewis, 1973), IFI – Incremental Fit Index, and NFI – Normed Fit Index (Hadziahmetovic and Dinc, 2020; Hooper et al., 2008). Model fit values were within acceptable range: Chi-square/df (χ^2/df) = 2.082 ($p < 0.001$); GFI = 0.933; CFI = 0.969; TLI = 0.962; RMSEA = 0.046, IFI = 0.969; NFI = 0.942. Tab. 5 shows the CFA's acceptable and analyzed values.

5.2 Hypotheses Testing

The proposed conceptual model and hypotheses were tested by modeling structural equations (SEM). Moreover, SEM (Fig. 2) is presented a direct link between social media marketing activities (SMMA), Brand Trust, and Brand Equity, and the indirect effect of Brand Trust between SMMA and Brand Equity they were analyzed by the structural equation modeling method in AMOS software. After the analysis, acceptable results were obtained and adequate

Tab. 5: CFA analysis

Fit indices	Acceptable range	Measured values
p-value of the model	> 0.05	0
Chi-square/df (χ^2/df)	< 3	2.082
Goodness-of-fit (GFI)	> 0.9	0.933
Comparative Fit Index (CFI)	> 0.9	0.969
Tucker-Lewis Index (TLI)	> 0.9	0.962
Root Means-Square Error of Approximation (RMSEA)	> 0.05	0.046
Incremental Fit Index (IFI)	> 0.9	0.969
Normed Fit Index (NFI)	> 0.9	0.942

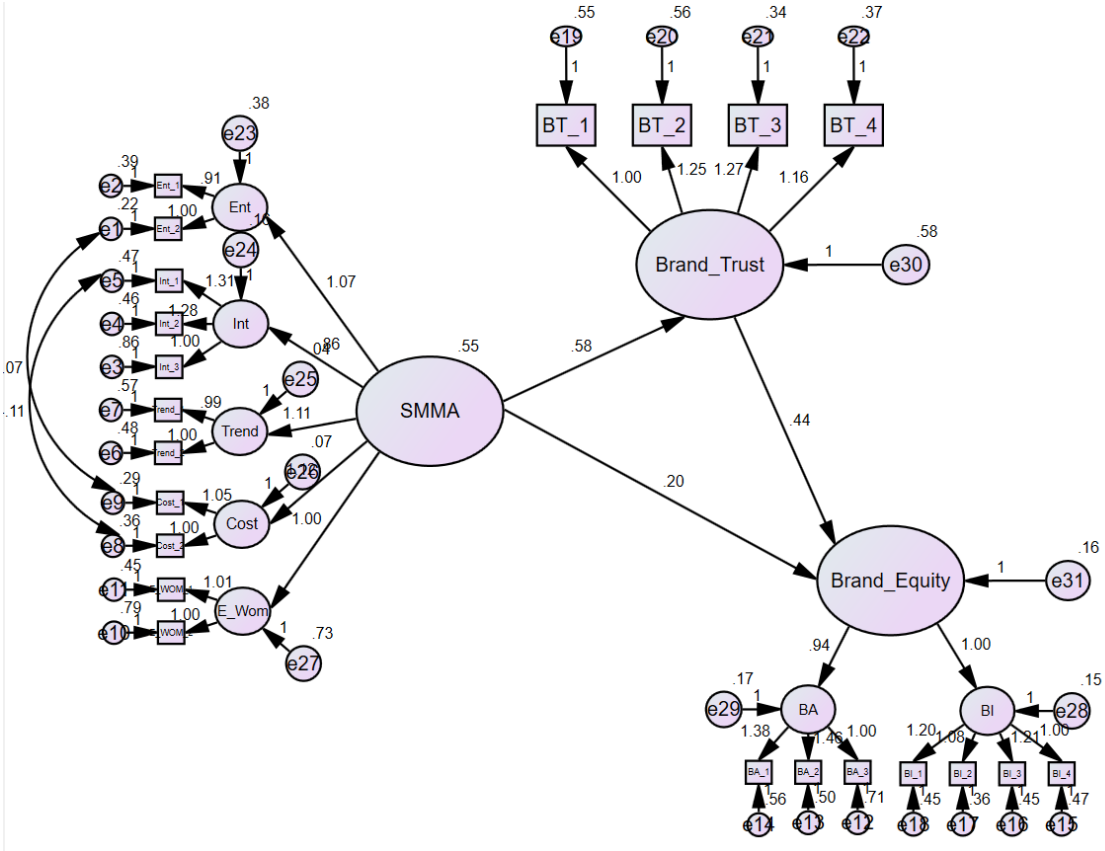

Fig. 2: SEM model

level of fit with $\chi^2/\mathrm{df} = 2.505$, $p = 0.000$, AGFI $= 0.896$, GFI $= 0.919$, NFI $= 0.928$, IFI $= 0.956$, RMSEA $= 0.054$ and CFI $= 0.955$.

The relationships between SMMA, BT, and BE were tested in the model (Fig. 2). SMMA has 5 dimensions with 11 items: Entertainment (Ent_1 and Ent_2), Interaction (Int_1, Int_2, and Int_3), Trendiness (Trend_1 and Trend_2), Customization (Cost_1 and Cost_2), and E-WOM (E_Wom_1 and E_Wom_2), Brand Trust is measured by 4 items (BT_1, BT_2, BT_3, and BT_4) and Brand Equity is examined in 2 dimensions: Brand Awareness (BA_1, BA_2, and BA_3) and Brand Image (BI_1, BI_2, BI_3, and BI_4). Investigating the path estimates, hypotheses were supported by critical values less than $p < 0.05$. Tab. 6 and 7 provide a summary of hypotheses testing. Hypothesis 2 (H_2) is supported with a p-value $= 0.000$ which implies that there is significant a positive impact of social media marketing activities (SMMA) on Brand Trust. Hypothesis 3 (H_3) is supported with p-value $= 0.000$, which implies that Brant Trust has a positive impact on Brand Equity. Consequently, the results provide support for hypothesis 4 (H_4), so social media marketing activities (SMMA) have a positive influence on Brand Equity, with a p-value $= 0.000$.

To assess the mediating role of Brand Trust between the two factors social media marketing activities (SMMA) and Brand Equity, the method from Gaskin and Lim (2018) in the AMOS software was used. The approach of further data analysis proves the existence of mediation, demonstrating the importance of the indirect significant influence of social media marketing activities (SMMA) on Brand Equity mediated by Brand Trust (0.258, $p = 0.001$), supporting hypothesis 1 (H_1; see Gaskin and Lim, 2018).

Tab. 6: Summary of SEM results

Hypothesis	Estimate	Sig	
H_2: SMMA → Brand Trust	0.584	***	Supported
H_3: Brand Trust → Brand Equity	0.442	***	Supported
H_4: SMMA → Brand Equity	0.198	***	Supported

Notes: $p < 0.000$ (99%), $p < 0.05$ (95%).

Tab. 7: Mediation

Parameter	Estimate	Lower	Upper	P
H_1: SMMA → Brand Trust → Brand Equity	0.258	0.2	0.335	0.001

This study reveals a direct significant link between social media marketing activities (SMMA) and Brand Equity, Brand Trust and Brand Equity, and SMMA and Brand Equity. Moreover, there is mediation between SMMA and Brand Equity, where the Brand Trust mediates the relationship.

6 DISCUSSION AND CONCLUSION

The research focused on bottled water brands and their presence and activity on social media, by examining their online activity and the customer trust hence created. It was assumed that SMMA has an impact on Brand Trust and Brand Equity. Furthermore, the study also examined the role of Brand Trust as a mediator between SMMA and Brand Equity. Building on previous literature in this area of marketing, this study's empirical results have shown that SMMA directly influence Brand Trust and Brand Equity and that Brand Trust plays a significant role in mediating between SMMA and Brand Equity. These results offer important theoretical and practical insights into digital marketing management and the bottled water industry in Bosnia and Herzegovina.

6.1 Theoretical Implications

The results of this research offer several conclusions that further supply the growing literature on social media marketing by observing the role of SMMA and by improving core branding goals, Brand Trust and Brand Equity. It is revealed that empirical data showcases positive predictors of SMMA: "Entertainment, Interaction, Trendiness, Customization, and E-WOM." Moreover, brand awareness and brand image are positive predictors of Brand Equity. The results of this research reaffirm the results of the Kim and Ko (2012) as well as the studies of Godey et al. (2016), Seo and Park (2018), and Koay et al. (2020) which found a direct influence of SMMA on Brand Equity.

Contrary to the results of this study, Ebrahim (2019) reported that the direct impact of SMMA on Brand Equity is not significant. However, he reported that SMMA have an indirect impact on Brand Equity through Brand Trust. In the case of Ebrahim's (2019) study, Brand Trust proved to be a significant mediator between SMMA and Brand Equity, and the results of this study confirm those claims. As expected, Brand Trust is very important in regards to SMMA. Moreover, this research confirms the significantly positive role of Brand Trust as a mediator in the link between SMMA and Brand Equity. In this study, measurements also show that the Brand Trust of bottled water consumers has a significant impact on Brand Equity. Consequently, positive brand trust supports brand equity. As for the consumers of bottled water present on social media, they did not make a significant distinction between domestic and foreign brands.

6.2 Managerial Implication

Managerial application of the research is necessary and inevitable since social media and social media marketing are an essential fragment of short-term and long-term online marketing strategies implemented by managers that thus seek to improve brand performance, as well as brand equity after all. It is imperative to connect marketing relationships with customers and their constructive experiences with the brand which in turn positively influence brand equity. This study focuses on managers considering the effectiveness of social media marketing in attracting consumers and building trust in the brand, which ultimately results in the growth of brand equity.

Social media is, among other things, an enormous source of information that could be used to benefit the brands, since the growth of trust in the brand affects the brand equity and its final positioning in the market. It is very important that companies provide accurate and verified information on their websites, as well as options to adequately interact with consumers. There have to be distinct sections on the brand page that provide detailed information about the brand, which will increase the trust.

Therefore, this research will be beneficial for researchers and managers to understand the influence of SMMA and brand experiences on brand equity, especially in the case of bottled water. The study provides data on the most frequently used social media, however, this study could be useful for brands looking to develop Brand Equity through various different social media platforms. Based on the results of this research, it can be concluded that SMMA create a positive impact on brand image and brand awareness, which further contributes to strengthening Brand Equity. Therefore, it is important that bottled water brands increase their activity on social media and encourage their consumers to do the same. Additionally, the growing trend of using social media in Bosnia and Herzegovina can also speed the process of switching to social media in order to get useful information about certain products and services, which will in turn increase brand equity.

7 LIMITATION AND FUTURE RESEARCH

The limitations observed during this research are very important and can offer motivating guidelines for upcoming studies in the arena of digital marketing. The focus of this research is primarily on bottled water brands, so the results may not apply to some other sectors and other areas. Future researches should take into account the limitations of this study to use the information gained from this study in future research and examine this phenomenon in different areas and sectors. The study was conducted on brands in Bosnia and Herzegovina, and research in another country may yield different results, counting on different mentalities, cultures, educational status, and purchasing power. As it was shown in the discussion section, there is conflicting evidence on the direct and indirect impact of Social Media Marketing Activities on Brand Equity, and we, therefore, recommend that research into this phenomenon continue in different areas and environments, and different fields. This study does not take into account other forms of brand marketing activities or the water quality of the brand itself. These limitations can be further considered and overcome in future studies.

8 REFERENCES

Aaker, D. A. 1991. *Managing Brand Equity: Capitalizing on the Value of a Brand Name*. New York: The Free Press.

Ajina, A. S. 2019. The Perceived Value of Social Media Marketing: An Empirical Study of Online Word-of-Mouth in Saudi Arabian Context. *Entrepreneurship and Sustainability Issues*, 6 (3), 1512–1527. DOI: 10.9770/jesi.2019.6.3(32).

Appel, G., Grewal, L., Hadi, R. and Stephen, A. T. 2020. The Future of Social Media in Marketing. *Journal of the Academy of Marketing Science*, 48, 79–95. DOI: 10.1007/s11747-019-00695-1.

Bagozzi, R. P. and Yi, Y. 1988. On the Evaluation of Structural Equation Models. *Journal of the Academy of Marketing Science*, 16, 74–94. DOI: 10.1007/BF02723327.

Bentler, P. M. 1990. Comparative Fit Indexes in Structural Models. *Psychological Bulletin*, 107 (2), 238–246. DOI: 10.1037/0033-2909.107.2.238.

Bollen, K. A. 1989. *Structural Equations with Latent Variables*. John Wiley & Sons. DOI: 10.1002/9781118619179.

Bruhn, M., Schoenmueller, V. and Schäfer, D. B. 2012. Are Social Media Replacing Traditional Media in Terms of Brand Equity Creation? *Management Research Review*, 35 (9), 770–790. DOI: 10.1108/01409171211255948.

Chaudhuri, A. and Holbrook, M. B. 2001. The Chain of Effects from Brand Trust and Brand Affect to Brand Performance: The Role of Brand Loyalty. *Journal of Marketing*, 65 (2), 81–93. DOI: 10.1509/jmkg.65.2.81.18255.

Chen, S.-C. and Lin, C.-P. 2019. Understanding the Effect of Social Media Marketing Activities: The Mediation of Social Identification, Perceived Value, and Satisfaction. *Technological Forecasting and Social Change*, 140, 22–32. DOI: 10.1016/j.techfore.2018.11.025.

Cheung, M. L., Pires, G. D. and Rosenberger, P. J. 2019. Developing a Conceptual Model for Examining Social Media Marketing Effects on Brand Awareness and Brand Image. *International Journal of Economics and Business Research*, 17 (3), 243–261. DOI: 10.1504/IJEBR.2019.098874.

Chi, H.-H. 2011. Interactive Digital Advertising vs. Virtual Brand Community. *Journal of Interactive Advertising*, 12 (1), 44–61. DOI: 10.1080/15252019.2011.10722190.

Christodoulides, G. and de Chernatony, L. 2010. Consumer-Based Brand Equity Conceptualisation and Measurement: A Literature Review. *International Journal of Market Research*, 52 (1), 43–66. DOI: 10.2501/S1470785310201053.

Constine, J. 2016. Facebook Hits 100M Hours Of Video Watched A Day, 1B Users On Groups, 80M On Fb Lite. *TechCrunch* [online]. Available at: `https://social.techcrunch.com/2016/01/27/facebook-grows/`.

Dann, S. 2010. Redefining Social Marketing with Contemporary Commercial Marketing Definitions. *Journal of Business Research*, 63 (2), 147–153. DOI: 10.1016/j.jbusres.2009.02.013.

Doney, P. M. and Cannon, J. P. 1997. An Examination of the Nature of Trust in Buyer–Seller Relationships. *Journal of Marketing*, 61 (2), 35–51. DOI: 10.2307/1251829.

Dwivedi, Y. K., Ismagilova, E., Hughes, D. L., Carlson, J., Filieri, R., Jacobson, J., Jain, V., Karjaluoto, H., Kefi, H., Krishen, A. S., Kumar, V., Rahman, M. M., Raman, R., Rauschnabel, P. A., Rowley, J., Salo, J., Tran, G. A. and Wang, Y. 2020. Setting the Future of Digital and Social Media Marketing Research: Perspectives and Research Propositions. *International Journal of Information Management*, 59, 102168. DOI: 10.1016/j.ijinfomgt.2020.102168.

Ebrahim, R. S. 2019. The Role of Trust in Understanding the Impact of Social Media Marketing on Brand Equity and Brand Loyalty. *Journal of Relationship Marketing*, 19 (4), 287–308. DOI: 10.1080/15332667.2019.1705742.

Felix, R., Rauschnabel, P. A. and Hinsch, C. 2017. Elements of Strategic Social Media Marketing: A Holistic Framework. *Journal of Business Research*, 70 (C), 118–126. DOI: 10.1016/j.jbusres.2016.05.001.

Fornell, C. and Larcker, D. F. 1981. Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, 18 (1), 39–50. DOI: 10.1177/002224378101800104.

Gaskin, J., James, M. and Lim, J. 2019. *Master Validity Tool*. AMOS Plugin. Gaskination's StatWiki.

Gaskin, J. and Lim, J. 2018. *Plugins—Gaskination's StatWiki* [online]. Available at: `http://statwiki.gaskination.com/index.php?title=Plugins`.

Gefen, D., Straub, D. and Boudreau, M.-C. 2000. Structural Equation Modeling and Regression: Guidelines for Research Practice. *Communications of the Association for Information Systems*, 4 (7). DOI: 10.17705/1CAIS.00407.

Godey, B., Manthiou, A., Pederzoli, D., Rokka, J., Aiello, G., Donvito, R. and Singh, R. 2016. Social Media Marketing Efforts of Luxury Brands: Influence on Brand Equity and Consumer Behavior. *Journal of Business Research*, 69 (12), 5833–5841. DOI: 10.1016/j.jbusres.2016.04.181.

Hadziahmetovic, N. and Dinc, M. S. 2020. Linking Reward Types to Organizational Performance in Central and Eastern European Universities: The Mediating Role of Affective Commitment. *Journal of East European Management Studies*, 25 (2), 325–359. DOI: 10.5771/0949-6181-2020-2-325.

Hair, J. F., Anderson, R. E., Tatham, R. L. and Black, W. C. 1998. *Multivariate Data Analysis.* 5th ed. NJ: Prentice Hall.

Henseler, J., Ringle, C. M. and Sarstedt, M. 2015. A New Criterion for Assessing Discriminant Validity in Variance-Based Structural Equation Modeling. *Journal of the Academy of Marketing Science*, 43, 115–135. DOI: 10.1007/s11747-014-0403-8.

Hooper, D., Coughlan, J. and Mullen, M. R. 2008. Structural Equation Modelling: Guidelines for Determining Model Fit. *Electronic Journal of Business Research Methods*, 6 (1), 53–60. DOI: 10.21427/D7CF7R.

Hu, L. and Bentler, P. M. 1999. Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6 (1), 1–55. DOI: 10.1080/10705519909540118.

Innovation Barometer. 2021. *Part 5: How to Adapt the Questionnaire* [online]. Available at: `https://www.innovationbarometer.org/copenhagen-manual/read-online/part-5-how-to-adapt-the-innovation-barometer-questionnaire/`.

Irshad, M., Ahmad, M. S. and Malik, O. F. 2020. Understanding Consumers' Trust in Social Media Marketing Environment. *International Journal of Retail & Distribution Management*, 48 (11), 1195–1212. DOI: 10.1108/IJRDM-07-2019-0225.

Jöreskog, K. G. and Sörbom, D. 1989. *LISREL 7: A Guide to the Program and Applications.* Chicago, IL: SPSS.

Jung, S. T. 1994. *Marketing Management.* Bombunasa, Seoul.

Kavota, J. K., Kamdjoug, J. R. K. and Wamba, S. F. 2020. Social Media and Disaster Management: Case of the North and South Kivu Regions in the Democratic Republic of the Congo. *International Journal of Information Management*, 52, 102068. DOI: 10.1016/j.ijinfomgt.2020.102068.

Keller, K. L. 1993. Conceptualizing, Measuring, and Managing Customer-Based Brand Equity. *Journal of Marketing*, 57 (1), 1–22. DOI: 10.1177/002224299305700101.

Khong, K. W., Onyemeh, N. C. and Chong, A. Y.-L. 2013. BSEM Estimation of Network Effect and Customer Orientation Empowerment on Trust in Social Media and Network Environment. *Expert Systems with Applications*, 40 (12), 4858–4870. DOI: 10.1016/j.eswa.2013.02.020.

Kim, A. J. and Ko, E. 2010. Impacts of Luxury Fashion Brand's Social Media Marketing on Customer Relationship and Purchase Intention. *Journal of Global Fashion Marketing*, 1 (3), 164–171. DOI: 10.1080/20932685.2010.10593068.

Kim, A. J. and Ko, E. 2012. Do Social Media Marketing Activities Enhance Customer Equity? An Empirical Study of Luxury Fashion Brand. *Journal of Business Research*, 65 (10), 1480–1486. DOI: 10.1016/j.jbusres.2011.10.014.

Kim, J.-H. and Hyun, Y. J. 2011. A Model to Investigate the Influence of Marketing-Mix Efforts and Corporate Image on Brand Equity in the IT Software Sector. *Industrial Marketing Management*, 40 (3), 424–438. DOI: 10.1016/j.indmarman.2010.06.024.

Kim, S. and Park, H. 2013. Effects of Various Characteristics of Social Commerce (S-Commerce) on Consumers' Trust and Trust Performance. *International Journal of Information Management*, 33 (2), 318–332. DOI: 10.1016/j.ijinfomgt.2012.11.006.

Koay, K. Y., Ong, D. L. T., Khoo, K. L. and Yeoh, H. J. 2020. Perceived Social Media Marketing Activities and Consumer-Based Brand Equity: Testing a Moderated Mediation Model. *Asia Pacific Journal of Marketing and Logistics*, 33 (1), 53–72. DOI: 10.1108/APJML-07-2019-0453.

KomoraBiH. 2021. *Vanjskotrgovinska razmjena bezalkoholnih pića i voda* [online]. Available at: `https://www.komorabih.ba/wp-content/uploads/2020/04/Bezalkoholna-pica-i-vode.pdf`.

Kusumasondjaja, S. 2018. The Roles of Message Appeals and Orientation on Social Media Brand Communication Effectiveness: An Evidence from Indonesia. *Asia Pacific Journal of Marketing and Logistics*, 30 (4), 1135–1158. DOI: 10.1108/APJML-10-2017-0267.

Lindell, M. K. and Whitney, D. J. 2001. Accounting for Common Method Variance in Cross-Sectional Research Designs. *Journal of Applied Psychology*, 86 (1), 114–121. DOI: 10.1037/0021-9010.86.1.114.

Lister, M. 2017. *40 Essential Social Media Marketing Statistics for 2018* [online]. Available at: `https://www.wordstream.com/blog/ws/2017/01/05/social-media-marketing-statistics`.

Nunnally, J. C. 1978. An Overview of Psychological Measurement. In Wolman, B. B. (ed.). *Clinical Diagnosis of Mental Disorders: A Handbook*, pp. 97–146. DOI: 10.1007/978-1-4684-2490-4_4.

Parveen, F., Jaafar, N. I. and Ainin, S. 2015. Social Media Usage and Organizational Performance: Reflections of Malaysian Social Media Managers. *Telematics and Informatics*, 32 (1), 67–78. DOI: 10.1016/j.tele.2014.03.001.

Pham, P. and Gammoh, B. S. 2015. Characteristics of Social-Media Marketing Strategy and Customer-Based Brand Equity Outcomes: A Conceptual Model. In Kim, K. (ed.). *Celebrating America's Pastimes: Baseball, Hot Dogs, Apple Pie and Marketing? Developments in Marketing Science: Proceedings of the Academy of Marketing Science,* pp. 433–434. DOI: 10.1007/978-3-319-26647-3_87.

Phan, M., Thomas, R. and Heine, K. 2011. Social Media and Luxury Brand Management: The Case of Burberry. *Journal of Global Fashion Marketing*, 2 (4), 213–222. DOI: 10.1080/20932685.2011.10593099.

Prasetyo, M., Nadhila, V. and Sanny, L. 2020. Effect of Social Media Marketing on Instagram Towards Purchase Intention: Evidence from Indonesia's Ready-to-Drink Tea Industry. *International Journal of Data and Network Science*, 4 (2), 91–104. DOI: 10.5267/j.ijdns.2020.3.002.

Richter, A. and Koch, M. 2007. *Social Software – Status Quo und Zukunft*. Technischer Bericht, Nr.-01, Fakultatfür Informatik. Universitat der BundeswehrMünchen, Sweden.

Rossiter, J. R. and Percy, L. 1987. *Advertising and Promotion Management*. McGraw-Hill Book Company.

Sano, K. 2014. Do Social Media Marketing Activities Enhance Customer Satisfaction, Promote Positive WOM and Affect Behavior Intention?: An Investigation into the Effects of Social Media on the Tourism Industry. 同志社商学 *(The Doshisha Business Review)*, 66 (3–4), 491–515. DOI: 10.14988/pa.2017.0000013844.

Seo, E.-J. and Park, J.-W. 2018. A Study on the Effects of Social Media Marketing Activities on Brand Equity and Customer Response in the Airline Industry. *Journal of Air Transport Management*, 66, 36–41. DOI: 10.1016/j.jairtraman.2017.09.014.

Sohail, M. S., Hasan, M. and Sohail, A. F. 2020. The Impact of Social Media Marketing on Brand Trust and Brand Loyalty: An Arab Perspective. *International Journal of Online Marketing (IJOM)*, 10 (1), 15–31. DOI: 10.4018/IJOM.2020010102.

Srivastava, R. K. and Shocker, A. D. 1991. *Brand Equity: A Perspective on its Meaning and Measurement*. MSI Report 91-124. Cambridge, MA: Marketing Science Institute.

Statista. 2020. *Internet Users in the World 2020* [online]. Available at: `https://www.statista.com/statistics/617136/digital-population-worldwide/`.

Steenkamp, M. and Hyde-Clarke, N. 2014. The Use of Facebook for Political Commentary in South Africa. *Telematics and Informatics*, 31 (1), 91–97. DOI: 10.1016/j.tele.2012.10.002.

Tatar, Ş. B. and Eren-Erdoğmuş, İ. 2016. The Effect of Social Media Marketing on Brand Trust and Brand Loyalty for Hotels. *Information Technology & Tourism*, 16 (3), 249–263. DOI: 10.1007/s40558-015-0048-6.

Tucker, L. R. and Lewis, C. 1973. A Reliability Coefficient for Maximum Likelihood Factor Analysis. *Psychometrika*, 38, 1–10. DOI: 10.1007/BF02291170.

Vohra, A. and Bhardwaj, N. 2019. From Active Participation to Engagement in Online Communities: Analysing the Mediating Role of Trust and Commitment. *Journal of Marketing Communications*, 25 (1), 89–114. DOI: 10.1080/13527266.2017.1393768.

Wardati, N. K. and Mahendrawathi, E. R. 2019. The Impact of Social Media Usage on the Sales Process in Small and Medium Enterprises (SMEs): A Systematic Literature Review. *Procedia Computer Science*, 161, 976–983. DOI: 10.1016/j.procs.2019.11.207.

We Are Social. 2019. *Digital in 2019: Global Internet Use Accelerates* [online]. Available at: `https://wearesocial.com/uk/blog/2019/01/digital-in-2019-global-internet-use-accelerates/`.

We Are Social. 2021. *Digital 2021: The Latest Insights into the 'State of Digital'* [online]. Available at: `https://wearesocial.com/uk/blog/2021/01/digital-2021-the-latest-insights-into-the-state-of-digital/`.

We Are Social. 2022. *Digital 2022: Another Year of Bumper Growth* [online]. Available at: `https://wearesocial.com/uk/blog/2022/01/digital-2022-another-year-of-bumper-growth-2/`

Yadav, M. and Rahman, Z. 2017. Measuring Consumer Perception of Social Media Marketing Activities in E-commerce Industry: Scale Development & Validation. *Telematics and Informatics*, 34 (7), 1294–1307. DOI: 10.1016/j.tele.2017.06.001.

Yadav, M. and Rahman, Z. 2018. The Influence of Social Media Marketing Activities on Customer Loyalty: A Study of E-commerce Industry. *Benchmarking: An International Journal*, 25 (9), 3882–3905. DOI: 10.1108/BIJ-05-2017-0092.

Zollo, L., Filieri, R., Rialti, R. and Yoon, S. 2020. Unpacking the Relationship between Social Media Marketing and Brand Equity: The Mediating Role of Consumers' Benefits and Experience. *Journal of Business Research*, 117, 256–267. DOI: 10.1016/j.jbusres.2020.05.001.

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DOES BETTER SPORTS PERFORMANCE GENERATE HIGHER REVENUES IN THE ENGLISH PREMIER LEAGUE? A PANEL DATA APPROACH

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ABSTRACT

In this paper, we examined the relationship of sports performance and revenue generation in the English Premier League (EPL) to understand how performance on the field impacts financial performance of professional football clubs. Further, we verified if increased wage expenses help improve sports performance. Independent dynamic models were estimated by GMM on panel data including $N = 28$ EPL teams and on a reduced data set excluding the top six teams ($N = 22$), spanning from the 2008/2009 to 2018/2019 seasons ($T = 11$). The results of the GMM models confirmed that sports performance and revenue generation significantly correlate. Teams with better sports performance do generate higher revenues. Additionally, higher wage expenses result in better sports performance. A positive relationship of the variables in both hypotheses were established in both directions (full data). In all analyses of reduced data, the parameters of interest are nonsignificant. Dependencies exist due to the top teams.

KEY WORDS

revenue, sports performance, panel data, Generalized Method of Moments, wage expenses, football

JEL CODES

C23, D22, J30, Z23

1 INTRODUCTION

Over the last decades, professional football has turned into a multi-million-dollar global business operation with fans following from all over the world. This in turn led to a worldwide competition for fan attention and money. In an increasingly connected world, professional football teams not only need to compete against domestic league competitors but also against other global football leagues and even a variety of other sports across the world in order to maximize revenues and fan engagement.

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Whilst debate regarding the key objective of professional football clubs – to be either revenue maximizers or utility maximizers – has been going on for decades (see for example Sloane, 1971), the continuous revenue increase amongst football clubs in Europe, particularly over the past two decades, suggests that the economic aspect is the most important one for professional sports organizations.

Previous studies showed that by improving sports performance, club revenues can be increased. Szymanski (1998) reported that league performance and club revenues are correlated. More specifically, he claimed that "better league performance leads to higher revenues that occur as a result of increased attendance, higher ticket prices, increased level of sponsorship, and income from merchandising and TV rights."

Since professional sport has undergone a variety of changes and innovations over the last years, the objective of this paper is to identify and quantify the relationship of revenue generation and sports performance in the English Premier League (EPL) on data collected between 2008/2009 and 2018/2019. This research will confirm or reject previous academic research undertaken on different professional football leagues. Also, we propose to identify the relationship between sports performance and wage expenditures.

The added value of current approach is use of a larger data set, as previous research data apart from Szymanski (1998) used data beyond ten seasons. Further, we applied a novel statistical approach to more recent and larger empirical data to include more teams than past research. The projected panel data analysis is expected to confirm possible relationships between sports performance and revenues, and also between wage expenses and sports performance to illustrate full cycle of potential revenue generation in professional European Football.

The rest of the paper is structured as follows: section two presents an overview of the most relevant literature on this topic. This provides background on the topic and help understand the status of academic research. Section three describes the data and methodology applied in this research. Results are presented and discussed in section four. The paper concludes in section five comprising a summary of the results, research questions and identification of potential strengths and weaknesses of the presented approach.

2 THEORETICAL FRAMEWORK

With football becoming broadly popular and relevant across the world, interest from an academic point of view has visibly grown. The wealth of data currently measured, tracked and publicly available enabled the possibilities for endless research. Several authors have analyzed the relationship of sports performance and financial performance of professional football clubs in several countries and leagues.

The first key paper was published by Szymanski (1998) who collected data from 69 clubs in the English Premier League over a hundred years and analyzed the relationship of league position and revenue, as well as league position and revenue. He concluded that league performance did not bear an impact on revenues. However, when the relationship of revenue and expenses to league performance were examined, the results showed much more useful outcomes and lead Szymanski (1998) to formulate two general concepts: 1. Better league performance leads to higher revenues and 2. Increased wage expenditure leads to better league performance.

Pinnuck and Potter (2006) took a similar approach on the Australian Football League (AFL) looking at the relationship of sports performance and different revenue streams. The authors focused on factors that influenced financial performance of the AFL over ten seasons. Pinnuck and Potter came to several insightful findings. Firstly, match attendance and sports success are strongly related. And secondly, membership figures are positively

Tab. 1: Previous empirical studies analyzing sport performance, revenues, and efficiency

Author	Country	Variables	Key results
Szymanski (1998)	England	League position and revenues and wage expenses and league position	Better league position leads to higher revenues; increased wage expenditure leads to better league performance
Gerrard (2005)	England	Sports performance, profitability, wage costs, playing quality, revenues, fan base	Team revenue is positively related to sports performance. Operating margin is negatively related to sports performance
Pinnuck and Potter (2006)	Australia	Match attendance, marketing, membership revenues	Sports performance has a positive impact on attendance and marketing revenues
Haas (2003)	England	Wages/salaries, points, total revenue	Sport ranking is not significantly related to the efficiency ranking
Guzmán and Morrow (2007)	England	Staff costs, points, total revenue	Efficiency scores are not correlated with sports ranking
Ribeiro and Lima (2012)	Portugal	Wages, league ranking	Efficiency rank and league rank don't correlate

influenced by past sports success and marketing expenses.

In his paper, "a resource-utilization model of organizational efficiency in professional sports teams," Gerrard (2005) analyzed whether revenues and sports performance relate. He affirmed that they positively relate and estimated that for every 1% improvement in points accumulated per season, revenues increase by 0.81% relative to the league's average. The authors also reported that financial performance is negatively related to sport performance, as with every 1% increase in sports performance, operating margins decrease by 0.25%.

Rather than exploring pure financial performance vs. sports performance, Haas (2003) investigated efficiency scores. In the productive efficiency, Haas researched the actual team performance in the English Premier League vs. the possible performance outcome, given the investments in talents made by the respective club in season 2000/2001. Through his Data Envelopment Analysis (DEA) approach, he came to the conclusion that the league ranking of the clubs at the end of the season are not related to the ranking based on the efficiency scores. More specifically, clubs with the highest investments in players and coaches measured by wage expenses are not achieving the success their investments would suggest.

Guzmán and Morrow (2007) increased the sample size to six seasons to explore the relationship of efficiency scores and sports performance in the EPL between seasons 1997/98 and 2002/03. The longer investigation period does not impact the findings as results are in line with Haas (2003) indicating no significant relationship between efficiency and sports performance. It is interesting, however, that Guzmán and Morrow seemed to detect an inverse relationship of the two, as the lower ranked teams showed better efficiency scores than most of the top ranked teams.

Later, Ribeiro and Lima (2012) expanded the investigated timeline to seven seasons covering the period from 2002/03 to 2008/09. They also applied the DEA method but using the Portuguese Football League as their data source for research. The authors found a negative relationship between sports performance and efficiency scores: clubs which perform well in the league ranking and employ the best players often give poor efficiency scores, while smaller clubs with less expenses on players seem to extract more out of their resources and achieve higher efficiency scores. Tab. 1 summarizes the most relevant historical studies and respective key findings.

As the literature reveals, there is great interest in football research. Professional football

is not only increasing in terms of global reach, popularity, and revenues. With the data now accessible, there is heightened interest in the impact of sports performance on revenues. Our recent data set enables us to examine whether these relationships hold or have changed in the recent years. By applying an alternative approach of panel data analysis, we seek to uphold past academic papers and also illustrate the full cycle of revenue increase.

3 DATA AND METHODS

European football continues to enjoy its success when it comes to revenue growth, with the largest share of revenue coming from the "big five" leagues, i.e., England, Germany, France, Spain and Italy. The EPL generated the highest absolute growth in 2018/19, and "continues to generate the highest revenues across the 'big five'" (€ 5.9 billion). The 20 EPL clubs' combined revenue grew by 7% (Deloitte, 2020). We chose the EPL for present research, as the league not only excels in revenue generation amongst all football leagues globally, but since comprehensive and reputable data sources are available. Whilst past researchers also focused on the English Premier League, we see the existing research on the EPL as advantageous, as it presents greater opportunities for comparison and for identifying changes over time.

The data used in this research covers information on football teams competing in the EPL from season 2008/09 to 2018/19. Each season has 20 teams competing in the EPL to become the league's champion. The champion is the team that collected the most points during the season where three points are awarded for a win, one point for a draw and no point for a defeat. As per rules and regulations of the EPL, each season the teams holding the three lowest rankings of the league's table (rank 18, 19 and 20), i.e., the teams with the lowest number of points, are demoted to the EFL Championship – until 2016 known as the Football League Championship – whilst the two top teams of the EFL Championship plus one additional team are promoted to the EPL. Therefore, instead of 20 consecutive team observations, we identified 36 different teams over the course of the eleven seasons. Data on team revenues and wage expenses were retrieved from the Deloitte Annual Review of Football Finance from 2010 to 2020. Information on league position and points accumulated at the end of season were gathered from kicker.de (2008–2019), the online platform of the renowned German sports magazine published by the Olympia-Verlag GmbH. The same source was also used in previous academic research (see Haas et al., 2004).

In this paper, we researched the following two hypotheses: Hypothesis 1 (H_1) is formulated "better sports performance leads to higher revenues". For sports performance, we used the total points a team accumulated over each season. While we also collected data on league positions, we decided against its use as the league ranks are also based on the points the team obtained per season. Therefore, total points as an input variable seemed more reasonable. This approach was also undertaken by many researchers looking into this topic, for example Haas (2003), Haas et al. (2004) or Guzmán and Morrow (2007).

Hypothesis 2 (H_2) suggests that "better players will bring better sports performance". The response variable is cumulated points end of season; the independent variable for Hypothesis 2 is wage expenses (GBP mil). A panel data analysis was chosen as "panel data have space as well as time dimensions" (Gujarati et al., 2012), which makes them suitable for this type of research. It allows not only to explore change and impact over time but also to identify top performing teams. The very poor performing teams eliminated themselves from the analysis by being relegated at the end of the season.

3.1 Data Samples

EPL relegation policies cause our data set to be an unbalanced panel as not all teams can stay in the first league every season and

consequently the teams in our dataset do not have the same number of observations. Moreover, we excluded teams that had two or fewer observations as their influence over the eleven seasons is small and do not add useful information to the Generalized Methods of Moments (GMM) estimation of the dynamic models of panel data. Specifically, Birmingham City, Blackpool, Brighton & Hove Albion, City Cardiff City, Huddersfield Town, Middlesbrough, Portsmouth and Reading FC were excluded from the analysis, for this reason. 28 teams remained thus in the dataset, designated as full data.

The time dimension in the current data is season from 2008/2009 until 2018/2019. After the 2019 season, we discontinued the data, as COVID-19 pandemics strongly affected revenue generation in this sport sector. For instance, fans were not allowed to be at the game, or were allowed in limited numbers in the stadium thereby negatively affecting matchday revenues. In our data, teams are cross-sectional units, namely the $N = 28$ teams that competed in the EPL for at least three seasons between 2008/09 and 2018/19 ($T = 3$ to 11). The total number of available observations in the full data is $n = 205$.

Furthermore, we created a reduced data set by eliminating the most successful teams in terms of revenue generation per season, points accumulated per season as well as wage expenses per season. There seem to be sizeable differences in level and variation among the top EPL teams and the remaining ones. Consequently, Arsenal FC, FC Chelsea FC, Liverpool FC, Manchester City FC, Manchester United FC and Tottenham Hotspur FC were removed from the full data set. This was done primarily to explore robustness of the econometric analyses. Consequently, for H_1 and H_2 we estimated the GMM system and difference models first on the full dataset, followed by estimation on the reduced data. The number of observations in the reduced data is $n = 139$ ($N = 22$).

3.2 Data Characteristics and Econometric Models

According to Greene (2002) the analysis of longitudinal data is subject of one of the most active and innovative bodies of literature in econometrics. Gujarati et al. (2012) state that "by combining time series of cross-section observations, panel data gives more informative data, more variability, less collinearity among variables, more degrees of freedom and more efficiency". For these reasons, a panel data analysis was chosen in the current research.

To estimate panel data models, we used the R program, version 4.1.2. R is a language and environment for statistical computing (R Core Team, 2021). Further, we applied the R extensible package plm, version 2.4-3. suitable to estimate numerous linear models of panel data and make robust inferences (Croissant and Millo, 2018).

To investigate the impact of sports performance on revenues we used points as the input variable to represent sports performance. Tab. 2 summarizes the variables employed for exploration of hypothesis 1.

Further, we explored the relationship of wage expenses and sports performance as previously carried out by other authors, for example see Szymanski (1998) or Gerrard (2005). We aim to verify the theory of Szymanski (1998) that "better players win more matches", i.e., wage expenses and sports performance positively correlate. Tab. 3 provides the variables used in the panel data models to verify hypothesis 2.

Fig. 1 and 2 illustrate the level and variation of revenues and points accumulated by the teams in the EPL. Fig. 3 depicts the identical information for player wages.

Generally, there are several methods of analysing longitudinal data. Due to probable dynamic nature of the relationships between the researched variables, we specified and estimated two different dynamic models of panel data: the system GMM model of Blundell and Bond (1998) and the difference GMM model described by Arellano and Bond (1991). Estimation technique for both models was the Generalized Method of Moments (GMM), chosen

Tab. 2: Variables used for verification of hypothesis 1

Category	Variables	Type of variable	Unit	Source
Revenues	Total revenues	Dependent variable	GBP mil.	Deloitte Annual Review of Football Finance
Sports performance	Points end of season	Independent variable	Points	www.kicker.de

Tab. 3: Variables used for verification of hypothesis 2

Category	Variables	Type of variable	Unit	Source
Sports performance	Points end of season	Dependent variable	Points	www.kicker.de
Wage costs	Wage expenses	Independent variable	GBP mil.	Deloitte Annual Review of Football Finance

primarily to handle likely correlation between the explanatory variable and the current or lagged error term, so called endogeneity issue leading to inconsistent estimates with some traditional estimation approaches. The GMM method applies lagged values of the dependent variable as instrumental variables to address the endogeneity problem.

Consider an initial model of panel data with lagged dependent variable, current and lagged independent variable and time dummies on the right-hand side of the model equation, as shown in (1).

$$\begin{aligned} y_{it} = c + \phi_1\, y_{it-1} + \phi_2\, y_{it-2} + \\ + \beta_1\, x_{it} + \beta_2\, x_{it-1} + \\ + \sum_{t=2}^{T} \gamma_t\, D_t + (\alpha_i + \varepsilon_{it}), \end{aligned} \tag{1}$$

where c is the intercept, ϕ_1 and ϕ_2 are the parameters for the lagged dependent variables, β_1 and β_2 are the coefficients for the current

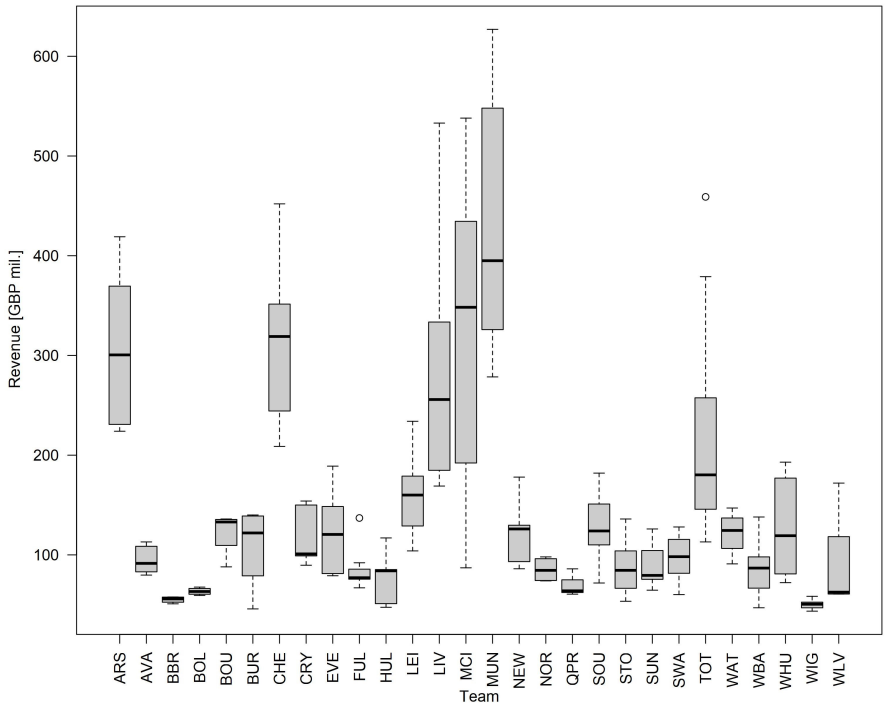

Fig. 1: Boxplots of Revenue (GBP mil.) by EPL team

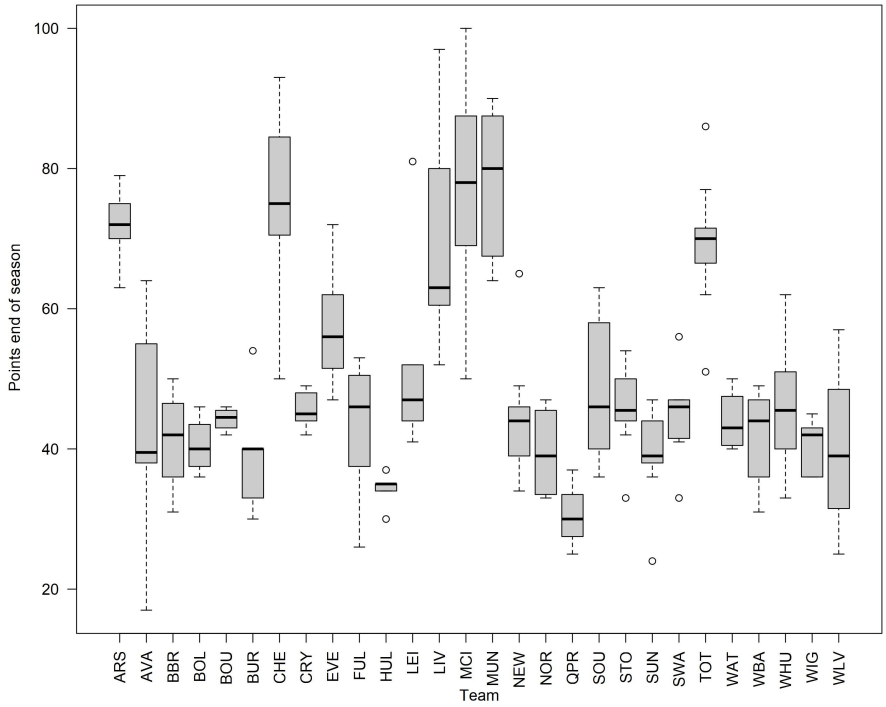

Fig. 2: Boxplots of Points end of season by EPL team

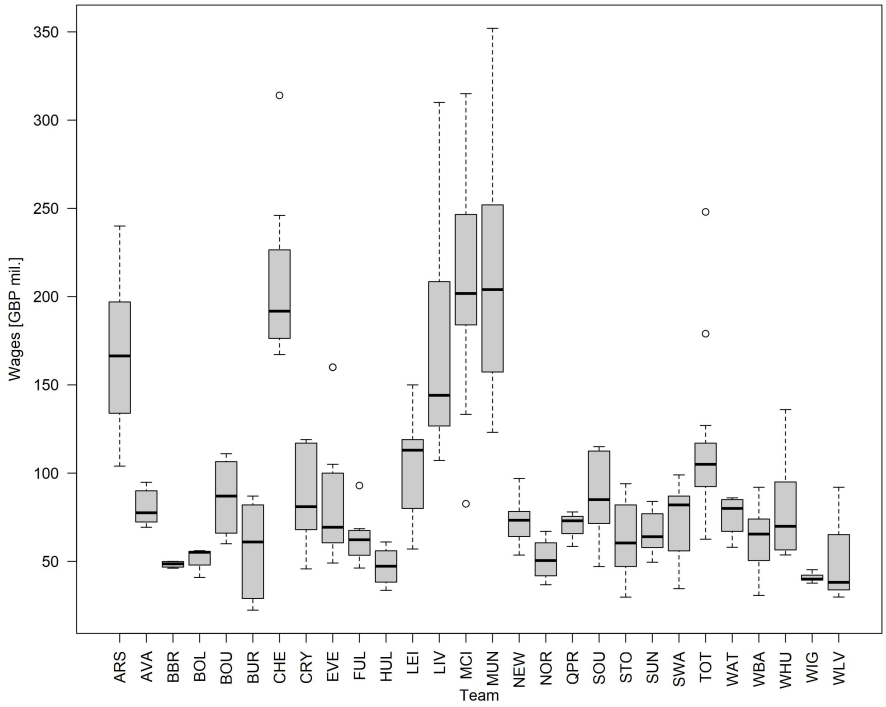

Fig. 3: Boxplots of Wage expenses (GBP mil.) by EPL team

and lagged explanatory variables of interest, γ_t is parameter for the corresponding t-th season dummy, α_i denote the constants associated with the fixed effects (cross-section units), and ε_{it} is the random error term. This model is later transformed to difference GMM model via 1st order differencing $\Delta y_{it} = y_{it} - y_{it-1}$ applied to both sides of equation (1), which removes the individual fixed effects, as shown in equation (2). The method of differencing, however, may possibly increase gaps between observations with unbalanced panel data.

$$\begin{aligned}\Delta y_{it} = \phi_1 \, \Delta y_{it-1} + \phi_2 \, \Delta y_{it-2} + \\ + \beta_1 \, \Delta x_{it} + \beta_2 \, \Delta x_{it-1} + \\ + \sum_{t=2}^{T} \gamma_t \, D_t + \Delta \varepsilon_{it}.\end{aligned} \tag{2}$$

The differenced GMM model was complemented with lagged dependent variables, as instruments to handle the issue of endogeneity.

Another variant is the system GMM model by Blundell and Bond (1998). In this model, the dependent variable considered in model (1) is a random walk and its lagged first-order differences serve as model instruments. Estimation of dynamic GMM models on panel data were obtained via the two-step estimation, known to provide better quality estimates. The number of lagged instruments included in GMM dynamic equations was restricted to one for both variants of GMM models. Robust inference was uniformly preferred in GMM model output and statistical tests. Blundell et al. (2000) state that use of the system GMM estimator not only improves the estimator precision but also greatly reduces finite sample bias. GMM estimators are generally applicable when there are independent variables that are not strictly exogenous, i.e., they are correlated with past and possibly current realizations of the error term, with fixed effects, and under heteroskedasticity and (or) autocorrelation within individuals (Roodman, 2009a).

Diagnostics of the estimated GMM models was secured with the Hansen–Sargan test, dubbed J-test (Hansen, 1982; Sargan, 1958) of overidentifying restrictions with weights taken from the two-step estimation procedure. The J-test verifies the null hypothesis of valid instruments. While a too low p-value of J-test may indicate poorly chosen instruments, a p-value close to unity suggests too many instruments, as dealt with in Roodman (2009b). Also, we applied independently the Arellano and Bond (1991) tests of no serial correlation of the error term with tested lags one or two. The Arellano-Bond test variant with robust estimators of the covariance matrix was used.

4 RESULTS AND DISCUSSION

Due to suspected non-stationarity of the variables revenues, wages and sport performance in some panels, we early run independent unit root tests based on LM statistic, as devised by Hadri (2000). Since non-stationarity tests generally show no tolerance to missing values in panels, the Hadri tests with a drift were applied to the six top EPL teams only with significant p-values < 0.001. Occurrence of unit root in at least one panel was thereby confirmed for all variables.

In this chapter, we primarily present the results in form of the econometric models verifying first hypothesis 1: "better sports performance leads to higher revenues" and then hypothesis 2: "better players will bring better sports performance", examining the relationship of sport performance and wage expenses. Presented GMM models include lagged values of the response variable with lags one and two, time (season) dummies and independent variables from the current and past period with lag one. For hypothesis 2 we applied one lag only to the response variable in the GMM model when testing the reverse direction of the relationship.

4.1 Results for Hypothesis 1: Models of Revenues

In this section, we present GMM models of the current revenues as a function of the

revenues lagged two seasons and current points and points from the previous season. The GMM models also include dummies for seasons. Tab. 4 presents the estimated coefficients and significance tests for the system and difference GMM dynamic model of panel data for revenue obtained from full the data. Further, in order to verify the estimated GMM models, we performed a set of diagnostic tests available in the plm library, which are also displayed in Tab. 4.

Tab. 4: Estimated parameters and significance z-tests for the system GMM model (left) and difference GMM model (right) of Revenue (mil. GBP) with full data

	Coefficient (std. error)	**Coefficient (std. error)**
Revenues $(t-1)$	0.915***	0.320**
	(0.124)	(0.143)
Revenues $(t-2)$	0.034	0.780***
	(0.139)	(0.179)
Points EoS (t)	0.512***	0.571***
	(0.184)	(0.157)
Points EoS $(t-1)$	−0.619***	1.170***
	(0.234)	(0.336)

Diagnostic test	**Statistic (df)**	p**-value**
Sargan-Hansen J-test for overidentifying restrictions	$\chi^2 = 8.758$ (17)	0.948
	$\chi^2 = 5.787$ (6)	0.447
Test for 1st order serial correlation	$z = -1.090$	0.276
	$z = -0.371$	0.711
Test for 2nd order serial correlation	$z = 0.774$	0.439
	$z = -1.215$	0.225

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%.

With the full data we observed positive and significant estimated parameters for the current and lagged points end of season in the difference and in the system model. The p-values of the significance tests were below the 5% significance boundary. The models therefore suggest positive impact of current and past player performance on the current team revenues. The Sargan-Hansen test of overidentifying restrictions shows that the instruments for the above GMM models were selected appropriately, as indicated by the non-significant p-values. The respective diagnostic tests for autocorrelation pointed out that respective error terms were free from serial correlation.

GMM estimates of the identical models on the reduced data as well as the diagnostic tests available in plm library of R, are displayed in Tab. 5 to establish dependency of the results on data sub setting.

Tab. 5: Estimated parameters and significance z-tests for the system GMM model (left) and difference GMM model (right) of Revenue (mil. GBP) with reduced data

	Coefficient (std. error)	**Coefficient (std. error)**
Revenues $(t-1)$	0.278	−0.141
	(0.202)	(0.385)
Revenues $(t-2)$	0.197*	−0.068
	(0.105)	(0.497)
Points EoS (t)	0.372*	0.491***
	(0.196)	(0.176)
Points EoS $(t-1)$	0.666	0.679*
	(0.416)	(0.397)

Diagnostic test	**Statistic (df)**	p**-value**
Sargan-Hansen J-test for overidentifying restrictions	$\chi^2 = 9.440$ (17)	0.926
	$\chi^2 = 2.347$ (6)	0.885
Test for 1st order serial correlation	$z = -0.885$	0.376
	$z = -0.326$	0.745
Test for 2nd order serial correlation	$z = 0.138$	0.890
	$z = 0.266$	0.790

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%.

Estimated coefficients from the dynamic GMM models of the current revenues (reduced data) show significant impact of the current points end of season on the current revenues in the difference model, however significant influence ($\alpha = 0.1$) of the lagged points can be seen in the difference model only. Equality of the parameters obtained from full and reduced data, however, could not be statistically tested. Consequently, we were able to confirm the H_1 hypothesis that player performance, expressed as points increases team revenues in the EPL. The validity of H_1 appears to hold in the tested direction for both full and reduced data, despite existing differences in the strength of the relationship, which seems to be more evident in the full data. The p-value of the Sargan test points out that the model instruments were chosen appropriately. The Arellano-Bond verification tests for serial correlation imply

that error terms were not serially correlated in neither the system nor difference GMM model.

To describe the relationship in the opposite direction, primarily to learn, whether current or lagged revenues influence the current sport performance expressed as points end of season, we applied the GMM estimator on the dynamic model specified in the reverse direction. Hence, we modelled the current points end of season as a function of lagged points (lags 1 and 2), and current and lagged revenues. Parameter estimates obtained on full data and output of the diagnostic tests performed to verify the above mentioned GMM models are displayed in Tab. 6.

Tab. 6: Estimated parameters and significance z-tests for the system GMM model (left) and difference GMM model (right) of Points end of Season with full data

	Coefficient (std. error)	**Coefficient (std. error)**
Points EoS $(t-1)$	0.136	-0.500**
	(0.159)	(0.217)
Points EoS $(t-2)$	0.105	-0.828***
	(0.144)	(0.311)
Revenues (t)	0.149***	0.058
	(0.410)	(0.051)
Revenues $(t-1)$	-0.066*	0.234***
	(0.034)	(0.079)

Diagnostic test	**Statistic (df)**	***p*-value**
Sargan-Hansen J-test for overidentifying restrictions	$\chi^2 = 18.214$ (17)	0.376
	$\chi^2 = 5.333$ (6)	0.502
Test for 1st order serial correlation	$z = -1.739$	0.082
	$z = -1.369$	0.171
Test for 2nd order serial correlation	$z = -0.292$	0.770
	$z = 1.296$	0.195

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%.

Model coefficients obtained from the full data show significant relationships between current revenues and current points in the system GMM model. The difference model thereby shows evidence that lagged revenues exerting a statistically significant impact upon current sport performance (points) in the EPL. The p-values of the Sargan-Hansen J-tests confirm that the model instruments were chosen in a suitable way, as they show no problematic instruments with p-values of acceptable size. The verification tests for autocorrelation first and second order indicate no significant autocorrelations of the residual terms.

Furthermore, we re-estimated the same model to check for robustness on the reduced data, where the top teams have been excluded. GMM estimates and standard diagnostic tests to verify the above GMM models are displayed in Tab. 7.

Tab. 7: Estimated parameters and significance z-tests for the system GMM model (left) and difference GMM model (right) of Points end of Season with reduced data

	Coefficient (std. error)	**Coefficient (std. error)**
Points EoS $(t-1)$	0.233	-2.125
	(0.322)	(2.525)
Points EoS $(t-2)$	0.245	-2.806
	(0.339)	(4.296)
Revenues (t)	0.243	0.430*
	(0.403)	(0.221)
Revenues $(t-1)$	-0.146	1.309
	(0.183)	(1.884)

Diagnostic test	**Statistic (df)**	***p*-value**
Sargan-Hansen J-test for overidentifying restrictions	$\chi^2 = 11.022$ (17)	0.855
	$\chi^2 = 2.723$ (6)	0.843
Test for 1st order serial correlation	$z = -1.170$	0.242
	$z = 0.177$	0.859
Test for 2nd order serial correlation	$z = -0.870$	0.384
	$z = -0.458$	0.647

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%.

Estimates of the GMM models from the reduced data (see Tab. 7) show no significant results for the variables of interest in the reverse direction (current and lagged revenues affecting the current cumulated points). Although the corresponding p-values are just above the 5% significance boundary, they are small, but not significant. This might imply that it is primarily the top EPL teams that attract the most revenues to stimulate better game performance. The p-values of the Sargan-Hansen tests confirm that model instruments were chosen correctly. The verification tests for autocorrelation indicate no autocorrelation of the first and second order in both GMM models.

Parameter estimates of our GMM models on H_1 confirm that sport performance and revenue

generation are significantly correlated; better playing clubs do generate higher revenues. This relationship still holds true for the full data and when the top performing teams were removed. We also found significant results in the reverse direction in the system and difference GMM model, detecting a positive impact of revenues on sport performance. Nonetheless, after removing the top teams the relevant parameters become no longer statistically significant and the relationship does not seem to hold.

4.2 Results for Hypothesis 2: Models of Points End of Season

In hypothesis 2, we are interested in identifying and quantifying a hypothetical relationship between wage expenditures and sport performance. For this reason, we estimated system and difference GMM models on the variables specified for hypothesis 2 on the full data, the reduced data, in the tested as well as the reversed direction of the hypothesized relationships on the full or reduced data.

Tab. 8: Estimated parameters and significance z-tests for the system GMM model (left) and difference GMM model (right) of Points end of Season with full data

	Coefficient (std. error)	**Coefficient (std. error)**
Points EoS $(t-1)$	0.058	−0.611***
	(0.165)	(0.205)
Points EoS $(t-2)$	−0.141	−0.553
	(0.160)	(0.345)
Wages (t)	0.123***	0.190***
	(0.040)	(0.054)
Wages $(t-1)$	0.123**	0.207***
	(0.056)	(0.036)

Diagnostic test	**Statistic (df)**	***p*-value**
Sargan-Hansen J-test for overidentifying restrictions	$\chi^2 = 17.245$ (17)	0.438
	$\chi^2 = 5.224$ (6)	0.515
Test for 1st order serial correlation	$z = -1.756$	0.079
	$z = -0.729$	0.466
Test for 2nd order serial correlation	$z = -0.268$	0.788
	$z = -0.319$	0.750

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%.

Presently, we modelled the current points end of season as a function of points from the previous season one and two seasons back and then as a function of the current and lagged wages. Coefficients of the system and difference GMM models obtained on the full data are displayed in Tab. 8 along with the diagnostic tests of the plm library to verify the GMM models.

Estimated parameters of the system and difference GMM model from full data show that current and lagged wages do significantly increase cumulated points end of season in the current season. The non-significant p-values of the Sargan-Hansen J-tests indicate that the model instruments appear to be selected in a suitable way. The verification tests for autocorrelation detect that the error terms are free from autocorrelation as shown by the respective p-values above the 5% significance level for both models.

Furthermore, we re-estimated the above-mentioned models on the reduced data to establish robustness of the estimated model parameters towards data segmentation. Coefficient estimates and diagnostic tests can be found in Tab. 9.

Tab. 9: Estimated parameters and significance z-tests for the system GMM model (left) and difference GMM model (right) of Points end of Season with reduced data

	Coefficient (std. error)	**Coefficient (std. error)**
Points EoS $(t-1)$	0.217	−0.535
	(0.275)	(0.536)
Points EoS $(t-2)$	0.176	−0.267
	(0.208)	(0.694)
Wages (t)	0.252*	0.238
	(0.146)	(0.166)
Wages $(t-1)$	−0.155	0.121
	(0.237)	(0.310)

Diagnostic test	**Statistic (df)**	***p*-value**
Sargan-Hansen J-test for overidentifying restrictions	$\chi^2 = 10.019$ (17)	0.903
	$\chi^2 = 4.098$ (6)	0.663
Test for 1st order serial correlation	$z = -1.092$	0.275
	$z = -0.119$	0.905
Test for 2nd order serial correlation	$z = -1.156$	0.248
	$z = -0.794$	0.427

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%.

While the p-value for wages in the system model was reasonably small ($\alpha = 0.1$), both

GMM models estimated on the reduced data showed no significant relationships specified in the tested direction of hypothesis 2.

Additionally, we verified the hypothetical dependency specified in hypothesis 2 in the reversed direction, i.e. whether current and lagged points end of season influence current wages. For this purpose, we applied the GMM estimator on dynamic models in the opposite direction early on the full and then on the reduced data. In Tab. 10, we present GMM models estimated on the full data including a single lag of the response variable. Output of the diagnostic tests follows.

Tab. 10: Estimated parameters and significance z-tests for the system GMM model (left) and difference GMM model (right) of Wages (mil. GBP) with full data

	Coefficient (std. error)	**Coefficient (std. error)**
Wages $(t-1)$	0.832***	0.624
	(0.094)	(0.385)
Points EoS (t)	0.265*	0.342*
	(0.153)	(0.175)
Points EoS $(t-1)$	0.527***	0.672***
	(0.157)	(0.242)

Diagnostic test	**Statistic (df)**	**p-value**
Sargan-Hansen J-test for overidentifying restrictions	$\chi^2 = 13.614$ (19)	0.806
	$\chi^2 = 12.633$ (8)	0.125
Test for 1st order serial correlation	$z = -2.070$	0.038
	$z = -1.957$	0.050
Test for 2nd order serial correlation	$z = 0.812$	0.417
	$z = 0.576$	0.565

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%.

Estimated model coefficients from the full data show statistically significant impact of the lagged cumulative points upon current Wages both in the system and the difference models. Consequently, the GMM models establish that past sport performance, measured as cumulated points per season impact the current wage expenses in the EPL. The non-significant p-values of the Sargan-Hansen J-tests for overidentification confirm appropriateness of the selected model instruments with properly sized p-values. The verification tests for autocorrelation first and second order identified that error terms were free from autocorrelation, except for the 1st order serial dependency test applied to the system GMM model.

As for the previous main hypotheses, we re-estimated the GMM models on the reduced data to check for sensitivity of the model estimates and tests thereof towards data subsampling. Model estimates together with the diagnostic tests are presented in Tab. 11.

Tab. 11: Estimated parameters and standard errors for the system GMM model (left) and difference GMM model (right) of Wages (mil. GBP) with reduced data

	Coefficient (std. error)	**Coefficient (std. error)**
Wages $(t-1)$	0.666***	0.114
	(0.080)	(0.181)
Points EoS (t)	0.200*	0.175
	(0.107)	(0.126)
Points EoS $(t-1)$	0.179	0.315*
	(0.198)	(0.170)

Diagnostic test	**Statistic (df)**	**p-value**
Sargan-Hansen J-test for overidentifying restrictions	$\chi^2 = 9.209$ (19)	0.970
	$\chi^2 = 10.370$ (8)	0.240
Test for 1st order serial correlation	$z = -2.135$	0.033
	$z = -1.904$	0.057
Test for 2nd order serial correlation	$z = 1.940$	0.053
	$z = 1.730$	0.084

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%.

Results of the system GMM model and difference GMM model of Wages (mil. GBP) estimated with reduced data show positive but nonsignificant estimated parameter for the lagged points coefficients. Therefore, nonsignificant relationship between points and wages can be reported. The system GMM model suggests that impact of points upon wages is markedly influenced by presence of the top teams in the EPL. The investigated effect in the reduced data appears to be of lesser magnitude compared to the unrestricted data. The Sargan-Hansen J-tests confirm that current model instruments were properly selected with the non-significant p-value in both GMM models. The verification tests for autocorrelation indicate dependency for the 1st order serial dependency test applied to the system model. Otherwise,

no serial dependencies of the first or the second order were detected in either GMM model.

Estimated coefficients of the GMM models on full data affirm that wage expenses and sport performance correlate; better players do bring better sports performance. However, our analyses showed no significant results with reduced data. This might suggest that mostly the top teams can afford to employ the very best players that ultimately make the difference on the field, while the average clubs mostly engage mediocre players being paid on the size of the club's budget.

We also found significant results in the reversed direction in both the system and difference GMM models, detecting a positive impact of sports performance upon wages. After removing the top teams, our estimates showed an effect of back shifted sport performance on wages in the system and difference model, but of no statistical significance.

4.3 Discussion

When summarizing the current dynamic GMM models, we concluded that sports performance, measured in points accumulated over the season positively influences revenues generated per season. We thereby corroborate the findings of Szymanski (1998) as well as those of Pinnuck and Potter (2006) who detected a positive relationship between on-field football performance and off-field financial success. Likewise, Barajas et al. (2005) who examined the relationship between sports performance and revenues in Spanish football, found that sports performance affects revenues of football clubs. A more recent study by Galariotis et al. (2017) also supports such conclusions in French football. The authors claim that better league performance leads to higher revenues because of increased attendance, a greater level of sponsorship, and higher revenues from merchandising, among others. Interestingly, they also found this relationship to exist in the opposite direction: more revenues positively influence sports performance. In our study, we were able to prove the same positive relationship in the reverse direction, i.e., revenues positively impacted the number of points accumulated over the season. Thereby, our results are in agreement with conclusions of Gerrard (2005) who found that the team's revenues are positively related to the league performance of the respective team. Furthermore, in the statistical analyses of H_2, we discovered that sport performance and wage expenditures were positively related. Our current results align with Szymanski (1998) and Rohde and Breuer (2016) that sporting success is driven by team investments.

In order to check for robustness of the current models, we ran the GMM analyses separately on the full data and on the reduced data, where the top six teams were removed. We were regretfully unable to estimate a distinct model with the top six teams only because of computational issues, specifically singularities. When comparing the results of the full and reduced data, the models estimated on full data provided statistically significant hypothesized relationships in the tested as well as the reversed direction, either in the system or the difference GMM model or in both models. The reduced data, however, only yields significant results for H_1 in the system and in the difference GMM model in the tested direction. Significant results were also present in the reversed direction in the difference GMM model. However, no significant results ($\alpha = 0.05$) were found for the reduced data in either direction of H_2.

This might suggest that only financially successful teams that offer high wages to their star players are able to accumulate a larger number of points during the season. It is concluded that the top six teams which generate high revenues also achieve more on-field success. Expectedly, in our study, robustness of the results towards different data subsets remains unproven. Current results suggest that the top teams attract higher attention from fans and sponsors and can thereby generate more revenues through sponsorship and ticketing compared to the mediocre teams. The top teams seem to exert a significant influence upon existence and strength of the explored relationships.

Weak points of this study could be related to the short length of the panel data. For this

type of data, longer panels were unavailable, while the number and selection of teams under exploration was determined by the rules of the EPL league. It is further hypothesized that data from teams with home base in the same city, for example Manchester or London, are likely to be extremely correlated thus contributing to the previously mentioned computational problems in some data subsets. Also, we noticed a sizeable sensitivity of the coefficients of respective dynamic GMM models that were related to model specification of the tested relationships.

The relationship that has not been explored in this paper is the one between revenues and wages. Nonetheless, we could assume that there is indeed a noteworthy relationship between revenues and wages: teams with higher revenues are able to spend more on players and coaches, thereby attracting the best talents. Better players consequently shall bring better sports performance as proven in H_2; better sports performance in turn leads to higher revenues as proven in H_1. However, this hypothesized relationship would be potentially relevant and interesting to explore in future research.

5 CONCLUSION

In models verifying H_1 on full data, we detected a positive relationship between sport performance and revenues in both directions. With reduced data, the impact of sports performance upon revenues was statistically established, while the relationship in the reverse direction was only statistically significant in the difference model. Similarly, in dynamic GMM models verifying H_2 on full data, we were able to find a positive relationship between wage expenses and sport performance in both directions. In the reduced data, the impact of wages on sport performance was statistically non-significant and could not be established.

We also conclude that the approach of using panel data is suitable for this sports research since it provides evidence of time effects upon the response variables of interest and explores variable relationships across all teams. The GMM models evidently helped prove the dependencies between the variables with the full data despite existing computational challenges related to unbalanced data. With a more recent dataset and increased sample size, we could be able confirm previous academic research on the relationship between sports performance and revenues as well as player investments and on-field success. Nonetheless, when the top six teams were excluded, results of the model where the independent variable was a financial value, i.e., revenues or wages, were not significant. This observation suggests a sustainable feedback cycle of wages, sport performance and revenues: if sport organizations can afford to pay better players, more on-field success shall follow. And with more success on the pitch, revenues are more likely to increase. Higher revenues shortly mean that more resources become available for players. This virtuous cycle was explored and stated by Baroncelli and Lago (2006). Nonetheless, there are other factors that need to be taken into account, such as strength of the opponent, competitiveness, and economic condition of other leagues.

The relationship between wages and revenues was unexplored in this study, although it would be interesting to include this potential relationship in future research. Further, it would be interesting to verify a relationship between investment and performance, i.e., how much investment needs to be made to achieve the optimal performance and achieve target revenues. More specifically, what an optimal investment looks like so that clubs of smaller financial budget are able to compete not only on the pitch but also in terms of revenue generation. There is certainly plenty to be explored in this field.

6 REFERENCES

Arellano, M. and Bond, S. 1991. Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *Review of Economic Studies*, 58 (2), 277–297. DOI: 10.2307/2297968.

Barajas, Á., Fernández-Jardón, C. M. and Crolley, L. 2005. *Does Sports Performance Influence Revenues and Economic Results in Spanish Football?* Munich Personal RePEc Archive, 3.234. DOI: 10.2139/ssrn.986365.

Baroncelli, A. and Lago, U. 2006. Italian Football. *Journal of Sports Economics*, 7 (1), 13–28. DOI: 10.1177/1527002505282863.

Blundell, R. and Bond, S. 1998. Initial Conditions and Moment Restrictions in Dynamic Panel Data Models. *Journal of Econometrics*, 87 (1), 115–143. DOI: 10.1016/S0304-4076(98)00009-8.

Blundell, R., Bond, S. and Windmeijer, F. 2000. *Estimation in Dynamic Panel Data Models: Improving on the Performance of the Standard GMM Estimator*. IFS Working Papers W00/12. Institute for Fiscal Studies, London, UK.

Croissant, Y. and Millo, G. 2018. *Panel Data Econometrics with R*. John Wiley & Sons.

Deloitte. 2020. *Annual Review of Football Finance (editions 2010–2020)* [online]. Available at: `https://www2.deloitte.com/uk/en/pages/sports-business-group/articles/annual-review-of-football-finance.html`. [Accessed 2022, January 15].

Galariotis, E., Germain, C. and Zopounidis, C. 2017. A Combined Methodology for the Concurrent Evaluation of the Business, Financial and Sports Performance of Football Clubs: The Case of France. *Annals of Operations Research*, 266 (1–2), 589–612. DOI: 10.1007/s10479-017-2631-z.

Gerrard, B. 2005. A Resource-Utilization Model of Organizational Efficiency in Professional Sports Team. *Journal of Sport Management*, 19 (2), 143–169. DOI: 10.1123/jsm.19.2.143.

Greene, W. H. 2002. *Econometric Analysis*. 5th ed. New Jersey: Prentice Hall.

Gujarati, D. N., Porter, D. C. and Gunasekar, S. 2012. *Basic Econometrics*. 5th ed. New Delhi: McGraw-Hill.

Guzmán, I. and Morrow, S. 2007. Measuring Efficiency and Productivity in Professional Football Teams: Evidence from the English Premier League. *Central European Journal of Operations Research*, 15 (4), 309–328. DOI: 10.1007/s10100-007-0034-y.

Haas, D. J. 2003. Productive Efficiency of English Football Teams – A Data Envelopment Analysis Approach. *Managerial and Decision Economics*, 24 (5), 403–410. DOI: 10.1002/mde.1105.

Haas, D. J., Kocher, M. G. and Sutter, M. 2004. Measuring Efficiency of German Football Teams by Data Envelopment Analysis. *Central European Journal of Operations Research*, 12 (3), 251–268.

Hadri, K. 2000. Testing for Stationarity in Heterogeneous Panel Data. *The Econometrics Journal*, 3 (2), 148–161. DOI: 10.1111/1368-423X.00043.

Hansen, L. P. 1982. Large Sample Properties of Generalized Method of Moments Estimators. *Econometrica*, 50 (4), 1029–1054. DOI: 10.2307/1912775.

kicker.de. 2008–2019. *Nuremberg: Olympia-Verlag GmbH* [Online]. Available at: `https://www.kicker.de/premier-league/spieltag/2008-09`. [Accessed 2022, January 15].

Pinnuck, M. and Potter, B. 2006. Impact of On-Field Football Success on the Off-Field Financial Performance of AFL Football Clubs. *Accounting & Finance*, 46 (3), 499–517. DOI: 10.1111/j.1467-629X.2006.00179.x.

R Core Team. 2021. *R: A Language and Environment for Statistical Computing* [online]. R Foundation for Statistical Computing, Vienna, Austria. Available at: `https://www.R-project.org/`.

Ribeiro, A. S. and Lima, F. 2012. Portuguese Football League Efficiency and Players' Wages. *Applied Economics Letters*, 19 (6), 599–602. DOI: 10.1080/13504851.2011.591719.

Rohde, M. and Breuer, C. 2016. Europe's Elite Football: Financial Growth, Sporting Success, Transfer Investment, and Private Majority Investors. *International Journal of Financial Studies*, 4 (2), 12. DOI: 10.3390/ijfs4020012.

Roodman, D. M. 2009a. How to Do Xtabond2: An Introduction to Difference and System GMM in Stata. *The Stata Journal: Promoting Communications on Statistics and Stata*, 9 (1), 86–136. DOI: 10.1177/1536867X0900900106.

Roodman, D. M. 2009b. A Note on the Theme of Too Many Instruments. *Oxford Bulletin of Economics and Statistics*, 71 (1), 135–158. DOI: 10.1111/j.1468-0084.2008.00542.x.

Sargan, J. D. 1958. The Estimation of Economic Relationships Using Instrumental Variables. *Econometrica*, 26 (3), 393–415. DOI: 10.2307/1907619.

Sloane, P. J. 1971. The Economics of Professional Football: the Football Club as a Utility Maximiser. *Scottish Journal of Political Economy*, 18 (2), 121–146. DOI: 10.1111/j.1467-9485.1971.tb00979.x.

Szymanski, S. 1998. Why is Manchester United So Successful? *Business Strategy Review*, 9 (4), 47–54. DOI: 10.1111/1467-8616.00082.

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WORKING CAPITAL MANAGEMENT AND PERFORMANCE IN FINANCIALLY DEPENDENT FIRMS: EVIDENCE FROM DEVELOPING ASIAN ECONOMIES

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ABSTRACT

This paper examines the impact of working capital management on firm performance in nine developing economies in Asia. Specifically, the study focuses on two critical aspects: the management of trade credit and inventory. The empirical findings reveal that effective management of these components significantly enhances the performance of financially dependent firms. In fact, during critical periods such as the 2008 financial crisis, these management strategies helped to boost performance considerably. However, no comparable association was observed in other firms within the sample. These results suggest that appropriate handling of trade credit and inventory can yield a significant performance advantage.

KEY WORDS

corporate performance, financial dependence, financing constraint, profitability, trade credit

JEL CODES

G30, G32, L26

1 INTRODUCTION

The substitutionary role of trade credit (hereafter referred to as TC) has been widely recognized in the literature (e.g., Schwartz, 1974; Ferris, 1981; Fisman and Love, 2003; Goto et al., 2015; Abdulla et al., 2017; Karakoç, 2022a). It suggests that delayed payment for inventory purchased from a supplier serves as a source of liquidity. Firms reliant on external financing, particularly those with significant growth opportunities but insufficient funding, tend to take advantage of this payment arrangement to finance physical investments (Rajan and Zingales, 1998; Fisman and Love, 2003; Aktas et al., 2012; Carbó-Valverde et al., 2016). Despite its benefits, credit purchases may be excessively costly (e.g., Cuñat, 2007; Yang and Birge, 2018), and borrowers must contend with inventory-related costs such as storage, ship-

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ment, and insurance. These drawbacks make borrowing from suppliers less attractive. Nevertheless, according to the data used in this study, trade debt accounts for an average of 13 percent of total assets. Therefore, interfirm credit and related inventory policies can have a significant impact on performance, particularly, in firms that rely on alternative financing instruments.

Rajan and Zingales (1998) use a company's capability to finance investment expenditures using cash flow as a criterion for identifying external dependence. They contend that if the cash flow is inadequate to cover the investment expenditures, then the firm can be classified as reliant on external financing to meet the shortfall. This statement highlights two factors: the first being investment expenditures, i.e., growth opportunities, and the second being insufficient cash flow. Although many firms use external resources to sustain their operations, the issue of external dependence in financing investment opportunities is closely linked to various fields of literature, such as financial and economic development (Diallo and Al-Titi, 2017; Osei-Tutu and Weill, 2022) capital structure and firm performance (Avcı, 2016; Dao and Ta, 2020; Islam and Iqbal, 2022). This matter is also closely associated with the notion of financing constraints[1], which has been extensively researched (see, for instance, Kerr and Nanda, 2011). A company's dependence on alternative financing instruments is largely determined by its reliance on external sources and the underdevelopment of the economy in which the firm operates (Fisman and Love, 2003). Therefore, in economies where investment opportunities are abundant, but funds to finance those opportunities are limited, trade credit as a financing instrument and its impact on corporate performance naturally become significant (e.g., Harris et al., 2019).

We explore this subject with a specific focus on externally financially dependent (EFD) firms. These firms are characterized by inadequate internal revenues to finance investment opportunities, which is likely to affect their ability to supply TC while simultaneously driving demand for borrowing more. Consequently, we examine both sides of the transaction. Building on previous literature (Avcı, 2016; Harris et al., 2019; Afrifa et al., 2020) on corporate performance, we include several control variables in our empirical model, specifically to account for corporate growth, growth opportunities, and access to traditional funding. To enhance the robustness of the analysis, we also investigate the effects of inventory management. Notably, when firms receive (offer) TC, they effectively borrow (lend) inventory, meaning that both transactions directly impact inventory levels. A strong correlation between TC and inventory levels provides an opportunity to scrutinize the relationship further and obtain more robust findings. In addition, we examine the 2008 financial crisis era due to its specific impact on corporate financing channels. During such times, alongside a decline in corporate income, access to traditional financing was substantially weakened, potentially motivating firms to seek alternative financing channels. As such, it is justified to study the effects of financing policies during such turbulent periods.

In econometric analysis, we use publicly traded firm data from nine developing economies (the full list of countries is in Tab. 5 in the Annex) and the difference GMM methodology, which controls for firm-level heterogeneity and allows for dealing with endogeneity issues.

This study makes the following contributions to the literature on trade credit. The majority of previous research has been conducted in Western countries (Dary and James, 2019; Bussoli and Jonte, 2020) or large Asian countries such as China and Korea (Hyun, 2017; Yano and Shiraishi, 2020). However, there has been a lack of investigation into the consequences of borrowing for financial reasons in the wider Asian context. Despite some similarities between those countries, there are significant variations in the level of their financial development. As a result, the study fills an important gap in the literature by examining the role of trade credit in countries with underdeveloped financial systems, where financing constraints

[1]The term "constraint" is utilized here to emphasize that cash flow is inadequate, and the process of obtaining external funding is not straightforward.

often lead to demand for alternative sources such as credit from suppliers.

Moreover, this study contributes to the literature by documenting the empirical evidence on the impact of TC activity on the performance of EFD firms, which has not been extensively explored before. Prior research has shown that business partners possess reliable knowledge of each other's prospects, and this informational advantage is reflected in the TC provided to profitable and growing firms (Fabbri and Menichini, 2010; Agostino and Trivieri, 2014). Therefore, it is argued that firms receiving more TC exhibit better performance. However, an important detail that has not been addressed in this literature is the dependency of certain firms on TC as a source of financing, which can significantly influence their financing policies. Furthermore, our findings do not completely support the conclusions drawn in previous studies (e.g., Aktas et al., 2012; Goto et al., 2015; Dary and James, 2019; Bussoli and Jonte, 2020). The common conclusion offered in these studies is that TC is positively associated with performance measures. Given that the cost of TC varies according to the quality of the borrower (Brennan et al., 1988; Murfin and Njoroge, 2015) and informationally efficient partners are well aware of each other's financial situations, the cost of borrowing and its effect on profitability is likely to vary based on the borrower's financial situation, favoring those firms that invest and grow more rapidly as suggested by the findings of this study.

2 HYPOTHESIS DEVELOPMENT

2.1 The Substitutionary Nature of Trade Credit and Performance

The redistribution hypothesis posits that financially sound firms offer TC to their financially constrained customers (Schwartz, 1974). While delayed payment for timely received goods and services provides a valuable source of liquidity, borrowing from suppliers can come at a high cost (see for example Aktas et al., 2012; Abdulla et al., 2017; Yang and Birge, 2018). If firms demand more credit than they normally would for financial reasons, sellers may be willing to provide additional TC, but at a higher cost that could drive profitability down (Cuñat, 2007). Moreover, when firms borrow TC, they borrow inventory, which incurs additional costs. However, after the liquidation of the borrowed inventory, the funds can be allocated to other value-adding operations. According to the working data of this study, which pertains to professionally managed publicly traded firms, inventories constitute, on average, 16 percent of all assets, with a median of 13 percent. These statistics indicate that firms invest significant portions of their funds in inventories and TC from suppliers may have enabled those resources to be allocated to profitable ventures. Additionally, by allowing the payment for several deliveries of goods to be made at once, TC reduces the cost of transactions and alleviates the need to carry large amounts of cash (Schwartz, 1974; Ferris, 1981), thereby facilitating efficient management of working capital.

The use of TC from suppliers in the form of inventory may seem to limit its benefits; however, it can lead to various ways in which borrowed TC can affect firm performance. For example, it can be used to finance TC supply, which ultimately increases sales and profitability (Abuhommous, 2017). By financing receivables, borrowed TC supports sales and enables firms to offset the excessive cost of borrowing by offering the same discount and duration to their buyers that they are offered. Therefore, firms that require TC for operational reasons are likely to experience a positive influence on performance because borrowing TC in the form of inventory provides them with the necessary tools to promote sales and profitability while eliminating the high costs associated with borrowing from suppliers.

Goto et al. (2015) assert that suppliers possess better information about the growth prospects of their clients and aim to cap-

ture their future profitable business, granting them an informational advantage that provides borrowers with access to supplier finance. Consequently, borrowers may either borrow cash from a financial institution or borrow inventory and make delayed payments to their suppliers. The authors further argue that the amount of TC may be regarded as a sign of suppliers' confidence in the future of the borrower. Aktas et al. (2012) contend that managers focused on wealth maximization finance capital investment with trade credit because replacing bank financing with TC curbs the use of firm resources for private benefits. Therefore, some studies have demonstrated that borrowed TC is actually utilized in financing long-term assets. For instance, Fisman and Love (2003) demonstrate that in poorly developed financial systems, companies with significant growth opportunities rely on TC, compensating for the lack of institutional funding required to finance capital investment. Carbó-Valverde et al. (2016) report similar findings, indicating that credit-constrained Spanish small and medium-sized enterprises (SMEs) rely on trade credit to finance physical investment, and this reliance intensified during the credit crisis. In addition, Yano and Shiraishi (2020) find empirical evidence showing that trade credit plays a crucial role in financing capital expenditures of financially constrained Chinese firms.

Unlike financial institutions, business partners hold an informational advantage. Through the frequency and volume of orders, or by paying visits in person, suppliers can reliably judge the quality of a buyer. Operating in the same industry, the supplier is aware of existing growth opportunities and can assess the quality of investment projects that the borrower undertakes[2]. Hence, a business partner that invests and displays signs of noteworthy growth is likely to receive better-termed trade credit contracts because of aligned interests. In recognition of this, the supplier considers offering trade credit to its partners as an investment in a long-term relationship (Wilson and Summers, 2002) and generously respond to partners' needs for financing (Love and Zaidi, 2010). One of the defining characteristics of EFD firms is the capital investment they undertake, which contributes to their bargaining power and possibly enables them to negotiate better terms in trade credit arrangements.

2.2 Macro Variables and Trade Credit Activity

External financing is a key element that affects firm growth, and it is influenced by a variety of macro and micro variables (Anton, 2016). Firms' access to traditional sources of financing can also have a significant impact on their reliance on alternative sources (Carbó-Valverde et al., 2016; McGuinness et al., 2018). In less developed economies, the availability of external financing options may be limited due to a range of macro and micro variables, such as political instability, economic volatility, and regulatory constraints (Allen et al., 2005). The need for resources triggered by development initiatives and limited access to bank loans and other capital market products can prompt firms to seek out alternative financing options, including crowdfunding, peer-to-peer lending, and other non-bank financing options. Therefore, when studying the financing of firms, it is essential to consider the country's financial system as one of the key factors.

The private debt-to-GDP ratio, which is utilized as a measure of financial development in some studies such as Demirgüç-Kunt and Maksimovic (2001), Fisman and Love (2003), and El Ghoul and Zheng (2016), is approximately 30 percent for Indonesia and Pakistan, whereas it is approximately 160 percent for China and Korea during the 2010–2020 period. A firm operating in a country where the debt-to-GDP ratio is considerably low is more likely to rely on alternative financing instruments.

Furthermore, access to formal financing is expected to be more convenient in countries where creditors' rights are protected rigorously in the event of default (La Porta et al., 1997). Financial institutions are likely to reject

[2]See Agostino and Trivieri (2014) and Karakoç (2022a) for discussions on seller's information advantage in business-to-business relationships.

fewer loan applications, knowing that they will be able to limit their losses, and therefore, better judicial enforcement systems and strong creditor protection will enhance firms' access to formal financing (Moro et al., 2018). In the case of developing countries, the rule of law index values ranges from 62 in Indonesia to 117 in Pakistan as of 2019.[3] In countries with low rule of law scores, indicating weak formal regulatory and judicial frameworks, firms may face enforcement-related problems that can significantly impede their ability to borrow from traditional sources or capital markets (Hermes et al., 2016).

Some of the developing countries have demonstrated remarkable growth performance in the last two decades, with growth rates ranging from approximately 4% in Korea to 8% in China (Lin and Chou, 2015). However, as is typical of less developed countries, inadequate contract enforcement and property rights can pose significant challenges to firms seeking traditional credit (Lin and Chou, 2015). Consequently, firms in underdeveloped economies often rely on alternative financial sources to support their investments, as observed in previous studies (e.g., Carbó-Valverde et al., 2016; Yano and Shiraishi, 2020).

Therefore, we hypothesize:

H_1: Working capital policies have a positive effect on the performance of financially dependent firms in developing economies.

3 DATA AND METHODOLOGY

3.1 Data

The dataset employed in this study encompasses nearly 7,000 firms from nine different countries (a detailed description of the data is provided in Tab. 5 in the Annex). This dataset is of significant interest to researchers for several reasons, which are explained as follows:

Tab. 1 displays the countries included in the sample data and provides the averages of the key variables. To facilitate comparisons, the average of the entire financial debt, encompassing both long and short-term debt securities and bank loans, is also presented. In all instances, the TC borrowed from suppliers constitutes not less than one-third of the total financial debt, placing it as the second most significant source of external funding. Every dollar borrowed from suppliers through TC is used to finance inventory or is kept in inventory awaiting liquidation, as documented in the works of Bougheas et al. (2008), Afrifa et al. (2020), and Karakoç (2022b). Collectively, these three working capital components account for a substantial portion of funds and assets in firms operating in developing economies.

Both the supply of TC and inventory levels have a significant association with the utilization of borrowed TC. Moreover, the latter is closely related to financial debt, as firms often resort to borrowing from their business partners when they face restricted access to financial sources (Abdulla et al., 2017). This trend is more pronounced in developing economies, where firms frequently encounter difficulties in obtaining bank loans or capital from financial markets (Fisman and Love, 2003; Lin and Zhang, 2020). Consequently, they are inclined towards leveraging TC as a financing option.

The sample countries have demonstrated remarkable growth performance in the last two decades, but as is typical of less developed countries, inadequate contract enforcement and property rights can pose significant challenges to firms seeking traditional credit (Lin and Chou, 2015). Moreover, access to formal financing is expected to be more convenient in countries where creditors' rights are protected rigorously in the event of default (La Porta et al., 1997). The sample countries lack strong formal regulatory and judicial frameworks, which may result in enforcement-related problems (Hermes et al., 2016). These factors make the

[3] A lower score indicates lower corruption, more press freedom, and strong rule of law. South Korea is not listed here due to its exceptionally low score.

Tab. 1: The sample countries and some key statistics

Countries	Trade credit borrowed	Trade credit supplied	Inventories	Total financial debt
China	0.093	0.153	0.149	0.268
India	0.137	0.239	0.183	0.329
Indonesia	0.222	0.169	0.175	0.318
Korea[4]	0.099	0.202	0.123	0.262
Malaysia	0.086	0.195	0.150	0.237
Pakistan	0.101	0.152	0.198	0.377
Philippines	0.083	0.143	0.103	0.279
Thailand	0.096	0.168	0.176	0.292
Vietnam	0.110	0.221	0.234	0.304

Note: All series presented in the table have been scaled by the contemporaneous assets. Specifically, the variable 'Trade credit borrowed' refers to trade payables, while 'Trade credit supplied' pertains to account receivables. The variable 'Inventories' reflects the total amount of inventory, and 'Total financial debt' comprises long and short-term bank loans and debt securities.

selected countries highly suitable for the study of firms' access to financing and their use of alternative financial sources (Carbó-Valverde et al., 2016; Yano and Shiraishi, 2020). The rich and comprehensive nature of the dataset, combined with the significant variability in financial development and regulatory environments across the sample countries, provides a unique opportunity to contribute to the existing literature on this topic.

Although the sample comprises developing economies, which tend to exhibit similarities in legal and financial regulations, there is significant variation in the average TC-to-total asset ratios, ranging from 25 percent in the Philippines to 47 percent in Indonesia, with a general average of about 32 percent (please refer to Tab. 6 in the Annex). The inventory-to-total asset ratio also displays similar variation, ranging from 10 percent in the Philippines to 24 percent in Vietnam.

Initially, the dataset contained 270,871 firm-year observations with a large number of missing values. To clean the data, extreme values at each end of the variables were removed, and negative observations in size, fixed assets, debt, and sales were dropped. Balance sheet variables that exceeded total assets and firms with fewer than four observations were removed. No restriction was enforced regarding firm entry and exit to avoid selection bias. Consequently, at the end of the data-cleaning process, an unbalanced panel data of 6,907 firms and 68,826 observations remained.

3.2 Methodology and Variables

Eq. 1 represents the regression equation and the variables used in the analysis.

$$\begin{aligned} \text{Perf}_{ijt} = \alpha_i + \beta_0\, \text{Perf}_{ijt-1} + \\ + \beta_1\, \text{TC}^{\text{SUM}}_{ijt-1} + \\ + \beta_n\, X_{ijt-1} + \\ + \mu_i + \delta_t + \varepsilon_{it} \end{aligned} \tag{1}$$

In Eq. 1, Perf_{ijt} represents the return on total assets in firm i from country j at time t.

$$\text{ROA} = \frac{\text{EBITDA}}{\text{Total Assets}}$$

Return on assets (ROA) is widely used as a measure of how much income is earned per unit

[4]South Korea is included in the sample of developing economies in Asia because it is still considered a developing country by some international organizations, such as the MSCI. Additionally, South Korea is a significant contributor to the region's economy, with almost a quarter of the firms in the sample based in South Korea. This makes it important to include South Korea in the sample to ensure the generalizability of the results. Additional analyses were conducted by excluding South Korea from the sample to address its classification as a developing country, and the results were compared to the analysis of the full sample. The inclusion or exclusion of South Korea had an insignificant impact on the coefficients in terms of their sign and magnitude.

of asset in previous literature (e.g., Kestens et al., 2012; Grau and Reig, 2018; Islam and Iqbal, 2022). Although the market-to-book ratio is also utilized (e.g., Dary and James, 2019), it is more forward-looking and likely to reflect relevant performance-related information that is unknown to parties who rely on reported financial statements. Therefore, we include it as an essential explanatory variable in our empirical analysis.

Instead of examining individual borrowed and received TCs, we focus on their sum, denoted as TC_{ijt}^{SUM}. There are at least two reasons for this approach. Firstly, prior research (e.g., Abuhommous, 2017; Afrifa et al., 2020) has demonstrated that both borrowing and offering TCs can enhance corporate performance in different ways. While borrowing TC creates liquidity and increases operational efficiency, offering it contributes to performance by expanding market share and enhancing business-to-business relationships. However, field evidence suggests a high correlation between borrowing and offering TCs. Thus, to account for the effects of both sides and to avoid multicollinearity issues, it is necessary to consider TC activity as a whole by using the sum of TC supplied and borrowed. Secondly, both sides of the transaction are both integral components of efficient inventory management policies that serve the goal of wealth maximization, functioning separately yet harmoniously.

To ensure robustness, we also examine the current inventory level as a proxy variable for total TC. When firms receive or offer TC, they effectively borrow or lend inventory, respectively, so both transactions directly affect inventory levels. The relationship between trade credit activity and inventory management was first recognized by Emery (1987), who argued that firms could offer more TC to buyers in response to variable demand, leading to increased sales and reduced inventory costs. Subsequent studies by Daripa and Nilsen (2005) and Bougheas et al. (2008) have also highlighted how TC can be effectively used to manage inventory-related costs. More recently, Afrifa et al. (2020) examined the role of TC in inventory management and found that firms use it to mitigate the effects of abnormally low or high inventory levels, thereby keeping them at optimal levels for performance improvement. Given the high correlation between TCs and inventory, exploring this relationship offers an opportunity to obtain robust results.

The remaining explanatory variables, namely sales growth, capital expenditure, fixed assets, financial debt, and growth opportunities, are denoted by the symbol X_{ijt}. For a comprehensive review of these variables, please refer to Tab. 7 in the Annex. Additionally, X_{ijt} encompasses Rajan and Zingales' dependence measure, which is employed to distinguish firms that depend on external resources to finance their investment opportunities. The underlying rationale behind this measure is that firms, which are unable to fully finance their capital investments through internal funds (net income + depreciation + inventories)[5], rely on financial credit from financial institutions, as well as borrow inventory and postpone payments to their suppliers (Goto et al., 2015). Unlike the original measure that considers cash flow, changes in inventory, and trade credits (TCs), we include inventory while excluding TC. This is because the existing inventory prior to borrowing TC may discourage firms from borrowing further. In fact, firms may even contemplate increasing the supply of TC to shift inventory-related expenses onto buyers (Bougheas et al., 2008). Hence, the dependence variable accounts for the potential limiting effects of the current inventory level on how much more a firm can borrow from its suppliers. To control for endogeneity, the identification strategy uses a once-lagged indicator of dependence, whereby firms that have cash flow (as defined above) less than capital expenditures (Capex) are classified as dependent in the year $t-1$.

The productivity level of a firm is a consequence of efficient resource management and is likely to exhibit a continuous structure. However, the inclusion of a once-lagged dependent variable as an explanatory variable in an em-

[5]A firm is considered financially dependent if its net income plus depreciation and inventories is less than its capital expenditures in a given year.

pirical design can capture this persistence while also giving rise to the problem of endogeneity. This issue arises due to the correlation between error terms and explanatory variables, as well as once-lagged performance (Anderson and Hsiao, 1981):

$$E\left[\text{Perf}_{it-1}\varepsilon_{it}\right] \neq 0.$$

The first-difference panel GMM methodology[6] can be taken advantage of to overcome this problem. The model controls for the endogeneity problem by employing instruments derived from the lags and lagged differences of endogenous variables. While these instruments are uncorrelated with error terms, they are correlated with the original variables (Arellano and Bond, 1991). Furthermore, by taking the difference with previous values, the model accounts for firm heterogeneity, i.e., it eliminates μ_i, the unobserved firm effect. Therefore, the difference GMM model is appropriate for analyzing the sample data, which exhibit a dynamic structure in the dependent variable, large N small T panels, independent variables that are not strictly exogenous, and heteroskedasticity and autocorrelation only within panels. For detailed information on the methodology, please refer to Roodman (2009).

The GMM estimation requires the orthogonality of the instruments, which can be tested via the Hansen test with the null of instrument validity. The choice of lags for determining the instruments, specifically the number of lags and the type of the equation, whether it is the level or the difference, is based on the information obtained from the Hansen and AR(2) tests. Therefore, the selected instruments satisfy the stated validity conditions. While selecting the lag, one should ideally opt for the closest lag available, such as $t-2$ instead of $t-3$ if both meet the required conditions. This is because the former is more likely to have a stronger correlation with the instrumented variable. Additionally, the set of instruments may differ from one estimation to another. For instance, the set of instruments that satisfies the validity conditions for total TC may not be suitable for inventory, or adding another variable to the equation may necessitate the use of a different set of instruments.

4 EMPIRICAL FINDINGS

4.1 Trade Credit-Performance Relationship in EFD Firms

The outcomes of the base regression analysis are presented in Tab. 2, with robust standard errors displayed in parentheses. The results show that TC^{SUM} and Inv have negative statistically significant coefficients, i.e., -10.3 percent and -12.3 percent, respectively, in the first and third columns of the table. These findings indicate a decrease in profitability as TC increases. A dummy variable, D_{depend}, which identifies dependent firms is interacted with TC^{SUM} and Inv. In the second and third columns, the new variables exhibit positive and statistically significant coefficients. Specifically, $\text{TC}^{\text{SUM}}_{\text{depend}}$ and $\text{Inv}_{\text{depend}}$ have coefficients of 19.3 percent and 28.5 percent, respectively, demonstrating the sensitivity of profitability to TC in EFD firms.

Regression estimations with TC^{SUM} and Inv variables produce similar results. The coefficients for both variables are statistically significant and negative, whereas the same coefficients for EFD firms are both significant and positive. A comparison of the magnitudes of the coefficient[7] for these variables in the second column of Tab. 1 indicates that the overall effect is positive. For example, in the case of TC the coefficient for TC^{SUM} is -0.106, and the

[6] All estimations are conducted in Stata using "xtabond2" code developed by Roodman (2009) This methodology has been commonly preferred in performance-related studies e.g., Grau and Reig (2018); Afrifa et al. (2020); Bussoli and Jonte (2020).

[7] Please note that in GMM estimation, the lag structure specified for endogenous variables can significantly affect the coefficients. To ensure a valid comparison, we used the same lag structure, specifically $t-5$, in our estimations.

Tab. 2: Trade credit and corporate performance in EFD firms

Dependent variable	**EBITDA/Assets**						
	1	**2**	**3**	**4**	**5**	**6**	**7**
Perf, $t-1$	0.363***	0.354***	0.383***	0.373***	0.363***	0.363***	0.363***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
TC^{SUM}	−0.103***	−0.106***		−0.103***	−0.061***	−0.055***	−0.058***
	(0.014)	(0.014)		(0.014)	(0.014)	(0.014)	(0.012)
TC^{SUM}_{depend}		0.193***			0.106***		0.053***
		(0.041)			(0.034)		(0.019)
Inv			−0.123***	−0.112***	−0.128***	−0.133***	−0.128***
			(0.019)	(0.008)	(0.020)	(0.020)	(0.020)
Inv_{depend}			0.285***			0.400***	0.284**
			(0.080)			(0.117)	(0.080)
Capex	−0.026	−0.023	0.008	−0.025*	0.006	0.004	0.008
	(0.005)	(0.005)	(0.005)	(0.015)	(0.005)	(0.005)	(0.005)
Growth	0.015***	0.015***	0.013***	0.013***	0.013***	0.013***	0.013***
	(0.005)	(0.001)	(0.001)	(0.003)	(0.003)	(0.001)	(0.001)
Size	−0.118***	−0.118***	−0.080***	−0.072***	−0.072***	−0.073***	−0.073***
	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)
PPE	−0.054***	−0.054***	−0.059***	−0.057***	−0.056***	−0.056***	−0.056***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Debt	−0.025***	−0.025***	−0.029***	−0.024***	−0.024***	−0.024***	−0.024***
	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Q measure	0.007***	0.008***	0.008***	0.008***	0.008***	0.008***	0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
AR(1)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR(2)	0.858	0.780	0.630	0.803	0.724	0.706	0.699
Hansen	0.575	0.574	0.504	0.503	0.508	0.403	0.496
# obs	48,886	48,886	48,886	48,886	48,886	48,886	48,886
# firm	6,616	6,616	6,616	6,616	6,616	6,616	6,616

Notes: The table presents the output from the estimation of Equation 1 using the first difference GMM estimator with robust standard errors. The independent variables are included as predetermined instruments. ***, **, * denote significance levels of 1%, 5%, and 10%, respectively. All specifications are estimated with constant and time dummies. AR(2) reports the p-values for the second-order serial correlation in the residuals with the null of no correlation. P-values for the Hansen test are presented for overidentifying restrictions of the instruments, with the null of instrument validity. TC^{SUM} is the sum of received and supplied trade credit. Perf is EBITDA/$assets_{t-1}$, debt represents interest-bearing debt, PPE is net plant property and equipment, the Q measure is the market cap divided by the book value, growth is growth in sales, size is the natural logarithm of total assets, Inv is the stock of inventories, and capex is capital expenditure. $TC^{SUM}_{depend} = TC^{SUM} \cdot D_{depend}$; $Inv_{depend} = Inv \cdot D_{depend}$. For a detailed description of the variables, see Tab. 7 in the Annex.

coefficient for TC^{SUM}_{depend} is 0.193, which yields an 8.7 percent net increase in profitability for EFD firms. As for Inv, the coefficients in the third column of the table are −0.123 for Inv, and 0.285 percent for Inv_{depend}. They indicate a net positive effect of 16.5 percent on EFD firms.

On the other hand, both sales growth and the Q measure, which respectively reflect accounting and market growth, have coefficients of 1.5 percent and 8 per thousand, indicating a positive impact on performance. Capex, which represents the level of investment, exhibits positive but statistically insignificant coefficients. Size and leverage, on the other hand, demonstrate coefficients of −11.8 percent and −2.5 percent, respectively, which quantify their adverse influence on performance. Lastly, the coefficient for PPE stands at approximately 5.4 percent and is statistically significant at the 1 percent level.

Tab. 3: Trade credit and corporate performance in EFD firms: Robustness check with an alternative measure of dependence

	EBITDA/Assets					
Dependent variable	**1**	**2**	**3**	**4**	**5**	**6**
Perf, $t-1$	0.363***	0.363***	0.363***	0.363***	0.363***	0.363***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
TC^{SUM}	−0.101***		−0.103***	−0.061***	−0.055***	−0.058***
	(0.012)		(0.014)	(0.014)	(0.014)	(0.012)
$2TC^{SUM}_{depend}$	0.157***			0.195***		0.109***
	(0.023)			(0.023)		(0.023)
Inv		−0.109***	−0.112***	−0.112***	−0.109***	−0.102***
		(0.019)	(0.009)	(0.009)	(0.020)	(0.008)
$2Inv_{depend}$		0.234***			0.236***	0.265**
		(0.094)			(0.095)	(0.138)
AR(1)	0.000	0.000	0.000	0.000	0.000	0.000
AR(2)	0.780	0.630	0.803	0.724	0.706	0.699
Hansen	0.574	0.504	0.503	0.508	0.403	0.496
# obs	48,886	48,886	48,886	48,886	48,886	48,886
# firm	6,616	6,616	6,616	6,616	6,616	6,616

Notes: The table presents the output from the estimation of Equation 1 using the first difference GMM estimator with robust standard errors. The independent variables are included as predetermined instruments. ***, **, * denote significance levels of 1%, 5%, and 10%, respectively. All specifications are estimated with constant and time dummies. AR(2) reports the p-values for the second-order serial correlation in the residuals with the null of no correlation. P-values for the Hansen test are presented for overidentifying restrictions of the instruments, with the null of instrument validity. TC^{SUM} is the sum of received and supplied trade credit. Perf is $EBITDA/assets_{t-1}$, debt represents interest-bearing debt, PPE is net plant property and equipment, the Q measure is the market cap divided by the book value, growth is growth in sales, size is the natural logarithm of total assets, Inv is the stock of inventories, and capex is capital expenditure. $2TC^{SUM}_{depend} = TC^{SUM} \cdot 2D_{depend}$; $2Inv_{depend} = Inv \cdot 2D_{depend}$. For a detailed description of the variables, see Tab. 7 in the Annex.

4.2 Robustness Check with an Alternative Measure of Dependence

The previous section employed a dependence measure to demonstrate the effects of working capital in firms that are more likely to resort to external sources of funding if their capital expenditure exceeds their internal revenues (net income + depreciation + inventories). The empirical analysis yielded results that are both statistically and economically significant and suggest that overall TC activity enhances the performance of financially dependent firms. However, the current level of liquid assets (i.e., cash and cash equivalents) is also an important factor in determining a firm's TC policies (Garcia-Appendini and Montoriol-Garriga, 2013; Zhang, 2020), as it may influence the amount of external borrowing required to finance capital expenditures. The current data indicate that the average liquid assets for all firms account for about 17 percent[8] of total assets, which implies that a considerable amount of funds is available to management for financing growth. Therefore, for robustness purposes, the dependence measure used in the previous section has been restructured to account for liquid assets.

To identify dependent firms, a $2D_{depend}$ dummy variable is created. This time, a firm is classified as dependent if, in a given year, its ratio of (net income + depreciation + cash and cash equivalents) / capex is less than 1. This ratio indicates that firms lack internal funding to finance their capital expenditure and may need to rely on external sources such as trade credit offered by suppliers. The $2TC^{SUM}_{depend}$ and $2Inv_{depend}$ variables are constructed by interacting $2D_{depend}$ with TC^{SUM} and Inv, respectively.

[8] All relevant variables are scaled by previous year's total assets.

Tab. 4: Trade credit and corporate performance: the 2008 crisis

Dependent variable	**1**	**2**	**3**	**4**
Perf, $t-1$	0.350	0.130	0.357	0.387*
	(0.224)	(0.084)	(0.227)	(0.237)
TC^{SUM}	−0.054***	−0.061***	−0.056***	−0.056***
	(0.013)	(0.013)	(0.013)	(0.013)
TC^{SUM}_{depend}		0.105**		
		(0.032)		
$TC^{SUM}_{dependCris}$	0.077**	0.012		
	(0.029)	(0.007)		
Inv	−0.140***	−0.140***	−0.140***	−0.132***
	(0.023)	(0.023)	(0.023)	(0.023)
Inv_{depend}				0.389***
				(0.012)
$Inv_{dependCris}$			0.328***	0.037
			(0.110)	(0.047)
D_{cris}	−0.032***	−0.032***	−0.032***	−0.032***
	(0.007)	(0.007)	(0.007)	(0.007)
AR(1)	0.000	0.000	0.000	0.000
AR(2)	0.790	0.731	0.787	0.712
Hansen	0.494	0.503	0.491	0.489
# obs	48,886	48,886	48,886	48,886
# firm	6,616	6,616	6,616	6,616

Notes: The table presents the output from the estimation of Equation 1 using the first difference GMM estimator with robust standard errors. The independent variables are included as predetermined instruments. ***, **, * denote significance levels of 1%, 5%, and 10%, respectively. All specifications are estimated with constant and time dummies. AR(2) reports the p-values for the second-order serial correlation in the residuals with the null of no correlation. P-values for the Hansen test are presented for overidentifying restrictions of the instruments, with the null of instrument validity. TC^{SUM} is the sum of received and supplied trade credit. Perf is EBITDA/$assets_{t-1}$, and Inv is the stock of inventories. $TC^{SUM}_{depend} = TC^{SUM} \cdot D_{depend}$; $Inv_{depend} = Inv \cdot D_{depend}$. $TC^{SUM}_{dependCris} = TC^{SUM}_{depend} \cdot D_{cris}$; $Inv_{dependCris} = Inv_{depend} \cdot D_{cris}$.

The output from the estimation of Eq. 1 is reported in Tab. 3, showing that both coefficients are statistically significant. The coefficient for $2TC^{SUM}_{depend}$ in the first column of the table is 15.7 percent and significant at the 1 percent level. Similarly, the coefficient for $2Inv_{depend}$ in the third column of the table is 23.4 percent and also significant at the 1 percent level.

4.3 Trade Credit and Performance in EFD Firms: The 2008 Crisis

In this part of the study, the analysis is focused on the 2008 financial crisis era due to its unique impact on corporate financing channels, specifically debt financing from financial institutions and internal revenues from own operations. Negative shocks in credit supply in the aftermath of the global financial crisis in 2008 weakened the real sector's access to debt financing (Garcia-Appendini and Montoriol-Garriga, 2013) and hurt revenues. Consequently, periods of contraction, such as this one, emphasize the significance of alternative financing instruments, such as TC. Therefore, examining the effects of current working capital components on performance in firms that rely on external sources during an adverse macroeconomic environment provides an opportunity to test the robustness of the earlier findings.

Tab. 4 displays the results of the estimation of Eq. 1, which incorporates a crisis dummy variable for the years 2008 and 2009. The negative and significant coefficient for the crisis dummy implies a decline in corporate profitability for the period. This dummy is interacted with key variables to create $TC^{SUM}_{dependCris}$ and $Inv_{dependCris}$, whose coefficients demonstrate

the effect of TC on performance in EFD firms. In the first and second columns of the table, the positive and significant coefficients for $TC^{SUM}_{dependCris}$ indicate that asset profitability in EFD firms increases with TC activity. This suggests that firms benefited from the TC they received/offered during such critical times. The positive effect of TC is further confirmed by the inventory variable. In column three, the coefficient for $Inv_{dependCris}$ is positive and statistically significant, which becomes insignificant but still positive in the fourth column.

5 DISCUSSION

Existing studies have primarily focused on the effects of either borrowed TC (Kestens et al., 2012; Aktas et al., 2016; Grau and Reig, 2018) or supplied TC (Abuhommous, 2017). The current findings are consistent with some of these studies, suggesting that overall TC activity in externally financially dependent firms positively affects performance. However, our analysis does not reveal any positive effect of TC on performance in the remaining firms in the sample. A negative association between TC activity and profitability is not new to the literature (see for example Lin and Zhang, 2020; Mahmud et al., 2022). While the contrasting results may be due to differences in empirical design and/or methodology, both of which in this study are determined based on the statistical requirements of the data and the nature of the empirical analysis. Therefore, the results demonstrate both statistical and economic significance.

One of the noteworthy aspects of this study is the utilization of the sum of both supplied and received trade credit (TC) in the empirical analysis due to their strong correlation. As outlined in Section 3.2, most firms tend to rely on borrowed TC to fund their supply, and both sides of the transaction are likely to positively affect performance. Using the sum of TCs a holistic approach is adopted to evaluate the consequences of working capital management.

Previous studies have employed several measures such as the level of cash (Garcia-Appendini and Montoriol-Garriga, 2013), asset size (McGuinness et al., 2018), listing status (Abdulla et al., 2017), and the level of short-term debt (Kestens et al., 2012) to identify firms that rely on TC for financing. While these measures suggest that firms tend to prefer TC in specific cases, the current approach accounts for the short-term reliance that arises in firms with insufficient funding when undertaking significant investment projects. The sample examined in this article comprises large, publicly traded firms with access to capital markets. Given that they maintain stable access to institutional finance, their reliance on TC is more likely to be temporary, resulting from a lack of primary funds and/or disruptions in credit channels. Hence, an appropriate measure should consider such temporary fluctuations in firms' current financial position. Therefore, a modified version of the financial dependency measure of Rajan and Zingales (1998), which considers the gap between cash flow and capital expenditure, is used. This modified measure suggests that firms lacking the necessary funding to fully finance their capital investment are likely to rely on external sources, including TC from suppliers (see Fisman and Love, 2003). The results are consistent with this intuition by indicating a positive and significant impact on performance in EFD firms.

Business partners are known to be well-informed about each other's businesses (see Burkart and Ellingsen, 2004; Agostino and Trivieri, 2014). Therefore, it is reasonable to assume that when they invest in receivables, they prefer to invest in companies that are financially solid and profitable, as opposed to those that are unprofitable and financially fragile. This is because they seek to establish long-term partnerships and collect the returns on their investment over the lifetime of the partnership (Wilson and Summers, 2002; Garcia-Appendini and Montoriol-Garriga, 2013). However, what happens when buyers are not financially sound? The financial situation of both buyers and

sellers, as well as their competitive powers, are among the factors that determine the conditions of TC contracts. For example, firms with strong competitive power, large market shares, and profitability are likely to obtain more favorable TC conditions from suppliers (see Giannetti et al., 2011; Murfin and Njoroge, 2015).

As such, the terms and conditions of TC contracts are likely to vary depending on the specific circumstances (Klapper et al., 2012), and TC is often used as a tool to favor certain buyers (Brennan et al., 1988). Therefore, it is not surprising that the impact of TC on borrowers' performance may differ. EFD firms, by definition, lack the necessary funding to fully finance their capital investments, and thus rely on external sources such as TC, while at the same time adding to their market power through investment in physical assets. As discussed in the literature (see, for example, Fabbri and Menichini, 2010; Karakoç, 2022a), stronger support from suppliers and enhanced TC terms are expected due to the shared future and increased market power of the borrower, as confirmed by the regression output in Tab. 2 and 3.

The preferences of firms for TC during economic fluctuations have been widely examined in the literature (e.g., Tsuruta, 2013; Hyun, 2017; Harris et al., 2019). This is mostly because TC is considered an alternative and easily accessible source of financing when traditional lending channels are no longer viable. In particular, the 2008 crisis caused a significant contraction in economic activity in most developed countries. Although developing economies were not directly affected by the crisis, the major Asian economies initially appeared to be immune to these developments, but the idea of Asia "decoupling" quickly disappeared. This was due to the transmission of the crisis to Asian economies through both financial and trade channels (Glick and Spiegel, 2009). As the western economies had been important business partners, the contraction was reflected in the volume of trade with them. However, the impact of the crisis varied across economies, depending on their degree of reliance on external demand and credit. For instance, export-dependent countries such as China, Korea, Thailand, Malaysia, and the Philippines experienced sharp declines in growth rates in the second half of 2008 and the first half of 2009 (Brunschwig et al., 2011). The transmission of the crisis resulted in economic vulnerability, reversing the capital flows, which dried up both domestic and international liquidity, especially in those countries with strong ties to global financial markets. Consequently, exchange rate depreciation and economic contraction also occurred in these countries, as indicated by the negative coefficient for the crisis dummy variable.

Our study suggests that trade credit (TC) played a significant role in financially dependent firms' survival during the crisis, despite a substantial decline in profitability. This finding supports the idea of supplier firms having an information advantage, as the credit used for profitable investment opportunities contributed to firms' performance. Moreover, it is worth noting that the mutual knowledge of trade partners about each other's businesses and the seller firm's competence in evaluating investment opportunities may have contributed to this outcome. In the crisis conditions, when firms struggled to obtain loans from licensed financial institutions, the fact that EFD firms could obtain loans from their trade partners and increase their profitability through such loans underscores this conclusion.

6 CONCLUSION AND LIMITATIONS

In this study, we examined the relationship between working capital and corporate performance in EFD firms in developing Asian economies. Our findings suggest that engaging in TC has a strong positive impact on company performance, and EFD firms that utilized TC during the 2008 crisis experienced higher returns on their TC policies. To ensure the robustness of our results, we used the current level of inventory as a proxy for total TC, as

policies related to borrowing from suppliers and lending to buyers can directly affect the level of inventory, resulting in a high correlation. The analysis with the inventory variable yielded largely consistent results.

During the global financial crisis, financial institutions reduced lending, and firms relied more heavily on support from their suppliers (Carbó-Valverde et al., 2016). Our study demonstrates that TC activity mitigates the majority of the adverse effects of the crisis, highlighting the importance of partnership among firms. Thus, Our findings contribute to the existing literature by providing significant empirical evidence of TC's contribution to performance in EFD firms during critical times.

While our findings have significant implications for authorities and firm managers in designing more efficient policies, the study is not without limitations. As previously explained, the positive marginal effect of TC activity is considered to be a result of a joint decision made by both buyers and sellers to maintain their business relationships, yet we only have access to data from one side. Therefore, the analysis could have been significantly improved by taking supplier firm data into account. Additionally, macro variables such as financial development and legal order have been shown to affect a firm's borrowing capacity in previous studies (Demirgüç-Kunt and Maksimovic, 2001; Fisman and Love, 2003; Moro et al., 2018; Hermes et al., 2016). As trade credits are often preferred as an alternative financing instrument, they too may be influenced by these variables. However, we do not directly include these macro-level variables in our analysis because retrospective data on legal order is not available to us, and the explanatory power of the financial development variable is weak when used in conjunction with other firm variables. We recommend that these issues be addressed in future studies with more in-depth analyses.

In conclusion, despite the limitations, the study provides significant empirical evidence of the positive impact of TC on performance in EFD firms, which demonstrates the importance of partnership among firms.

7 REFERENCES

Abdulla, Y., Dang, V. A. and Khurshed, A. 2017. Stock Market Listing and the Use of Trade Credit: Evidence from Public and Private Firms. *Journal of Corporate Finance*, 46 (3), 391–410. DOI: 10.1016/j.jcorpfin.2017.08.004.

Abuhommous, A. A. A. 2017. The Impact of Offering Trade Credit on Firm's Profitability. *Journal of Corporate Accounting & Finance*, 28 (6), 29–40. DOI: 10.1002/jcaf.22298.

Afrifa, G. A., Alshehabi, A., Tingbani, I. and Halabi, H. 2020. Abnormal Inventory and Performance in Manufacturing Companies Evidence from the Trade Credit Channel. *Review of Quantitative Finance and Accounting*, 56, 581–617. DOI: 10.1007/s11156-020-00903-y.

Agostino, M. and Trivieri, F. 2014. Does Trade Credit Play a Signaling Role? Some Evidence from SMEs Micro-Data. *Small Business Economics*, 42 (1), 131–151. DOI: 10.1007/s11187-013-9478-8.

Aktas, N., de Bodt, E., Lobez, F. and Statnik, J.-C. 2012. The Information Content of Trade Credit. *Journal of Banking & Finance*, 36 (5), 1402–1413. DOI: 10.1016/j.jbankfin.2011.12.001.

Allen, F., Qian, J. and Qian, M. 2005. Law, Finance, and Economic Growth in China. *Journal of Financial Economics*, 77 (1), 57–116. DOI: 10.1016/j.jfineco.2004.06.010.

Anderson, T. W. and Hsiao, C. 1981. Estimation of Dynamic Panel Models with Error Components. *Journal of American Statistic Association*, 76 (375), 598–606. DOI: 10.2307/2287517.

Anton, S. G. 2016. The Impact of Leverage on Firm Growth: Empirical Evidence from Romanian Listed Firms. *Review of Economic & Business Studies*, 9 (2), 147–158. DOI: 10.1515/rebs-2016-0039.

Arellano, M. and Bond, S. 1991. Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *Review of Economic Studies*, 58 (2), 277–297. DOI: 10.2307/2297968.

Avci, E. 2016. Capital Structure and Firm Performance: An Application on Manufacturing Industry. *Marmara Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 38 (1), 15–30. DOI: 10.14780/iibd.81334.

Bougheas, S., Mateut, S. and Mizen, P. 2008. Corporate Trade Credit and Inventories: New Evidence of a Trade-Off from Accounts Payable and Receivable. *Journal of Banking & Finance*, 33 (2), 300–307. DOI: 10.1016/j.jbankfin.2008.07.019.

Brennan, M. J., Maksimovic, V. and Zechner, J. 1988. Vendor Financing. *Journal of Finance*, 43 (5), 1127–1141. DOI: 10.1111/j.1540-6261.1988.tb03960.x.

Brunschwig, S., Carrasco, B., Hayashi, T. and Mukhopadhyay, H. 2011. *The Global Financial Crisis: Impact on Asia and Emerging Consensus* [online]. South Asia Working Paper Series, No. 3. Available at: `https://www.think-asia.org/handle/11540/1407`.

Burkart, M. and Ellingsen, T. 2004. In-Kind finance: A Theory of Trade Credit. *American Economic Review*, 94 (3), 569–590. DOI: 10.1257/0002828041464579.

Bussoli, C. and Jonte, D. 2020. Trade Credit and Firm Profitability Moderation Analysis of Intercompany Financing in Italy. *Journal of Small Business and Enterprise Development*, 27 (6), 965–985. DOI: 10.1108/JSBED-04-2020-0133.

Carbó-Valverde, S., Rodríguez-Fernández, F. and Udell, G. F. 2016. Trade Credit, the Financial Crisis, and SME Access to Finance. *Journal of Money, Credit and Banking*, 48 (1), 113–143. DOI: 10.1111/jmcb.12292.

Cuñat, V. 2007. Trade Credit: Suppliers as Debt Collectors and Insurance Providers. *The Review of Financial Studies*, 20 (2), 491–527. DOI: 10.1093/rfs/hhl015.

Dao, B. T. T. and Ta, T. D. N. 2020. A Meta-Analysis: Capital Structure and Firm Performance. *Journal of Economics and Development*, 22 (1), 111–129. DOI: 10.1108/JED-12-2019-0072.

Daripa, A. and Nilsen, J. H. 2005. *Subsidizing Inventory: A Theory of Trade Credit and Pre-Payment* [online]. Available at: `https://ssrn.com/abstract=2342661`. DOI: 10.2139/ssrn.2342661.

Dary, S. K. and James, H. S. 2019. Does Investment in Trade Credit Matter for Profitability Evidence from Publicly Listed Agro-Food Firms. *Research in International Business and Finance*, 47 (C), 237–250. DOI: 10.1016/j.ribaf.2018.07.012.

Demirgüç-Kunt, A. and Maksimovic, V. 2001. *Firms as Financial Intermediaries: Evidence from Trade Credit Data*. World Bank Policy Research Working Paper No. 2696.

Diallo, B. and Al-Titi, O. 2017. Local Growth and Access to Credit: Theory and Evidence. *Journal of Macroeconomics*, 54 (B), 410–423. DOI: 10.1016/j.jmacro.2017.07.005.

El Ghoul, S. and Zheng, X. 2016. Trade Credit Provision and National Culture. *Journal of Corporate Finance*, 41 (C), 475–501. DOI: 10.1016/j.jcorpfin.2016.07.002.

Emery, G. W. 1987. An Optimal Financial Response to Variable Demand. *Journal of Financial and Quantitative Analysis*. 22 (2), 209–225. DOI: 10.2307/2330713.

Fabbri, D. and Menichini, A. M. C. 2010. Trade Credit, Collateral Liquidation and Borrowing Constraints. *Journal of Financial Economics*, 96 (3), 413–432. DOI: 10.1016/j.jfineco.2010.02.010.

Ferris, J. S. 1981. A Transaction Theory of Trade Credit Use. *The Quarterly Journal of Economics*, 96 (2), 243–270. DOI: 10.2307/1882390.

Fisman, R. and Love, I. 2003. Trade Credit, Financial Intermediary Development, and Industry Growth. *The Journal of Finance*. 58 (1), 353–374. DOI: 10.1111/1540-6261.00527.

Garcia-Appendini, M. E. and Montoriol-Garriga, J. 2013. Firms as Liquidity Providers: Evidence from the 2007–2008 Financial Crisis. *Journal of Financial Economics*. 109 (1), 272–291. DOI: 10.1016/j.jfineco.2013.02.010.

Giannetti, M., Burkart, M. and Ellingsen, T. 2011. What You Sell is What You Lend? Explaining Trade Credit Contracts. *The Review of Financial Studies*, 24 (4), 1261–1298. DOI: 10.1093/rfs/hhn096.

Glick, R. and Spiegel, M. M. 2009 Asia and the Global Financial Crisis: Conference Summary. In *Proceedings from the Federal Reserve Bank of San Francisco's Conference on Asia and the Global Financial Crisis*, Santa Barbara, California.

Goto, S., Xiao, G. and Xu, Y. 2015. As Told by the Supplier: Trade Credit and the Cross Section of Stock Returns. *Journal of Banking & Finance*, 60, 296–309. DOI: 10.1016/j.jbankfin.2015.08.030.

Grau, A. J. and Reig, A. 2018. Trade Credit and Determinants of Profitability in Europe. The Case of the Agri-Food Industry. *International Business Review*, 27 (5), 947–957. DOI: 10.1016/j.ibusrev.2018.02.005.

Harris, C., Roark, S. and Li, Z. 2019. Cash Flow Volatility and Trade Credit in Asia. *International Journal of Managerial Finance*, 15 (2), 257–271. DOI: 10.1108/IJMF-02-2018-0062.

Hermes, N., Lensink, R., Lutz, C. and Thu, U. N. L. 2016. Trade Credit Use and Competition in the Value Chain: Evidence from Vietnam. *Economics of Transition and Institutional Change*, 24 (4), 765–795. DOI: 10.1111/ecot.12106.

Hyun, J. 2017. Trade Credit Behavior of Korean Small and Medium Sized Enterprises During the 1997 Financial Crisis. *Journal of Asian Economics*, 50, 1–13. DOI: 10.1016/j.asieco.2017.02.005.

Islam, Z. ul and Iqbal, M. M. 2022. The Relationship between Capital Structure and Firm Performance: New Evidence from Pakistan. *The Journal of Asian Finance, Economics and Business*, 9 (2), 81–92. DOI: 10.13106/jafeb.2022.vol9.no2.0081.

Karakoç, B. 2022a. Corporate Growth – Trade Credit Relationship: Evidence from a Panel of Countries. *Borsa Istanbul Review*, 22 (1), 156–168. DOI: 10.1016/j.bir.2021.03.004.

Karakoç, B. 2022b. Information Asymmetry, Shortage of Liquidity and Evidence on the Role of Credit Sales in Business-to-Business Marketing. *Global Business Review*, OnlineFirst. DOI: 10.1177/09721509221116690.

Kerr, W. R. and Nanda, R. 2011. Financing Constraints and Entrepreneurship. In Audretsch, D., Falck, O. and Heblich, S. (eds.). *Handbook of Research on Innovation and Entrepreneurship*, Chapter 8, pp. 88–103. Cheltenham: Edward Elgar Publishing.

Kestens, K., van Cauwenberge, P. and Bauwhede, H. V. 2012. Trade Credit and Company Performance During the 2008 Financial Crisis. *Accounting & Finance*, 52 (4), 1125–1151. DOI: 10.1111/j.1467-629X.2011.00452.x.

Klapper, L., Laeven, L. and Rajan, R. 2012. Trade Credit Contracts. *Review of Financial Studies*. 25 (3), 838–867. DOI: 10.1093/rfs/hhr122.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R. W. 1997. Legal Determinants of External Finance. *Journal of Finance*, 52 (3), 1131–1150. DOI: 10.1111/j.1540-6261.1997.tb02727.x.

Lin, T.-T. and Chou, J.-H. 2015. Trade Credit and Bank Loan: Evidence from Chinese Firms. *International Review of Economics & Finance*, 36, 17–29. DOI: 10.1016/j.iref.2014.11.004.

Lin, Q. and Zhang, T. 2020. Trade Credit in Economic Fluctuations and Its Impact on Corporate Performance: A Panel Data Analysis from China. *Applied Economics*, 52 (1), 1–18. DOI: 10.1080/00036846.2019.1621982.

Love, I. and Zaidi, R. 2010. Trade Credit, Bank Credit and Financial Crisis. *International Review of Finance*, 10 (1), 125–147. DOI: 10.1111/j.1468-2443.2009.01100.x.

Mahmud, A. A., Miah, M. S. and Bhuiyan, M. R. U. 2022. Does Trade Credit Financing Affect Firm Performance? Evidence from an Emerging Market. *International Journal of Financial Studies*, 10 (4), 85. DOI: 10.3390/ijfs10040085.

McGuinness, G., Hogan, T. and Powell, R. 2018. European Trade Credit use and SME Survival. *Journal of Corporate Finance*, 49, 81–103. DOI: 10.1016/j.jcorpfin.2017.12.005.

Moro, A., Maresch, D. and Ferrando, A. 2018. Creditor Protection, Judicial Enforcement and Credit Access. *The European Journal of Finance*, 24 (3), 250–281. DOI: 10.1080/1351847X.2016.1216871.

Murfin, J. and Njoroge, K. 2015. The Implicit Costs of Trade Credit Borrowing by Large Firms. *The Review of Financial Studies*, 28 (1), 112–145. DOI: 10.1093/rfs/hhu051.

Osei-Tutu, F. and Weill, L. 2022. Democracy Favors Access to Credit of Firms. *European Journal of Political Economy*, 77, 102312. DOI: 10.1016/j.ejpoleco.2022.102312.

Rajan, R. G. and Zingales, L. 1998. Financial Dependence and Growth. *The American Economic Review*, 88 (3), 559–586.

Roodman, D. 2009. How to Do Xtabond2: An Introduction to Difference and system GMM in Stata. *The Stata Journal: Promoting Communications on Statistics and Stata*, 9 (1), 86–136. DOI: 10.1177/1536867X0900900106.

Schwartz, R. A. 1974. An Economic Model of Trade Credit. *Journal of Finance and Quantitative Analysis*, 9 (4), 643–657. DOI: 10.2307/2329765.

Tsuruta, D. 2013. Customer Relationships and the Provision of Trade Credit During a Recession. *Applied Financial Economics*, 23 (12), 1017–1031. DOI: 10.1080/09603107.2013.791016.

Wilson, N. and Summers, B. 2002. Trade Credit Terms Offered by Small Firms: Survey Evidence and Empirical Analysis. *Journal of Business Finance & Accounting*, 29 (3–4), 317–351. DOI: 10.1111/1468-5957.00434.

Yang, S. A. and Birge, J. R. 2018. Trade Credit, Risk Sharing, and Inventory Financing Portfolios. *Management Science*, 64 (8), 3667–3689. DOI: 10.1287/mnsc.2017.2799.

Yano, G. and Shiraishi, M. 2020. Financing of Physical and Intangible Capital Investments in China. *Emerging Markets Finance and Trade*, 56 (6), 1351–1376. DOI: 10.1080/1540496X.2018.1562889.

Zhang, R. 2020. Trade Credit, Cash Holdings, and Product Market Competition. *The Quarterly Review of Economics and Finance*, 78 (C), 132–146. DOI: 10.1016/j.qref.2020.01.006.

8 ANNEX

Tab. 5: Descriptive statistics by country

Variable	# obs	Mean	Std. Dev.	Min	Max
CHINA					
Perf	21,413	0.0939949	0.076872	−0.2923848	0.6176968
Total TC	21,413	0.2834009	0.1982376	0.0147689	1.412917
Inventories	21,413	0.1698047	0.146336	2.62e−07	0.8427349
Sales growth	21,413	0.1564943	0.3020514	−0.6398277	1.913087
Size	21,413	14.99446	1.342321	11.15213	21.59476
PPE, net	21,413	0.3630139	0.2280386	0.0070535	1.111819
Debt	21,413	0.3063266	0.1989758	2.56e−06	1.164398
Capex	21,401	0.0695899	0.0757637	0.0000285	1.125951
Tobin	21,413	2.083299	1.177563	0.4430544	7.301784
INDIA					
Perf	15,174	0.1194889	0.0954134	−0.2898704	0.6163717
Total TC	15,174	0.3954459	0.2375083	0.0155392	1.424774
Inventories	15,174	0.1924128	0.14474	0.0000153	0.8414803
Sales growth	15,174	0.1324804	0.2818535	−0.6427712	1.886954
Size	15,174	15.22762	1.786659	11.0468	22.24613
PPE, net	15,174	0.4191797	0.2321938	0.0071024	1.112018
Debt	15,174	0.3663548	0.2257886	8.26e−07	1.17291
Capex	14,903	0.0799723	0.095943	0.000125	1.296918
Tobin	15,174	1.345511	0.8805323	0.4378046	7.264511
INDONESIA					
Perf	3,002	0.1223063	0.1004317	−0.2874549	0.6136189
Total TC	3,002	0.4438304	0.3184144	0.0158625	1.430591
Inventories	3,002	0.1852222	0.1537733	0.0000292	0.8288033
Sales growth	3,002	0.1240036	0.2591819	−0.6331237	1.911525
Size	3,002	21.04462	1.418293	16.77918	23.71536
PPE, net	3,002	0.4540882	0.2462791	0.0074964	1.109397
Debt	3,002	0.3303814	0.2175216	0.0000509	1.14444
Capex	2,993	0.0668508	0.0770837	0.0005672	0.6846429
Tobin	3,002	1.337385	0.8509981	0.4384968	7.153394
KOREA					
Perf	12,615	0.0831425	0.0970357	−0.2927265	0.6034412
Total TC	12,615	0.3234476	0.1963526	0.0147202	1.43109
Inventories	12,615	0.1339661	0.0986964	0.0000134	0.8324803
Sales growth	12,615	0.0958712	0.2774679	−0.64132	1.911223
Size	12,615	19.11698	1.463272	12.14993	23.70693
PPE, net	12,615	0.3796376	0.2057981	0.0071243	1.109738
Debt	12,615	0.2794027	0.1903808	4.72e−06	1.164946
Capex	12,546	0.062093	0.1353957	0.000171	1.277512
Tobin	12,615	1.147879	0.6636816	0.438066	7.289185
MALAYSIA					
Perf	6,302	0.0896397	0.0881007	−0.2916959	0.6143905
Total TC	6,302	0.2955452	0.2006806	0.0150251	1.425305
Inventories	6,302	0.1589661	0.1396964	0.0000117	0.8351703
Sales growth	6,302	0.0838238	0.2829663	−0.6359339	1.870187
Size	6,302	13.03933	1.421157	11.04529	18.35248
PPE, net	6,302	0.3894195	0.2268561	0.0070729	1.105433
Debt	6,302	0.2486314	0.1743629	5.14e−06	1.121013
Capex	6,301	0.0474894	0.0606835	0.0000696	0.7811031
Tobin	6,302	1.048588	0.674973	0.4383819	7.291541

Variable	# obs	Mean	Std. Dev.	Min	Max
PAKISTAN					
Perf	2,104	0.1258875	0.1046168	−0.2834562	0.5978506
Total TC	2,104	0.2647296	0.206627	0.0153872	1.276757
Inventories	2,104	0.2058647	0.140916	0.0001521	0.8235619
Sales growth	2,104	0.1336995	0.2922954	−0.6282113	1.894831
Size	2,104	15.68971	1.476875	11.25268	19.97608
PPE, net	2,104	0.5694412	0.2117618	0.0108876	1.111535
Debt	2,104	0.4179365	0.228988	0.0004667	1.14761
Capex	2,067	0.0722515	0.0887395	3.58e−06	0.7633569
Tobin	2,104	1.169997	0.6842016	0.438423	7.065823
PHILIPPINES					
Perf	1,253	0.1253402	0.0914853	−0.2796146	0.546282
Total TC	1,253	0.2405807	0.1608562	0.0203406	1.077249
Inventories	1,253	0.1121150	0.115401	0.0001787	0.7468693
Sales growth	1,253	0.1079137	0.2477618	−0.5694306	1.58035
Size	1,253	16.46973	1.815304	11.8527	21.29511
PPE, net	1,253	0.4212623	0.2343739	0.0080431	1.095375
Debt	1,253	0.299439	0.2045172	0.0009607	1.074457
Capex	1,250	0.0649943	0.0689132	0.0000535	0.6107208
Tobin	1,253	1.333665	0.8117846	0.4379889	6.811156
THAILAND					
Perf	4,017	0.1229374	0.1043865	−0.2819639	0.6160618
Total TC	4,017	0.2869816	0.2200819	0.0146923	1.407947
Inventories	4,017	0.190927	0.175872	3.06e−06	0.836038
Sales growth	4,017	0.0833211	0.2458588	−0.6303743	1.830961
Size	4,017	15.15827	1.584205	11.13076	21.52156
PPE, net	4,017	0.4166763	0.2488785	0.0073751	1.108218
Debt	4,017	0.300038	0.2167065	1.95e−06	1.173726
Capex	4,014	0.0608835	0.071935	0.0000509	0.7053141
Tobin	4,017	1.425585	0.8423478	0.4376372	7.257525
VIETNAM					
Perf	3,793	0.1273359	0.0917552	−0.2755453	0.5938115
Total TC	3,793	0.348983	0.2291533	0.0154545	1.425638
Inventories	3,793	0.244624	0.179207	5.79e−07	0.837641
Sales growth	3,793	0.1288757	0.3337238	−0.6372656	1.90722
Size	3,793	20.0795	1.3074	16.55811	23.69828
PPE, net	3,793	0.3243085	0.2405806	0.0070933	1.106708
Debt	3,793	0.343511	0.2188412	0.0000696	1.163347
Capex	3,713	0.069782	0.1002073	0.0004667	0.8454422
Tobin	3,793	1.079935	0.5177559	0.4392767	6.641725

Note: All relevant variables are scaled by once-lagged total assets EBITDA, Sales, TCs and Inventories are adjusted for inflation.

Tab. 6: Descriptive statistics: all countries

Variable	# obs	Mean	Std. Dev.	Min	Max
Perf	69,673	0.1034188	0.0920566	−0.2927265	0.6176968
Total TC	69,673	0.3255076	0.2222781	0.0146923	1.43109
Inventories	69,673	0.1732756	0.1443513	2.62e−07	0.8427349
Sales growth	69,673	0.1250305	0.2887442	−0.6427712	1.913087
Size	69,673	16.2093	2.695874	11.04529	23.71536
PPE, net	69,673	0.3928367	0.2314782	0.0070535	1.112018
Debt	69,673	0.3152514	0.209486	8.26e−07	1.173726
Capex	69,188	0.0678373	0.0944153	−0.4643502	1.277512
Tobin	69,673	1.493914	0.9970322	0.4376372	7.301784

Note: All relevant variables are scaled by once-lagged total assets EBITDA, Sales, TCs and Inventories are adjusted for inflation.

Tab. 7: Descriptive statistics: all countries

Acronym	Variable	Measurement
Perf	Performance	EBITDA_{ijt} / Total assets_{ijt-1}
TC^{SUM}	Total trade credit	(Received TC + supplied TC) / Total assets_{ijt-1}
PPE	Plant property and equipment (Net)	PPE_{ijt} / Total assets_{ijt-1}
Inv	Total stock of inventory	Inventories_{ijt} / Total assets_{ijt-1}
Debt	Bank loans and debt securities	Debt_{ijt} / Total assets_{ijt-1}
Capex	Capital expenditures	Capex_{ijt} / Total assets_{ijt-1}
Size	Total assets	$\log(\text{total asset})_{ijt-1}$
Q measure	Market cap. divided by book value of equity	MarketCap_{ijt} / Equity_{ijt}
Growth	Growth in sales	$(\text{Sales}_{ijt} - \text{Sales}_{ijt-1}$ / Sales_{ijt-1}
D_{cris}	A dummy variable for the 2008 crisis	1 if year is 2008 or 2009, otherwise it is 0
D_{depend}	A dummy variable for dependent firms	1 if in $t-1$ (net income + depreciation + inventories) / (capital expenditure) < 1, otherwise 0
$2\text{D}_{\text{depend}}$	A dummy variable for dependent firms	1 if in $t-1$ (net incomde + depreciation + cash + cash equivalents) / (capital expenditure) < 1, otherwise 0

Note: All dummy variables are interacted with TC^{SUM} and Inv. All relevant variables are scaled by once-lagged total assets.

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HOW FIRMS IN THE SERVICE SECTOR CHANGED THEIR BEHAVIOR DURING THE COVID-19 PANDEMIC – A CASE STUDY FROM THE MORAVIAN-SILESIAN REGION

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ABSTRACT

The Covid-19 pandemic has had a significant impact on the service sector. This paper aims to assess how firms in the service sector changed their behavior during the covid-19 pandemic regarding innovations and using flexible forms of work. We obtained responses from approximately 300 companies operating in the Moravian-Silesian region service sector through a questionnaire survey. We show that the most common innovation firms use organizational and process innovation. Moreover, we found that larger, younger, and more internalized firms enjoyed more innovation during the pandemic than others. While changes in part-time jobs and agreements held outside the employment relationship are temporary, changes in home office use and outsourcing appear to be permanent.

KEY WORDS

Covid-19, pandemics, innovations, flexible forms of work, Moravian-Silesian region

JEL CODES

D22, M12, O32

1 INTRODUCTION

The Covid-19 pandemic has significantly impacted the service sector, as many businesses have had to either reduce their operations or close entirely due to government-imposed lockdowns and restrictions. This has led to job losses and reduced employment opportunities in the service sector.

For firms in the service sector, there are several ways their employees may be endangered due to Covid-19. These include (i) the risk of contracting the virus since service sector workers, particularly those in customer-facing roles, may be at higher risk of contracting the virus due to their frequent interactions

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with the public; (ii) health and safety concerns because workers may be concerned about their health and safety, as well as the health and safety of their colleagues and customers; (iii) reduced demand, which may lead to layoffs or reduced hours for workers or (iv) economic downturn, which has harmed many service sector businesses may lead to job losses or reduced employment opportunities.

Moreover, The Moravian-Silesian Region is one of the structurally affected regions and is characterized by several economic problems, such as a smaller supply of promising job opportunities, not only for young and qualified professionals, or worse conditions and lower attractiveness for business. Thus, the impacts associated with the pandemic may be more significant in structurally affected regions than in the case of other regions.

This paper aims to assess how firms in the service sector changed their behavior during the Covid-19 pandemic. Behavioral change is examined mainly on two levels – what innovations firms started to use and what flexible forms of work they introduced.

We obtained responses from approximately 300 companies operating in the Moravian-Silesian region service sector through a questionnaire survey. In recent years, there have been several studies on the impact of the Covid-19 pandemic. We add some new insights to the existing literature on this topic.

We assess individual innovations and flexible forms of work individually and, in the case of innovations, also according to different firm characteristics. In addition, through two rounds of questioning, we can see how each flexible form of work has changed over the pandemic and whether the changes are temporary or permanent.

We show that the firms use organizational and process innovation the most. Moreover, we found that larger, younger, and more internalized firms enjoyed more innovation during the pandemic than others. Also, the most used flexible forms of work during the Covid-19 pandemic include part-time jobs, home-office, outsourcing, and agreements held outside the employment relationship. While changes in part-time jobs and agreements held outside the employment relationship are temporary in nature, changes in the use of home-office and outsourcing appear to be permanent.

The paper's outline is as follows: Section 2 describes the general theoretical framework and provides a literature review. Section 3 presents our methods and data. Section 4 illustrates results of our research. Section 5 concludes.

2 THEORETICAL FRAMEWORK

The global pandemic has forced companies to change the way they operate. Many have had to adapt quickly to new technologies and processes to remain competitive and serve their customers. Many companies have shifted to remote working, streamlined their operations, and used digital tools to keep up with market demands. They have also implemented social distancing protocols, contactless payment systems, and increased hygiene and safety measures. Furthermore, companies have had to re-evaluate their marketing strategies, invest in digital infrastructure, and develop e-commerce capabilities to serve their customers better.

Moreover, Hashiguchi et al. (2022) find that, during economic downturns, countries that are able to prop up the economy through the domestic service sectors instead of domestic goods and foreign sectors are more resilient to negative shocks. This further underlines the importance of sector services during a pandemic.

In this paper, we want to focus on two areas of corporate behavior. First, we are interested in what innovations firms have started to introduce, and second, we are interested in the use of flexible forms of work that firms have not used before.[1]

2.1 The Covid-19 Pandemic and Innovation

Marques Santos et al. (2021) claim that the main elements influencing business innovation and growth are internal factors (such as the firm's size and age, management capacity, workforce skills, financing capacity, ownership), and external factors (like macroeconomic conditions, size of the market, regulation, government support, public infrastructure or knowledge flows, and networks). Their results show that the economic performance of innovative firms in 2020 was less affected by the coronavirus disease than non-innovative ones. The analysis also points out that organization and marketing innovations were the firms' primary patterns.

Gopalakrishnan and Kovoor-Misra (2021) suggest that firms with high human-physical interdependence in their core technologies are motivated to innovate through the creation and/or adoption to reduce human-physical interdependence in their core technology. Moreover, they claim that firms can face threat-driven or opportunity-driven innovations based on their industry.

Lien and Timmermans (2021) showed that agility is particularly relevant for the Covid-19 crisis. Firms that had established an agile organization prior to the crisis were more likely than other firms to implement crisis-induced innovation.

There are different types of innovation that firms could use. Christa and Kristinae (2021) discuss the importance of product innovation. It is also essential to distinguish whether the firm innovated its product or adopted an innovation already available on the market. Process innovation is implementing a new or significantly improved production or delivery method. Process innovations are essential for coping with the Covid-19 pandemic because they can help organizations quickly and effectively adapt to the changing circumstances caused by the pandemic. For example, process innovations can help companies to implement new safety protocols and procedures to protect employees and customers from infection or develop new ways of delivering goods and services that maintain social distancing. Marketing innovations are essential for coping with the Covid-19 pandemic (see e.g., Wang et al., 2020) because they can help organizations adapt to the changing market conditions and consumer behavior caused by the pandemic. For example, marketing innovations can help companies create new digital strategies that take advantage of online channels, such as social media and e-commerce platforms. Also, organizational innovations can help organizations adapt to the changing circumstances caused by the pandemic quickly and effectively (see e.g., Mai et al., 2022). Organizational innovations can include changes to an organization's structure, governance, or culture and the introduction of new management practices or technologies. For example, organizational innovations can help companies to create more flexible and agile structures that can quickly respond to the changing needs of the market and customers, such as by implementing remote working (Kutieshat and Farmanesh, 2022).

[1] The questionnaires also asked about compensation programs (question 24). We asked about 9 different compensation programs (Late filing of tax returns or withholding tax statements; Postponement of the VAT control declaration deadline; Temporary cancellation of the EET obligation or postponement of the start of the last wave of EET; Postponement of other taxes – road tax, real estate acquisition tax; Antivirus program; COVID financial instruments; "Twenty-five" program (compensation bonus); COVID Support Programme – Rent; "Nursing allowance" for self-employed persons). Most of the firms that were eligible were receiving at least some type of support. However, due to the relatively low absolute number of respondents, the individual responses were diluted so that it was not possible to perform statistically significant tests on the effect of each type of support. Testing whether there was a difference between firms that drew at least some support and those that did not was again not possible due to the low number of firms that did not draw support. Thus, in terms of aid use/non-use, we consider our sample to be homogeneous and the results of the analysis hold for both groups.

In our paper, we, therefore, deal with five types of innovations:

- Product innovation new to market – introduction of a new or significantly improved service before your competitors.
- Product innovation new to company – introduction of a new or substantially improved service that was already available from your competitors.
- Process innovation – introduction of a new or substantially improved method of service delivery.
- Marketing innovation – the introduction of a new marketing method, including substantial changes in design or packaging, market positioning, promotion, or pricing.
- Organizational innovation – introducing a new organizational method into your processes, workplaces, organizational and external relationships.

2.2 The Covid-19 Pandemic and Flexible Forms of Work

The Covid-19 pandemic has changed the perception of flexible working for both employees and employers. According to Spurk and Straub (2020) employers are now more likely to use flexible work forms. Moreover, Diab-Bahman and Al-Enzi (2020) claim that most employees agreed that old working conditions must be reviewed, and the majority enjoyed the flexible conditions. Forbes et al. (2020) claim that managers are much more positive about working from home since the lockdown (the number of managers who thought a worker needed to be physically present in the workplace decreased from 57.3% to 37.5% during the pandemic) and that managers intend to encourage more homeworking in the future (70.1% percent of managers said they are now supporting more flexible working requests).

Unlike most authors who examine flexible forms of work as a whole, we look at each form separately, as each may have been affected differently by the Covid-19 pandemic. While it is clear that the pandemic has contributed to the increase in forms such as the home office, it needs to be clarified for part-time jobs. Part-time workers were a particularly vulnerable group during the pandemic. If firms had to resort to layoffs during the pandemic, it is likely that they first laid off part-time employees. On the other hand, Hean and Chairassamee (2020) find that part-time employment increased during the US lockdown as full-time workers shifted to part-time jobs. Nevertheless, Forbes et al. (2020) show managers' willingness to employ part-time employees is significantly lower than for other flexible forms of work, especially in public administration.

In addition, because the survey was conducted in two waves and we also asked questions about future developments, we are at least partially able to assess whether the use of flexible forms of work was only temporary or permanent.

In our paper, we investigate seven types of flexible forms of work:

- part-time jobs,
- home-office and remote access,
- job sharing,
- sharing employees with multiple employers,
- use of outsourcing/ self-employed person,
- agreements held outside the employment relationship,
- agency employment.

3 METHODOLOGY AND DATA

3.1 Methodology

To answer whether a firm's different characteristics affect its innovation, we use Fisher's exact test (Fisher, 1922). It is a statistical significance test used in the analysis of contingency tables, which is particularly suitable for small sample size analysis. It calculates how many ways the cutoff frequencies can be reached and then evaluates the probability that the above-observed configuration can be obtained by chance alone. Thus, in this test statistic, the primary outcome

probability (p-value) is the probability that determines whether the null hypothesis is valid when comparing the chosen significance level of the α (0.05) test. If the p-value of the test is less than the chosen α, we reject the null hypothesis of independence of variables X and Y. Alternatively (in case of many observations), we use Pearson's χ^2 test (Pearson, 1900).

3.2 Data

Using the Magnusweb database, we created the database of companies to be approached in the questionnaire survey. The database included companies that fulfilled the defined selection criteria (CZ NACE and headquarters/operating location in MSK) and had a specified e-mail contact. 12,344 entities have met these criteria (which constitutes the core set of the research sample). The e-mail was successfully delivered to 11,590 addresses (92.9%), 2,490 subjects (21.5% of those delivered) clicked on and read the e-mail at least once, and the total number of reads was 4,578 (39.5%). The number of clicks on the questionnaire was 366 (3.2%). The primary data collection took place from 7th October to 1st November 2021. A total of 168 questionnaires were collected during this period.

In 2022, a second survey was carried out in two phases to ensure the highest possible response rate. The primary data collection took place from 13th July to 5th October 2022. A total of 151 questionnaires were received during this period. For both surveys, this represents 320 respondents. In the first phase, 13,187 companies were contacted, with 25.3% of companies opening the e-mail and 2.3% clicking through to the questionnaire. Due to the low response rate, firms were subsequently re-contacted. In the second phase of this survey, the e-mail was sent to 11,845 subjects, with the difference in the number of subjects compared to the first phase being due to a reduction in the number of inactive firms and also a reduction in the number of firms that did not wish to receive a similar e-mail again and also the number of firms that completed the questionnaire in the first phase. In the second phase of this survey, 25.1% of firms opened the e-mail, and 1.7% of subjects clicked through. The full text of the questionnaire is in the Annex.

4 RESULTS

An essential factor in the impact of the Covid-19 pandemic was the respondents' subjective assessment of the situation. Respondents answered the question: "How has the pandemic affected the overall situation in the company?" on a Likert scale of 1 – significantly worsened to 5 – significantly improved, where a value of 3 here, therefore, indicated a neutral attitude of no change. It is unsurprising that for more than half (53.5%) of the respondents, the situation concerning the Covid-19 pandemic has worsened their business activities (1–2 Likert scale). 37.12% of the respondents rate the impact of the pandemic as neutral, and only 9.37% of the respondents have seen an improvement, see Fig. 1.

4.1 Innovations

First, we present aggregate data for all firms. In the next step, we then examine whether factors such as age, size, and location play a statistically significant role in whether firms have innovated.

Fig. 2 shows an overview of the innovations implemented about their intensity. Most firms did not implement any innovations listed here during the pandemic. If some of the innovations were implemented, they were primarily organizational innovations (44.82%), followed by process innovations (39.13%) and marketing innovations (28.09%). To a lesser extent, there were then product innovations, where a distinction was made between a product innovation new to the firm (i.e., the product innovation was already in place in the market, but the firm did

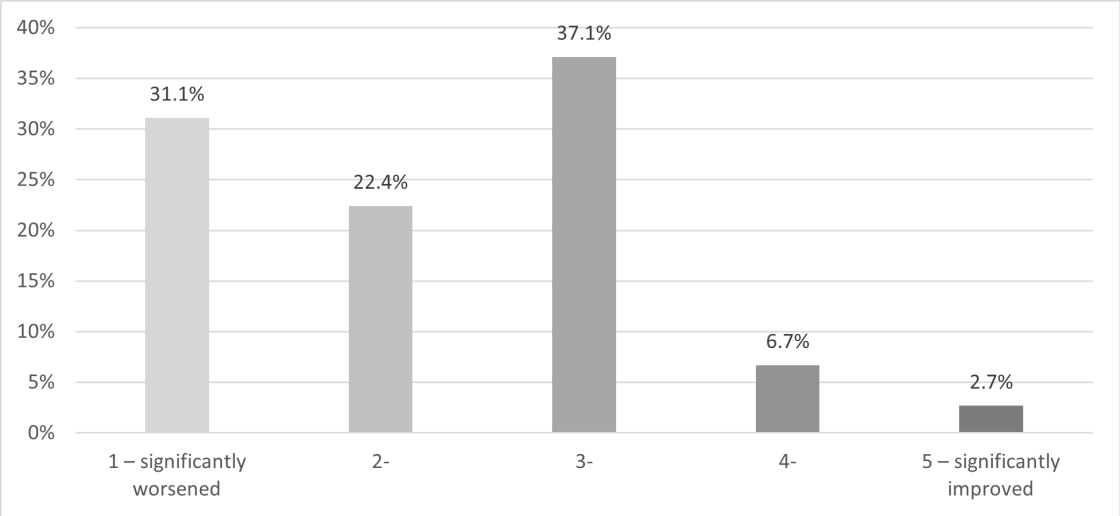

Fig. 1: Impact of the pandemic on the overall company/business situation (%)

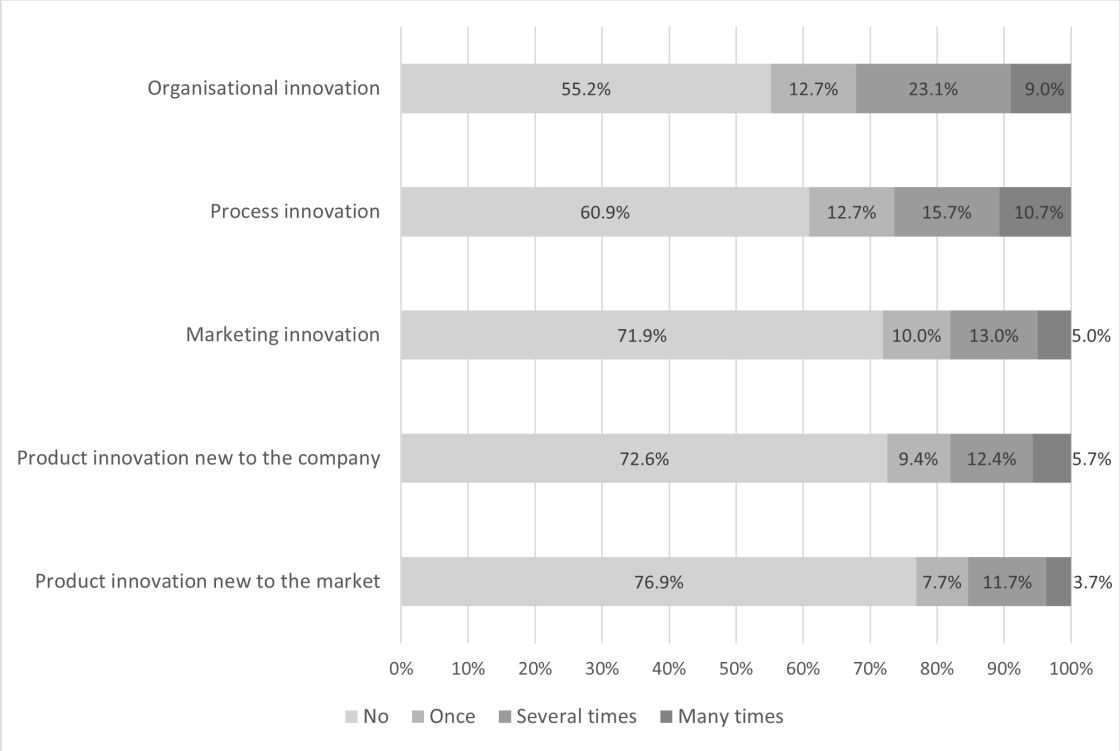

Fig. 2: Innovations during the Covid-19 pandemic (%)

not yet possess it) and an innovation new to the market (i.e., it was a completely new innovation in the market).

Firms also had the opportunity to name the innovation in question, and the list was extensive. The most common organizational innovations were the introduction of home-office teleworking and online meetings or employee training. Process innovations included:

- online communication with customers,
- the introduction of new e-shops,
- online consulting or improvements to existing processes, and
- investments in new technologies and software.

Some companies have even been forced to restructure their processes to more cost-effective ones. For example, marketing innovations generally included improvements to existing online platforms for communicating with customers. Product innovations included expanding existing services, such as those that can be implemented primarily online, expanding additional services, such as parcel outlets, or, in the catering sector, most often offering packaged meals.

To assess the role of firm size, age, and local scope, we recalculated the response values on an index normalized both vertically and horizontally. The index calculation provides an overview of the importance of each value in the context of rows and columns. For example, if all values in the contingency table were equal, each value would have an index of 1. If the index is less than 1, it is less important than the other items in its row and column. If the index exceeds 1, it is more important than the other entries in its row and column. Thus, this calculation standardizes the values considering both the vertical and horizontal structure of the sample. Tab. 1 to 3 depict the results.

4.1.1 Firms' Size (Number of Employees)

The innovations, in terms of the number of employees or terms of firm size, would be dominant in large (251 or more employees) and medium-sized firms (51–250 employees), especially in the areas of process, marketing, and innovation (see Tab. 1). One can say that larger firms have more resources to implement innovation or have their teams dedicated to this area. However, it is essential to note that firms without employees (self-employed), in neither case, did achieve zero values in any innovation. In each type of innovation, they achieved values higher than one in at least one frequency.

It is questionable whether the firm size is directly related to innovation. So, we calculated χ^2 test of independence. The null hypothesis states that random variables X and Y are independent, meaning that the probability of a particular variant of random variable X occurring does not affect the occurrence of a particular variant of random variable Y. The test is based on comparing the observed frequencies (measured) and the so-called expected frequencies (calculated under the assumption of the null hypothesis) of each combination of random variables X and Y. A single contingency table was created, where the values were summarized within each innovation and the frequencies of (non-)realization of the innovation (separated into yes/no frequencies). Thus, Fisher's test was not appropriate in this case, as the number of observations reached large values, $n = 1485$. The χ^2 statistic is 62.4215, and the p-value is 0.0001. Therefore, the null hypothesis can be rejected, and the result is significant at $p < 0.05$. Hence it can be concluded that the relationship between firm size and innovation is non-random. Tab. 1 shows that for all types of innovation, larger firms are more likely to innovate than smaller firms.

4.1.2 Firms' Age

Tab. 2 presents the indexed innovation variables from the firm's founding date perspective. The results suggest that innovation was the most crucial area for firms founded in 2019.

However, it was only marketing innovation, process innovation, and product innovation within the firm. For the other categories, no innovations were recorded for these firms. Organizational innovations were most important for firms founded between 2011 and 2015, and new-to-market innovations for firms founded between 2016 and 2018. It can be assumed that firms with more prolonged market presence also have more experience, not only in innovation. Therefore, the relationship between innovation and firm founding date was subjected to a χ^2 test of independence. The calculation analogy was the same as in the previous case, and again a summary contingency table with $n = 1469$ was constructed. The χ^2 statistic is 14.0138, and the p-value is 0.0072. The result is significant at $p < 0.05$. We can reject the null hypothesis, and the relationship between innovations implemented during the pandemic is related to the year of establishment of the firm.

Tab. 1: Innovation by company size/number of employees (index)

Company size	No	Once	Several times	Many times
Product innovation new to the market				
0	1.09	0.67	0.71	0.84
1–10	1.02	1.03	0.86	0.98
11–50	0.87	1.66	1.74	0.00
51–250	0.72	0.72	2.36	3.00
251 and more	0.87	2.15	0.00	4.50
Product innovation new to the company				
0	1.06	1.03	0.59	1.09
1–10	1.05	0.56	1.05	1.01
11–50	0.85	2.26	1.23	0.45
51–250	0.69	1.83	2.23	0.97
251 and more	0.92	0.00	1.34	2.91
Process innovation				
0	1.17	0.81	0.59	0.87
1–10	1.00	1.08	0.82	1.14
11–50	0.68	1.60	1.94	0.71
51–250	0.73	0.43	2.46	1.03
251 and more	1.10	0.00	1.05	1.55
Marketing innovation				
0	1.10	0.62	0.63	1.24
1–10	1.04	0.65	1.05	1.00
11–50	0.79	2.28	1.37	0.51
51–250	0.70	2.75	1.69	0.00
251 and more	0.70	1.65	1.27	3.30
Organizational innovation				
0	1.25	0.65	0.72	0.69
1–10	1.04	1.02	0.94	0.88
11–50	0.51	1.60	1.43	1.97
51–250	0.51	1.74	2.15	0.00
251 and more	0.61	0.00	0.72	5.50

Note: If the index is less than 1, it is less important than the other items in its row and column. If the index exceeds 1, it is more important than the other entries in its row and column.

Tab. 2: Innovation by date of company establishment (index)

Establishment	No	Once	Several times	Many times
Product innovation new to the market				
Before 2000	1.04	0.72	1.15	0.24
2001–2010	1.03	0.71	1.05	0.81
2011–2015	0.91	1.65	0.90	1.90
2016–2018	0.88	1.76	0.77	2.70
2019	1.30	0.00	0.00	0.00
Product innovation new to the company				
Before 2000	1.06	0.70	1.03	0.59
2001–2010	1.07	0.90	0.99	0.25
2011–2015	0.93	0.70	1.37	1.58
2016–2018	0.78	2.50	0.55	2.53
2019	1.03	0.00	1.00	2.32
Process innovation				
Before 2000	1.01	0.81	1.06	1.07
2001–2010	1.01	0.96	1.21	0.66
2011–2015	1.01	0.50	1.08	1.43
2016–2018	0.86	2.31	0.43	1.09
2019	1.44	0.00	0.79	0.00
Marketing innovation				
Before 2000	1.05	0.63	1.16	0.51
2001–2010	0.97	1.36	1.04	0.58
2011–2015	1.06	0.63	1.13	0.45
2016–2018	0.79	2.03	0.52	3.38
2019	1.21	0.00	0.00	2.65
Organizational innovation				
Before 2000	0.97	0.81	1.27	0.73
2001–2010	0.97	1.18	0.94	1.10
2011–2015	1.00	1.00	0.64	1.94
2016–2018	0.99	1.42	0.88	0.78
2019	1.81	0.00	0.00	0.00

Note: If the index is less than 1, it is less important than the other items in its row and column. If the index exceeds 1, it is more important than the other entries in its row and column.

4.1.3 Firms' Local Scope

The last structure presented is a view of innovation and its intensity by firm scope (see Tab. 3). The importance of product innovation in the market was particularly evident for international firms. Process, organizational, and marketing innovations were necessary for firms with a national scope. Finally, product innovations new to the firm were most important for firms with local scope.

Tab. 3: Innovation by company location (index)

Location	No	Once	Several times	Many times
Product innovation new to the market				
Local	1.03	1.14	1.00	0.00
Regional	1.13	0.30	0.79	0.32
National	0.90	1.33	1.26	1.54
International	0.91	1.39	0.91	2.42
Product innovation new to the company				
Local	1.05	1.62	0.71	0.00
Regional	1.09	0.51	0.94	0.82
National	0.91	0.88	1.46	1.39
International	0.96	1.18	0.72	1.88
Process innovation				
Local	0.99	1.38	1.12	0.41
Regional	1.13	0.91	0.66	0.87
National	0.90	0.62	1.15	1.80
International	0.97	1.26	1.13	0.67
Marketing innovation				
Local	1.00	1.17	0.90	0.88
Regional	1.02	1.04	1.07	0.46
National	1.01	0.68	1.04	1.35
International	0.94	1.24	0.96	1.42
Organizational innovation				
Local	1.04	1.15	1.02	0.49
Regional	1.08	0.91	0.85	1.03
National	0.97	0.89	0.93	1.51
International	0.88	1.12	1.31	0.79

Notes: Local = municipality and surrounding municipalities; regional = city, region, several regions; national = whole Czech Republic. If the index is less than 1, it is less important than the other items in its row and column. If the index exceeds 1, it is more important than the other entries in its row and column.

The question is whether the firm scope is directly related to innovations and their frequencies. One could say that the larger the market in which the firm operates, the more intense the innovation, as firms must face more competitors. Again, this relationship was subjected to a χ^2 test of independence, where a contingency table was constructed with $n = 1075$. The χ^2 statistic is 10.4979, and the p-value is 0.0147. The result is significant at $p < 0.05$, and the relationship between the variables is non-random. There is a relationship between firm scope and innovations implemented during the Covid-19 pandemic.

4.2 Flexible Forms of Work

First, we investigated whether firms that used flexible forms of work coped with the pandemic better than others. Thus, we examined the statistical dependence of two features for the next dichotomous question: whether successful/unsuccessful firms used flexible forms of work. The procedure for constructing the contingency table and calculating Fisher's exact test was analogous to the previous cases. The contingency table (2×2) again contained the aggregate value of the firm's situation (worsened/improved) and the answer to the dichotomous question, "Have you or do you use any of the flexible forms of work?"

In the case of flexible forms of work, the Fisher exact test value is 0.7783. The result is not significant at $p < 0.05$. We do not reject the null hypothesis and can conclude that whether firms have used flexible forms of work is not related to the firm's situation in the context of the Covid-19 pandemic.

We then sought to understand how firms have changed their behavior and whether it is temporary or permanent. As can be seen from Fig. 3, the most used flexible forms of work during the Covid-19 pandemic include part-time jobs, home-office (where the most significant increase was noted), outsourcing, and agreements held outside the employment relationship. It is interesting to look at Fig. 4, which calculates from both surveys how much firms used flexible forms of work before, during,

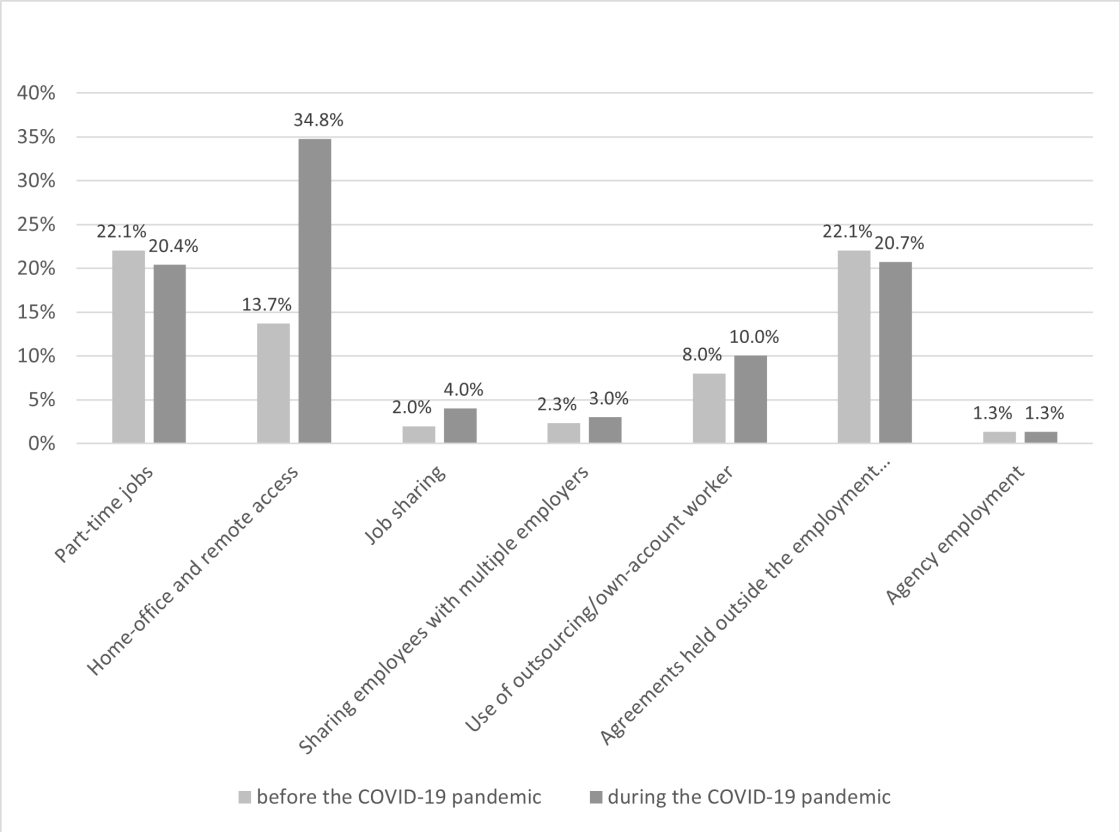

Fig. 3: Change in the use of flexible forms of work before and during the Covid-19 pandemic (%)

and after the pandemic and whether they plan to use them in the future.

In the case of part-timers, there is an evident decline during the pandemic. This can be explained by the fact that firms that were forced to reduce their operations and lay off employees preferred to lay off part-time workers. Therefore, after the end of the restrictive measures, the number of part-time jobs has returned to pre-pandemic levels, and firms do not plan to make significant changes in their use in the future.

For obvious reasons, the number of companies that started using home-office more than doubled during the pandemic. This decline after the end of the restrictions, while somewhat diminished, remains considerably higher than before the pandemic. About one in ten firms that did not use home-office before the pandemic are using it and plan to use it in the future.

A slight increase can also be observed in the case of outsourcing. More interestingly, companies plan to use this tool even more frequently in the future than they did before or during the pandemic. In the case of agreements held outside the employment relationship, we can observe a similar trend as for part-time jobs. These agreements were also less used during the pandemic than before (it is easier for employers to terminate an agreement than an employment relationship). Nevertheless, firms plan to return to the original level. Other flexible forms of work were not sufficiently represented to draw statistically significant conclusions. They are retained in both graphs for completeness and less rigorous analysis.

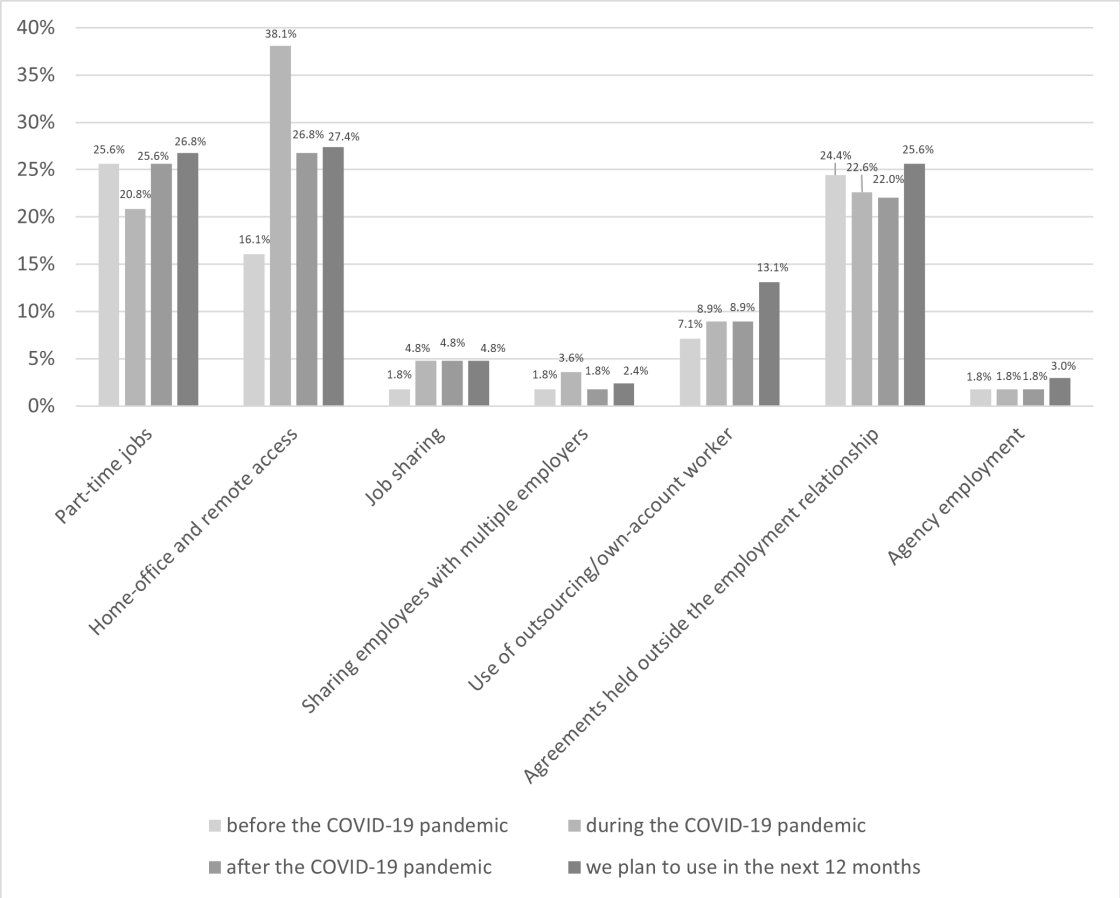

Fig. 4: Change in the use of flexible working arrangements after the Covid-19 pandemic (%)

In terms of the temporariness or longevity of the changes, part-time and out-of-work arrangements have experienced a temporary decline. They are returning to their original levels after the pandemic. On the other hand, firms have used and plan to continue to use home-office and outsourcing to a greater extent after the pandemic.

5 DISCUSSION AND CONCLUSIONS

We try to assess how firms in the service sector changed their behavior during the Covid-19 pandemic. To do so, we investigate two areas – innovations and flexible forms of working.

We found that despite all the harmful effects of the Covid-19 pandemic (not only) on the economy, positive effects can also be observed, especially in innovation. Depending on the type of innovation, we found that every second to fourth firm introduced some innovation. The most common innovations were organizational and process innovations. This can be explained mainly by the fact that firms were forced to change work organization due to pandemic measures. Therefore, larger firms (with more employees) were more innovative. This may be because they have more resources than smaller firms, and innovation brings them more significant economies of scale. This is also related to the fact that firms with a

larger scale (international presence) innovated more.

The most used flexible forms of work during the Covid-19 pandemic include part-time jobs, home-office, outsourcing, and agreements held outside the employment relationship. It is interesting to see the part-time attrition. While Hean and Chairassamee (2020) find that part-time employment increased during the US lockdown as full-time workers shifted to part-time jobs, we conclude that firms were more likely to terminate part-time jobs during the pandemic. However, this is only a temporary change, as the number returned to the same level. Firms were thus forced to lay off part-time workers temporarily and are now only returning to the original situation.

In contrast, the situation is different for home-office and outsourcing. The significant increase in home-office was understandably due to government action and often by direct order. However, one in ten companies that did not use home-office before the pandemic, plan to use it in the future. The pandemic has thus contributed to more flexible working in the future. This is even more evident with outsourcing, which firms plan to use even more in the future than they did during the pandemic.

Based on our findings, it is also possible to formulate general recommendations for the government. The government should encourage and support innovation in the service sector through funding and resources that will help firms of all sizes and with an international scope continue introducing new organizational and process innovations. Moreover, the government should also help smaller firms maintain competitiveness. Also, it is necessary to introduce policies and regulations that ensure the protection and promotion of flexible forms of work, such as home-office and outsourcing, for firms that plan to use them in the future. Finally, the government must provide support and resources to firms and part-time workers to help mitigate the negative impacts of temporary layoffs during a pandemic and facilitate a smooth transition back to pre-pandemic levels of part-time employment.

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7 REFERENCES

Christa, U. R. and Kristinae, V. 2021. The Effect of Product Innovation on Business Performance During COVID 19 Pandemic. *Uncertain Supply Chain Management*, 9 (1), 151–158. DOI: 10.5267/j.uscm.2020.10.006.

Diab-Bahman, R. and Al-Enzi, A. 2020. The Impact of COVID-19 Pandemic on Conventional Work Settings. *International Journal of Sociology and Social Policy*, 40 (9/10), 909–927. DOI: 10.1108/IJSSP-07-2020-0262.

Fisher, R. A. 1922. On the Interpretation of χ^2 from Contingency Tables, and the Calculation of P. *Journal of the Royal Statistical Society*, 85 (1), 87–94. DOI: 10.2307/2340521.

Forbes, S., Birkett, H., Evans, L., Chung, H. and Whiteman, J. 2020. *Managing Employees During the COVID-19 Pandemic: Flexible Working and the Future of Work*. University of Birmingham.

Gopalakrishnan, S. and Kovoor-Misra, S. 2021. Understanding the Impact of the Covid-19 Pandemic Through the Lens of Innovation. *BRQ Business Research Quarterly*, 24 (3), 224–232. DOI: 10.1177/23409444211013357.

Hashiguchi, Y., Yamano, N. and Webb, C. 2022. How Thick is Your Armour? Measuring Economic Resilience to Shocks in Global Production Networks. *Economic Systems Research*, 34 (4), 410–439. DOI: 10.1080/09535314.2021.1958764.

Hean, O. and Chairassamee, N. 2020. The Immediate Effects of COVID-19 on Employment Transition Dynamics: Comparative Study between Rural and Urban America. In *67th Annual North American Meetings of the Regional Science Association International*.

Kutieshat, R. and Farmanesh, P. 2022. The Impact of New Human Resource Management Practices on Innovation Performance during the COVID 19 Crisis: A New Perception on Enhancing the Educational Sector. *Sustainability*, 14 (5), 2872. DOI: 10.3390/su14052872.

Lien, L. and Timmermans, B. 2021. *Innovation as a Crisis Response*. C4 Working Paper Series.

Mai, N. K., Do, T. T. and Ho Nguyen, D. T. 2022. The Impact of Leadership Competences, Organizational Learning and Organizational Innovation on Business Performance. *Business Process Management Journal*, 28 (5/6), 1391–1411. DOI: 10.1108/BPMJ-10-2021-0659.

Marques Santos, A., Haegeman, K. and Moncada-Paternò-Castello, P. 2021. *The Impact of Covid-19 and of the Earlier Crisis on Firms' Innovation and Growth: A Comparative Analysis*. JRC Working Papers on Territorial Modelling and Analysis No. 03/2021. European Commission, Seville, JRC125490.

Pearson, K. 1900. On the Criterion That a Given System of Deviations from the Probable in the Case of a Correlated System of Variables is Such That It Can Be Reasonably Supposed to Have Arisen from Random Sampling. *The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science*, 50 (302), 157–175. DOI: 10.1080/14786440009463897.

Spurk, D. and Straub, C. 2020. Flexible Employment Relationships and Careers in Times of the COVID-19 Pandemic. *Journal of Vocational Behavior*, 119, 103435. DOI: 10.1016/j.jvb.2020.103435.

Wang, Y., Hong, A., Li, X. and Gao, J. (2020). Marketing Innovations During a Global Crisis: A Study of China Firms' Response to COVID-19. *Journal of Business Research*, 116, 214–220. DOI: 10.1016/j.jbusres.2020.05.029.

8 ANNEX

The full text of the questionnaire:

1. How has the Covid-19 pandemic affected the overall situation in your company?
2. How do you assess the current overall situation in your company?
3. Has there been a reduction in your economic/business activity during the Covid-19 pandemic?
4. During the Covid-19 pandemic, did the following innovations occur in your company?
5. Please give an example or examples of an innovation you introduced during the Covid-19 pandemic, and you consider to be the most innovative or beneficial.
6. Do you believe that at least one of the above innovations helped your company to cope with complications associated with pandemic measures?
7. Compared to most of your competitors, do you believe that you are currently:
8. How would you characterize your current practices towards suppliers?
9. How would you rate the financial health of your company?
10. Please estimate your revenue development in 2022 (compared to 2019):
11. In your opinion, to what extent is the current situation of your company influenced by the following factors?
12. Did you have employees at the time of the Covid-19 pandemic?
13. Have you used or do you use any of the flexible forms of work?
14. Please indicate whether you have used or plan to use the flexible forms of work listed below:
15. What barriers have you faced or are you facing in using flexible forms of work?
16. What do you see as the main advantages of flexible working?
17. What do you see as the main disadvantages of flexible working?

18. In addition to the above flexible working arrangements, have you introduced any or any other flexible forms of work?
19. The number of employees during the Covid-19 pandemic in your company compared to the period before pandemic:
20. What changes in the number of employees compared to the Covid-19 pandemic period do you plan to make in the next 12 months:
21. How many employees do you plan to hire/fire in the next 12 months?
22. In your opinion, to what extent are the planned layoffs/recruitment affected by the following the factors listed below?
23. In your opinion, what impact has the Covid-19 pandemic had on:
24. Which of the following assistance/reliefs has your company benefited from since the start of the Covid-19 pandemic?
25. Has your company used any of the employment protection aids?
26. How would you rate the overall administrative burden of processing aid applications in your industry in the context of the Covid-19 pandemic?
27. Main object of your business:
28. Date of establishment of your business:
29. Headquarters of your company:
30. Size of the municipality in which your firm is located:
31. Legal form:
32. Current number of employees of your company:
33. The scope of your company:
34. Please indicate the title of your current position:
35. Your age:
36. Your education:
37. Your sex:
38. Did you participate in Phase 1 of this survey?

Note: Since the original questionnaire was in Czech, it has been translated into English for the purposes of this article ex-post.

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LINKING ESG-INVESTING CONSCIOUSNESS, BEHAVIORAL BIASES, AND RISK-PERCEPTION: SCALE VALIDATION WITH SPECIFICS OF INDIAN RETAIL INVESTORS

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ABSTRACT

The research focuses on the calibration and measurement of the relationship between the selected behavioural biases and the risk perceptions of Indian retail investors, as well as its ultimate implications on equity investment decisions. Further, it examines the association of the factors to non-financial determinants such as ESG investing consciousness. The research leveraged a structured questionnaire for data collection across 438 samples. EFA for factor-extraction and assessing dimensional validity; CFA for understanding the factor structure, the validity & reliability of the latent variables; and AMOS-based SEM for the establishment of path analysis and structural causal relationships amongst the variables are used for the study. The study confirms the significant impact of risk perception on equity investment decisions and establishes a significant link between the selected biases for the study and the perceived risk. The findings also indicate a statistically significant relationship between ESG consciousness and the risk perception of investors. Further, there is confirmation of a statistically significant negative moderation effect of ESG consciousness on the relationship between the selected biases and investors' perceived risk, indicating that higher ESG consciousness weakens the positive relationship between investors' perceived biases and risk perception.

KEY WORDS

ESG investment, risk perception, behavioral biases, availability bias, herding bias, aversion bias, gambler's fallacy, overconfidence, anchoring bias

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1 INTRODUCTION

The measurement of retail investors' ESG (Environmental, Social, and Governance) investment consciousness, ecological and social sensitivity, and adherence to ESG protocols have emerged as a new field of academic research. The ESG investing phenomenon stems from non-financial global concerns such as climate change, environmental conservation, hydrocarbon reduction, consideration for people and relationships, social welfare, and moral standards for business operations (Tsagas, 2020). The environmental aspect pertains to the internal policies that the firms are implementing to ensure minimal environmental damage, possible mitigation of climate change, and environmental conservation. Corporate social policy addresses the potential impact of corporate actions on societal well-being. Similarly, the governance aspect addresses corporate structures and procedures that direct and regulate businesses (Vicente-Ortega Martínez, 2021). The ESG phenomenon was prevalent in the ancient philosophy of responsible business, but the formal consensus emerged only in the 1990s (Sharma, 2016). The Kyoto Protocol, the World Economic Forum's emphasis on climate change, and the United Nations' Sustainable Development Goals are among the formal measures promoting retail investors' ESG awareness (OECD, 2021).

Hence, ESG investing is here to stay, and its multifaceted intervention in investors' behaviour is a matter for study. ESG aspects are gaining currency in retail investment decisions on account of viability, sustainable business models, and rising awareness about saving the planet and doing good for overall humanity. The retail investor and their aspirations have widened to include environmental and societal agendas in investment decision-making. They started to echo the predilection for sustainability in business investments (Mottola et al., 2022; D'Hondt et al., 2022). Despite the lack of a standardised ESG model for investment undertakings, ESG consciousness is undeniable and rampant as the investor population becomes aware and conscious of global trends (Amel-Zadeh and Serafeim, 2017). The rising ESG consciousness has led to deviations in the investor's information processing, cognition development, and belief enrichment concerning the investment undertaken. The studies are now being conducted from a pro-environment perspective rather than a conventional perspective (Polman and Winston, 2022).

Simultaneously, investor behavioural biases are fast becoming recognised as an imperative trait for investment decisions. Behavioral science researchers have established that numerous biases formulate the theme for the decisions and risk analysis of investors (Montibeller and von Winterfeldt, 2015; Tversky and Kahneman, 1973). Numerous empirical studies in the field of behavioural finance have revealed findings that both retail and institutional investors consistently deviate from making rational investment decisions. Investors' behavioural biases are deviations in how they absorb information, feel, and think, which can have an adverse impact on their decision to invest rationally by raising idiosyncratic risk and degrading portfolio performance (Kumar and Goyal, 2015; Sivaramakrishnan et al., 2017). Individuals as agents are susceptible to influences from social actors' beliefs, norms, and assumptions (Neal et al., 2022). As per the behavioral finance school of thought, investors, on account of their limited cognitive and emotional capabilities and lack of strong rationality, seem to act in ways that are rarely regarded as optimum. They seem to be externally driven by a preset agenda (Hohenberger et al., 2019). The 'choice architecture' entails the act of influencing and making a judgement by organising available material amidst limited availability of information relevant to decisions, limited capability to analyse and compare alternative choices, and constrained attention and self-control (Jurevičienė and Ivanova, 2013; Thaler et al., 2013). The intent to pre-judge forms a major component of these so-called choice architectures that are cognitive and emotional in nature and are widely identified as behavioural biases. As such, biases could imply ignoring important informa-

tion, treating irrelevant aspects as imperative, incorrectly weighting information, finding false correlations, creating false memories as the sole basis for decision making, or being swayed away by social groups and pressures, or misjudging the desirability of outcomes (Wangzhou et al., 2021). Human thinking, as evident in the form of dual cognitive processes, is observed to inculcate a quick, involuntary, emotionally-driven, intuitive process and a slow, calculative, logic-based, deliberative process. This drives individual decision-making while allocating funds, rationalising portfolios, and maintaining investments (Kvaran et al., 2013; Kahneman, 2013). Therefore, biases can be understood as the obvious distortions of judgements that deviate from expected utility or normative principles of probability, which are otherwise adequately represented by traditional finance and economics theories (Korteling et al., 2018).

As an investment influencer, ESG belief and concern play a role in churning risk perception, belief creation, information processing, and the usual commitment of biases during investment decision making. The widespread media support for ESG accountability of firms and investor-related activism is fueling the role of non-financial aspects as outweighing the financial-driven agenda in stock selection (Friede, 2019). In addition to performance analyses, a tiny segment of empirical studies has looked into the traits, motivations, and investment strategies of ESG investors both at individual and institutional levels. According to Renneboog et al. (2011), ESG mutual funds investors exhibit less bias toward past financial success than conventional investors, and as a result, biases based on historical results are less common among these investors. Beal et al. (2005) looking into why particular investors choose to invest in ESG. discovered that the primary motivations for investing in social concerns are largely money returns, social transformation, and non-wealth returns. Putting it in another way, in addition to financial gains as a received return, investors value the sense of helping others or supporting a worthwhile cause. Nilsson (2009) examined the justifications for investors to put money into ESG mutual funds in yet another significant study. They discovered that ESG investors are a heterogeneous group made up of three different investor types who are predominantly motivated by (i) financial considerations, (ii) mixed objectives, and (iii) altruistic motivations. Daugaard (2019) stated that even if ESG investments do worse than their conventional counterparts, investors in ESG would keep their ESG investments.

The existing literature acknowledges and recognises that the behavioural aspects of retail investors, their investment choices, and risk perception are multifaceted constructs that include numerous environmental influences and that bind well with non-financial components of ESG investing consciousness. Non-financial aspects are positioned as exerting extensive intervention in the determination of financial decisions, individual risk awareness, and the construction and preservation of beliefs (Masini and Menichetti, 2013; Naveed et al., 2020). However, the existent academic literature has differing views in relative association concerning the quantification of the relationships across the chosen variables for the study: investors' behavioural biases, risk perception, ESG consciousness, and their investment intentions. The focus on Indian retail investors and the peculiarity of Indian ESG-oriented retail investors are lacking from the existing studies on the topic, which are more focused on the developed economies. Although, India is witnessing a growing financial market, a glaring population research gap with the phenomenon's conceptualization is seen. There appears to be a scarcity of existing literature on quantitative and empirical analyses of the interactions between behavioural and ESG investment paradigms. Additionally, a vast section of behavioural finance research uses information from investor trading records. However, primary data, as opposed to secondary data, is a more reliable predictor of investor behaviour (Ritika and Kishor, 2020). By utilising primary data and concentrating explicitly on the behavioural factors of Indian individual investors, the study seeks to close this gap.

The broad focal point of the research is conceptualising, developing, and validating a scale for calibration and measurement of association between the selected factors for the study. It is dedicated to studying the impact of Indian retail investors' selected behavioural biases on their risk perceptions and their ultimate implications on the undertaking of equity investments from a post-pandemic perspective. Further, the work aims to study how biases and risk perception are associated with non-financial determinants such as ESG investing consciousness.

2 THEORETICAL FRAMEWORK AND RESEARCH HYPOTHESIS

The constructs of investors' decision-making behavior are borrowed extensively from the literature works of behavioral finance. The studies posit the core role of biased influences such as "availability bias", "gambler's fallacy", "overconfidence bias", "anchoring bias", "herding bias", and "regret aversion bias" (Tversky and Kahneman, 1973; Costa et al., 2017; Stöckl et al., 2015) to be dominant in investor's decision-making patterns. Investment decision-making is a cognitive and emotional process to choose among the available alternative scenarios. The problem of effective interpretation and decoding of the investor's decision-making patterns has always remained a puzzle across behavioral science research (Montibeller and von Winterfeldt, 2015). The behavioral biases and irregularities that are been observed, yet are not alone in influencing retail investors' stock market participation. The traits of risk perception and ESG investing consciousness have been observed to shape the level and depth of equity market decisions (Lucarelli and Brighetti, 2010; Gajdošová, 2011). The study hence proposes the research model as demonstrated in Fig. 1. Perception of risk is the interpretation or judgment of risk or uncertain events, and their ultimate influence on human behavior. It is highly dependent on psychological features and characteristics (Nguyen et al., 2017; Ainia and Lutfi, 2019). It is the subjective assessment of a person's impression of the risk involved in a certain circumstance, event, activity, or technological advancement. When assessing the frequency of various risks, humans have the propensity to exaggerate minor frequencies and underestimate bigger ones. This is a key illustration of biased risk assessment. The psychometric paradigm, assuming that risk is psychologically determined, is a well-known method for investigating risk perception (Böhm and Tanner, 2018).

2.1 Availability Bias and Risk Perception Formulation

The term 'availability' classifies as a cognitive error where the incumbent retail investor seeks to process information in a distinct or particular way to reach conclusions while investing. (Toshino and Suto, 2004) The availability bias affects probability assessments depending on a person's ability to recall earlier instances of an event or their capacity to envisage an event occurring. The bias tends to occur when investors overestimate the occasional events and have a vivid representation of them in their memory when making decisions. There are two errors emanating from the availability heuristic: ease of recall and retrievability (Ritika and Kishor, 2020). As a result of this information processing error, responding investors assess risk and value solely based on availability perception. The factor 'perceived availability' has been viewed as shaping the impetus for risk perception development. Investors frequently end up mitigating the wrong risk because of incorrect risk perceptions. The investor's judgement is dependent on their unique and unpredictable life experiences. People with availability bias focus on the most recent risks and may be concerned about the incorrect ones (Siegrist and Árvai, 2020). Hence, the research proposes hypothesis H_1.

H_1: There is a significant relationship between perceived availability and risk perception formulation.

2.2 Herding Intent and Risk Perception Formulation

The herding bias paints a historical picture of retail investors' intent to blindly ape the footsteps of others in their social group, environment, or as influenced by media. It is a common form of conviction that an investor encounters while choosing between equities. It gauges an investor's willingness to mindlessly follow others without independent thought regarding the problem at hand or potential future profits. Herding is the propensity to follow friends, family, brokers, or advisors across various social platforms and make decisions in groups. The bias is the desire to act in accordance with what is customarily done while building a portfolio, allocating funds, or evaluating risk when making asset allocation decisions (Ton and Dao, 2014). When making decisions, the desire to naively imitate a group or to follow market leaders or the herd appears to weigh heavily. This herding behaviour owes to investors' low-risk propensity or risk-aversion as well as their desire to lower their risk of loss (Ahmed et al., 2022). They are hesitant to take on the risk of investing, or they simply do not know how to invest and rely on the advice or direction of others. Furthermore, investors face more herding behaviour in poorer areas where people perceive a higher risk due to a lack of investment (Huang et al., 2016). Herding consequently has an impact on investors' perception of risk and decision-making. The study pinpoints and hypothesises a link between the two factors.

H_2: There is a significant relationship between perceived herding and risk perception formulation.

2.3 Perceived Regret Aversion and Risk Perception Formulation

The regret aversion tendency among retail investors is identified as comprising the elements of loss regret undertaking or regret avoidance intent with regard to either loss of opportunity or loss of ability to benefit from a profit-making option (Wangzhou et al., 2021). This tendency of investors has been reported to frame and ascertain a course of action when they are faced with gross uncertainties. People are afraid of regret and avoid making decisions because they believe that any path they take will turn out to be less idyllic in the long run. In essence, this bias aims to prevent the regret that comes with making bad choices. Investors, for instance, are unnecessarily wary of entering financial markets that have recently produced losses due to regret aversion. Negative investing outcomes make them feel compelled to save money, withdraw, and nurse their wounds rather than continue and buy possibly cheap stocks (Qin, 2015). Investors, at times, postulate that they could have evaded an adverse outcome if a different sequence of action had been chosen while trading. What investors typically care about is the profit or gains that they could have comprehended in the past if they had accepted a different investment option. Such deviations from norms result in regret aversion biases, which alter risk perception (Ady and Hidayat, 2019; Weber, 2004). The studies show that the anticipation of regret stimulates behaviour choice and can endorse risk-averse or risk-seeking propensities. When individuals regret a choice, they either take more risks or refrain from taking risks in order to avoid the distress of regret in the future (Shah and Malik, 2021). Hence the research hypotheses in the following statement.

H_3: There is a significant relationship between perceived regret aversion and risk perception formulation.

2.4 Gambler's Fallacy and Risk Perception Formulation

The gambler's fallacy transpires when an individual has an inaccurate belief that the occurrence of a particular random event is more probable to happen or unfold in the future in a particular way, grounded on the result of a preceding event or sequence of events. This fallacy or myth is etiologically associated with gambling, where it is often believed that the

next roll of the dice is more likely to show a six since in recent throws the number of sixes has been lower than usual (Stöckl et al., 2015). People usually take up the notion that chance is a self-correcting procedure, where outcomes in one direction make the opposite outcome more likely to occur, ultimately leading to the restoration of equilibrium (Tversky and Kahneman, 1973). Investors frequently hold onto declining equities and sell rising ones. The steady increase in a stock's value may be seen by investors as a sign that it will soon fall, leading them to decide to sell. Similar to when a stock's value falls, this may be interpreted as a sign that it is about to rise, and thus investors choose to hold onto those stocks. Based on the history of similar previous events, investors make assessments of the possibility of a largely arbitrary occurrence, such as the stock price. Both are not necessarily associated (Shefrin and Statman, 1994). Gambling fallacies are thought to be etiologically related to the perception of risk, though with tenuous evidence (Spurrier et al., 2014). Investors have a predisposition to minimise risk during an upward trend because they want to maintain their prior earnings. Due to their belief that losses are more likely to occur in the future if profits were gained in earlier periods, investors will become more cautious and limit their investments as a result. On the other side, during a downturn, the bias develops since investors seem to be more risk-averse and assume that since some past periods produced losses, the likelihood of profits in the future will be high (Wijayanti et al., 2019). The paper tries to comprehensively identify the gambling fallacy bias amongst investors and examine its presence in determining an individual's investment risk perception. Hence, the research proposes this hypothesis:

H_4: There is a significant relationship between gambler and risk perception formulation.

2.5 Overconfidence and Risk Perception Formulation

The review of existing literature elaborates on the phenomenon of investor overconfidence, where the investor overtrades on account of his excessive belief in his capacity to understand markets, fetch a value, or preserve the value of the portfolio. The overconfidence flaw in decision-making often manifests as the most prevalent and most rampant bias in security market decisions (Ainia and Lutfi, 2019). This bias is defined as a vague or falsely elevated sense of confidence as a result of prior learning, skills, knowledge, or experiences, abilities, and capabilities that, in some way or another, lead to flawed risk assessment and the allocation of funds. The academic literature (Zahera and Bansal, 2018) has documented the excessive confidence among retail investors as evident in the form of overweighting certain aspects, ignorance of critical details, and overestimation of information from one peculiar source. Retail investors indulge in the provision of estimates for a given parameter that are different from the actual performance yardstick. (Broihanne et al., 2014) showed that overconfidence and optimism have a favourable impact on the risk that investors are ready to take, while risk perception has a negative impact. The subjective lack of probability drill, intent to start with extreme estimations (low and high), and tendency to circumvent central tendency anchors; often crystallise as an overconfidence exhibition in risk assessment (Costa et al., 2017). The flawed aggregation of outcomes and values seems to mould the risk perceived by the investors. Hence, the research proposes this hypothesis:

H_5: There is a significant relationship between overconfidence and risk perception formulation.

2.6 Anchoring and Risk Perception Formulation

The phenomenon of "anchoring" has been observed to involve the manner in which retail investors seek to evaluate the subjective probabilities of wealth maximisation and returns from investments by focusing excessively and unwisely on the first piece of advice or information, referred to as the "anchor" (Tversky and Kahneman, 1973). The subjects tend to anchor future prices with recent and contemporary observations. The estimate is based

on the preliminary initial value proposed in the investment problem statement. The initial value is then adjusted to yield the desired resultant value. Thus, anchoring bias leads to the resulting value being biassed toward the initial value, i.e., the prevalence of insufficient adjustment (Ritika and Kishor, 2020). Under mimetic pressures of information and a false sense of dependence on a piece of information, the retail investor often fails to devise a strategy to count the risk or the optimum allocation plan for the concerned financial resources (Costa et al., 2017). Ricciardi (2008) noted that when investors trust in an anchor value or look for possible anchor evidence, bias ensues, which in turn has an effect on the individual's perception of risk. This bias is further complicated by the fact that it is challenging to remove the anchor, even when people are aware they are doing so. Investors, whether intentionally or unintentionally, stick to their original opinions and can only modify their views by beginning with the same beliefs. Hence, the research proposes this hypothesis:

H_6: There is a significant relationship between anchoring and risk perception formulation.

2.7 ESG Consciousness and Risk Perception Formulation

Most ESG literature examines the performance of sustainable investments on the financial performance of the portfolio. However, the linkage between ESG Consciousness and risk perception formulation has not been much explored in the yesteryear research works. The evolving ESG embedment across retail investors seeks to shape up the impetus for the biased risk perception as the ESG values often lead to one-sided or selective risk assessment (Briehl, 2022; Tomo and Landi, 2017). The partaking of retail investors in the equity market is increasing. Of all the information available to the investor for building his perception, one important piece of information is the EGSness of the company i.e., information regarding environmental safety, corporate integrities, employee relationships, etc. The information concurrently helps investors to better perceive risks related to their investment decisions. ESG investment decisions are stimulating investors to take up ethical investment practices, and also changing their perspective on the risk-return analysis for their portfolio, thereby influencing their risk perception (Park and Oh, 2022). Boffo and Patalano (2020) noted ESG ratings to be a broader tool that serves diverse purposes for diverse investors. Some investors use ESG as a tool for risk management. Hence the research tries to bring the risk perception view into the ESG consciousness of investors, and thereby proposes this hypothesis:

H_7: There is a significant relationship between ESG Consciousness and risk perception formulation.

2.8 Risk Perception Formulation and Investment Decision Making

"Risk Perception" shows how investors consider the risk related to financial assets based on their emotions and experiences. Subjective behaviors that are impacted by external factors seem to reflect risk perception (Weber, 2004). Risk and uncertainty are connected ideas that determine how intense of a risk investor perceives. When making investments or building projects, policymakers and investors work to reduce risk. Inexperienced investors naturally perceive risk more inaccurately than investors with extensive understanding of the financial market (Nguyen et al., 2017). All investors view risk differently because different decisions are influenced by investors' diverse portfolios, and because investors' perception of risk is influenced by their beliefs, opinions, and judgements. Thus, an investor's propensity to take risks is influenced by how they perceive risk (Wangzhou et al., 2021). Hence the research proposes this hypothesis:

H_8: There is a significant relationship between risk perception formulation and investment decision making.

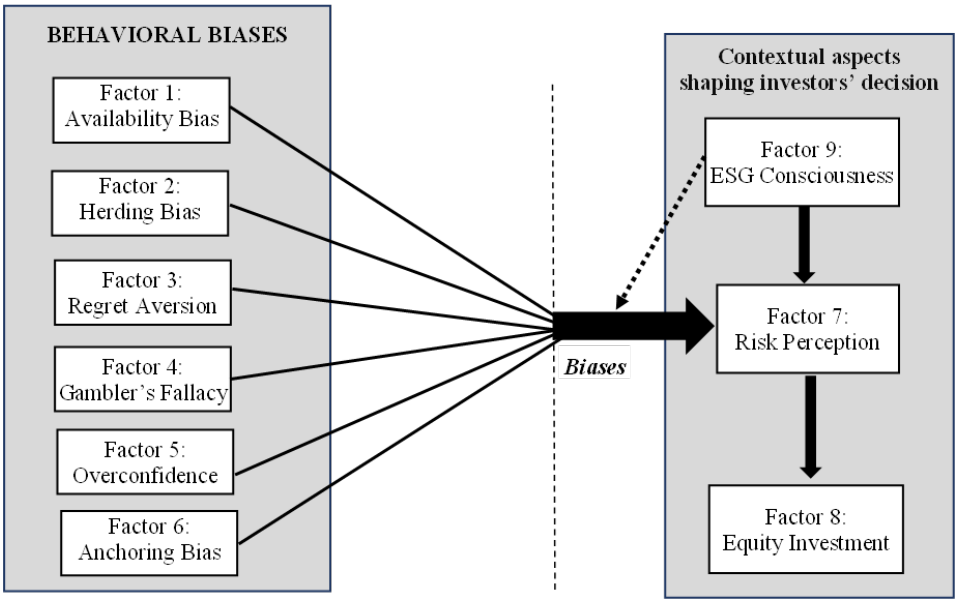

Fig. 1: Tentative mapping of factors across the hypothetic model

3 METHODOLOGY

3.1 Scaling Instrumentation

The constructs of the proposed study are sought to be operationalized with aid of facilitators namely the behavioral biases: "availability", "herding", "aversion", "gamblers' fallacy", "overconfidence", "anchoring"; "ESG Consciousness"; "risk perception" and "investment decision". They form the latent variables of the study. The study seeks to leverage the 5-point Likert scale for the collection of data through a structured questionnaire considered in line with the work of (Ajzen and Fishbein, 1980). The questionnaire was divided into parts of investors' profiles (demographics) and then statements with 5 Likert-based options ranging from 1 for "strongly disagree"; to 5 for "strong agree". Tab. 2 lists the items included in the questionnaire. The items included in the questionnaire were adopted from various previous research works with partial modification, and a few were created by the researcher as per the requirement of the proposed study.

3.2 Sampling

The study is based on the perceptions of Indian investors in the stock markets in aftermath of the COVID pandemic. Random samples of 438 investors (above 18 years) were asked to fill up the questionnaire. This is at par with the reference of Hair et al. (2006) which recommends a sample size of not less than 200. The random sampling method ensured covering the entire geographical zones and diverse cultures of the Indian investing population. The research attracted 259 males and 179 females. A brief snapshot of the investors' profile is illustrated in Tab. 1.

3.3 Research Tools

Dimensional validity assessment for scale items with extractive and confirmatory factor analysis is considered a prerequisite to SEM modelling and hypothetical research model attainment (Anderson and Gerbing, 1988). The research used "factor analysis" methodology to investigate the scopes of the factors considered for the study. The Exploratory Factor Analysis

Tab. 1: Investor's profile (Age, Gender, Experience, Qualification and Income), $n = 438$

Variable		Male	Female	Total
Age of Investors	18–30 years	66	61	127
	31–45 years	82	63	145
	46–60 years	70	39	109
	60 years and above	41	16	57
Experience in Equity Market	< 1 year	52	40	92
	1–3 years	86	71	157
	3–5 years	64	39	103
	Above 5 years	57	29	86

Variable		Total	Variable		Total
Annual Income (in Rs. Millions)	Less than 0.5M	39	Qualification of Investors	Class X	30
	0.5–1M	137		Class XII	74
	1–2M	117		Graduate	214
	2–3M	96		Post-Graduate	92
	Above 3M	49		Higher or any other professional degree	28

(EFA) enables the estimation of the dimensions and leads to a dimensional validity assessment with regard to the collected data (Gosselin et al., 2008). In view of the research objective, the "KMO Test" (for data suitability), "EFA" (for identifying and defining latent constructs), and "Reliability Assessment" with "Cronbach Alpha" were used in the study. SPSS was leveraged to calculate the variance with oblimin rotation in the PCA method (principal component analysis). EFA was observed to lead to the subsequent reduction of the subscale items. PCA was used to validate the loading of the subscale items and to determine factor structure (Hoyle, 1995). The research relies on "Confirmatory Factor Analysis" (CFA) for understanding the factor structure, validity, and reliability of the latent variables of the study. The AMOS-based "Structural Equation Modeling" (SEM) was used for the establishment of path analysis and structural causal relationships amongst the variables. SEM is relevant for mapping cross-factor relationships. It is a multivariate tool for estimating path-based relationships across factors (Hair et al., 2006; Hoyle, 1995).

3.3.1 Factorability Assessment

The Kaiser-Meyer-Olkin (KMO) measurement was 0.896, which falls within the acceptable range of 0.7 to 0.99 (Vogt and Johnson, 2015). In essence, this signifies the appropriateness of using factor analysis on the data gathered regarding the model's contributing factors. In ideal terms, KMO measures the amount of variance among the variables used in the study. The "Bartlett Test" of data sphericity showed a p-value of 0.000 (< 0.05), which indicates that statistically significant variance is present across the collected data. The significant p-value indicates that the data is significantly suitable for factor analysis. Consequently, the study's data set is normal, and the sample size is enough (Williams et al., 2010).

3.3.2 Factor Extraction and Dimensional Validity

To determine the weighted average that each component holds across the scale composition, factor extraction is crucial. The factors for the study are extracted using PCA and varimax rotation. All factor loadings greater than 0.5 were retained and considered for further analysis (Roesch and Rowley, 2005). Furthermore, the variance examination reveals the factor-bound weights, as shown in Tab. 2. Literature suggests that variables with eigenvalues greater than 1 are taken into account for the purpose of factor extraction. The factors in the study explain approximately 69% of

Tab. 2: Total Variance Explained

	Initial Eigenvalues			Rotation Sums of Squared Loadings		
Component	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1 = Overconfidence	11.051	19.735	19.735	6.816	12.172	12.172
2 = Risk	6.748	12.051	31.786	5.264	9.400	21.572
3 = Anchoring	4.524	8.079	39.865	5.082	9.074	30.646
4 = Herding	3.809	6.802	46.667	4.112	7.343	37.990
5 = Investment	3.587	6.405	53.071	4.036	7.206	45.196
6 = Aversion	2.966	5.297	58.368	3.850	6.874	52.070
7 = Availability	2.400	4.286	62.655	3.592	6.414	58.484
8 = ESG	2.127	3.799	66.453	3.570	6.375	64.859
9 = Gambler	1.555	2.777	69.230	2.448	4.371	69.230

Note: Extraction Method: Principal Component Analysis

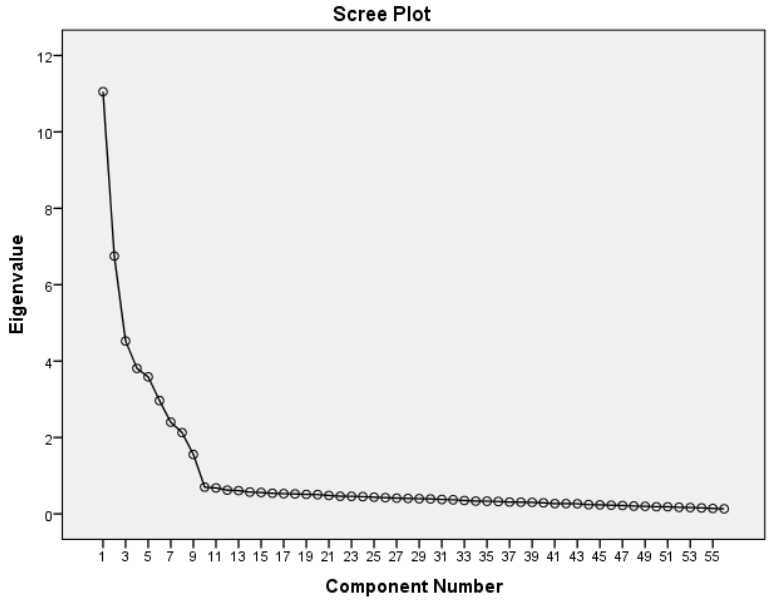

Fig. 2: Scree plot for the selected Factors

the total cumulative variance. Additionally, a graphical method called a scree plot (Fig. 2) is used to access the factor extraction. It maps the variance of the considered factors and illustrates the Eigen values on the y-axis and the number of factors on the x-axis, respectively The downward curve slopes to the right, and the number of factors considered for the study is to be classified from the slope to the elbow point (Ledesma et al., 2015). For extracting interpretable factors, Varimax rotation, also known as Kaiser-Varimax rotation or Kaiser Normalization, was used. The factors with higher loadings are identified and labelled for each component (Weide and Beauducel, 2019).

3.3.3 Discriminant & Convergent Validity of the Model, CFA Model Fit

The loadings of the sub-scale dimensions that indicate the research's incorporated factors are shown in Tab. 3. The table indicates the factor strength and respective AVE ("average variance explained"), CR ("composite reliability"), and MSV ("maximum shared variance") measures, which are all in the acceptable range. The factor

Tab. 3: Discriminant and convergent validity measures (AMOS, SPSS)

Sub Scale Statements		Factor Loadings	CR	AVE	MSV	Alpha
Factor: Perceived Availability						
Source scale: Ritika and Kishor (2020); Siraji (2021); Salman et al. (2021); Hunguru et al. (2020)						
AV1	"I usually make an investment decision in these stocks that have more information available to me"	0.777	0.904	0.654	0.224	0.902
AV2	"When I invest in a certain company, then I relay information provided by brokers and friends"	0.813				
AV3	"I prefer to invest in well-known companies that have wider media coverage"	0.819				
AV4	"I consider the recent records of a security before investing"	0.792				
AV6	"While considering the track record of an investment, I put more weight on its recent performance"	0.794				
Factor: Perceived Herding						
Source scale: Raut and Kumar (2018); Ton and Dao (2014)						
HE1	"Before purchasing stocks, consultation with others (family, friends, or colleagues) is required"	0.832	0.889	0.616	0.101	0.890
HE2	"Information about transactions of foreign investors helps me in taking my portfolio decisions"	0.789				
HE4	"The best way to protect wealth is to do as others do in the share market"	0.822				
HE6	"Other investors' decisions of buying and selling of particular stocks have an impact on my investment decision"	0.779				
HE7	"Other investor's decision regarding the stock volume has an impact on my investment decision"	0.798				
Factor: ESG Consciousness						
Source scale: Inderst et al. (2012); self-developed questions						
ESG1	"I wish to invest in companies that care about the risk of climate change issues like global warming, the greenhouse effect"	0.786	0.895	0.635	0.205	0.801
ESG2	"I'm willing to share something with others without expecting anything direct and immediate in return"	0.791				
ESG3	"I wish to invest in companies that care about workplace health and the safety of the employees"	0.790				
ESG4	"I wish to invest in companies that care about the independence and accountability of board members"	0.771				
ESG6	"Companies should take responsibility for the planet and society"	0.763				
Factor: Gambler's Fallacy						
Source scale: Waweru et al. (2008); self-developed questions						
GA1	"I consider the continual rise of a stock's value as an indication that it will soon crash"	0.846	0.840	0.568	0.112	0.802
GA2	"I am normally able to anticipate the end of good or poor market returns in the stock market"	0.865				
GA4	"I avoid selling shares that have decreased in value as this is an indication that it is due for appreciation in the future"	0.858				

Sub Scale Statements		Factor Loadings	CR	AVE	MSV	Alpha
Factor: Regret Aversion *Source scale: Ritika and Kishor (2020); Baker et al. (2018)*						
AVS1	"When it comes to investment, no loss of capital (invested money) is more important than returns/profits"	0.769	0.920	0.694	0.040	0.928
AVS2	"I will not increase my investment when the market performance is poor"	0.806				
AVS3	"Holding loss-making investments for a longer time is more painful than disposing of profitable investments early"	0.770				
AVS4	"I avoid investing in profitable assets if I had incurred losses in similar investments in the past"	0.724				
Factor: Overconfidence *Source scale: Ritika and Kishor (2020); Metawa et al. (2018)*						
OC1	"I am aware of almost every major event in the share market"	0.870	0.934	0.746	0.129	0.849
OC2	"I am confident in my ability to make investment decisions better than others"	0.850				
OC3	"I keep the best stocks in my portfolio"	0.815				
OC4	"I trust my intuitions while making investment decisions"	0.840				
OC6	"I always feel optimistic about the future returns of my investments"	0.867				
Factor: Anchoring *Source scale: Hunguru et al. (2020); Shah et al. (2018)*						
ANH1	"I compare the current stock prices with their recent high and low prices to justify my stock purchase"	0.718	0.886	0.556	0.226	0.730
ANH2	"I use the stock purchase price as a reference point for trade"	0.747				
ANH3	"If a stock hits its year high, I will sell the stock immediately"	0.752				
ANH4	"I usually use the purchase price as a benchmark for a sell decision"	0.736				
Factor: Equity Investment Decision *Source scale: Shockey (2002); Mayfield et al. (2008); self-developed questions*						
INV1	"I would like continuing buying and selling shares in the stock market/exchange for the next few years"	0.827	0.897	0.634	0.204	0.831
INV3	"I prefer to invest in the stock exchange to other parallel markets such as housing, gold, currency, and so on"	0.813				
INV4	"Even in the case of temporary fluctuations in the stock market, I will not leave the market"	0.778				
INV6	"I often keep booking profits gained in the share market"	0.766				
INV7	"I would invest a larger sum of money in the stock"	0.784				
INV8	"I am a good observer of movements in stocks"	0.786				

Sub Scale Statements		Factor Loadings	CR	AVE	MSV	Alpha
Factor: Risk Perception *Source scale: Grima et al. (2021); Shah et al. (2018); Sindhu and Kumar (2014)*						
PR1	"As a person, I am open-minded, curious, open to new ideas, and creative"	0.777	0.906	0.656	0.227	0.802
PR2	"Any risk events that I experienced in my life had an effect on my current behavior and attitude toward those risks"	0.787				
PR4	"The more I know about risks the more I feel I have more control over the risks"	0.748				
PR6	"The higher an investment's yield or rate of return, the greater its associated risk"	0.801				
PR7	"The more familiar an investment, the less risky it is"	0.798				
PR9	"An investment that involves a great deal of risk is not really an investment but it is gambling"	0.808				
PR11	"The need to liquidate quickly prohibits me from considering riskier products"	0.813				
PR12	"I prefer to remain with an investment strategy that has known problems rather than take the risk of trying a new investment strategy that has unknown problems, even if the new investment strategy has great returns"	0.733				

loadings adjacent to the column of items in Tab. 3 represent the dimensional validity. The factor loadings range from a high of 0.87 for item statement "OC1" to a low of 0.718 for item statement "ANH1." Since every reported result is greater than 0.7, the significant reliability is confirmed (Kiliç et al., 2020). The value of each latent variable's Cronbach's α in the table is significantly above 0.70, the literature-recommended floor level, indicating composite reliability for the study (Chang and Zhu, 2020). The CR values vary from 0.84 to 0.93 and are securely above the suggested standard of being above 0.6. The AVE scores also satisfy the standardised recommendation of being greater than 0.5. Moreover, all nine constructs meet the criterion that the CR value must be greater than the AVE value. Thus, statistically, the constructs of the research work ensure convergent validity. All AVE values reported in the table are greater than 0.5 and above the MSV value, thereby confirming the discriminant validity of the study (Hair et al., 2006).

Confirmatory factor analysis was done to evaluate the measurement model's structural validity. Good model fit indices were shown by the CFA measure, which had the following values: χ^2 / df = 2.8, CFI = 0.95, GFI = 0.94, AGFI = 0.90, NFI = 0.93, and RMSEA = 0.03. The values are all well above the recommended benchmarks (Hair et al., 2006).

4 ANALYSIS & RESULTS

The assessment of structural linkages between the latent variables is considered crucial to determining the validity of the presumptive hypothesis and the appropriate evaluation of the cross-factor influence. The study of structural relationships among the relevant factors was carried out using the AMOS software. Fig. 3 shows the model validation of the selected biases for the study. The results showed that subconstructs: "availability bias", "gambler's

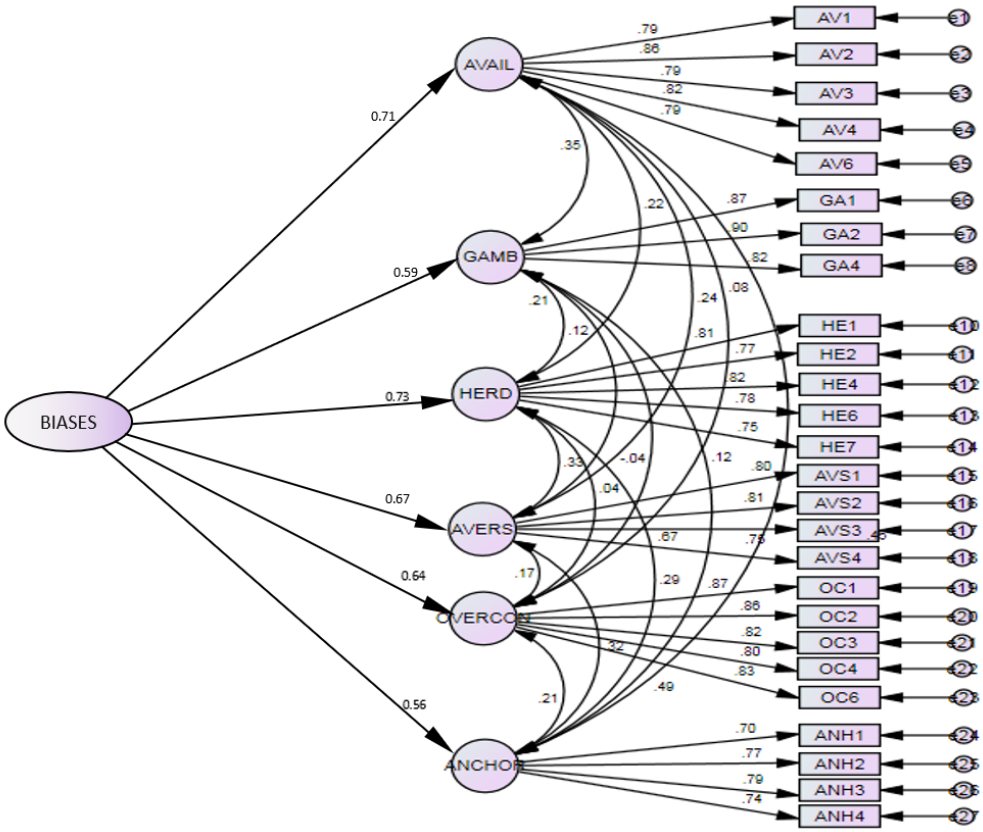

Fig. 3: Biases Model Validation (AMOS)

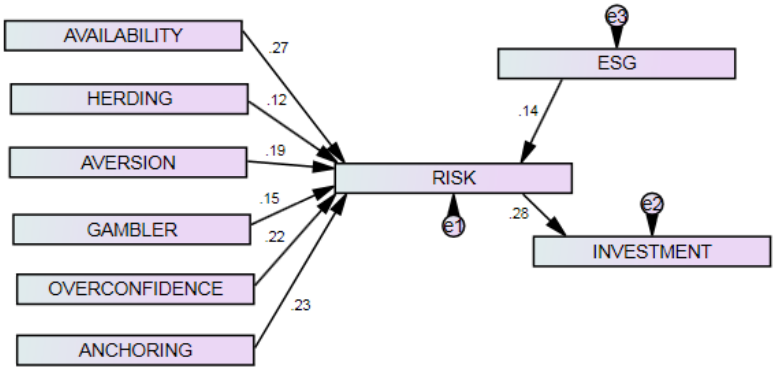

Fig. 4: Structural impact modeling (AMOS)

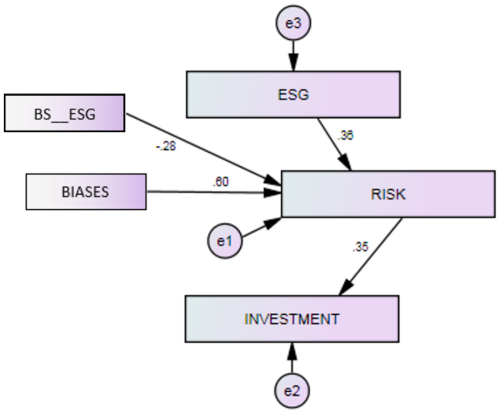

Fig. 5: Aggregate impact modelling with moderation emphasis of ESG (AMOS)

fallacy", "herding bias", "aversion bias", "overconfidence", and "anchoring bias" load properly on to the construct: "behavioral biases".

SEM modelling platform was used to accomplish the causal and path-based hypothesis testing, depicted in Fig. 4. The calculations revealed the incidence of "availability bias", "gambler's fallacy", "herding bias", "aversion bias", "overconfidence", and "anchoring bias" as exerting a considerable and statistically significant impact on risk perception, which further impacts the equity investment undertakings. Also, ESG consciousness is seen to be statistically related to the risk perception of the investors. The CR (critical ratio) in AMOS is the most observed basis for examination of the statistical significance of the structural equation modelling calculations. The most acceptable values for CR are ± 2.58. This establishes statistical significance at $p < 0.01$ levels of estimation. It is found that there is significant relationship across the construct of availability bias and risk perception (standardized estimates = 0.270, CR = 4.053). Hence H_1 stands vindicated. Also, the construct of herding was observed to lead to a significant impact in sense of risk perception (standardized estimates = 0.120, CR = 3.934). Hence H_2 stands vindicated. The research also observed that there is significant relationship across the construct of aversion bias and risk perception (standardized estimates = 0.190, CR = 4.789). Hence H_3 stands vindicated. In association, the construct of the gamblers' fallacy was observed to lead to a significant change in risk perception (standardized estimates = 0.150, CR = 2.82). Hence H_4 stands vindicated. The research also observed that there is a significant relationship between overconfidence bias and perceived risk of investors (standardized estimates = 0.220, CR = 4.095). Hence H_5 stands accepted. Likewise, hypothesis H_6 (standardized estimates = 0.230, CR = 4.039) stands accepted, implying that a statistically significant impact of anchoring tendencies on risk perception is seen among investors. Hypothesis H_7 stating that ESG consciousness and risk perceptions exhibited a statistically significant relationship is accepted (standardized estimates = 0.140, CR = 4.059). Similarly, risk perceptions and investment undertaking bear a statistically significant relation, thereby validating hypothesis H_8 (standardized estimates = 0.280, CR = 4.021). Further, the structural equation model in Amos shows that ESG consciousness work as a factor influencing risk perception, as well as a moderator between the perceived biases of investors and their risk perception (Fig. 5).

For examining the impact of ESG consciousness as the moderator between biases and risk perception, the interaction procedure is used (Hair et al., 2006). Interaction variables are created in SPSS by calculating the product of the independent and the moderator variable. First of all, the independent variable "Biases" and the moderating variable: ESG

Consciousness were standardized, and then the interaction term (BS_ESG) was calculated. The moderation was tested in AMOS by constructing a structured diagram. The path estimates are all statistically significant as calculated in Fig. 5 and Tab. 4. The aggregate 'biases' were observed as having a direct relationship with risk perception, whereas the interaction term exhibited a considerable negative moderation impact of 0.28 times. This shows that ESG investing consciousness negatively moderated the relationship between Biases and Risk perception. It shows that higher ESG consciousness weakens the positive relationship between investors' perceived biases and Risk perception.

Tab. 4: Moderating SEM outcomes

Path based relationships		Estimate
RISK	← BIASES	0.597***
RISK	← ESG	0.358***
RISK	← BS_ESG	−0.284**
INVESTMENT	← RISK	0.355***

Notes: *** signifies 1% level of significance; ** signifies 5% level of significance

5 DISCUSSION AND CONCLUSIONS

Irrationalities in financial decision-making and the further interaction between behavioural biases, risk perception and ESG investing consciousness is the core subject of this study. Though traditional finance calls for perfectionism and rationality in financial decision-making, yet the actual decision-making is always full of irrationality, abrasions, and deviations from the suggested and opinioned course of action. The results as observed echo the findings of earlier studies that vindicated that the human psyche has always been prone to deviations, distractions, and imbalance (Ady and Hidayat, 2019; Kahneman, 2013; Lazuarni and Asri, 2019; Hunguru et al., 2020).

The study, in line with other research works of Wangzhou et al. (2021), Weber (2004), Nguyen and Rozsa (2019) confirms that risk perception significantly impacts the equity investment decisions of investors and establishes significant link between the selected biases of the study and the perceived risk towards equity investment decisions. Forlani and Mullins (2000) examined perceived risk and found significant links with behavioral biases. Houghton et al. (2016) also concluded that risk perception mediated the relationship between cognitive biases and the decision to start a venture. Zhang et al. (2022) confirmed the mediation role of risk perception between cognitive biases on investment decisions. The study establishes that Availability bias has a significant effect on perceived risk on investments which is similar to the finding of Toshino and Suto (2004). Investors use mental shortcuts that relies on immediate examples that come to a given person's mind when undertaking decisions. Siegrist and Árvai (2020) too pointed out that people with availability bias are looking at the most recent risks. and might worry about the wrong risks. The study has also statistically vindicated that Herding behavior has an impact on investors' perception of risk and decision-making. Previous works like Huang et al. (2016), Ahmed et al. (2022) too pointed out that the major reason for herding behavior is low-risk propensity or risk avoidance of investors, and their want to minimize the risk of loss. Investors do not want to take the risk of investment and so follow the opinion/directions of others to have investment safety. The regret aversion tendency among retail investors is impacting the risk perception of investors, with statistical significance. The studies (Ady and Hidayat, 2019; Weber, 2004; Shah and Malik, 2021) too show that the anticipation of regret stimuluses behavior choice and can endorse risk-averse or risk-seeking propensities. When people regret a decision, either they take more risks, or they compel from risk, in order to prevent the pain of regret in the future. The research also confirms that gambler's fallacy transpires into investors equity decisions and their risk perception. Investors frequently keep holding onto declining equities and sell rising ones. They believe that outcomes in one direction make

the outcome in the contradictory direction more likely to occur, ultimately leading to the restoration of the equilibrium (Tversky and Kahneman, 1973). The fallacy has not much been discussed in yesteryear researches. Spurrier et al. (2014) pointed gambling fallacies to be etiologically related to the perception of risk, however with tenuous evidence. Wijayanti et al., (2019) concluded that the bias occurs during an uptrend because investors tend to avoid risk and during a downtrend because investors will be more risk-seekers. As elaborated by the existing literature of Ainia and Lutfi (2019) or Zahera and Bansal (2018), the phenomenon of investor's overconfidence is seen significantly to impact investors' perceived risk and their equity decisions. Ishfaq et al. (2017) mentioned the mediative role of risk perception between overconfidence and investment decisions. Broihanne et al. (2014) carried out the study in context of finance professionals, and found similar results of overconfidence and optimism influenced by risk perception. The phenomenon of "anchoring" bias has also been observed to be significantly related to the risk perceived by investors. This is again in line with literatures of Tversky and Kahneman (1973), Ritika and Kishor (2020), Costa et al. (2017), whereby evidences are seen that investors seek to evaluate the probabilities of wealth maximization and returns from the investments by extensive and unwise focus or reliance on only the first piece of advice or information, known as the 'anchor'. Zhang et al. (2022) provided evidences of relationship of anchoring bias through risk perception with investment decision undertaking.

The study here discusses the Indian perspective of the relevance of ESG investing consciousness, its relationship with the way risk is perceived by investors, and further its moderation impact on the relationship between the behavioural biases and the corresponding risk perception of equity investors. The findings indicate a statistically significant relationship between ESG consciousness and risk perception of investors. This aligns with the findings of a few limited studies in the same context which predicts that ESG investment decisions are stimulating investors to take up ethical investment practices, and also changing their perspective on the risk-return analysis (Park and Oh, 2022; Statman, 2020; Friede, 2019; Coulter and Malmqvist, 2021). Boffo and Patalano (2020) noted ESG ratings as a broader instrument serving investors as a tool for risk management. Yu et al. (2021) in their research work attributed that non-financial factors such as ESG plays a part in shaping how investors perceive the riskiness factor. When investors search for additional environmental information, there is a reduction in information asymmetry which can further lower investors' perceived risk for their investment undertaken. The current study also observed that ESG choices alter the way identifiable investors' biases can affect their perceived risk of investors. Empirical results show statistically significant negative moderation effect of ESG consciousness on the relationship between the selected biases for the study and investors' perceived risk. This indicates that higher ESG consciousness weakens the positive relationship between investors' perceived biases and Risk perception. Briehl (2022) pointed out that numerous individual characteristics contribute to the difference in behaviors between ESG conscious investors and conventional investors. According to Rosen et al. (1991), ESG investors are more educated and younger than ordinary investors and the general public, making them less likely to harbor biases. Similar to this, Tippet and Leung (2009) discovered that ethical investors in Australia are primarily women, who tend to be younger and better educated than conventional investors, but who also tend to have smaller, less diversified portfolios. Statman (2020) also pointed out that "plow-minded" investors, in return for emotional benefits, are prepared to sacrifice the utilitarian benefits of their portfolio returns, while, "banners-minded" investors are unwilling to sacrifice any utilitarian returns, in exchange for emotional benefits. Thus, ESG investing decisions reflects the behavioural aspects of the investors in various research works. The current study also observed that ESG choices often alter the way identifiable investors' biases can affect their perceived risk for equity investments.

6 LIMITATIONS AND FURTHER SCOPE

The research experienced limitations in terms of approach and selection of factors and variables for the study. For building the theoretical framework, the research relied only on the existing literature and the publications that surfaced with keyword searches. The choice of behavioral factors for the study could be a limitation in itself. Although the current research is based on a pan-national perspective, it suffers from limitations in terms of the time focus. The study was time bound yet a longitudinal perspective could have yielded better results and enabled mapping of influences over a larger time frame. Further research could be conducted for the other behavioral biases prospects observed across the retail investor. Also, the role of digital media and other external factors in shaping investors' cognitions for ESG investing leaves a further scope for research.

7 REFERENCES

Ady, S. U. and Hidayat, A. 2019. Do Young Surabaya's Investors Make Rational Investment Decisions? *International Journal of Scientific & Technology Research*, 8 (7), 319–322.

Ahmed, Z., Rasool, S., Saleem, Q., Khan, M. A. and Kanwal, S. 2022. Mediating Role of Risk Perception Between Behavioral Biases and Investor's Investment Decisions. *SAGE Open*, 12 (2). DOI: 10.1177/21582440221097394.

Ainia, N. S. N. and Lutfi, L. 2019. The Influence of Risk Perception, Risk Tolerance, Overconfidence, and Loss Aversion towards Investment Decision Making. *Journal of Economics, Business, & Accountancy Ventura*, 21 (3), 401–413. DOI: 10.14414/jebav.v21i3.1663.

Ajzen, I. and Fishbein, M. 1980. *Understanding Attitudes and Predicting Social Behavior*. 278 pp. Prentice-Hall. ISBN 978-0-13-936435-8.

Amel-Zadeh, A. and Serafeim, G. 2017. *Why and How Investors Use ESG Information*. Harvard Business School Working Paper No. 17-079.

Anderson, J. C. and Gerbing, D. W. 1988. Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach. *Psychological Bulletin*, 103 (3), 411–423. DOI: 10.1037/0033-2909.103.3.411.

Baker, H. K., Kumar, S., Goyal, N. and Gaur, V. 2018. How Financial Literacy and Demographic Variables Relate to Behavioral Biases. *Managerial Finance*, 45 (1), 124–146. DOI: 10.1108/MF-01-2018-0003.

Beal, D. J., Goyen, M. and Philips, P. 2005. Why Do We Invest Ethically? *The Journal of Investing Fall*, 14 (3), 66–78. DOI: 10.3905/joi.2005.580551.

Boffo, R. and Patalano, R. 2020. *ESG Investing: Practices, Progress and Challenges* [online]. OECD Paris. Available at: `http://www.oecd.org/finance/ESG-Investing-Practices-Progress-and-Challenges.pdf`.

Böhm, G. and Tanner, C. 2018. Environmental Risk Perception. In Steg, L. and de Groot, J. I. M. (eds.). *Environmental Psychology: An Introduction*, Chapter 2. 2nd ed. DOI: 10.1002/9781119241072.ch2.

Briehl, S. 2022. *Behavioral Biases in ESG Investing*. Master's Thesis. Munich: GRIN Verlag.

Broihanne, M., Merli, M. and Roger, P. 2014. Overconfidence, Risk Perception and the Risk-Taking Behavior of Finance Professionals. *Finance Research Letters*, 11 (2), 64–73. DOI: 10.1016/j.frl.2013.11.002.

Chang, Y. P. and Zhu, D. H. 2020. The Role of Perceived Social Capital and Flow Experience in Building Users' Continuance Intention to Social Networking Sites in China. *Computers in Human Behavior*, 28 (3), 995–1001. DOI: 10.1016/j.chb.2012.01.001.

Costa, D. F., de Melo Carvalho, F., de Melo Moreira, B. C. and do Prado, J. W. 2017. Bibliometric Analysis on the Association between Behavioral Finance and Decision Making with Cognitive Biases Such as Overconfidence, Anchoring Effect and Confirmation Bias. *Scientometrics*, 111, 1775–1799. DOI: 10.1007/s11192-017-2371-5.

Coulter, C. and Malmqvist, T. 2021. *Retail Investors' Views of ESG* [online]. GlobeScan Radar. Available at: `https://globescan.com/wp-content/uploads/2021/12/GlobeScan-Radar-2021-Retail_Investors_Views_of_ESG-Full-Report.pdf`.

D'Hondt, C., Merli, M. and Roger, T. 2022. What Drives Retail Portfolio Exposure to ESG Factors? *Finance Research Letters*, 46 (B), 102470. DOI: 10.1016/j.frl.2021.102470.

Daugaard, D. 2019. Emerging New Themes in Environmental, Social and Governance Investing: A Systematic Literature Review. *Accounting & Finance*, 60 (2), 1501–1530. DOI: 10.1111/acfi.12479.

Forlani, D. and Mullins, J. W. 2000. Perceived Risk and Choices in Entrepreneurs' New Venture Decisions. *Journal of Business Venturing*, 15 (4), 305–322. DOI: 10.1016/S0883-9026(98)00017-2.

Friede, G. 2019. Why Don't We See More Action? A Metasynthesis of the Investor Impediments to Integrate Envrionmental, Social and Governance Factors. *Business Strategy and the Environment*, 28 (6), 1260–1282. DOI: 10.1002/bse.2346.

Gajdošová, K. 2011. Socially Responsible Investment as a Trend in Investment Services in Europe. In *Proceedings of the 10th International Conference Liberec Economic Forum*, pp. 127–138.

Gosselin, P., Ladouceur, R., Evers, A., Laverdière, A., Routhier, S. and Tremblay-Picard, M. 2008. Evaluation of Intolerance of Uncertainty: Development and Validaiton of a New Self Report Measure. *Journal of Anxiety Disorders*, 22 (8), 1427–1439. DOI: 10.1016/j.janxdis.2008.02.005.

Grima, S., Hamarat, B., Özen, E., Girlando, A. and Dalli-Gonzi, R. 2021. The Relationship between Risk Perception and Risk Definition and Risk-Addressing Behavior during the Early COVID-19 Stages. *Journal of Risk and Financial Management*, 14 (6), 272. DOI: 10.3390/jrfm14060272.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E. and Tatham, R. 2006. *Multivariate Data Analysis*. 6th ed. Upper Saddle River, NJ: Pearson Prentice Hall.

Hohenberger, C., Lee, C. and Coughlin, J. F. 2019. Acceptance of Robo-Advisors: Effects of Financial Experience, Affective Reactions and Self-Enhancement Motives. *Financial Planning Review*, 2 (2), e1047. DOI: 10.1002/cfp2.1047.

Houghton, S. M., Simon, M., Aquino, K. and Goldberg, C. B. 2016. No Safety in Numbers: Persistence of Biases and Their Effects on Team Risk Perception and Team Decision Making. *Group & Organization Management*, 25 (4), 325–353. DOI: 10.1177/1059601100254002.

Hoyle, R. H. 1995. The Structural Equation Modeling Approach: Basic Concepts and Fundamental Issues. In Hoyle, R. H. (ed.). *Structural Equation Modeling: Concepts, Issues, and Applications*, pp. 1–15. Sage Publications.

Huang, T. C., Wu, C. C. and Lin, B. H. 2016. Institutional Herding and Risk–Return Relationship. *Journal of Business Research*, 69 (6), 2073–2080. DOI: 10.1016/j.jbusres.2015.12.011.

Hunguru, P., Sibanda, V. and Tadu, R. 2020. Determinants of Investment Decisions: A Study of Individual Investors on the Zimbabwe Stock Exchange. *Applied Economics and Finance*, 7 (5), 38–53. DOI: 10.11114/aef.v7i5.4927.

Inderst, G., Kaminker, C. and Stewart, F. 2012. *Defining and Measuring Green Investments: Implications for Institutional Investors' Asset Allocations*. OECD Working Paper on Finance, Insurance and Private Pensions No. 24.

Ishfaq, M., Maqbool, Z., Akram, S., Tariq, S. and Khurshid, M. K. 2017. Mediating Role of Risk Perception between Cognitive Biases and Risky Investment Decision: Empirical Evidence from Pakistan's Equity Market. *Journal of Managerial Sciences*, 11 (3), 265–278.

Jurevičienė, I. and Ivanova, O. 2013. Behavioural Finance: Theory and Survey. *Mokslas – Lietuvos Ateitis / Science – Future of Lithuania*, 5 (1), 53–58. DOI: 10.3846/mla.2013.08.

Kahneman, D. 2013. *Thinking, Fast and Slow*. 499 pp. Farrar, Straus and Giroux.

Kiliç, A., Uysal, I. and Atar, B. 2020. Comparison of Confirmatory Factor Analysis Estimation Methods on Binary Data. *International Journal of Assessment Tools in Education*, 7 (3), 451–487. DOI: 10.21449/ijate.660353.

Korteling, J. E., Brouwer, A. M. and Toet, A. 2018. A Neural Network Framework for Cognitive Bias. *Frontiers in Psychology*, 9, 1561. DOI: 10.3389/fpsyg.2018.01561.

Kumar, S. and Goyal, N. 2015. Behavioural Biases in Investment Decision Making – A Systematic Literature Review. *Qualitative Research in Financial Markets*, 7 (1), 88–108. DOI: 10.1108/QRFM-07-2014-0022.

Kvaran, T., Nichols, S. and Sanfey, A. 2013. The Effect of Analytic and Experiential Modes of Thought on Moral Judgment. In Chandrasekhar Pammi, V. S. and Srinivasan, N. (eds.). *Decision Making: Neural and Behavioural Approaches*, Chapter 11, pp. 187–196. Progress in Brain Research Book Series, Vol. 202. DOI: 10.1016/B978-0-444-62604-2.00011-3.

Lazuarni, S. and Asri, M. 2019. Does Heuristic Behavior Leave Anomalies in the Capital Market? *Journal of Indonesian Economy and Business*, 34 (3), 217–219. DOI: 10.22146/jieb.45652.

Ledesma, R. D., Valero-Mora, P. and Macbeth, G. 2015. The Scree Test and the Number of Factors: A Dynamic Graphics Approach. *The Spanish Journal of Psychology*, 18, E11. DOI: 10.1017/sjp.2015.13.

Lucarelli, C. and Brighetti, G. 2010. Biased or Unbiased Risk Tolerance in Financial Decision Making. In Fiordelisi, F., Molyneux, P. and Previati, D. (eds.). *New Issues in Financial and Credit Markets*, Chapter 14, pp. 184–199. DOI: 10.1057/9780230302181_15.

Masini, A. and Menichetti, E. 2013. Investment Decisions in the Renewable Energy Sector: An Analysis of Non-Financial Drivers. *Technological Forecasting and Social Change*, 80 (3), 510–524. DOI: 10.1016/j.techfore.2012.08.003.

Mayfield, C., Perdue, G. and Wooten, K. 2008. Investment Management and Personality Type. *Financial Services Review*, 17 (3), 219–236.

Metawa, N., Hassan, M. K., Metawa, S. and Safa, M. F. 2018. Impact of Behavioral Factors on Investors' Financial Decisions: Case of the Egyptian Stock Market. *International Journal of Islamic and Middle Eastern Finance and Management*, 12 (1), 30–55. DOI: 10.1108/IMEFM-12-2017-0333.

Montibeller, G. and von Winterfeldt, D. 2015. Cognitive and Motivational Biases in Decision and Risk Analysis. *Risk Analysis*, 35 (7), 1230–1251. DOI: 10.1111/risa.12360.

Mottola, G., Valdes, O. and Ganem, R. 2022. *Investors Say They Can Change the World, If They Only Knew How: Six Things to Know About ESG and Retail Investors*. Consumer Insights: Money & Investing. FINRA Investor Education Foundation.

Naveed, M., Ali, S., Iqbal, K. and Sohail, M. K. 2020. Role of Financial and Non-Financial Information in Determining Individual Investor Investment Decision: A Signaling Perspective. *South Asian Journal of Business Studies*, 9 (2), 261–278. DOI: 10.1108/SAJBS-09-2019-0168.

Neal, T., Lienert, P., Denne, E. and Singh, J. P. 2022. A General Model of Cognitive Bias in Human Judgment and Systematic Review Specific to Forensic Mental Health. *Law and Human Behavior*, 46 (2), 99–120. DOI: 10.1037/lhb0000482.

Nguyen, L., Gallery, G. and Newton, C. 2017. The Joint Influence of Financial Risk Perception and Risk Tolerance on Individual Investment Decision-Making. *Accounting & Finance*, 59 (S1), 747–771. DOI: 10.1111/acfi.12295.

Nguyen, T. A. N. and Rozsa, Z. 2019. Financial Literacy and Financial Advice Seeking for Retirement Investment Choice. *Journal of Competitiveness*, 11 (1), 70–83. DOI: 10.7441/joc.2019.01.05.

Nilsson, J. 2009. Segmenting Socially Responsible Mutual Fund Investors: The Influence of Financial Return and Social Responsibility. *International Journal of Bank Marketing*, 27 (1), 5–31. DOI: 10.1108/02652320910928218.

OECD. 2021. *ESG Investing and Climate Transition: Market Practices, Issues and Policy Considerations* [online]. Available at: `https://www.oecd.org/finance/ESG-investing-and-climatetransition-Market-practices-issues-and-policy-considerations.pdf`.

Park, S. R. and Oh, K.-S. 2022. Integration of ESG Information Into Individual Investors' Corporate Investment Decisions: Utilizing the UTAUT Framework. *Frontiers in Psychology*, 13, 899480. DOI: 10.3389/fpsyg.2022.899480.

Polman, P. and Winston, A. 2022. Yes, Investing in ESG Pays Off. *Harvard Business Review* [online]. Available at: `https://hbr.org/2022/04/yes-investing-in-esg-pays-off`.

Qin, J. 2015. A Model of Regret, Investor Behavior, and Market Turbulence. *Journal of Economic Theory*, 160, 150–174. DOI: 10.1016/j.jet.2015.08.010.

Raut, R. K. and Kumar, R. 2018. Investment Decision-Making Process between Different Groups of Investors: A Study of Indian Stock Market. *Asia-Pacific Journal of Management Research and Innovation*, 14 (1–2), 39–49. DOI: 10.1177/2319510X18813770.

Renneboog, L., Ter Horst, J. and Zhang, C. 2011. Is Ethical Money Financially Smart? Nonfinancial Attributes and Money Flows of Socially Responsible Investment Funds. *Journal of Financial Intermediation*, 20 (4), 562–588. DOI: 10.1016/j.jfi.2010.12.003.

Ricciardi, V. 2008. The Psychology of Risk: The Behavioral Finance Perspective. In Fabozzi, F. J. (ed.). *Handbook of Finance, Volume 2: Investment Management and Financial Management*, pp. 85–111. John Wiley & Sons.

Ritika and Kishor, N. 2020. Development and Validation of Behavioural Biases Scale: A SEM Approach. *Review of Behavioural Science*, 14 (2), 237–259. DOI: 10.1108/RBF-05-2020-0087.

Roesch, S. C. and Rowley, A. A. 2005. Evaluating and Developing a Multidimensional, Dispositional Measure of Appraisal. *Journal of Personality Assessment*, 85 (2), 188–196. DOI: 10.1207/s15327752jpa8502_11.

Rosen, B. N., Sandler, D. M. and Shani, D. 1991. Social Issues and Socially Responsible Investment Behavior: A Preliminary Empirical Investigation. *Journal of Consumer Affairs*, 25 (2), 221–234. DOI: 10.1111/j.1745-6606.1991.tb00003.x.

Salman, M., Khan, B., Khan, S. Z. and Khan, R. U. 2021. The Impact of Heuristic Availability Bias on Investment Decision-Making: Moderated Mediation Model. *Business Strategy and Development*, 4 (3), 246–257. DOI: 10.1002/bsd2.148.

Shah, I. and Malik, I. R. 2021. Role of Regret Aversion and Loss Aversion Emotional Biases in Determining Individual Investors' Trading Frequency: Moderating Effects of Risk Perception. *Humanities & Social Sciences Reviews*, 9 (3), 1373–1386. DOI: 10.18510/hssr.2021.93137.

Shah, S. Z. A., Ahmad, M. and Mahmood, F. 2018. Heuristic Biases in Investment Decision-Making and Perceived Market Efficiency: A Survey at the Pakistan Stock Exchange. *Qualitative Research in Financial Markets*, 10 (1), 85–110. DOI: 10.1108/QRFM-04-2017-0033.

Sharma, K. 2016. *Corporate Social Responsibility (CSR): An Overview of the Indian Perspective* [online]. Manupatra. Available at: `http://docs.manupatra.in/newsline/articles/Upload/35136B5C-B616-4D36-97E5-F54BB578E9E8.1-A__company.pdf`.

Shefrin, H. and Statman, M. 1994. Behavioral Capital Asset Pricing Theory. *Journal of Financial and Quantitative Analysis*, 29 (3), 323–349. DOI: 10.2307/2331334.

Shockey, S. S. 2002. *Low-Wealth Adults' Financial Literacy, Money Management Behaviors, and Associated Factors, Including Critical Thinking*. Diploma thesis. The Ohio State University.

Siegrist, M. and Árvai, J. 2020. Risk Perception: Reflections on 40 Years of Research. *Risk Analysis*, 40 (S1), 2191–2206. DOI: 10.1111/risa.13599.

Sindhu, K. P. and Kumar, S. R. 2014. Influence of Risk Perception of Investors on Investment Decisions: An Empirical Analysis. *Journal of Finance and Bank Management*, 2 (2), 15–25.

Siraji, M. 2021. Heuristics Bias and Investment Performance: Does Age Matter? Evidence from Colombo Stock Exchange. *Asian Journal of Economics, Business and Accounting*, 12 (4), 1–14. DOI: 10.9734/ajeba/2019/v12i430156.

Sivaramakrishnan, S., Srivastava, M. and Rastogi, A. 2017. Attitudinal Factors, Financial Literacy and Stock Market Participation. *International Journal of Bank Marketing*, 35 (5), 818–841. DOI: 10.1108/IJBM-01-2016-0012.

Spurrier, M., Blaszczynski, A. and Rhodes, P. 2014. Gambler Risk Perception: A Mental Model and Grounded Theory Analysis. *Journal of Gambling Studies*, 31 (3), 887–906. DOI: 10.1007/s10899-013-9439-9.

Statman, M. 2020. ESG as Waving Banners and as Pulling Plows. *The Journal of Portfolio Management*, 46 (3), 16–25. DOI: 10.3905/jpm.2020.46.3.016.

Stöckl, T., Huber, J., Kirchler, M. and Lindner, F. 2015. Hot Hand and Gambler's Fallacy in Teams: Evidence from Investment Experiments. *Journal of Economic Behavior & Organization*, 117, 327–339. DOI: 10.1016/j.jebo.2015.07.004.

Thaler, R. H., Sunstein, C. R. and Balz, J. P. 2013. Choice Architecture. In Shafir, E. (ed.). *The Behavioral Foundation of Public Policy*, Chapter 25, pp. 428–439. Princeton University Press. DOI: 10.1515/9781400845347-029.

Tippet, J. and Leung, P. 2009. Defining Ethical Investment and its Demography in Australia. *Australian Accounting Review*, 11 (25), 44–55. DOI: 10.1111/j.1835-2561.2002.tb00389.x.

Tomo, A. and Landi, G. 2017. Behavioral Issues for Sustainable Investment Decision-Making: A Literature Review. *International Journal of Business and Management*, 12 (1). DOI: 10.5539/ijbm.v12n1p1.

Ton, H. and Dao, T. 2014. The Effects of Psychology on Individual Investors' Behaviors: Evidence from the Vietnam Stock Exchange. *Journal of Management and Sustainability*, 4 (3), 125–134. DOI: 10.5539/jms.v4n3p125.

Toshino, M. and Suto, M. 2004. *Cognitive Biases of Japanese Institutional Investors: Consistency with Behavioral Finance*. Waseda University, Institute of Finance Working Paper Series No. WIF-04-005.

Tsagas, G. 2020. A Proposal for Reform of EU Member States' Corporate Governance Codes in Support of Sustainability. *Sustainability*, 12 (10), 4328. DOI: 10.3390/su12104328.

Tversky, A. and Kahneman, D. 1973. Availability: A Heuristic for Judging Frequency and Probability. *Cognitive Psychology*, 5 (2), 207–232. DOI: 10.1016/0010-0285(73)90033-9.

Vicente-Ortega Martínez, C. 2021. *ESG Investments and their Evolution During the COVID-19 Pandemic*. Final thesis. Universidad Pontifica Comillas, Facultad de Ciencias Humanas y Sociales.

Vogt, W. P. and Johnson, R. B. 2015. *The SAGE Dictionary of Statistics & Methodology: A Nontechnical Guide for the Social Sciences*. 5th ed. SAGE Publications.

Wangzhou, K., Khan, M., Hussain, S., Ishfaq, M. and Farooqi, R. 2021. Effect of Regret Aversion and Information Cascade on Investment Decisions in the Real Estate Sector: The Mediating Role of Risk Perception and the Moderating Effect of Financial Literacy. *Frontiers in Psychology*, 12, 736753. DOI: 10.3389/fpsyg.2021.736753.

Waweru, N. M., Munyoki, E. and Uliana, E. 2008. The Effects of Behavioural Factors in Investment Decision-Making: A Survey of Institutional Investors Operating at the Nairobi Stock Exchange. *International Journal of Business and Emerging Markets*, 1 (1), 24–41. DOI: 10.1504/IJBEM.2008.019243.

Weber, E. U. 2004. Perception Matters: Psychophysics for Economists. In Brocas, I. and Carrillo, J. D. (eds.). *The Psychology of Economic Decisions, Volume II: Reasons and Choices*, Chapter 9, pp. 163–176. Oxford University Press.

Weide, A. C. and Beauducel, A. 2019. Varimax Rotation Based on Gradient Projection. *Frontiers in Psychology*, 10, 645. DOI: 10.3389/fpsyg.2019.00645.

Wijayanti, D., Suganda, T. R. and Thewelis, F. S. 2019. Gambler's Fallacy as Behavioural Bias of Young Investor. *Journal of Business and Behavioural Entrepreneurship*, 3 (2), 72–80. DOI: 10.21009/JOBBE.003.2.05.

Williams, B., Onsman, A. and Brown, T. 2010. Exploratory Factor Analysis: A Five-Step Guide for Novices. *Journal of Emergency Primary Health Care*, 8 (3), 990399. DOI: 10.33151/ajp.8.3.93.

Yu, E. P., Tanda, A., Luu, B. V. and Chai, D. H. 2021. Environmental Transparency and Investors' Risk Perception: Cross-Country Evidence on Multinational Corporations' Sustainability Practices and Cost of Equity. *Business Strategy and the Environment*, 30 (8), 3975–4000. DOI: 10.1002/bse.2852.

Zahera, S. A. and Bansal, R. 2018. Do Investors Exhibit Behavioral Biases in Investment Decision Making? A Systematic Review. *Qualitiative Research in Financial Markets*, 10 (2), 210–251. DOI: 10.1108/QRFM-04-2017-0028.

Zhang, M., Nazir, M. S., Farooqi, R. and Ishfaq, M. 2022. Moderating Role of Information Asymmetry Between Cognitive Biases and Investment Decisions: A Mediating Effect of Risk Perception. *Frontiers in Psychology*, 13, 828956. DOI: 10.3389/fpsyg.2022.828956.

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FACTORS AFFECTING BEHAVIOURAL INTENTION TO USE MOBILE HEALTH APPLICATIONS AMONG OBESE PEOPLE IN MALAYSIA

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ABSTRACT

Obesity is a significant public health issue as it seems to be the cause for high blood pressure, diabetes and other health problems. The human body cannot function efficiently if it has high body mass index score. According to the National Health and Morbidity Survey (NHMS), people with BMI score of ≥ 25 are being categorized as obese. One way to control obesity is to rely on the help of technology such as mobile health applications. In literature, there is a lack in research addressing obese people's intention of using mobile health applications. Recognising the critical role of their behavioural intention to use mobile health applications, this research investigates the factors affecting behavioural intention to use mobile health applications. Adapting Consumer Acceptance Technology (CAT) model by Kulviwat et al. (2007) and Health Belief Model (HBM) developed by Glanz et al. (2008), this research examines factors of perceived cognition, perceived affection, perceived threat, compatibility, accessibility and attitude towards behavioural intention to use mobile health apps. To test the proposed framework, data were collected using quota sampling, while questionnaires were distributed to 500 obese people in the top 5 percent in the states with the obesity population in Malaysia, namely Malacca, Federal Territory of Putrajaya, Negeri Sembilan, Kedah and Perlis. Data collected were analysed using Partial Least Square (PLS) software. The results show that relationship between perceived cognition and perceived affection towards behavioural intention to use is partially significant, while significant relationship has been found between perceived threat, compatibility and accessibility and behavioural intention to use. Besides, perceived cognition and perceived affection partially support relationship on attitude. On the other hand perceived threat, compatibility and accessibility fully support relationship on attitude. Finally, the results demonstrate attitude partially mediates the relationship between perceived cognition and perceived affection, while attitude fully mediates the effect of perceived threat, compatibility, accessibility on behavioural intention to use. Findings provided empirical evidence on the collective effect of behavioural intention to use mobile health applications as well as independent effect of perceived cognition, perceived affection, perceived threat, compatibility and accessibility. Besides, findings suggested to encourage individual to use mobile health applications, while related stakeholders should continually improve user perception on health applications.

KEY WORDS

mobile health applications, obese people, behavioural intention to use, Malaysia

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1 INTRODUCTION

Since 2013, there is a high demand towards mobile health applications. However, statistics showed that the majority of unsatisfied mobile health applications users (58%) were due to several challenges. These include a host of matters, such as interrelated network between applications and hospital systems; health care monitoring by the professionals; mobility concept that enables consumers to do it by themselves (Research2Guidance, 2015); complement the physician-patient interaction particularly after being discharged from hospital; mobile health apps unreachable by those who are under high risk of getting disease (Alushi et al., 2022); privacy concern; lack of trust in government and perceived applications ineffectiveness (Gao et al., 2022) as well as lack of knowledge and benefits of the mobile health applications (Aldhahir et al., 2022).

Zooming into developed country such as the United States, almost 90% of physicians reported that they would suggest mobile health applications to be used by their patients, although only 30% have done so. This matter is primarily because of a lack of knowledge or ability to adequately assess a medical application's quality (Saxon, 2016).

Studies showed that advanced technology such as mobile health applications have a positive outcome for obese people in reducing weight and having a healthy lifestyle (Bakken et al., 2014; Barnett et al., 2015; Kim et al., 2014). In addition, studies showed that using smartphone applications is an efficient tool for weight loss management and behaviour change (Coughlin et al., 2016; Vlahu-Gjorgievska et al., 2018; Bt wan Mohamed Radzi et al., 2020; Arthurs et al., 2022). Therefore, it is undeniable that smartphone applications may help obese people to work for the ideal weight and reduce the risks of the disease.

With reference to Malaysia, the acceptance of mobile health application is at immature level of adoption (Lee et al., 2020). In the market, there are multiple applications available for health and fitness, for example Nike+ Run Club, Fitness for Weight Loss, Mi Fit, Running for Weight Loss and others. Those are applications that may give an opportunity for users to choose the functions that they needed, such as healthy diet and exercise. However, none of them has been specifically developed for obese people. In Malaysia, it is still unclear on utilization rates and the role of the mobile health applications in supporting the health management (Lee et al., 2020).

The Medical Journal of Malaysia reported that there is a gradually increasing percentage of obese people in Malaysia from 4.4% in 1996 to 17.7% in 2015 (Malaysian Medical Association, 2016), and the Indians is the ethnic group with the highest prevalence of the issue (27.7% in 2015). The statistics is rising every year that in 2019, up to 63.9% of Indian adults in Malaysia are overweight or obese (National Institutes of Health, 2019). People can do self-health monitoring and reduce this statistics through the use of mobile health applications. Individuals with obesity are exposed to diabetes, heart attack, high blood pressure and others (Ghee, 2016; Harous et al., 2018; Thorpe et al., 2004). Mobile health applications are the media that enables them to have a healthy lifestyle by self-monitoring system (Lim et al., 2011; Ramanathan et al., 2016).

In Malaysia, there are many studies related to health services (Maarop and Win, 2012; Zailani et al., 2014a, 2014b) and mobile devices services (Blebil et al., 2014; Faziharudean and Li-Ly, 2011; Kuo et al., 2013; Mahat et al., 2012). Unfortunately, there are limited studies which focused on mobile health applications among obese people (Qasim et al., 2015).

Many mobile health applications studies have been performed to promote a healthy lifestyle (Deng et al., 2014; Higgins, 2016; Ramanathan et al., 2016; Subramanian, 2015). However, the issue of low adoption rate and increasing number of people with obesity gives way to anxiety. A large number of prior studies have already examined behavioural intention to use mobile health. For example, a study by Lim et al. (2011) suggested that perceived usefulness and self-efficacy play a key role in predicting the in-

fluence intention to use mobile health. Deng et al. (2014) also indicated that perceived value's behavioural intention to use mobile health services could be influenced. Their study showed a significant effect between perceived value and behavioural intention among middle-aged and older consumers. However, few studies have directly or indirectly examined the relationship among four dimensions of perceived cognition, perceived affection, perceived threat, compatibility, and accessibility towards behavioural intention to use mobile health applications. For example, Dwivedi et al. (2016) discovered that perceived cognition and perceived affection are part of factors in mobile health adoption.

Specifically, the current mixed results and lack of evidence will have practitioners convinced that mobile health applications adoption will improve healthy lifestyles, especially for obese people. However, they did not cover the compatibility and accessibility elements, found to be important as elements to influence obese people to use mobile health applications. Many prior studies have already examined the relationships between perceived cognition and behavioural intention (Alam et al., 2020; Amicelle et al., 2012; Harris et al., 2016; Pai and Alathur, 2019). Meanwhile, it seems rare to find the study related to emotion as in perceived affection. In the well-known theory of Technology Acceptance Model (TAM), Davis (1989) did not cover the emotion part or perceived affection. According to Kulviwat et al. (2007) "the few studies that have incorporated affect have tended to measure a single emotion rather than modelling it comprehensively" (Kulviwat et al., 2007, p. 1059). Results from the review proposed that affection, as pleasure and arousal, can incredibly work on the prescient force of the TAM.

As such, the origin of Consumer Acceptance Technology (CAT) model developed by Kulviwat et al. (2007) showed that the intention to adopt technology and persuade the consumer to accept high-technology innovation is influenced by the cognitive and affective factors. However, researchers such as Chuah et al. (2016) as well as Hall et al. (2015) have taken a step further by using the study's CAT model for wearable technology and social media. The variables used in their research are similar, but slightly different from the current study. In this study, the researcher replicated the Consumer Acceptance Technology (CAT) model with extension of perceived threat, compatibility and accessibility as factors towards attitude and behavioural intention to use mobile health applications. Chuah et al. (2016) as well as Hall et al. (2015) focused on the cognitive and affective variables in their study, but they used different research tool than the study in hand, that is the smartwatch and social media, while the current research used mobile health applications.

Therefore, a more extensive research in this area is required to examine the intention to use mobile health applications, particularly among obese people. Besides, the current study also attended to fulfil the suggestion by Miah et al. (2017) on some issues with the healthcare accessibility. Hence, this study will have accessibility and compatibility as part of the factors towards behavioural intention to use.

The increasing percentage of obese people, theoretical gaps and the insufficient literature specifically on factors influencing behavioural intention to use mobile health applications in Malaysia have indeed captured the researchers' interest. Therefore, in this study, the researchers attempted to investigate the effect of perceived cognition, perceived affection, perceived threat, compatibility, accessibility and attitude towards behavioural intention to use mobile health applications.

2 THEORETICAL BACKGROUND AND RELATED WORK

The innovation of mobile phone is not only limited to the use of networking, but also the applications that have been available to be used for various aspects of health including weight management for obesity (Wang et al., 2017; Castelnuovo et al., 2014; Selvaraj and Sriram, 2022). Past researchers have focused on consumer behavioural intention to use mobile health apps in various health apps across different types of users (Gessa et al., 2020; Palos-Sanchez et al., 2021; Klaver et al., 2021; Schomakers et al., 2022). However, very limited study has been specifically focussed on behaviourial intention to use mobile health apps among obese people. Therefore, this research aims to determine factors that influence obese people's behavioural intention to use mobile health applications.

This research has integrated two underpinning models, namely Consumer Acceptance of Technology Model (CAT) developed by Kulviwat et al. (2007) and Health Belief Model (HBM) developed by Glanz et al. (2008). The integration of CAT Model and HBM were believed to provide new contribution to the existing theory and health informatics discipline. Due to that, the researchers proposed the following framework (Fig. 1).

Fig. 1 is being developed based on the integration of two underpinning theories which are Consumer Acceptance of Technology model (CAT; see Kulviwat et al., 2007) and Health Belief Model (HBM; see Glanz et al., 2008). Fig. 1 represents the proposed framework with independent variables (perceived cognition, perceived affection, perceived threat, compatibility and accessibility); mediating variable (attitude) and dependent variable (behavioural intention to use). The perceived cognition variable comprised three constructs that are perceived ease of use, perceived usefulness and relative advantage. The perceived affection variable comprised three constructs, namely pleasure arousal and dominance, while the perceived threat comprised two constructs, namely perceived susceptibility and perceived severity. The perceived cognition and perceived affection variables are derived from CAT model, while perceived threat is derived from HBM model.

The compatibility and accessibility variables are standalone independent variable without any constructs. These variables, compatibility and accessibility are two important ones that have been highlighted as important variable to be studied in the mobile health applications field, yet inconclusive findings were reported by past researchers, mainly compatibility (Devos et al., 2015; Wu et al., 2011) and accessibility (Miah et al., 2017). Thus, the researchers have included these two variables in the proposed framework above. These two variables, namely compatibility and accessibility are the novelty of the proposed framework (Fig. 1).

2.1 Hypotheses Development

2.1.1 Relationship between Perceived Cognition, Perceived Affection, Perceived Threat, Compatibility and Accessibility towards Behavioural Intention to Use

There is a consensus among social science fields that cognition has been covered by cognition and behavioural intentions to use technology. In Sharifi (2013), there is a positive relationship between cognition and behavioural intention. The result of his study revealed that cognition may influence the behavioural intention to use. Meanwhile, in the past study of Faziharudean and Li-Ly (2011), there is a significant positive influence between perceived ease of use and behavioural intention to use. On the other hand, Zhao et al. (2018) discovered that perceived usefulness and perceived ease of use have a significant effect on individual attitudes and have an influence on behavioural intention. Besides, there is a positive influence on the perceived usefulness and behavioural intention to use in the study of technology devices (Park and del Pobil, 2013) while Pai and Alathur (2019) as well as Wang et al. (2014) found inverse

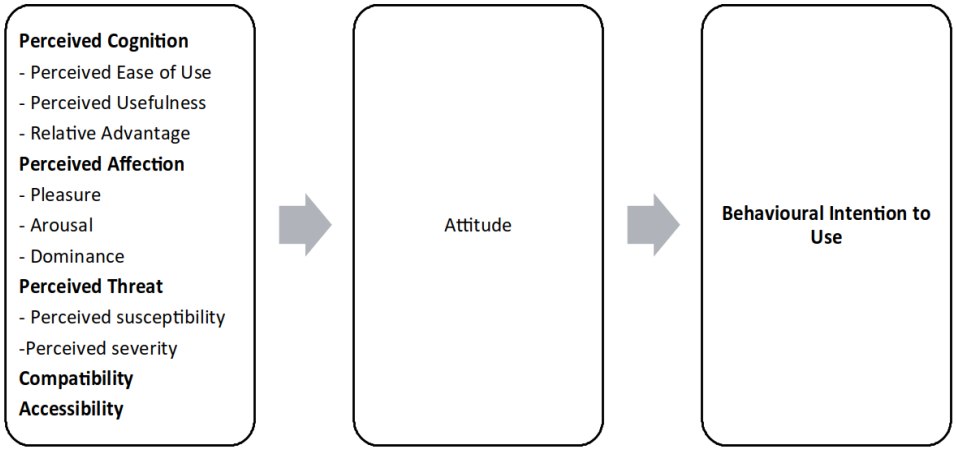

Fig. 1: The Proposed Framework

relationship between perceived usefulness and behavioural intention to use the technology.

In regards to the effect between perceived affection and behavioural intention to use, it was found that there is a positive relationship between cognition and behavioural intention to use. Still, a finding shows the perceived affection factor is more vital to influence behavioural intention (Sharifi, 2013).

Looking at the relationship between perceived threat and behavioural intention to use, the researchers measured perceived threat by looking at the perceived susceptibility and perceived severity (Wei et al., 2021). Past study defines perceived severity of an illness as an individual's assessment of whether the sickness causes harmful behaviour, either clinically or socially (Deng, 2013). If people are more vulnerable to health, they might consider utilising mobile health applications as a preventive step for health (Saunders et al., 2013).

In addition, past findings demonstrated that the perceived severity of disease had a significant effect on attitude, which significantly affects behavioural intention to utilise mobile health (Zhang et al., 2019; Karahoca et al., 2018). If a person understands their continuous poor behaviour, the suggested response is more likely to be taken to themselves (Lee and Chang, 2011). This matches earlier studies, which found that mobile health applications greatly impacted, especially on physical well-being. In line with previous research done in China, which discovered that individuals who see a bigger danger are also more likely to feel that fitness programmes are more beneficial.

In regards to the relationship between compatibility and behavioural intention to use, Ndayizigamiye and Maharaj (2017) examined the compatibility elements that influence the adoption of mobile health among healthcare professionals in East Africa. The majority of healthcare professionals agreed that to run everyday activities, compatibility of mobile health is required. The compatibility of mobile health helps them to perform their duty and organise their working style. The findings is also supported by research conducted by Meri et al. (2019), which found that compatibility is significant towards behavioural intentions in examining the cloud health information system. However, it does the opposite from the study by Shareef et al. (2014), that compatibility does not become significant with behavioural intention. Hence, through the study on the Internet of Things in health care, they found that the relationship between compatibility and behavioural intention does not support it (Karahoca et al., 2018).

In viewing the effect of accessibility towards behavioral intention to use, accessibility refers to access or entry into the health care applica-

tion (Aday and Andersen, 1974). In the work of Ye et al. (2019), the perspective of mobile health in China was found that the implementation of mobile health had a substantial influence on accessibility. Moreover, Pai and Alathur (2021) investigated the use of mobile phone-based healthcare solutions during the Covid-19 pandemic, and discovered that a lack of awareness, accessibility and an unwillingness to utilise the technology, complicated healthcare demands, application infrastructure, policies, and a lack of training and support impedes the successful use of this important tool. This has demonstrated that with public knowledge, accessibility, and acknowledgement of healthcare requirements, mobile health innovation is the solution to support a healthy lifestyle. Overcoming the difficulties such as accessibility of mobile health applications may encourage users to adopt mobile health applications and improve the response towards the coronavirus pandemic. Thus, the following hypothesis was formulated:

Hypothesis 1. Perceived cognition, perceived affection, perceived threat, compatibility and accessibility have significant positive effect on behavioural intention to use.

2.1.2 Relationship between Perceived Cognition, Perceived Affection, Perceived Threat, Compatibility and Accessibility towards Attitude

Looking at the relationship between perceived cognition and attitude, an individual believes a technology product or system tends to be more useful if it is easy to use and requires minimal effort (Davis, 1989; Davis and Venkatesh, 2004). In addition, in the study on technology adoption by Alsaleh and Thakur (2019), there is a significant relationship between perceived usefulness and attrition.

In regards to the relationship between perceived affection and attitude, in many countries throughout the world, the substantial effect of pleasure has been discovered on adopting high technology solutions (Hall et al., 2015; Huang et al., 2017; Kulviwat et al., 2007). Therefore, people worldwide with pleasure and joy utilisese new technology are likely to accept technology more positively than those with less pleasant affection. Next, in determining the success of domination, Kulviwat et al. (2007) and Nasco et al. (2008) discovered insignificant findings between dominance and technological acceptance. In another study, Alsaleh and Thakur (2019) reported that all pleasure, arousal and dominance are significant towards attitude.

With regard to the relationship between perceived threat and attitude, the health belief model introduced perceived threat with the elements of perceived susceptibility and perceived severity (Becker, 1974). Based on health behaviour theory, perceived susceptibility and perceived severity substantially influences attitude and emphasises the impact of threat assessments (Zhao et al., 2018). To some extent, the results appear to support the notion that the more seriously individuals regard their illnesses, the more likely they are to engage positively with the mobile health application (Zhang et al., 2019). The findings of their study found that there is a positive relationship between perceived severity and attitude. It shows that if people feel they have a more serious health risk, mobile health is more likely to be used as a precautionary for a health condition. In other words, it means perceived threat positively influences the attitude to use mobile health applications.

In terms of relationship between perceived compatibility and attitude, compatibility which is the degree to which innovation is perceived to be consistent with potential users' existing values, prior to experiences and needs (Rogers, 2003); it is one of the challenges or barriers that developers face to ensure the applications fulfil the consumer's requirements (Ahmad et al., 2018). They emphasised that the lack of tool support renders the applications incompatible and results in a failure in mobile application development. A study by Ndayizigamiye and Maharaj (2017) showed that compatibility is one element that influences them to use mobile health applications. Furthermore, attitude has the most impact on adopting any Internet of Things healthcare device and is the factor used to explain adoption intentions (Karahoca et al., 2018). In addition, another study shows compatibility is positively significant towards the attitude (Meri et al., 2019). Under such circum-

stances, mobile health applications may help to promote positive attitudes by performing specific roles among obese people in Malaysia.

In regards to the relationship between accessibility and attitude, even though there is no specific research in the context of mobile technology acceptance that referred direct relationship between accessibility and attitude (Harous et al., 2018; Lyzwinski et al., 2017), the latter agreed that one of the perceived benefits is the accessibility of mobile health applications, which could be shaping habits and behaviour. Harous et al. (2018) supported the study that accessibility of mobile health applications could influence the user to have and maintain a healthy lifestyle. Given this, it is further hypothesized that:

Hypothesis 2. Perceived cognition, perceived affection, perceived threat, compatibility, accessibility have significant positive effect on attitude.

2.1.3 Relationship between Attitude and Behavioural Intention to Use

In this research, the dependent variable is behavioural intention to use, being defined as a measure of an individual's likelihood of the behaviour indicated (Fishbein and Ajzen, 1975). While the attitude was positive, the consumer thought towards performing the target behaviour can be either positive or negative (Kulviwat et al., 2007). In the context of consumers, Kulviwat et al. (2007) highlighted that the attitude towards the intention to adopt technological advancement is completely mediated by social influence.

Hussein et al. (2017) discovered that attitude is associated with the intention to use mobile health. Moreover, there is a positive relationship between attitude and behavioural intention (Karahoca et al., 2018) in the adoption of healthcare product. In reviewing the conceptual work of Alsaleh and Thakur (2019), the structural model supported the hypothesis that attitude towards adopting an innovative technology was significantly related to the intention to use that technology. Therefore, the following hypothesis was formulated:

Hypothesis 3. Attitude has significant positive effect on behavioural intention to use.

2.1.4 The Mediation Effect between Attitude, Perceived Cognition, Perceived Affect, Perceived Threat, Compatibility, Accessibility and Behavioural Intention to Use

The perceived cognition variable (which is represented by the constructs of perceived usefulness, perceived ease of use and relative advantage) has been found in several prior studies. There is a significant positive relationship that has been found between the perceived usefulness of new Internet services and attitudes towards these services (Childers et al., 2001; Gentry and Calantone, 2002; Karahoca et al., 2018). Similarly, perceived usefulness has been found to have a positive impact on attitude towards using mobile Internet products (Bruner and Kumar, 2005; Lee et al., 2003; Kulviwat et al., 2007). Similarly, ease of use was found to have a direct and positive effect on attitude towards use of technological innovations (Childers et al., 2001; Dabholkar and Bagozzi, 2002; Gentry and Calantone, 2002; Karahoca et al., 2018). However, not all advantages are necessarily considered useful by consumers. Hence, usefulness partially mediates the effect of relative advantage on attitude towards adoption (Kulviwat et al., 2007).

The variable of perceived effect (pleasure, arousal and dominance), has also shown the positive effect on attitude and towards the adoption of technology. Besides, when operationalized as fun, it had a direct effect on attitude towards the use of handheld internet devices (Bruner and Kumar, 2005). Moreover, Igbaria and Parasuraman (1989) found that anxiety was the strongest predictor of negative attitude towards technology. In fact, the effect was even greater than that of the demographic and cognitive style variables examined (Kulviwat et al., 2007).

The variable of perceived threat (the constructs of perceived susceptibility and perceived severity) from the health belief model (Becker, 1974); would determine the positive effects on attitude towards using mobile health application. To some extent, the result seems to confirm with the statement that the more seriously people perceive the diseases, the more likely

they are to have positive engagement (Zhang et al., 2019) with mobile health applications.

In this study, the compatibility and accessibility variables (Fig. 1) were seen as a contribution to the integration of two models, namely Consumer Acceptance of Technology Model and Health Belief Model. The significance of accessibility and attitude variables has been shown by Ndayizigamiye and Maharaj (2017); Harous et al. (2018) and Lyzwinski et al. (2017).

Hypothesis 4. Attitude mediates relationship between perceived cognition, perceived affection, perceived threat, compatibility, accessibility and behavioural intention to use.

3 MATERIALS AND METHODS

Respondents were selected based on the following criteria, namely individual aged 18 and above (The National Health and Morbidity Survey, NHMS), owner of at least a smartphone, obese people with an obesity score of $\geq$ 25 (according to Asia Pacific guideline) on their body mass index (BMI). The selection of sample based on quota sampling was being exercised based on the five states in Malaysia with the highest number of obese people. The NHMS (Institute for Public Health, 2015) reported the highest percentage of states with obesity were Federal Territory of Putrajaya (43.0%), Malacca (36.0%), Perlis (36.0%), Negeri Sembilan (35.6%) and Kedah (33.2%).

Referring to the sample size, the researchers have chosen the Cohen (1988) formula as guidance on sample size for this research. The allocation of sample size for this study is depicted in Tab. 1.

Tab. 1: Total distribution of questionnaire across selected state

State	Total Distribution of Questionnaire
Federal Territory of Putrajaya	10
Malacca	105
Perlis	5
Negeri Sembilan	145
Kedah	235
Total	500

This study used survey as a tool to measure the data collected for the study. The structure of the questionnaire is shown in Tab. 2.

Tab. 2: Structure of questionnaire

Variable Name	Source
Perceived ease of use	Chuah et al. (2016); Kulviwat et al. (2007)
Perceived usefulness	Chuah et al. (2016); Kulviwat et al. (2007)
Relative advantage	Chuah et al. (2016); Kulviwat et al. (2007)
Pleasure	Chuah et al. (2016); Kulviwat et al. (2007)
Arousal	Chuah et al. (2016); Kulviwat et al. (2007)
Dominance	Chuah et al. (2016); Kulviwat et al. (2007)
Perceived susceptibility	Kim et al. (2012); Saunders et al. (2013)
Perceived severity	Kim et al. (2012); Saunders et al. (2013)
Compatibility	Atkinson (2007); Kim et al. (2010)
Accessibility	Hsu and Liao (2014)
Attitude	Chuah et al. (2016); Kulviwat et al. (2007)
Behavioural intention to use	Chuah et al. (2016); Kulviwat et al. (2007)

3.1 Ethical Approval

The study protocol was reviewed and approved by the Research Management Centre (RMC), Universiti Teknologi MARA (UiTM) with clearance number 600-IRMI (5/1/6). In addition, the permission to carry out data collection was granted by the National Medical Research Register (NMRR) Malaysia. This ethical consideration is used to safeguard the respondent's privacy. Each respondent must sign a consent form granting permission to conduct the survey and publish the results. The data can be used for this study after they have signed the consent form.

4 RESULTS

The first section of this research results deliberates on the profiling background of the respondents, while the second section discusses the major findings of hypotheses testing. Out of the 500 questionnaires distributed, 114 questionnaires were discarded due to either not returned or contained incomplete information (missing item). Thus, 386 questionnaires were further used and analysed for this research. Several reasons might explain the probability of not returning the questionnaires and missing items. In this study, the respondents were from the sensitive group of obesity and some of them were probably unaware of the importance of the research. Others might have felt threatened despite a brief explanation and ethical consideration consent was given.

4.1 Demographic Profile of Respondents

In the first section, namely profiling background of the respondents, as depicted in Tab. 3, it was found that majority of them are female counted at 227 (58.8%), between 30–39 years of age at 176 (45.6%). Besides, in relation to mobile health applications, majority of the respondents used mobile apps at least once in a week, accounted for 76 respondents (19.7%) and 339 respondents (87.8%) were aware that information can be accessed via mobile health applications.

4.2 Measurement Model

Overall, the composite reliability for every construct used in this research was high with values of 0.9 and above. All the indicators for behavioural intention to use demonstrated the highest value (0.974), followed by perceived usefulness (0.973). Other constructs also had a substantial amount in construct reliability. The details of each composite reliability are in Tab. 4. Besides, all constructs in this study achieved an average variance extracted (AVE) value higher than 0.5. The amount showed that

Tab. 3: Respondents' Demographic

		Frequency ($n = 386$)	**Percent (%)**
Gender	Male	159	41.2
	Female	227	58.8
Age	19–29	101	26.2
	30–39	176	45.6
	40–49	78	20.2
	50–59	30	7.8
	60 and above	1	0.3
Frequency using mobile health applications	Less than once in a week	71	18.6
	At least once in a week	76	19.7
	Three or four times in a week	56	13.2
	At least once a day	24	6.2
	Several times a day	8	2.1
	All-day long	6	1.6
	Never	150	38.9
Awareness health care information can be accessed via applications	Yes	339	87.8
	No	30	7.8
	Unknown	17	4.4

all the constructs used in this study met the standard of minimum convergent validity (Hair et al., 2016; Henseler et al., 2016). However, one item with loading below 0.7 value which is PSUS1 (0.528) was found; the researcher decided that such item should remain since the value was within 0.4 and 0.7.

Additionally, the convergent validity for the construct of perceived susceptibility was above 0.05 and it is valid to be used in the study (Hair et al., 2016). Tab. 4 shows the confirmatory factor analysis model which shows the assessment of internal consistency and convergent validity for the construct of perceived ease of use, perceived usefulness, relative advantage, pleasure, arousal, dominance, perceived susceptibility, perceived severity, compatibility, accessibility and attitude as the mediate variable and behavioural intention to use as the dependent variable.

Besides the confirmatory factor analysis model above, the discriminant validity test was conducted to ensure each construct is distinct from the other (Hair et al., 2016). Discriminant validity based on Heterotrait-Monotrait (HTMT) test (Hair et al., 2016; Henseler et al., 2016) was used which is obtainable in the PLS Algorithm procedure. The purpose of HTMT test is to ensure all the indicators are different from each other (Hair et al., 2016). Several authors have emphasised the measurement of HTMT value (Clark and Watson, 1995; Kline, 2015a) should be either below 0.85 or 0.9 (Clark and Watson, 1995; Gold et al., 2001; Kline, 2015b; Teo et al., 2008). These recommendations were reported to produce the best value, with high sensitivity for the validation value among every single indicator. However, Henseler et al. (2016) stated that when the HTMT value is less than 1, it is acceptable to show that the indicators are distinct from each other.

Tab. 5 represents the HTMT values of this study obtained from the procedure of the PLS Algorithm. The value of HTMT of each indicator was below 0.9. This situation indicates that all indicators of this study met the established discriminant validity standard value of HTMT.

4.3 Hypotheses Testing

Hypothesis 1. Perceived cognition, perceived affection, perceived threat, compatibility and accessibility has significant positive effect on behavioural intention to use.

Tab. 6 illustrates the hypothesis testing for hypothesis 1 that is perceived cognition, perceived affection, perceived threat, compatibility and accessibility have significant positive effect on behavioural intention to use. The results show that hypothesis 1 is partially supported. There are two elements which did not support relationship in this study. These elements are perceived usefulness and arousal that are not significant towards behavioural intention to use mobile health applications, while other elements are fully supported.

Hypothesis 2. Perceived cognition, perceived affection, perceived threat, compatibility, accessibility has significant positive effect on attitude.

As depicted in Tab. 7, based on the results, there are significant relationship between perceived ease of use (H_{2a}), relative advantage (H_{2c}), pleasure (H_{2d}), dominance (H_{2f}), perceived susceptibility (H_{2g}), perceived severity (H_{2h}), compatibility (H_{2i}) and accessibility (H_{2j}). However, this study also found that the relationship was insignificant between perceived usefulness and attitude (H_{2b}) and the relationship between arousal and attitude (H_{2e}).

Hypothesis 3. Attitude has significant positive effect on behavioural intention to use.

As shown in Tab. 8, the result revealed that attitude has a significant positive relationship with the behavioural intention to use (H_3). To some extent, the result seems to conform with the principle of CAT model, which highlights the attitude as playing a mediator role in the model (Kulviwat et al., 2007). This not only in CAT model, but also in several other theories and models, for instance, TAM (Davis, 1989), TRA (Fishbein and Ajzen, 1975) and others.

Hypothesis 4. Attitude mediate relationship between perceived cognition, perceived affection, perceived threat, compatibility, accessibility and behavioural intention to use.

Tab. 4: Confirmatory factor analysis model

Construct	Item	Loading	Composite Reliability (CR)	Average Variance Extracted (AVE)	Convergent Validity (AVE > 0.5)
Perceived Ease of Use	PEOU1	0.715	0.957	0.820	Yes
	PEOU2	0.953			
	PEOU3	0.976			
	PEOU4	0.913			
	PEOU5	0.947			
Perceived Usefulness	PU1	0.867	0.973	0.877	Yes
	PU2	0.927			
	PU3	0.923			
	PU4	0.975			
	PU5	0.987			
Relative Advantage	RA1	0.891	0.957	0.817	Yes
	RA2	0.903			
	RA3	0.941			
	RA4	0.901			
	RA5	0.881			
Pleasure	PL1	0.844	0.941	0.799	Yes
	PL2	0.875			
	PL3	0.886			
	PL4	0.967			
Arousal	AR1	0.778	0.947	0.818	Yes
	AR2	0.933			
	AR3	0.955			
	AR4	0.941			
Dominance	DO1	0.953	0.961	0.860	Yes
	DO2	0.968			
	DO3	0.961			
	DO4	0.819			
Perceived Susceptibility	PSUS1	0.528	0.952	0.807	Yes
	PSUS2	1.097			
	PSUS3	0.928			
	PSUS4	0.930			
	PSUS5	0.910			
Perceived Severity	PSEV1	0.809	0.928	0.764	Yes
	PSEV2	0.873			
	PSEV3	0.819			
	PSEV4	0.985			
Compatibility	COMP1	0.902	0.970	0.889	Yes
	COMP2	0.939			
	COMP3	0.967			
	COMP4	0.961			
Accessibility	ACC1	0.752	0.960	0.829	Yes
	ACC2	0.919			
	ACC3	0.889			
	ACC4	1.006			
	ACC5	0.967			
Attitude	ATT1	0.843	0.960	0.826	Yes
	ATT2	0.828			
	ATT3	0.951			
	ATT4	0.978			
	ATT5	0.934			
Behavioural Intention to Use	BI1	0.885	0.974	0.884	Yes
	BI2	0.955			
	BI3	0.981			
	BI4	0.908			
	BI5	0.969			

Note: Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Relative Advantage (RA), Pleasure (PL), Arousal (AR), Dominance (DO), Perceived Susceptibility (PSUS), Perceived Severity (PSEV), Compatibility (COMP), Accessibility (ACC), Behavioural Intention to Use (BI) and Attitude (ATT) as mediator.

Tab. 5: Heterotrait-Monotrait (HTMT)

	PEOU	PU	RA	PL	AR	DO	PSUS	PSEV	COMP	ACC	ATT	BI
PEOU	–											
PU	0.698	–										
RA	0.702	0.799	–									
PL	0.530	0.554	0.649	–								
AR	0.535	0.566	0.572	0.749	–							
DO	0.552	0.560	0.589	0.610	0.668	–						
PSUS	0.223	0.226	0.317	0.319	0.167	0.169	–					
PSEV	0.146	0.122	0.240	0.204	0.257	0.197	0.239	–				
COMP	0.466	0.461	0.486	0.471	0.453	0.468	0.269	0.243	–			
ACC	0.527	0.517	0.610	0.476	0.453	0.459	0.262	0.194	0.674	–		
ATT	0.474	0.477	0.521	0.428	0.409	0.398	0.212	0.317	0.468	0.611	–	
BI	0.405	0.472	0.512	0.468	0.447	0.419	0.230	0.335	0.507	0.623	0.826	–

Note: Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Relative Advantage (RA), Pleasure (PL), Arousal (AR), Dominance (DO), Perceived Susceptibility (PSUS), Perceived Severity (PSEV), Compatibility (COMP), Accessibility (ACC), Behavioural Intention to Use (BI) and Attitude (ATT) as mediator.

Tab. 6: Path Coefficient Assessment between Perceived Cognition, Perceived Affection, Perceived Threat, Compatibility, Accessibility and Behavioural Intention to Use

Hypothesis	Relationship	Std. Beta	Std. Error	T-Value	Decision
H_{1a}	PEOU → BI	0.147	0.065	2.238*	Supported
H_{1b}	PU → BI	0.075	0.066	1.141	Not Supported
H_{1c}	RA → BI	0.241	0.071	3.393**	Supported
H_{1d}	PL → BI	0.176	0.062	2.815**	Supported
H_{1e}	AR → BI	0.090	0.069	1.293	Not Supported
H_{1f}	DO → BI	0.135	0.051	2.647**	Supported
H_{1g}	PSUS → BI	0.120	0.048	2.513*	Supported
H_{1h}	PSEV → BI	0.222	0.043	5.209**	Supported
H_{1i}	COMP → BI	0.357	0.045	7.936**	Supported
H_{1j}	ACC → BI	0.436	0.057	7.650**	Supported

Notes: ** $p < 0.01$, * $p < 0.05$. Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Relative Advantage (RA), Pleasure (PL), Arousal (AR), Dominance (DO), Perceived Susceptibility (PSUS), Perceived Severity (PSEV), Compatibility (COMP), Accessibility (ACC), Attitude (ATT) and Behavioural Intention to Use (BI)

The result in Tab. 9 showed the mediation result that were formulated via bootstrapping analysis using the Smart-PLS software. Majority of the indicators of hypotheses shows the result as expected, except for the hypothesis H_{4c} (RA → ATT → BI) and hypothesis H_{4e} (AR → ATT → BI) which were not supported. Besides, another important analysis which are important in this study were assessing the level of R-square (R^2), f-square (f^2), effect size and predictive relevance (Q^2).

Tab. 10 shows that the R-square for mediating variable (attitude) and dependent variable (behavioural intention to use) was 0.456 and 0.730, respectively. Thus, it shows that the results were exogenous constructs which explained 73.7% of the total variance in behavioural intention to use mobile health applications. In addition, in Tab. 8 the outcome of predictive relevance Q^2 shows the attitude with 0.362 while behavioural intention to use was 0.621. The result was higher than 0.000, thus it indicated that exogenous construct has predictive relevance over endogenous construct.

Tab. 7: Path Coefficient Assessment between Perceived Cognition, Perceived Affection, Perceived Threat, Compatibility, Accessibility and Attitude

Hypothesis	Relationship	Std. Beta	Std. Error	T-Value	Decision
H_{2a}	PEOU → ATT	0.189	0.084	2.257*	Supported
H_{2b}	PU → ATT	0.097	0.088	1.098	Not Supported
H_{2c}	RA → ATT	0.310	0.093	3.325**	Supported
H_{2d}	PL → ATT	0.232	0.089	2.605**	Supported
H_{2e}	AR → ATT	0.118	0.103	1.152	Not Supported
H_{2f}	DO → ATT	0.178	0.063	2.823**	Supported
H_{2g}	PSUS → ATT	0.151	0.062	2.440*	Supported
H_{2h}	PSEV → ATT	0.279	0.056	5.008**	Supported
H_{2i}	COMP → ATT	0.471	0.051	9.282**	Supported
H_{2j}	ACC → ATT	0.612	0.054	11.317**	Supported

Notes: ** $p < 0.01$, * $p < 0.05$. Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Relative Advantage (RA), Pleasure (PL), Arousal (AR), Dominance (DO), Perceived Susceptibility (PSUS), Perceived Severity (PSEV), Compatibility (COMP), Accessibility (ACC), Attitude (ATT) and Behavioural Intention to Use (BI)

Tab. 8: Path Coefficient Assessment between Attitude and Behavioural Intention to Use

Hypothesis	Relationship	Std. Beta	Std. Error	T-Value	Decision
H_3	ATT → BI	0.675	0.069	9.771**	Supported

Notes: ** $p < 0.01$, * $p < 0.05$. Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Relative Advantage (RA), Pleasure (PL), Arousal (AR), Dominance (DO), Perceived Susceptibility (PSUS), Perceived Severity (PSEV), Compatibility (COMP), Accessibility (ACC), Attitude (ATT) and Behavioural Intention to Use (BI)

Tab. 9: Mediation Effects using the Bootstrapping Analysis

Hypothesis	Relationship	Std. Beta	Std. Error	T-Value	Decision
H_{4a}	PEOU → ATT → BI	0.241	0.073	3.294**	Supported
H_{4b}	PU → ATT → BI	0.147	0.064	2.284*	Supported
H_{4c}	RA → ATT → BI	0.075	0.071	1.054	Not Supported
H_{4d}	PL → ATT → BI	0.176	0.068	2.601**	Supported
H_{4e}	AR → ATT → BI	0.090	0.078	1.155	Not Supported
H_{4f}	DO → ATT → BI	0.135	0.049	2.755**	Supported
H_{4g}	PSUS → ATT → BI	0.222	0.043	5.209**	Supported
H_{4h}	PSEV → ATT → BI	0.120	0.048	2.513*	Supported
H_{4i}	COMP → ATT → BI	0.357	0.045	7.936**	Supported
H_{4j}	ACC → ATT → BI	0.436	0.057	7.650**	Supported

Notes: ** $p < 0.01$, * $p < 0.05$. Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Relative Advantage (RA), Pleasure (PL), Arousal (AR), Dominance (DO), Perceived Susceptibility (PSUS), Perceived Severity (PSEV), Compatibility (COMP), Accessibility (ACC), Attitude (ATT) and Behavioural Intention to Use (BI)

Tab. 10: Strength of the Mediating and Dependent Effect based on Cohen's (1988) and Henseler et al. (2016) Guidelines

	R-Square (R^2)				
Construct	Included	Excluded	f-Square (f^2)	Effect Size	Predictive Relevance (Q^2)
Attitude	0.456	0.442	0.918	Large	0.362
Behavioural Intention to Use	0.730	0.722	–	–	0.621

Notes: For interpretation of R^2, 0.75 is substantial, 0.50 is moderate, and 0.25 is weak. For interpretation of effect size, 0.02 and above – small effect size, 0.15 and above – medium and 0.35 and above as large effect (Cohen, 1988; Hair et al, 2014). For interpretation of Q^2, a value larger than 0 indicate the exogenous construct has predictive relevance over endogenous construct.

5 DISCUSSION

Hypothesis 1. Perceived cognition, perceived affection, perceived threat, compatibility and accessibility has significant positive effect on behavioural intention to use.

The findings indicated that perceived ease of use have significant effect towards behavioural intention to use mobile health apps, thus supported hypothesis H_{1a}. This findings are in line with past studies of Faziharudean and Li-Ly (2011) and Zhao et al. (2018).

Interestingly, this study identified that the direct effect of perceived usefulness and behavioural intention to use (H1b) was insignificant and these are in line with the work of (Karahoca et al., 2018; Pai and Alathur, 2019; Wang et al., 2014). However, these findings contradict with the study of Park and del Pobil (2013) and Alsaleh and Thakur (2019) on technology innovation, showed a positive relationship between perceived usefulness and behavioural intention to use. This outcome indicates that when it comes to behavioural intention to use mobile health applications, healthcare practitioner plays a more important role than perceived usefulness. Traditionally, only the care that takes place in the physical clinic or hospital is required by the health provider. However, today they must take care of patients within the hospital and their patients who use their services online (Alweshail and Brahim, 2020). With the help of mobile health applications, the health care practitioners could trace the patients' health background and the assessment they undergo. For instance, relating to the issues of the Covid-19 pandemic, mobile health applications help health workers to trace individual assessments quickly (Wei et al., 2021). The mobile health applications provided the patients' background and encouraged communication among healthcare workers (Hussein, 2018; Alweshail and Brahim, 2020).

The reason behind this is due to a digital solution which has been recommended by the professionals (Pai and Alathur, 2019), whereby the specification and requirement are preferably developed based on their own preferences. Therefore, the mutual understanding between patient or users and health practitioners are needed, and for the public, they need guidance on ways to use it. For example, when the software developer understands the challenges and issues that the patients and health care workers are facing in adopting to the use of the mobile health applications, they could provide the most appropriate solutions in applications that are suitable to meet their consumers' needs to implement the mobile health applications successfully (Hoque and Sorwar, 2017).

As noted earlier, the result indicated that hypothesis relative advantage (H_{1c}) have a significant effect towards behavioural intention to use. From the data analysis, there was a significant positive relationship between relative advantage and behavioural intention to use, which is parallel with the study by Butcher et al. (2012). Hence, it shows that the majority of obese people who are exposed to mobile health applications believe that the application would be beneficial to their everyday lives. For example, the advancements in mobile health applications would allow patients, or consumers like obese people, to access their medical health information quicker than ever before (Balapour et al., 2019; Chen et al., 2018; Choi et al., 2020; Naddeo et al., 2017). In the case of an emergency, consumers or obese people often need immediate help. They can use the mobile health applications to learn or seek information. Additionally, smartphone-compatible healthcare applications might aid in facilitating consumers' continuous healthcare, as it can be monitored remotely (Balapour et al., 2019; Chen et al., 2018; Choi et al., 2020; Naddeo et al., 2017).

In addition, it makes it easy to track their symptoms and the effectiveness of the medications if the individuals are on a prescribed or pharmaceutical therapy. Individuals who have to regulate their non-communicable diseases should also have regular self-monitoring. Non-communicable illnesses (hypertension, obesity, anaemia, dengue, handicapped) are diseases that cannot be

transmitted by traditional means of infection. A report by the Ministry of Health Malaysia, non-communicable diseases, risk factors and other health problems have been monitored periodically. In other words, it is advised that an individual with a non-communicable disease, like obesity and being overweight, should utilise mobile health applications. Dounavi and Tsoumani (2019) have agreed that individuals who self-monitored using mobile health applications regularly and accordingly could lose weight and live a healthy lifestyle.

Accordingly, the results indicated that perceived affection towards behavioural intention is partially supported (H_1). The variable of pleasure and dominance have significant positive effects on the behavioural intention to use, thus supporting H_{1d} and H_{1f}. Despite that, the relationship of arousal towards intention to use was not significant (H_{1e}). Thus, the results are slightly different from the study by Sharifi (2013), which showed the relationship of perceived affection is stronger than perceived cognition towards the behavioural intention to use.

As expected, pleasure has a significant positive relationship towards behavioural intention to use, which is similar to findings in a few studies (Demangeot and Broderick, 2010; Kulviwat et al., 2007; Sharifi, 2013), and supported the hypothesis H_{1d}. The result is also in tandem with the CAT model (Kulviwat et al., 2007), indicating that pleasure influenced technology adoption. It does describe that obese people's attitudes towards behavioural intention to use mobile health applications are positively influenced if they are happy and pleased about a high technology mobile intervention.

However, this study has produced an insignificant relationship between arousal and behavioural intention to use mobile health applications (rejected hypothesis H_{1e}). These findings contradict the CAT model (Kulviwat et al., 2007), which reported a significant relationship between arousal and intention to use. There are several reasons why obese people might feel less aroused when considering mobile health applications owing to a few barriers and these being more interesting than other types of technology. Some of the obstacles are limited regulation, lack of trust, sensitive personal information (privacy), and the security of the users' information. They might feel that the information requires to be safeguarded, which are reasons that merit caution and become barriers for the consumers to use mobile health applications (Kao and Liebovitz, 2017). These barriers will indirectly impact their attitude towards the use of mobile health applications.

In addition, the findings showed that dominance produced a significant effect to the behavioural intention to use mobile health applications and accepted hypothesis H_{1f}. The result contradicts the underpinning model which shows insignificant dominance towards intention to use (Kulviwat et al., 2007). The possibility that dominance influences the behavioural intention to use mobile health applications is because the obese people in this study own at least a smartphone, and the applications are well-known to them, compared to the study by Kulviwat et al. (2007), which focused on high technology innovation.

Overall, this result is closely similar and supports the study of Huang et al. (2017), which reported that pleasure and dominance are significant towards behavioural intention to use technology innovation. For instance, when users use mobile health applications, they might probably feel the happiness and excitement from the functions and services provided by the applications. These messages of good emotion would encourage their intentional behaviour towards the use of mobile health applications.

In addition, the results revealed that perceived susceptibility and perceived severity had positive significant effects on behavioural intention to use. To a certain extent, these results support previous research (Saunders et al., 2013) by demonstrating a direct relationship between perceived susceptibility, perceived severity and behavioural intention to use. The findings supported hypotheses H_{1g} and H_{1h}.

There has been a significant effect between perceived susceptibility and behavioural intention to use (hypothesis H_{1g}). The results are also similar to the study findings by Saunders et al. (2013) related to health behaviour. It does show that obese people thought their condition

would develop into a more severe situation in the future. They became worried about their obese state, and if there was no action or a lack of efforts in taking care of their health, it may negatively affect their lifestyle.

There was also a significant effect between perceived severity and behavioural intention to use, confirming hypothesis H_{1h}. This study confirmed the results of previous studies that showed a significant relationship between perceived severity and behavioural intention to use mobile health by (Zhang et al., 2019) in China. Indirectly, the applicability of health behaviour theory has been verified in the context of mobile health application adoption, specifically among patients of non-communicative diseases like obesity. Based on the findings in this study, it could be suggested that when someone recognises his habitual lousy behaviour, it is more likely that they will see the advice as a threat.

Looking at the element of compatibility, the findings support prior studies which showed a positive relationship between compatibility and behavioural intention to use (H_{1i}), such as the study by Meri et al. (2019). Nevertheless, there have also been initial studies which found negative or non-significant relationships between compatibility and behavioural intention to use (Karahoca et al., 2018; Shareef et al., 2014).

In seeing that compatibility constructs have a significantly positive influence on the behavioural intention to use mobile health applications, the result of the study is in line with prior research by Ndayizigamiye and Maharaj (2017) that have examined mobile health among health care professionals. In addition, the findings also support the study of Meri et al. (2019), having brought compatibility from a different view of health innovation technology, which is using cloud health information systems. Hence, mobile health applications innovation should be compatible with the needs of obese people to ensure successful implementation of interventions.

Based on data analysis conducted, it revealed a significant positive relationship between accessibility and behavioural intention to use mobile health applications, and this supported hypothesis H_{1j}. This result is consistent with the study by Ye et al. (2019) that reported a significant relationship between accessibility and behavioural intention to use mobile health.

One of the possible reasons obese people intend to use mobile health applications is when the chances to access health information are difficult to retrieve physically. Therefore, they choose to use mobile health applications as a solution to access the information quickly and fulfil their needs. In the study by Ye et al. (2019), they have found that patients who find difficulty to receive health services are the potential consumers to use mobile health applications, compared to those who have easy access to medical resources. For example, if they are living nearby a hospital or healthcare service centre, the patient would prefer to go to the centre first, instead of receiving health information via mobile health applications.

Overall, the findings demonstrated that perceived cognition, perceived affection, perceived threat, compatibility and accessibility would act as important constructs to influence behavioural intention to use mobile health applications.

Hypothesis 2. Perceived cognition, perceived affection, perceived threat, compatibility and accessibility have significant positive effect on attitude.

This study attempted to ascertain that perceived ease of use positively affects the attitude in the use of mobile health applications context (H_{2a}). Based on the results, the relationship was directly supported, and previous research in almost similar contexts also showed a significant relationship between perceived ease of use and attitude (Karahoca et al., 2018).

However, there is insignificant relationship between perceived usefulness and attitude (H_{2b}), which contradicts with the findings of prior research by Karahoca et al. (2018) as well as Alsaleh and Thakur (2019). One possible reason for this result to reveal differently may be that these obese people believe that there is an advantage in using the mobile health applications. However, they are still in doubt on the functions of such mobile health applications themselves.

In another, the variable of relative advantage had a significant positive relationship with the attitude construct (H_{2c}). This result reflected that obese Malaysians do believe in the innovativeness of alternative ways towards the use of mobile health applications.

It was also found that there was a significant positive relationship between pleasure and attitude (H_{2d}). The finding may be attributed to the underpinning CAT model, which found a substantial relationship between pleasure and attitude (Kulviwat et al., 2007).

Furthermore, insignificant results were also found between arousal and attitude (H_{2e}) in this study. However, the results do not seem to be consistent with previous studies (Alsaleh and Thakur, 2019; Kulviwat et al., 2007). Meanwhile, it was supported by the study conducted by Kulviwat et al. (2016) that shows arousal is moderately low in reliability. The result might give a description of respondents that are quite calm and inactivite towards positive attitude.

Besides, the findings indicated that dominance has a significantly positive relationship with attitude (H_{2f}); and this result supported a prior study by Alsaleh and Thakur (2019), but contradicts with the findings of Kulviwat et al. (2007).

When a mobile health application excites an individual, it favourably influences his view about adoption. The study results suggested that technology is difficult enough to produce a greater degree of dominance-related feelings. These findings were in line with Alsaleh and Thakur's (2019) research which used the same CAT Model (Kulviwat et al., 2007) and discovered similar findings with the researchers, mainly dominance significantly affects the attitude towards high-technology adoption.

In another, the perceived threat (with the construct of perceived susceptibility and perceived severity) result revealed that both constructs have a significant positive relationship with attitude (H_{2g} and H_{2h}). Accordingly, the result implies that perceived threat (perceived susceptibility and perceived severity) from the Health Belief Model (Becker, 1974), would determine the positive effects on attitude towards using mobile health application. To some extent, the result seems to conform with the statement that the more seriously people perceive their diseases, the more likely they are to have positive engagement (Zhang et al., 2019) with mobile health applications.

Besides, the findings revealed a positive and significant relationship between compatibility and attitude (H_{2i}) among obese people towards their behavioural intention to use mobile health applications. These results are consistent with those found in the study by Ndayizigamiye and Maharaj (2017). In mobile health applications, a minor study has focused on a direct relationship between compatibility and attitude. The attitudes of healthcare consumers and providers were found to be the primary determinants of adoption intentions while using healthcare devices (Karahoca et al., 2018). Perhaps, when the attitude is positive, the potential of adopting any technology innovation also has a more significant impact.

In another, the finding from this study also showed significant relationship between accessibility and attitude (H_{2j}), thus hypothesis H_{2j} was supported. In addition, it shows that technology acceptance, such as mobile health applications, could be significant with accessibility as an independent variable. The possible reason it happens is that some mobile health applications are premium-based applications. However, in this study, the subjects were obese people. Therefore, some applications that have been designed specifically for obese people are limited.

Hypothesis 3. Attitude has significant positive effect on behavioural intention to use.

Few studies have embarked on demonstrating the interrelationships between attitude and behavioural intention (Karahoca et al., 2018; Zhang et al., 2019). The result revealed that attitude has a significant positive relationship with the behavioural intention to use (hypothesis H_3). To some extent, the result seems to conform with Consumer Acceptance of Technology (CAT) model, which highlights attitude to play mediator role in the model (Kulviwat et al., 2007). Not only in the CAT model, but also several other theories and

models. For instance, Technology Acceptance Model (Davis, 1989), Theory of Reason Action (Fishbein and Ajzen, 1975) and others.

The findings of the current study are consistent with Karahoca et al. (2018) as well as Zhang et al. (2019). In addition, Hussein et al. (2017) have highlighted that attitude is a crucial component in promoting the adoption of mobile health applications. These findings have given compelling evidence that, by including compatibility and accessibility as elements in a Technology Acceptance Model, it is feasible to obtain a more comprehensive picture of attitude towards behavioural intention to use mobile health applications.

Hypothesis 4. Attitude mediates relationship between perceived cognition, perceived affection, perceived threat, compatibility, accessibility and behavioural intention to use.

Out of the ten hypotheses, H_{4c} and H_{4e} were found to not present mediating effects. Meanwhile, the remaining hypotheses (H_{4a}, H_{4b}, H_{4d}, H_{4f}, H_{4g}, H_{4h}, H_{4i}, and H_{4j}) were all significantly positive and showed mediating effects.

In this study, the results suggested that attitude and behavioural intention were closely linked to each other. Generally, obese people with a positive attitude have a higher extent to use mobile health applications. The findings supported past study in mobile health services in Bangladesh that used the Unified Theory of Acceptance and Use of Technology (UTAUT) model as the underpinning theory (Alam et al., 2020). Even though there were differences in terms of view, their result was found to be similar to the study's findings on behaviour towards technology adoption.

Two hypotheses (H_{4c} and H_{4e}) were found to be not significant. Specifically, the non-significant relationships were found (H_{4c}) for attitude as mediator for the relationship between relative advantage and behavioural intention to use. Contrary to expectation, the result indicated that attitude did not mediate the relationship between relative advantage and behavioural intention to use. The result is not in line with the underpinning model, which is the CAT model (Kulviwat et al., 2007). As indicated by the result, obese Malaysians seem to be less intentional in using mobile health applications, if it is just referring to the benefit of using it. Another possible explanation is that the respondents are more likely to sit face-to-face with medical practitioners than just rely on mobile health applications. Current studies have shown that patients, especially women, prefer making doctor's appointments compared to using mobile health applications (Ye et al., 2019).

Hypothesis (H_{4e}) also was not supported for the mediation effect between arousal, attitude and behavioural intention to use. As expected, no mediation effect between arousal, attitude and behavioural intention to use. The result is not surprising because relationship between arousal and behavioural intention is also insignificant, therefore constraining the obese as a user of mobile phones to use the mobile health applications. These research findings are similar to the study by Huang et al. (2017). They might occur due to the fact that specific mobile health applications for obese people are limited. Most applications are either developed for a general health issue or those services are interlinked to the healthcare centre. Therefore, it seems that obese people are less emotional towards mobile health applications.

6 CONCLUSIONS

To conclude, this study has provided meaningful information on factors influencing the attitude and behavioural intention to use mobile health applications among obese people in Malaysia. Specifically, the findings of this study have enabled the researchers to identify factors affecting behavioural intention as well as to provide better understanding of obese people' influence to use mobile health applications.

The findings of this study indicated that Malaysian obese who had more thought of perceived cognition, perceived affection, perceived

threat, compatibility and accessibility were able to influence their behavioural intention to use mobile health applications. Moreover, the findings have indicated that the mediating effect of attitude influenced on the relationship between perceived cognition, perceived affection, perceived threat, compatibility, accessibility and behavioural intention to use mobile health applications among obese people.

Firstly, the study uses multiple theoretical models to identify the antecedents for measuring behavioural intention to use mobile health applications among obese people in Malaysia. As indicated by the researchers, various theoretical models form a robust framework that integrates theoretical efforts to support multiple constructs. In the conceptualization of this model, the variables, namely perceived cognition, perceived affection (Alam et al., 2020; Karahoca et al., 2018), perceived threat (Glanz et al., 2008), compatibility (Olok et al., 2015), accessibility (Hsu and Liao, 2014) and behavioural intention to use (Kulviwat et al., 2007), are incorporated to make improvement, according to the present situation. The literature on these variables were further explained subsequently. Thus, considering the relevant variables parallel with the current scenario, this conceptual model was specifically formed for obese people in Malaysia. Referring to the statistics, it is gradually rising the number of obese people in Malaysia. Through this research framework it is hoped that the stakeholder such as government, healthcare organization and others could use it as reference to promote healthy lifestyle using the health applications technology.

Secondly, limited prior research have used the Consumer Acceptance Model (CAT; see Kulviwat et al., 2007) to discuss the behavioural intention to use, specifically in the context of mobile applications. Therefore, the framework proposed in this research would be beneficial for academicians to understand factors affecting intention to use mobile health apps in the future. By including two new constructs, namely compatibility and accessibility alongside the CAT Model and HBM Model, this research goes beyond what Kulviwat et al. (2007) proposed in the CAT Model. These additional variables of mobile health applications have been overlooked in the previous literature.

Fourthly, past studies on the research of behavioural intention to use mobile health applications were conducted in developed countries, such as the USA. On the other hand, Malaysia is a multi-lingual, multi-ethnic, and multi-religious Southeast Asian nation with a population of more than 33.4 million people. Since the literature on behavioural intention to use mobile health applications in local studies is limited, this research has added value to the current body of knowledge. This research presents results that can be compared to other studies of a similar scenario and provides empirical evidence for the importance of behavioural intention antecedents in a particular cultural context.

This research provides various practical implications for behavioural intention to use mobile health applications in general and health management applications specifically. This study has made a practical addition to the multiple uses of mobile health applications. Therefore, the findings should be of interest to the government, healthcare organizations, software developers and consumers.

Referring to the benefits of this research to the government, the latter needs to encourage every individual to use mobile health applications. People are able to live a healthy lifestyle via mobile health applications with low or affordable costs of services (Pai and Alathur, 2021). By identifying multiple factors influencing the behavioural intention to use mobile health applications, healthcare practitioners and stakeholders can quickly get the true reflection of the reality for the requirements and specifications to ensure that universal health coverage goals will be successful. For instance, obese people in Malaysia may require the mobile health applications that show food calories calculators. The applications should provide information which are related to Asian food and closely represent those items specific to Malaysia. Moreover, Ye et al. (2019) have also suggested that mobile health plays a crucial role in providing and assigning medical resources

and supplying government agencies with the theoretical basis for developing mobile health policies. Particularly so during this pandemic, data collection has to be on virtual mode or the most accessible method like an application on a smartphone.

This research will also provide benefits to the healthcare organization. Nowadays, there are many health applications in the market. However, having an official healthcare application that is standardized and interlinked among healthcare organizations is still non-existence, in practice. There are several types of healthcare organizations that require information technology support, namely hospitals, private practice clinics, specialist offices and clinics, nursing homes, pharmacies, rehabilitation centres and others. Mobile health applications could assist medical practitioners in keeping track of their patients' assessments of health and services (Alweshail and Brahim, 2020).

Patients' health needs, including their blood pressure, heart rate, height, and weight, must be regularly tracked; hence when mobile health application is used, tracking is made easy. Besides, it does not limit the healthcare practitioners to give the audience any information about health management. This means that the users of mobile health applications could socialize and connect. Therefore, the healthcare organization needs to have compatible and accessible standardized applications so that every authorized individual could give and receive valid information. Another example is when obese people want to keep an update with their healthcare practitioners regarding their health information. They can easily be connecting with their medical healthcare personnel through the mobile health application. Activities may consist of checking with the appointment date, medicine intake, and even advanced care when there is an emergency. Moreover, their medical healthcare practitioner could also be monitoring them through the applications (Balapour et al., 2019; Chen et al., 2018; Choi et al., 2020; Naddeo et al., 2017).

Besides, this research would also be beneficial to software developers. They would refer to the individual or company that responds to identify, design, install and test a software system built for particular functions (Davis and Venkatesh, 2004). In particular, the technology engineer and software developers should take into consideration consumer preferences. They need to promote and make the applications easy to use for the users. For instance, visual displays need to be interactive, efficient, and compatible to be used according to their needs. It is vital to create conducive and innovative mobile health applications (Pai and Alathur, 2021) to improve consumers' awareness and recognition of healthcare.

Variables that impact mobile application adoption have been studied with the results being essential to mobile application developers, since they may assist in formulating more suitable and strategic marketing interventions (Dhiman et al., 2019). This study has contributed to the academic literature on behavioural intention to use mobile health applications and contribute to the literature on the CAT model by including three endogenous elements, namely perceived threat, compatibility, and accessibility. The results of this study can be brought to the attention of mobile health application developers to have a better understanding of which behavioural factor influences behavioural intention to use the mobile health applications.

Finally, this research would be beneficial to consumers as they may have influence on the technology applications advancement (Karahoca et al., 2018). The consumer's behavioural intention to use mobile health applications can be achieved by understanding their needs and requirements. The findings indicated that mobile health applications could be accepted regardless of age, gender and educational background. It has also been supported by WHO (2018) that demographics do not influence the use of smartphones or mobile phones. However, their perceived cognition and affect do influence their attitude towards the use of mobile health applications.

Furthermore, there are benefits for the individuals, particularly among obese people, to use mobile health applications, as discussed in the literature review. Among these benefits

are quick access to the health information (Balapour et al., 2019; Chen et al., 2018; Choi et al., 2020; Naddeo et al., 2017) and self-monitoring (Balapour et al., 2019; Chen et al., 2018; Choi et al., 2020; Naddeo et al., 2017).

Moreover, mobile health applications can provide information regardless of the location of the user either in urban or rural areas (Kaium et al., 2020). The most vital prerequisite is for the consumers to have compatible devices and accessible applications to be used anytime and anywhere. In line with the CAT model and prior studies, the results of this study indicated that compatibility and accessibility of the applications may influence consumers or obese people, specifically their behavioural intention to use the mobile health applications.

As the findings and literature supported in this study show, the introduction of mobile health applications can promote self-efficiency for patients, increase access, and strengthen the links in ambulatory and hospital settings between patients and healthcare professionals. There are other aspects that could be considered as the reasons consumers should use mobile health applications. However, the researchers had limited the scope to examine obese people and mobile health applications. Future studies could perhaps improve and discuss further on the aspects that have not been covered in this study, namely safety and security, policies and regulations, financial and others.

7 REFERENCES

Aday, L. A. and Andersen, R. 1974. A Framework for the Study of Access to Medical Care. *Health Services Research*, 9 (3), 208–220.

Ahmad, A., Li, K., Feng, C. Asim, S. M., Yousif, A. and Ge, S. 2018. An Empirical Study of Investigating Mobile Applications Development Challenges. *IEEE Access*, 6, 17711–17728. DOI: 10.1109/ACCESS.2018.2818724.

Alam, M. Z., Hoque, M. R., Hu, W. and Barua, Z. 2020. Factors Influencing the Adoption of mHealth Services in a Developing Country: A Patient-Centric Study. *International Journal of Information Management*, 50, 128–143. DOI: 10.1016/j.ijinfomgt.2019.04.016.

Aldhahir, A. M., Alqahtani, J. S., Althobiani, M. A., Alghamdi, S. M., Alanazi, A. F., Alnaim, N., Alqarni, A. A. and Alwafi, H. 2022. Current Knowledge, Satisfaction, and Use of E-Health Mobile Application (Seha) Among the General Population of Saudi Arabia: A Cross-Sectional Study. *Journal of Multidisciplinary Healthcare*, 15, 667–678. DOI: 10.2147/JMDH.S355093.

Alsaleh, D. and Thakur, R. 2019. Impact of Cognition, Affect, and Social Factors on Technology Adoption. *Journal of the Academy of Marketing Science*, 13 (2), 178–200. DOI: 10.1504/IJTMKT.2019.102266.

Alushi, K., Hinterseher, I., Peters, F., Rother, U., Bischoff, M. S., Mylonas, S., Grambow, E., Gombert, A., Busch, A., Gray, D., Konstantinou, N., Stavroulakis, K., Horn, M., Görtz, H., Uhl, C., Federrath, H., Trute, H.-H., Kreutzburg, T. and Behrendt, C.-A. 2022. Distribution of Mobile Health Applications amongst Patients with Symptomatic Peripheral Arterial Disease in Germany: A Cross-Sectional Survey Study. *Journal of Clinical Medicine*, 11 (3), 498. DOI: 10.3390/jcm11030498.

Alweshail, E. A. and Brahim, H. 2020. A Smartphone Application to Provide the Health Care Services at Home. In *2020 3rd International Conference on Computer Applications & Information Security (ICCAIS)*. DOI: 10.1109/ICCAIS48893.2020.9096758.

Amicelle, A., Bus, J., El-Baba, T., Fuchs, C., Mordini, E., Rebera, A., Robinson, N., Trottier, D., Venier, S. and Wright, S. 2012. *Report on Theoretical Frameworks and Previous Empirical Research*. Project PACT Deliverable: D1.1.

Arthurs, N., Tully, L., O'Malley, G. and Browne, S. 2022. Usability and Engagement Testing of mHealth Apps in Paediatric Obesity: A Narrative Review of Current Literature. *International Journal of Environmental Research and Public Health*, 19 (3), 1453. DOI: 10.3390/ijerph19031453.

Atkinson, N. L. 2007. Developing a Questionnaire to Measure Perceived Attributes of eHealth Innovations. *American Journal of Health Behavior*, 31 (6), 612–621. DOI: 10.5993/AJHB.31.6.6.

Bakken, S., Jia, H., Chen, E. S., Choi, J., John, R. M., Lee, N.-J., Mendonca, E., Roberts, W. D., Velez, O. and Currie, L. M. 2014. The Effect of a Mobile Health Decision Support System on Diagnosis and Management of Obesity, Tobacco Use, and Depression in Adults and Children. *Journal for Nurse Practitioners*, 10 (10), 774–780. DOI: 10.1016/j.nurpra.2014.07.017.

Balapour, A., Reychav, I., Sabherwal, R. and Azuri, J. 2019. Mobile Technology Identity and Self-Efficacy: Implications for the Adoption of Clinically Supported Mobile Health Apps. *International Journal of Information Management*, 49, 58–68. DOI: 10.1016/j.ijinfomgt.2019.03.005.

Barnett, J., Harricharan, M., Fletcher, D., Gilchrist, B. and Coughlan, J. 2015. MyPace: An Integrative Health Platform for Supporting Weight Loss and Maintenance Behaviors. *IEEE Journal of Biomedical and Health Informatics*, 19 (1), 109–116. DOI: 10.1109/JBHI.2014.2366832.

Becker, M. H. 1974. *The Health Belief Model and Personal Health Behavior*. Thorofare, NJ: Slack.

Blebil, A. Q., Sulaiman, S. A. S., Hassali, M. A., Dujaili, J. A. and Zin, A. M. 2014. Impact of Additional Counselling Sessions through Phone Calls on Smoking Cessation Outcomes among Smokers in Penang State, Malaysia. *BMC Public Health*, 14, 460. DOI: 10.1186/1471-2458-14-460.

Bruner, G. C. and Kumar, A. 2005. Explaining Consumer Acceptance of Handheld Internet Devices. *Journal of Business Research*, 58 (5), 553–558. DOI: 10.1016/j.jbusres.2003.08.002.

Bt wan Mohamed Radzi, C. W. J., Salarzadeh Jenatabadi, H. and Samsudin, N. 2020. mHealth Apps Assessment among Postpartum Women with Obesity and Depression. *Healthcare*, 8 (2), 72. DOI: 10.3390/healthcare8020072.

Butcher, L., Phau, I. and Marchegiani, C. 2012. Extending the Consumer Acceptance of Technology (CAT) Model: Antecedents and Mediators. In *Australian and New Zealand Marketing Academy Conference*. Australian and New Zealand Marketing Academy.

Castelnuovo, G., Manzoni, G. M., Pietrabissa, G., Corti, S., Giusti, E. M., Molinari, E. and Simpson, S. 2014. Obesity and Outpatient Rehabilitation using Mobile Technologies: The Potential mHealth Approach. *Frontiers in Psychology*, 5, 559. DOI: 10.3389/fpsyg.2014.00559.

Chen, Y., Yang, L., Zhang, M. and Yang, J. 2018. Central or Peripheral? Cognition Elaboration Cues' Effect on Users' Continuance Intention of Mobile Health Applications in the Developing Markets. *International Journal of Medical Informatics*, 116, 33–45. DOI: 10.1016/j.ijmedinf.2018.04.008.

Childers, T. L., Carr, C. L., Peck, J. and Carson, S. 2001. Hedonic and Utilitarian Motivations for Online Retail Shopping Behavior. *Journal of Retailing*, 77 (4), 511–535. DOI: 10.1016/S0022-4359(01)00056-2.

Choi, Y., Kim, J.-S., Kwon, I. H., Kim, T., Kim, S. M., Cha, W., Jeong, J. and Lee, J.-H. 2020. Development of a Mobile Personal Health Record Application Designed for Emergency Care in Korea: Integrated Information from Multicenter Electronic Medical Records. *Applied Sciences* 10 (19), 6711. DOI: 10.3390/APP10196711.

Chuah, S. H.-W., Rauschnabel, P. A., Krey, N., Nguyen, B., Ramayah, T. and Lade, S. 2016. Wearable Technologies: The Role of Usefulness and Visibility in Smartwatch Adoption. *Computers in Human Behavior*, 65, 276–284. DOI: 10.1016/j.chb.2016.07.047.

Clark, L. A. and Watson, D. 1995. Constructing Validity: Basic Issues in Objective Scale Development. *Psychological Assessment*, 7 (3), 309–319. DOI: 10.1037/1040-3590.7.3.309.

Cohen, J. 1988. *Statistical Power Analysis for the Behavioral Sciences*. 2nd ed. Lawrence Earlbaum Associates.

Coughlin, S. S., Whitehead, M., Sheats, J. Q., Mastromonico, J. and Smith, S. 2016. A Review of Smartphone Applications for Promoting Physical Activity. *Jacobs Journal of Community Medicine*, 2 (1), 021.

Dabholkar, P. A. and Bagozzi, R. P. 2002. An Attitudinal Model of Technology-Based Self-Service: Moderating Effects of Consumer Traits and Situational Factors. *Journal of the Academy of Marketing Science*, 30, 184–201. DOI: 10.1177/0092070302303001.

Davis, F. D. 1989. Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13 (3), 319–340. DOI: 10.2307/249008.

Davis, F. D. and Venkatesh, V. 2004. Toward Preprototype User Acceptance Testing of New Information Systems: Implications for Software Project Management. *IEEE Transactions on Engineering Management*, 51 (1), 31–46. DOI: 10.1109/TEM.2003.822468.

Demangeot, C. and Broderick, A. J. 2010. Consumer Perceptions of Online Shopping Environments: A Gestalt Approach. *Psychology & Marketing*, 27 (2), 117–140. DOI: 10.1002/mar.20323.

Deng, Z. 2013. Understanding Public Users' Adoption of Mobile Health Service. *International Journal of Mobile Communications*, 11 (4), 351–373. DOI: 10.1504/IJMC.2013.055748.

Deng, Z., Mo, X. and Liu, S. 2014. Comparison of the Middle-Aged and Older Users' Adoption of Mobile Health Services in China. *International Journal of Medical Informatics*, 83 (3), 210–224. DOI: 10.1016/j.ijmedinf.2013.12.002.

Devos, P., Min Jou, A., De Waele, G. and Petrovic, M. 2015. Design for Personalized Mobile Health Applications for Enhanced Older People Participation. *European Geriatric Medicine*, 6 (6), 593–597. DOI: 10.1016/j.eurger.2015.10.004.

Dhiman, N., Arora, N., Dogra, N. and Gupta, A. 2019. Consumer Adoption of Smartphone Fitness Apps: An Extended UTAUT2 Perspective. *Journal of Indian Business Research*, 12 (3), 363–388. DOI: 10.1108/JIBR-05-2018-0158.

Dounavi, K. and Tsoumani, O. 2019. Mobile Health Applications in Weight Management: A Systematic Literature Review. *American Journal of Preventive Medicine*, 56 (6), 894–903. DOI: 10.1016/j.amepre.2018.12.005.

Dwivedi, Y. K., Shareef, M. A., Simintiras, A. C., Lal, B. and Weerakkody, V. 2016. A Generalised Adoption Model for Services: A Cross-Country Comparison of Mobile Health (m-Health). *Government Information Quarterly*, 33 (1), 174–187. DOI: 10.1016/j.giq.2015.06.003.

Faziharudean, T. M. and Li-Ly, T. 2011. Consumers' Behavioral Intentions to Use Mobile Data Services in Malaysia. *African Journal of Business Management*, 5 (5), 1811–1821. DOI: 10.5897/AJBM10.794.

Fishbein, M. and Ajzen, I. 1975. *Belief, Attitude, Intention and Behaviour: An Introduction to Theory and Research.* Reading, MA: Addison-Wesley.

Gao, G., Lang, R., Oxoby, R. J., Mourali, M., Sheikh, H., Fullerton, M. M., Tang, T., Manns, B. J., Marshall, D. A., Hu, J. and Benham, J. L. 2022. Drivers of Downloading and Reasons for not Downloading COVID-19 Contact Tracing and Exposure Notification Apps: A National Cross-Sectional Survey. *PLoS ONE*, 17 (7), e0269783. DOI: 10.1371/journal.pone.0269783.

Gentry, L. and Calantone, R. 2002. A Comparison of Three Models to Explain Shop-Bot Use on the Web. *Psychology & Marketing*, 19 (11), 945–956. DOI: 10.1002/mar.10045.

Gessa, A., Jiménez, A. and Sancha, P. 2020. Open Innovation in Digital Healthcare: Users' Discrimination between Certified and Non-Certified mHealth Applications. *Journal of Open Innovation: Technology, Market, and Complexity*, 6 (4), 130. DOI: 10.3390/joitmc6040130.

Ghee, L. K. 2016. A Review of Adult Obesity Research in Malaysia. *Medical Journal of Malaysia*, 71, 1–19.

Glanz, K., Rimer, B. K. and Viswanath, K. (eds.). 2008. *Health Behaviour and Health Education: Theory, Research, and Practice.* 4th ed. John Wiley & Sons.

Gold, A. H., Malhotra, A. and Segars, A. H. 2001. Knowledge Management: An Organizational Capabilities Perspective. *Journal of Management Information Systems*, 18 (1), 185–214. DOI: 10.1080/07421222.2001.11045669.

Hair, J. F., Hult, G. T. M., Ringle, C. M. and Sarstedt, M. 2016. *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM).* 2nd ed. Sage Publications.

Hall, M., Elliott, K. and Meng, J. G. 2015. Predicting Consumers' Attitude toward Their Facebook Experience: the Influence of Cognitive and Affective Factors. *Journal of Technology Research*, 7, 1–20.

Harous, S., El Menshawy, M., Serhani, M. A. and Benharref, A. 2018. Mobile Health Architecture for Obesity Management Using Sensory and Social Data. *Informatics in Medicine Unlocked*, 10, 27–44. DOI: 10.1016/j.imu.2017.12.005.

Harris, M. A., Brookshire, R. and Chin, A. G. 2016. Identifying Factors Influencing Consumers' Intent to Install Mobile Applications. *International Journal of Information Management*, 36 (3), 441–450. DOI: 10.1016/j.ijinfomgt.2016.02.004.

Henseler, J., Hubona, G. and Ray, P. A. 2016. Using PLS Path Modeling in New Technology Research: Updated Guidelines. *Industrial Management & Data Systems*, 116 (1), 2–20. DOI: 10.1108/IMDS-09-2015-0382.

Higgins, J. P. 2016. Smartphone Applications for Patients' Health and Fitness. *The American Journal of Medicine*, 129 (1), 11–19. DOI: 10.1016/j.amjmed.2015.05.038.

Hoque, R. and Sorwar, G. 2017. Understanding Factors Influencing the Adoption of mHealth by the Elderly: An Extension of the UTAUT Model. *International Journal of Medical Informatics*, 101, 75–84. DOI: 10.1016/j.ijmedinf.2017.02.002.

Hsu, C.-L. and Liao, Y.-C. 2014. Exploring the Linkages between Perceived Information Accessibility and Microblog Stickiness: The Moderating Role of a Sense of Community. *Information & Management*, 51 (7), 833–844. DOI: 10.1016/j.im.2014.08.005.

Huang, M., Ali, R. and Liao, J. 2017. The Effect of User Experience in Online Games on Word of Mouth: A Pleasure-Arousal-Dominance (PAD) Model Perspective. *Computers in Human Behavior*, 75, 329–338. DOI: 10.1016/j.chb.2017.05.015.

Hussein, Z. 2018. The Advantages and Disadvantages of the Mhealth Applications and the Intention to Use among Smartphone Users. *International Journal of Mechanical Engineering and Technology*, 9 (12), 943–947.

Hussein, Z., Oon, S. W. and Fikry, A. 2017. Consumer Attitude: Does It Influencing the Intention to Use mHealth? *Procedia Computer Science*, 105, 340–344. DOI: 10.1016/j.procs.2017.01.231.

Igbaria, M. and Parasuraman, S. 1989. A Path Analytic Study of Individual Characteristics, Computer Anxiety and Attitudes Toward Microcomputers. *Journal of Management*, 15 (3), 373–388. DOI: 10.1177/014920638901500302.

Institute for Public Health. 2015. *National Health and Morbidity Survey 2015. Vol. II: Non-Communicable Diseases, Risk Factors & Other Health Problems.* ISBN 978-983-2387-23-7.

Kaium, M. A., Bao, Y., Alam, M. Z. and Hoque, M. R. 2020. Understanding Continuance Usage Intention of mHealth in a Developing Country: An Empirical Investigation. *International Journal of Pharmaceutical and Healthcare Marketing*, 14 (2), 251–272. DOI: 10.1108/IJPHM-06-2019-0041.

Kao, C.-K. and Liebovitz, D. M. 2017. Consumer Mobile Health Apps: Current State, Barriers, and Future Directions. *PM&R: The Journal of Injury, Function and Rehabilitation*, 9 (5), 106–115. DOI: 10.1016/j.pmrj.2017.02.018.

Karahoca, A., Karahoca, D. and Aksöz, M. 2018. Examining Intention to Adopt to Internet of Things in Healthcare Technology Products. *Kybernetes*, 47 (4), 742–770. DOI: 10.1108/K-02-2017-0045.

Kim, C., Mirusmonov, M. and Lee, I. 2010. An Empirical Examination of Factors Influencing the Intention to Use Mobile Payment. *Computers in Human Behavior*, 26 (3), 310–322. DOI: 10.1016/j.chb.2009.10.013.

Kim, H.-S., Ahn, J. and No, J.-K. 2012. Applying the Health Belief Model to College Students' Health Behavior. *Nutrition Research and Practice*, 6 (6), 551–558. DOI: 10.4162/nrp.2012.6.6.551.

Kim, K. K., Logan, H. C., Young, E. and Sabee, C. M. 2014. Youth-Centered Design and Usage Results of the iN Touch Mobile Self-Management Program for Overweight/Obesity. *Personal and Ubiquitous Computing*, 19, 59–68. DOI: 10.1007/s00779-014-0808-x.

Klaver, N. S., van de Klundert, J., van den Broek, R. J. G. M. and Askari, M. 2021. Relationship Between Perceived Risks of Using mHealth Applications and the Intention to Use Them Among Older Adults in the Netherlands: Cross-Sectional Study. *JMIR mHealth and uHealth*, 9 (8), e26845. DOI: 10.2196/26845.

Kline, R. B. 2015. *Principles and Practice of Structural Equation Modelling.* 4th ed. New York: Guilford Press.

Kline, S. 2015. Moral Panic, Reflexive Embodiment and Teen Obesity in the USA: A Case Study of the Impact of 'Weight Bias'. *Young Consumers*, 16 (4), 407–419. DOI: 10.1108/YC-12-2014-00495.

Kulviwat, S., Bruner, G. C., Kumar, A., Nasco, S. A. and Clark, T. 2007. Toward a Unified Theory of Consumer Acceptance Technology. *Psychology & Marketing*, 24 (12), 1059–1084. DOI: 10.1002/mar.20196.

Kulviwat, S., Zhang, Y., Fan, J. and Zheng, L. 2016. Understanding Consumer Shopping Behaviour: A Comparison of Three Theories of Emotions in Predicting Online Flow. *International Journal of Electronic Marketing and Retailing*, 7 (1), 3–21. DOI: 10.1504/IJEMR.2016.075322.

Kuo, K.-M., Liu, C.-F. and Ma, C.-C. 2013. An Investigation of the Effect of Nurses' Technology Readiness on the Acceptance of Mobile Electronic Medical Record Systems. *BMC Medical Informatics and Decision Making*, 13, 88. DOI: 10.1186/1472-6947-13-88.

Lee, H. H. and Chang, E. 2011. Consumer Attitudes Toward Online Mass Customization: An Application of Extended Technology Acceptance Model. *Journal of Computer-Mediated Communication*, 16 (2), 171–200. DOI: 10.1111/j.1083-6101.2010.01530.x.

Lee, M.-B., Suh, K.-S. and Whang, J. 2003. The Impact of Situation Awareness Information on Consumer Attitudes in the Internet Shopping Mall. *Electronic Commerce Research and Applications*, 2 (3), 254–265. DOI: 10.1016/S1567-4223(03)00028-0.

Lee, J. Y., Wong, C. P. and Lee, S. W. H. 2020. M-Health Views and Perception among Malaysian: Findings from a Survey among Individuals Living in Selangor. *mHealth*, 6. DOI: 10.21037/mhealth.2019.09.16.

Lim, S., Xue, L., Yen, C. C., Chang, L., Chan, H. C., Tai, B. C., Duh, H. B. L. and Choolani, M. 2011. A Study on Singaporean Women's Acceptance of Using Mobile Phones to Seek Health Information. *International Journal of Medical Informatics*, 80 (12), 189–202. DOI: 10.1016/j.ijmedinf.2011.08.007.

Lyzwinski, L. N., Caffery, L. J., Bambling, M. and Edirippulige, S. 2017. Consumer Perspectives on mHealth for Weight Loss: A Review of Qualitative Studies. *Journal of Telemedicine and Telecare*, 24 (4). DOI: 10.1177/1357633X17692722.

Maarop, N. and Win, K. T. 2012. Understanding the Need of Health Care Providers for Teleconsultation and Technological Attributes in Relation to the Acceptance of Teleconsultation in Malaysia: A Mixed Methods Study. *Journal of Medical Systems*, 36 (5), 2881–2892. DOI: 10.1007/s10916-011-9766-2.

Mahat, J., Ayub, A. F. M., Luan, S. and Wong. 2012. An Assessment of Students' Mobile Self-Efficacy, Readiness and Personal Innovativeness towards Mobile Learning in Higher Education in Malaysia. *Procedia – Social and Behavioral Sciences*, 64 (9), 284–290. DOI: 10.1016/j.sbspro.2012.11.033.

Malaysian Medical Association. 2016. *The Medical Journal of Malaysia* [online]. 4th Asia Pacific Conference on Public Health. Vol. 70. Available at: `http://www.e-mjm.org/2015/v70s1/Asia-Pacific-Conference-on-public-health.pdf`.

Meri, A., Hasan, M. K., Danaee, M., Jaber, M., Jarrar, M., Safei, N., Dauwed, M., Abd, S. K. and Al-bsheish, M. 2019. Modelling the Utilization of Cloud Health Information Systems in the Iraqi Public Healthcare Sector. *Telematics and Informatics*, 36, 132–146. DOI: 10.1016/j.tele.2018.12.001.

Miah, S. J., Hasan, N., Hasan, R. and Gammack, J. 2017. Healthcare Support for Underserved Communities Using a Mobile Social Media Platform. *Information Systems*, 66, 1–12. DOI: 10.1016/j.is.2017.01.001.

Naddeo, S., Verde, L., Forastiere, M., De Pietro, G. and Sannino, G. 2017. A Real-time m-Health Monitoring System: An Integrated Solution Combining the Use of Several Wearable Sensors and Mobile Devices. In *Proceedings of the 10th International Joint Conference on Biomedical Engineering Systems and Technologies – Volume 5 HEALTHINF: SmartMedDev*, 545–552. DOI: 10.5220/0006296105450552.

Nasco, S. A., Kulviwat, S., Kumar, A. and Bruner, G. C. 2008. The CAT Model: Extensions and Moderators of Dominance in Technology Acceptance. *Psychology & Marketing*, 25 (10), 978–1005. DOI: 10.1002/mar.20249.

National Institutes of Health. 2019. *National Health and Morbidity Survey 2019: Key Findings* [online]. Available at: `https://iptk.moh.gov.my/images/technical_report/2020/4_Infographic_Booklet_NHMS_2019_-_English.pdf`.

Ndayizigamiye, P. and Maharaj, M. 2017. Determinants of Mobile Health Adoption in Burundi. *The African Journal of Information Systems*, 9 (3), 171–191.

Olok, G. T., Yagos, W. O. and Ovuga, E. 2015. Knowledge and Attitudes of Doctors towards E-Health Use in Healthcare Delivery in Government and Private Hospitals in Northern Uganda: A Cross-Sectional Study. *BMC Medical Informatics and Decision Making*, 15, 87. DOI: 10.1186/s12911-015-0209-8.

Pai, R. R. and Alathur, S. 2019. Determinants of Individuals' Intention to Use Mobile Health: Insights from India. *Transforming Government: People, Process and Policy*, 13 (3/4), 306–326. DOI: 10.1108/TG-04-2019-0027.

Pai, R. R. and Alathur, S. 2021. Mobile Health Intervention and COVID-19 Pandemic Outbreak: Insights from Indian Context. *International Journal of Health Governance*, 26 (1), 42–50. DOI: 10.1108/IJHG-04-2020-0043.

Palos-Sanchez, P. R., Saura, J. R., Martin, M. Á. R. and Aguayo-Camacho, M. 2021. Toward a Better Understanding of the Intention to Use mHealth Apps: Exploratory Study. *JMIR mHealth and uHealth*, 9 (9), e27021. DOI: 10.2196/27021.

Park, E. and del Pobil, A. P. 2013. Extending the Technology Acceptance Model in Remote Pointing Technology: Identifying the Role of Perceived Mobility and Control. *Sensor Review*, 33 (1), 40–47. DOI: 10.1108/02602281311294333.

Qasim, M. M., Zulkifli, A. N., Ahmad, M., Omar, M. and Abu Bakar, J. A. 2015. Parent's Perception towards the Adoption of Mobile Application for Monitoring Their Children's Obesity Status. *ARPN Journal of Engineering and Applied Sciences*, 10 (3), 977–985.

Ramanathan, N., Swendeman, D., Comulada, W. S., Estrin, D. and Rotheram-Borus, M. J. 2016. Identifying Preferences for Mobile Health Applications for Self-Monitoring and Self-Management: Focus Group Findings from HIV-Positive Persons and Young Mothers. *International Journal of Medical Informatics*, 82 (4), 38–46. DOI: 10.1016/j.ijmedinf.2012.05.009.

Research2Guidance. 2015. *mHealth App Development Economic 2015* [online]. Available at: `http://research2guidance.com/r2g/r2g-mHealth-App-Developer-Economics-2015.pdf`.

Rogers, E. M. 2003. *Diffusion of Innovations.* 3rd ed. New York: The Free Press.

Saunders, G. H., Frederick, M. T., Silverman, S. and Papesh, M. 2013. Application of the Health Belief Model: Development of the Hearing Beliefs Questionnaire (HBQ) and its Associations with Hearing Health Behaviors. *International Journal of Audiology*, 52 (8), 558–567. DOI: 10.3109/14992027.2013.791030.

Saxon, L. A. 2016. Mobile Health Application Solutions. *Circulation: Arrhythmia and Electrophysiology*, 9 (2), e002477. DOI: 10.1161/CIRCEP.115.002477.

Schomakers, E.-M., Lidynia, C., Vervier, L. S., Valdez, A. C. and Ziefle, M. 2022. Applying an Extended UTAUT2 Model to Explain User Acceptance of Lifestyle and Therapy Mobile Health Apps: Survey Study. *JMIR mHealth and uHealth*, 10 (1), e27095. DOI: 10.2196/27095.

Selvaraj, S. N. and Sriram, A. 2022. The Quality of Indian Obesity-Related mHealth Apps: PRECEDE-PROCEED Model-Based Content Analysis. *JMIR mHealth and uHealth*, 10 (5), e15719. DOI: 10.2196/15719.

Shareef, M. A., Kumar, V. and Kumar, U. 2014. Predicting Mobile Health Adoption Behaviour: A Demand Side Perspective. *Journal of Customer Behaviour*, 13 (3), 187–205. DOI: 10.1362/147539214X14103453768697.

Sharifi, S. S. 2013. Impacts of the Trilogy of Emotion on Future Purchase Intentions in Products of High Involvement Under the Mediating Role of Brand Awareness. *European Business Review*, 26 (1), 43–63. DOI: 10.1108/EBR-12-2012-0072.

Subramanian, R. 2015. *Diet, Exercise and Smartphones – A Content Analysis of Mobile Health Applications for Weight Loss*. Dissertation. Southern Illinois University Carbondale.

Teo, T. S. H., Srivastava, S. C. and Jiang, L. 2008. Trust and Electronic Government Success: An Empirical Study. *Journal of Management Information Systems*, 25 (3), 99–132. DOI: 10.2753/MIS0742-1222250303.

Thorpe, K. E., Florence, C. S., Howard, D. H. and Joski, P. 2004. The Impact of Obesity on Rising Medical Spending. *Health Affairs*, 23 (1). DOI: 10.1377/hlthaff.W4.480.

Vlahu-Gjorgievska, E., Mulakaparambil Unnikrishnan, S. and Win, K. T. 2018. mHealth Applications: A Tool for Behaviour Change in Weight Management. *Studies in Health Technology and Informatics*, 252, 158–163. DOI: 10.3233/978-1-61499-890-7-158.

Wang, B. R., Park, J.-Y., Chung, K. and Choi, I. Y. 2014. Influential Factors of Smart Health Users According to Usage Experience and Intention to Use. *Wireless Personal Communications*, 79, 2671–2683. DOI: 10.1007/s11277-014-1769-0.

Wang, Y., Xue, H., Huang, Y., Huang, L. and Zhang, D. 2017. A Systematic Review of Application and Effectiveness of mHealth Interventions for Obesity and Diabetes Treatment and Self-Management. *Advances in Nutrition*, 8 (3), 449–462. DOI: 10.3945/an.116.014100.

Wei, J., Vinnikova, A., Lu, L. and Xu, J. 2021. Understanding and Predicting the Adoption of Fitness Mobile Apps: Evidence from China. *Health Communication*, 36 (8), 950–961. DOI: 10.1080/10410236.2020.1724637.

World Health Organization (WHO). 2018. *World Health Statistic 2018: Monitoring Health for the Sustainable Goals* [online]. Available at: `https://apps.who.int/iris/rest/bitstreams/1137482/retrieve`.

Wu, I.-L., Li, J.-Y. and Fu, C.-Y. 2011. The Adoption of Mobile Healthcare by Hospital's Professionals: An Integrative Perspective. *Decision Support Systems*, 51 (3), 587–596. DOI: 10.1016/j.dss.2011.03.003.

Ye, Q., Deng, Z., Chen, Y., Liao, J., Li, G. and Lu, Y. 2019. How Resource Scarcity and Accessibility Affect Patients' Usage of Mobile Health in China: Resource Competition Perspective. *JMIR mHealth and uHealth*, 7 (8), e13491. DOI: 10.2196/13491.

Zailani, S., Iranmanesh, M., Nikbin, D. and Beng, J. K. C. 2014. Determinants of RFID Adoption in Malaysia's Healthcare Industry: Occupational Level as a Moderator. *Journal of Medical Systems*, 39 (1), 172. DOI: 10.1007/s10916-014-0172-4.

Zailani, S., Gilani, M. S., Nikbin, D. and Iranmanesh, M. 2014. Determinants of Telemedicine Acceptance in Selected Public Hospitals in Malaysia: Clinical Perspective. *Journal of Medical Systems*, 38 (9), 111. DOI: 10.1007/s10916-014-0111-4.

Zhang, X., Liu, S., Wang, L., Zhang, Y. and Wang, J. 2019. Mobile Health Service Adoption in China: Integration of Theory of Planned Behavior, Protection Motivation Theory and Personal Health Differences. *Online Information Review*, 44 (1), 1–23. DOI: 10.1108/OIR-11-2016-0339.

Zhao, Y., Ni, Q. and Zhou, R. 2018. What Factors Influence the Mobile Health Service Adoption? A Meta-Analysis and the Moderating Role of Age. *International Journal of Information Management*, 43, 342–350. DOI: 10.1016/j.ijinfomgt.2017.08.006.

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MEASURING EMOTIONAL RESPONSE FROM THE MALL EXPERIENCES: A CASE OF TIER II AND III CITY MALLS IN INDIA

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ABSTRACT

A mall has a holistic solution for a variety of consumer needs. Malls have aggressively spread in small cities too. The presence of malls in tier II & III cities of India may have provided diversified experiences of mall culture to its residents. Malls offer an abundance of retail offerings with entertainment and leisure. Previous studies focused upon metro city malls and provided results towards mall attributes, consumer experiences, evoked emotional responses, and patronage intentions. Hence, it is indeed necessary to examine the behavioral aspects associated with visitors of small (non-metro/tier II & III) city malls to assess the change in consumption patterns of small city consumers. The present study attempts to investigate linkages among mall attractive dimensions, visitors' experiences, and visitors' emotions. A sample size of 613 (from malls of tier II & III cities, India) was analyzed using SEM through SmartPLS 3. Finding suggests significant relationships with few exceptions. Responders' emotions (pleasure and arousal) are predicted when they are interacted with mall attractive dimensions due to experiences. The results may benefit mall management, mall tenants, consumers, and society at large.

KEY WORDS

mall shopping, retail, shopping behavior, mall attractiveness, experience economy, pleasure, arousal

JEL CODES

M10, M21, L81, D91

1 INTRODUCTION

India is the 4th largest retail market on the globe has only 22% organized format (Goyal, 2021). The rural market and consumption patterns are not affected by the economic slowdown, which has completely changed the mindset of marketers (Kashyap, 2012). The organized retail market of India is at its peak and leading amongst other emerging countries.

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According to data, in 2020, the Indian retail industry is estimated at USD 883 billion, of which grocery retail sales are the USD 608 billion. Industry expert's expectations are very high and they anticipate a USD 1.3 trillion industry by 2024 (IBEF, 2021). Healthy economic development, changing demographics, greater disposable income, urbanization, and changing customer tastes and preferences are all propelling the organized retail industry in India forward. In particular, the spread of modern Kirana stores (modern grocery stores) has increased due to the desire for new experiences by small city Indian consumers (Goyal, 2021). The mall is an excellent investment opportunity for organized retail. The shopping malls, one of the largest rising organized retail formats, influenced industrialists and promoters to invest in such facilities in almost all the metro cities of India and further extended mall experiences to many emerging cities of India as an upcoming trend influenced by global business environment and multicultural behaviour (Priya, 2009; Ghosh et al., 2010), providing ample opportunities to the new urbanized Indian consumers with developed preferences towards hypermarket and supermarket to exploit their hedonic and utilitarian desires at one destination (Kiran and Jhamb, 2011). By 2030, India's growing prosperity would have transformed the country, dominated by the middle-class group. Consumers in India are adopting new retailing formats at an increasing rate, indicating that they have developed new purchasing preferences. Malls have become a part of the lifestyle of people in emerging – "Tier II and Tier III" cities already. Also, the expected surge in discretionary expenses is predicted to climb up due to the increment in the female workforce. Their participation would increase by 40% in the next five years, reaching 10 million (Goyal, 2021). The growth of shopping mall activities has reached its peak. Active participation in-mall activities by small city residents have also been noticed, though there is a lack of exposure in small city mall compared to metro city malls. Hence, it is necessary to identify the attitude and behavior of residents of a small city, as they may perhaps not behave similarly, as residents of metro cities do. The findings of such research would give information that might be utilized to make a mall the ideal location for their desired shopping experiences and expectations. Several studies applied the perspective of experience economy to tourism and retail, but the experience view of tier II and III level consumers is scarce in empirical studies. Therefore, using the experience perspective of consumer behavior to conduct empirical testing on shopping mall experience in India, especially in emerging cities, is still an unexplored research area.

2 LITERATURE REVIEW

2.1 Mall Attractive Dimensions

In recent years, the rise of organized retail business in India has brought a lot of sweeping changes, resulting in the nation's operation of numerous sorts of modern shops. A shopping mall consists of a collection of several retail stores in a complex with an attractive ambiance, facilities, options, and services. Visitors at shopping destinations are sensitive, space seekers, and sensuous (Prashar et al., 2015). Shopping mall has been created, owned, and administered as a holistic product by organized retail business group to increase sales (Kotler et al., 2002; Khan and Ahmad, 2020). Levy et al. (2017) mentioned malls as enclosed facilities having lobbies and walking areas alongside showrooms, shops, and outlets, providing a view to the center body and access through various junctions like pathways, escalators, and lifts, maintaining well-lit and soothing climatic conditions, specifically designed for shopping. The retail malls have a unique and favorable image due to the severe competition and by merging several features in one area (Singh and Dash, 2012). Booms and Bitner (1981) expanded the 4P's of marketing mix given by McCarthy (1964) into 7P's. Patel and Sharma

(2009) surveyed to evaluate Indian customers' purchase motivations and discovered nine components split into utilitarian and hedonic. These two encompassed several sectors, such as economics, pleasure, satisfaction, shopping ideas, etc., which affect Indian customers' incentive to purchase at malls. Customer-based retail equity is derived from the features and attributes of a shopping center (Das, 2015). Blend of factors like ambiance, infrastructure – design, marketing activities, convenience, and safety influence positively towards shopping experiences (Singh and Sahay, 2012). In the Indian context, Mittal and Jhamb (2016) evaluated four constructs (merchandising, variety & selection, milieu & facilities, and convenience). Kesari and Atulkar (2016) drew attention to the changing preferences associated with shopping i.e. the amount of contentment of Indian shoppers depends on the utilitarian and hedonic benefits provided by convenient access to all necessities under a single roof. Kushwaha et al. (2017) incorporated the mall presentation features viz service experience factors, internal environment factors, convenience factors, utilitarian factors, acoustic factors, demonstration factors, and proximity factors. Music, sound effects, retail music, advertising music, and songs contribute (acoustics) has considerable potential to attract visitors for longevity in the shopping environment (Krause and North, 2016; Raja et al., 2019). These factors influence consumers to choose or select a mall or a shopping complex to visit specifically in Indian conditions. Furthermore, Prashar et al. (2017) highlighted the significant positive relevance of the convenience factor while selecting a mall for a visit. For shoppers, proximity is an indispensable factor and forms a part of convenience (Gahinet and Cliquet, 2018). People are attracted due to certain factors. Mall Attractive Dimensions (MADs) were an outcome of a study conducted in Tier-II cities. MADs are comprised of six indicators – mall environment, convenience, mall staff, mall hygiene, entertainment, and security (Kumar et al., 2021). From the literature review at was found that MADs identified by Kumar et al. (2021) could fulfill the parameters for the present study under tier II and tier III conditions.

2.2 Visitors' Experience

The four realms of experience (i.e., 4E's) are educational, entertainment, escapist, and esthetic experiences (Pine and Gilmore, 1998, 2013). In the study of tourism, researchers have demonstrated the importance of different permutations of the 4Es in evoking consumer reactions (Bærenholdt and Haldrup, 2006; Oh et al., 2007; Hosany and Witham, 2009; Lee and Chang, 2012; Sinclair-Maragh, 2016; Liasidou, 2018), online retailing (Jeong et al., 2009), mobile applications – user interface (Mathwick et al., 2001; Hsu et al., 2021), theme parks (Milman and Tasci, 2018), food outlets at shopping malls (Koronaki and Theodoridis, 2020) and malls and its in-house retail offerings (Sadachar, 2014; Sadachar and Fiore, 2018).

2.3 Visitors' Emotions

Mehrabian and Russell's (1974) environmental psychology technique is a popular methodology for assessing and describing environmental experiences, characterizing human perceptions of physical surroundings using three facets of emotions. Also, to give greater clarity, Bakker et al. (2014) connected pleasure, arousal, and dominance with Affect, Cognition, and Behavior (ABC). Still, several researchers emphasized these three dimensions, giving more preference to pleasure and arousal in their studies related to social psychology. Emotional behavior of shoppers is affected by color and its combinations of a retail store, its display and merchandise (Bellizzi et al., 1983), hunters observe pleasure as a predictor to satisfaction (Floyd, 1997), satisfaction measurement study on "target-arousal level" provided knowledge regarding the key role of hedonic aspects (Wirtz et al., 2000) and supported the previous study by Berlyne (1970) on hedonic values and relationships between pleasantness, interestingness, and novelty. Pleasure and arousal are significant predictors when music is played at a location (Krause and North, 2016), effects of lighting color on emotional states (Lee and Lee, 2021). Research on online booking sites reveals the positive impact of e-atmospherics like portal design, music, and colorful effects on emotions that please hotel customers (Essawy, 2017).

3 CONCEPTUAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

The environment has certain stimuli "S" which provide impact to an organism's internal states "O" and these influenced internal states examines his / her future behavior in the form of response "R" (Mehrabian and Russell, 1974). This S-O-R framework was adopted by Donovan and Rossiter (1982) in a retail context and afterward used and adopted by many researchers to examine the impact of showroom atmosphere and environment on the reactions and responses of consumers' and visitors' (Bitner, 1992; Donovan et al., 1994; Eroglu et al., 2001; Baker et al., 2002; Menon and Kahn, 2002; Das, 2013). The S-O-R Framework is adapted for the conceptual framework for the present study (refer Fig. 1). Exploration of interrelationships among (1) mall attractive dimensions (MADs), (2) Pine and Gilmore's (1998) experience economy (4E's), and (3) affective aspects of consumer (i.e. pleasure and Arousal) at Tier-II and Tier-III cities in India is based on S-O-R model, which is an unexplored topic to my knowledge.

3.1 MADs and Visitors' Experience

Tauber (1972) revealed interesting facts about peoples' behavior while planning a visit to a shopping destination. In his study, he provides ample information to managers to attract visitors not just by product information, but through other means and features, which may fulfill their needs for not only buying products but also exploring and browsing new trends and fashion. The exploring and browsing for updating one's knowledge may be categorized in educational experiences. Malls are just another habitat for visitors, where they forget to come out of it, because of engagements in various attributes and facilities at malls (Bloch et al., 1994). A study carried out in India revealed that there is an influence of features like architecture, design, service consistency, variety of options availability under one roof on consumers' experiences (Khare, 2011). Also, escapist behavior is noticed due to visitors' engagement in various in-house activity options like a movie screen, dining courts, fun, and gaming zones, where visitors relax with companions, fantasize, and feel freedom from daily routine work (Bloch and Richins, 1983; Khare, 2011; Singh and Sahay, 2012). Mall ambiance, internal and external environment, design, and architecture are prominent contributors for providing esthetic experiences to visitors (Phillips and Sternthal, 1977; Michon et al., 2008; Singh and Sahay, 2012). Kushwaha et al. (2017) found that seven important aspects – experiences from the services of a mall, mall interiors, and atmospherics, visitor's convenience, utilities from the mall, and presentations by mall and retail store staff – significantly affect visitor's emotions and experiences. The features of showrooms, shops, and outlets based in the mall and features of the mall as a whole provide experiences to visitors in the form of increment in visitor's information, fun, and aesthetics (Vilnai-Yavetz et al., 2021). People in tier II and tier III cities are attracted to a mall from six attributes (Kumar et al., 2021). Mall attractive dimensions (MADs: mall environment, convenience, mall staff, mall hygiene, entertainment, and security) may impact upon four experiential realms in context to the second-tier and third-tier cities of India. This is an unexplored study.

Hence, the following hypothesis is proposed as follows:

- H_1: Mall attractive dimensions positively influence educational experience.
- H_2: Mall attractive dimensions positively influence the entertainment experience.
- H_3: Mall attractive dimensions positively influence escapist experience.
- H_4: Mall attractive dimensions positively influence esthetic experience.

3.2 Visitors' Experience and Visitors' Emotions

Pine and Gilmore (1998) came up with the theory of the four realms of an experience

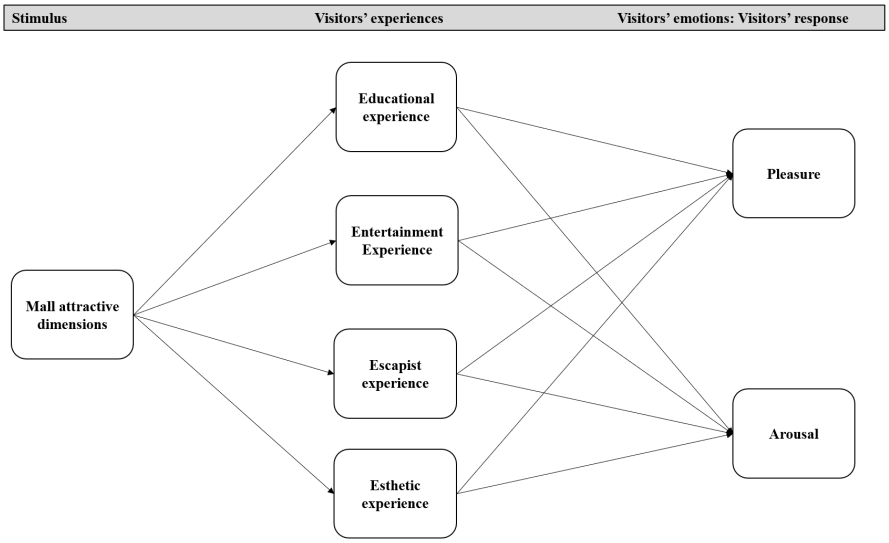

Fig. 1: Hypothesized Research Model adapted, based on Mehrabian and Russell (1974)

(educational, entertainment, escapist and esthetic – 4E's). According to him visitors' experiential consumption style and style of participation during such engagement process were active participation – absorption (educational experience), passive participation – absorption (entertainment experience), immersion in the environment – passive participation (escapist experience), and immersion in the environment – active participation (esthetics experience). Empirical analysis taking antecedent factors from store environment and its experiences supported the predictive factors related to affective state i.e. pleasure and arousal (Babin et al., 1994; Sherman et al., 1997; Baker et al., 2002). Laroche et al. (2005) found that the consumer's emotions (pleasure and evoked mood) are influenced by consumers' experiences (cognitive – educational experience) are invariant at all destinations. The study at a mall in a metro city in India concludes with an emphasis on entertainment aspects to increase customer visits. Because a customer may not wish to purchase anything (passive participation in the buying process) but will like to watch a movie (absorption) and enjoy spending time in the mall (Anuradha and Manohar, 2011). Fun was found to successfully work in a novel study carried out on consumers visiting the shopping complex, escapism experiences like imagination of being someone else, fantasizing or imagining another environment resulting in a high level of feelings – pleasure and arousal (Babin et al., 1994). Perception of the esthetic atmosphere and retaliation due to such atmosphere in a mall affect the behavioral intentions of its visitors (Ortegón-Cortázar and Royo-Vela, 2019). Modern marketplace and regime of experiential consumption from it equate sensual pleasure (Jantzen et al., 2012). Extended experiences had higher prominence towards the emotional aspects like fun (Pelletier and Collier, 2018). Hence, four realms of an experience (educational, entertainment, escapist, and esthetic experiences) may perform a crucial part in explicating the visitors' emotions after interaction with mall attractive dimensions and should be assessed in the context of Indian Tier II and Tier III cities with the following four hypotheses:

- H_5: There is an impact of educational experience on pleasure.
- H_6: There is an impact of the entertainment experience on pleasure.
- H_7: There is an impact of escapist experience on pleasure.
- H_8: There is an impact of esthetic experience on pleasure.

- H_9: There is an impact of educational experience on arousal.
- H_{10}: There is an impact of the entertainment experience on arousal.
- H_{11}: There is an impact of escapist experience on arousal.
- H_{12}: There is an impact of esthetic experience on arousal.

Thus, hypothesized research model (Fig. 1) is proposed after the comprehensive study of previous distinguished findings.

4 RESEARCH METHODOLOGY

The majority of the measuring items utilized in this study were derived from the literature. A list of the measuring items utilized in this study for survey purposes is given in Tab. 5 and Tab. 6 in the Annex. To obtain primary data, a mall-intercept survey approach with a structured close-ended questionnaire was employed. The questionnaire comprised of four survey sections. All the questions in the instrument were based on a 7-point Likert scale (1 represent Lowest/Strongly disagree and 7 represent Highest/Strongly agree). In this study, a convenience sampling methodology was adopted. The study's population was comprised of adult (age above 18 years) respondents from Western Utter Pradesh, India's Tier II and Tier III. All the malls of three cities (Moradabad, Bareilly, and Mathura) of Uttar Pradesh were identified. Moradabad and Bareilly (Tier-II cities) and Mathura (Tier III city) are not categorized in metropolitan cities list by Govt. of India (Ministry of Housing and Urban Affairs, 2011; Maps of India, 2019). These three cities were selected because of some common factors like demographics, language and anthropologic similarities in sociocultural behaviour. Responders were intercepted in the malls for their time to provide responses. The sample size for this study was 700 people. Questionnaires with abounding missing values were repudiated. Six hundred thirteen (613) responses were found to be complete and analyzed.

5 DATA ANALYSIS AND INTERPRETATION

5.1 Demographic Data Analysis

The respondent's demographic data is shown in Tab. 1.

5.2 Data Analysis Procedure

To achieve the research objectives, the present study employed SmartPLS 3 to facilitate data analysis. Partial least square-structural equation modeling (PLS-SEM) was used for data analysis, due to fact that its appropriateness with good results in analyzing composite models (Dash and Paul, 2021). Moreover, if the model includes both reflecting and formative modeling, PLS-SEM in SmartPLS 3 provides greater flexibility in such complicated models, making it a widely recognized multivariate analytical approach (Hair et al., 2017).

5.3 Measurement Model Evaluation

For examining the measurement model internal consistency, convergent validity, and discriminant validity were analyzed. Convergent validity shows "the extent to which different measures refer to the same conceptual construct" (Dinev and Hart, 2004).

From Tab. 2 it is evident that the values of Cronbach's Alpha (α) and Composite Reliability (CR) for all the constructs are greater than 0.60 and 0.70 respectively. This indicates the reliability of the study instrument (Hair et al., 2011; Ali et al., 2018). Next, to measure convergent validity, average variance extracted (AVE) for all the dimensions were found greater than 0.50, supporting Hair et al. (2011) acceptance boundary of > 0.50.

Tab. 1: Summary of the Demographic Characteristics of the respondents

Variable		$n = 613$	%
Gender	Male	431	70.31
	Female	182	29.69
Age	18–24 years	221	36.05
	25–34 years	171	27.90
	35–44 years	111	18.11
	45–54 years	73	11.91
	Above 55 years	37	6.04
Marital status	Single	242	39.48
	Married	371	60.52
Education	School-level	31	5.06
	Bachelor's degree	429	69.98
	Post-graduate degree	153	24.96
Employment profile	Student	180	29.36
	Business	137	22.35
	Govt. job	31	5.06
	Private job	148	24.14
	Homemaker	83	13.54
	Professional	23	3.75
	Other	11	1.79
Household income	Rs. 30,000 and less	316	51.55
	Rs. 30,001 to 60,000	149	24.31
	Rs. 60,001 to 100,000	76	12.40
	Rs. 100,001 and above	72	11.75

To examine the discriminant validity, the Fornell-Larcker and Heterotrait-Monotrait criteria were employed. The square roots of average variance extracted of the constructs were found higher than the correlation values between each construct as well as other constructs. Thus, discriminant validity was established as per the Fornell-Larcker criterion. A comparatively non-traditional concept of Heterotrait-Monotrait ratio of correlations (HTMT) is employed in addition to the usual approach of assessing the discriminant validity of the constructs. According to the most recent criterion, all HTMT values must be less than one as recommended by the HTMT Monte Carlo technique (Clark and Watson, 1995), however, it is debatable, Heterotrait-Monotrait (HTMT) Ratio of correlations with a maximum ratio of 0.85 and 0.9 acceptable value (Gold et al., 2001; Teo et al., 2008; Henseler et al., 2016). In this study, the HTMT values exceeded 0.90 for esthetic experience and escapist experience, for which HTMT was used to establish discriminant validity on the liberal side. Refer Tab. 7 in the Annex for Fornell-Larcker Criteria values and Tab. 8 in the Annex for Heterotrait-Monotrait criteria values.

5.4 Model Fit Estimates and Evaluation

SEM performed with SmartPLS can also be estimated for its fitness. The most common and accepted parameter is to assess it based on standard root square residual (SRMS) values which are a result of bootstrapping (Browne and Cudeck, 1992; Hu and Bentler, 1998). A value not exceeding the 0.08 limit is accepted to confirm a model as fit and to reject any inconsistencies with pragmatic relationships (Hu and Bentler, 1999; Henseler et al., 2016). In present analysis SRMR = 0.047 < 0.08 hence, model is found

Tab. 2: Model evaluation

Constructs	Indicator	Outer Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Mall Attractive Dimensions (MADs)	MAD1	0.897	0.956	0.965	0.819
	MAD2	0.905			
	MAD3	0.892			
	MAD4	0.919			
	MAD5	0.915			
	MAD6	0.904			
Educational Experience (EDUE)	EDU1	0.871	0.930	0.947	0.782
	EDU2	0.858			
	EDU3	0.880			
	EDU4	0.905			
	EDU5	0.905			
Entertainment Experience (ENTE)	ENT1	0.859	0.909	0.932	0.732
	ENT2	0.890			
	ENT3	0.862			
	ENT4	0.853			
	ENT5	0.812			
Escapist Experience (ESCE)	ESC1	0.909	0.948	0.960	0.827
	ESC2	0.913			
	ESC3	0.905			
	ESC4	0.898			
	ESC5	0.922			
Esthetic Experience (ESTE)	EST1	0.912	0.948	0.960	0.828
	EST2	0.920			
	EST3	0.890			
	EST4	0.922			
	EST5	0.907			
Pleasure (PLE)	PLE1	0.886	0.943	0.954	0.777
	PLE2	0.881			
	PLE3	0.890			
	PLE4	0.877			
	PLE5	0.875			
	PLE6	0.882			
Arousal (ARO)	ARO1	0.869	0.936	0.950	0.758
	ARO2	0.903			
	ARO3	0.864			
	ARO4	0.822			
	ARO5	0.879			
	ARO6	0.885			

fit. R^2 explains the variance and covariance for a given endogenous construct by exogenous variables connected to it. The magnitude of the 'coefficient of determination' i.e., R^2 assist to get the predictive accurate model (Hair et al., 2014; Hair et al., 2019) which is found medium in the present study. The predictive nature of change can be assessed by Q^2 indices also (Hair et al., 2011). Because all of the Q^2 values are larger than zero, the PLS structural model may explain predictive effects. Refer to Tab. 3 for R^2 and Q^2 values of the study.

Tab. 3: R^2 and Q^2

Constructs	R^2	Q^2	Effect
Educational Experience	0.309	0.240	medium
Entertainment Experience	0.215	0.154	medium
Escapist Experience	0.306	0.251	medium
Esthetic Experience	0.236	0.193	medium
Pleasure	0.383	0.294	medium
Arousal	0.200	0.148	small

Tab. 4: PLS-SEM Results

Hypotheses	Path	b	Standard deviation	t-static	p-value	Decision
H_1	MAD → EDUE	0.556	0.042	13.135	0.000	Supporting
H_2	MAD → ENTE	0.463	0.048	9.595	0.000	Supporting
H_3	MAD → ESCE	0.553	0.047	11.651	0.000	Supporting
H_4	MAD → ESTE	0.486	0.050	9.762	0.000	Supporting
H_5	EDUE → PLE	−0.057	0.046	1.241	0.215	Not Supporting
H_6	ENTE → PLE	0.127	0.058	2.188	0.029	Supporting
H_7	ESCE → PLE	0.206	0.086	2.403	0.016	Supporting
H_8	ESTE → PLE	0.357	0.086	4.169	0.000	Supporting
H_9	EDUE → ARO	0.061	0.046	1.317	0.188	Not Supporting
H_{10}	ENTE → ARO	0.137	0.053	2.583	0.010	Supporting
H_{11}	ESCE → ARO	0.156	0.090	1.725	0.085	Not Supporting
H_{12}	ESTE → ARO	0.144	0.084	1.717	0.086	Not Supporting

Notes: t-values for two-tailed test: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

5.5 Structural Model Evaluation

Next evaluations for the SEM path were conducted by bootstrapping method to check the significance of hypotheses (Tab. 4). Significance levels are shown with path (relationship) and respective β values. The standardized path coefficients (β) were found to be insignificant and positive at $p < 0.001$ and $p < 0.05$, which indicated that there existed strong evidence in rejection of the hypotheses H_5, H_9, H_{11}, and H_{12} except for H_1***, H_2***, H_3***, H_4***, H_6*, H_7*, H_8***, and H_{10}**.

6 DISCUSSION

This research reveals the empirical significant impact of MADs on the visitors' experiences (4E's: Educational – Entertainment – Escapist – Esthetic experience) and visitors' experience on visitors' emotions (pleasure and arousal) – refer Fig. 2. Hypothesis (H_1, H_2, H_3, and H_4) checked the relationship between MADs and visitors' experiences. These relationships are found significant and positive in the present study. The findings for H_1 found parallel with previous studies. People do not visit for buying products only, but also to explore, browse, increase knowledge about new trends and fashion (Tauber, 1972). Similarly, the present study complements the results of Khare (2011), where she stated that mall features influence exploration and examine products to avail EDUE. The results of the study concerning H_2 support previous findings, where mall attributes like movie-plexes, game zones, festive and anniversary celebrations, food courts provide significant ENTE to visitors (Bloch et al., 1994; Wakefield and Baker, 1998; Kashyap and Raghuvanshi, 2020; Kumar et al., 2021; Vilnai-Yavetz et al., 2021). The findings concerning H_3 support earlier research stating the positive impact of mall attributes on ESCE, where visitors' engagement in various in-house activity options like a movie screen, dining courts, fun, and gaming zones. Visitors relax with companions, fantasize, and feel freedom from daily routine work (Bellenger and Korgaonkar, 1980; Bloch and Richins, 1983; Khare, 2011; Singh and Sahay, 2012; Kushwaha et al., 2017).

The findings for H_4 support studies of previous researchers where mall ambiance, internal and external environment, design, and architecture are prominent contributors for providing ESTE to visitors (Phillips and Sternthal, 1977; Michon et al., 2008; Kusumowidagdo et al.,

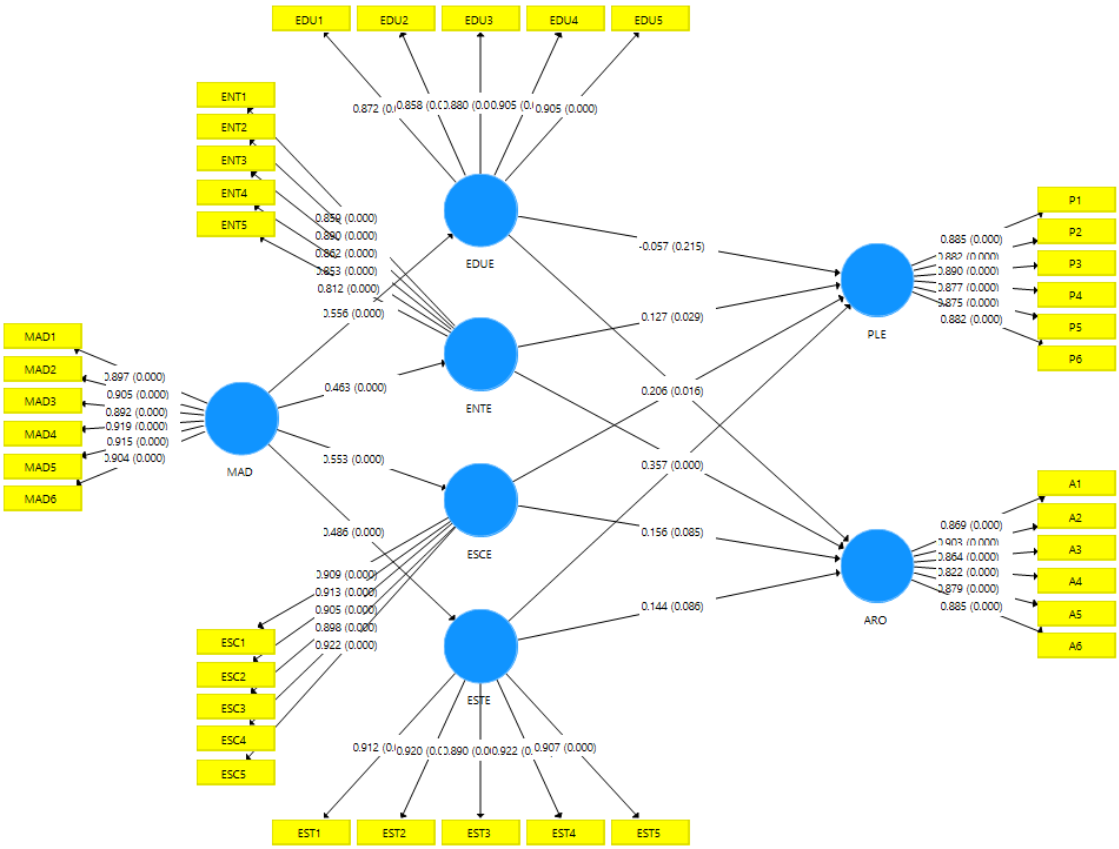

Fig. 2: PLS Structural Equation Model – Output

2016; Kushwaha et al., 2017). Findings of the H_5 and H_9 established an insignificant relationship between EDUE and PLE and ARO. This shows that pleasure and arousal are not predicted from educational experiences from a mall in Tier II & III cities. This may be because the malls in Tier II and Tier III cities are small, lack variety and have limited brands, unawareness of international brands, and visitors being a follower of old traditional markets and shops (Mathur, 2010; Basupattad and Kothari, 2016; Sahu, 2016). This is a contradiction from previous studies where exploration and educational experience play an important role in making the mall a habitat, provide adventure and pleasure, satisfaction, motivation, and arousal (Bloch et al., 1994; Bayley and Nancarrow, 1998; Jeong et al., 2009; Singh and Prashar, 2014; Sadachar and Fiore, 2018).

The testing of the H_6 and H_{10} established a significant and positive relationship between ENTE – PLE, and ENTE – ARO, this is also supported by previous writers. Zerlang (2015) discussed the relationship between entertainment and urbanization which steered the world towards the development of mall culture in the 21st century as entertainment could evoke emotions viz. pleasure and arousal. Pleasure, arousal, or joyful experiences are inevitable components, categorizing entertainment as one of the most critical factors which should not be overlooked, and the concept of "retailtainment" and "entertainmerce" influence visitors to extend visiting hours, thus, are inevitable for physical as well as web-based shopping destinations (Jeong, 2007; Hosany and Witham, 2009; Anuradha and Manohar, 2011; Anuradha et al., 2020; Elmashhara and Soares, 2020). Wakefield and Baker (1998) also found that

entertainment influences consumer excitement or arousal in a mall setting. Finding to H_7 provided a significant positive relationship and H_{11} insignificant relationship between ESCE – PLE and ESCE – ARO respectively. This means escapist experiences positively contribute towards pleasure but does not instigate arousal. Both the results are supported by previous studies that happiness, pleasure, and satisfaction are outcomes of escapist experiences. Escapist experiences provide isolation from boring routine daily work pressures and are reinforced from various engagements at the mall (Bellenger and Korgaonkar, 1980; Bloch and Richins, 1983; Khare, 2011; Singh and Sahay, 2012; Kushwaha et al., 2017). The mall experiences instigate arousal and excitement when visitor's orientation is towards adventure and recreational activities (Hemalatha and Ravichandran, 2009; van Rompay et al., 2011), getting immersed and participating actively in non-utilitarian activities (Pine and Gilmore, 1998), which might be negligible in the case of Tier II & III city malls. The testing of the hypothesis H_8 and H_{12} established a positive relationship between ESTE – PLE and an insignificant relationship between ESTE – ARO. The results are relatively different from previous studies. Consumers with hedonic motivations will engage in the esthetic experiences, which will consequently lead to favorable emotional responses (Holbrook and Hirschman, 1982).

In esthetic experiences, visitors like being involved in a sensory environment. Esthetic appeal from the mall design, architecture, settings, lightings, color combinations and atmospheric details (e.g., store layout, interior details, and visual presentation of products) provide immediate pleasure and arousal to consumers (Wakefield and Baker, 1998). In Tier II & Tier III the esthetic appeal provides pleasure but did not arouse the emotions to a high extent. This may be because the malls in Tier II & Tier cities lack architecture and ambiance compared to the malls in metro cities or western countries.

7 THEORETICAL CONTRIBUTION

A great number of researches have given importance to the environment where customers roam, interact, sense, enjoy, examine, explore, identify, recognize, recall and decide. The emotional aspects of consumers play a vital role in reaching a particular decision. The decision to visit a shopping arena is critically based on the human psychological framework, which is affected by mall attractive dimensions (stimulus) and emotional outcomes (responses) through engagements and experiences (organism). This is also justified from the studies of (Mehrabian and Russell, 1974; Donovan et al., 1994; Baker et al., 2002). The present study in small city conditions has provided some different and specific insights. This could be regarded as a significant contribution to the current literature which was previously conducted in developed and metro cities, lacking empirical evidence of consumer behavior at Tier-II & III city malls. This research also contributes towards drawing new theoretical inferences. Because developed (e.g., western countries and metro cities) and developing cities have substantial economic, cultural and social differences and consumer behavior in small cities of rising economies like India, can differ dramatically from that of western countries like the United States and metro cities like New Delhi and Mumbai. Previous studies have used the experience economy approach extensively, although mostly in the context of western countries and metro cities. Hence, the present research significantly contributed to the theory while examining the relevance of Pine and Gilmore's (1998) 4E's and Mehrabian and Russell's (1974) S-O-R model for analyzing visitor's behavior. The present study encourages researchers to extend the application of MADs in various predictors like patronage intention, loyalty, revisit intention, and recommendations. Moreover, the present model may be applied for comparative study between Tier I and Tier II/III city malls. A comparative analysis may suggest results which

could be useful for arranging suitable services to Tier I city malls having rural immigrants and Tier II/III city malls having urban visitors. Extension of present study may also be done for retail grocery outlets, branded food chains, local restaurants, spa, saloons, etc. in Tier II/III city. Further, author opens avenues for exploring the moderating and mediating role of 4E's on pleasure, and arousal in similar or different demographics.

8 MANAGERIAL CONTRIBUTION

The present study confirms the appeal of new experiential marketing strategies (i.e., 4Es) to visitors and consumers which may be practically executed in Tier II & Tier III cities. Therefore, Malls should identify the hedonic motivations of their target customers and offer particular combinations of the mall attractive dimensions which have more effect over four experiences. By knowing the behavioral patterns of visitors, the mall management, mall tenants, and retailers can use their limited resources more effectively to focus on dimensions that provide experiences. Visitors felt pleasure, found relaxation, and were satisfied (escapist and esthetic experience) with the mall's attractive dimensions but did not have access to the desired recreational environment which could arouse their emotions. Thus, results suggest that malls in such cities considerably lack some of the recreational set-ups like fun-game zones, facilities for festival celebration, extended hang out places, health parlor (spa, etc.), food courts, etc. which could be a matter of concern. Hence, more efforts are required to strengthen this overlooked feature to ensure the outcomes of escapist experience towards evoked pleasure (positively significant from the present study) as well as evoked arousal (insignificant outcome) to strengthen mall engagements. Thus, the study findings suggest implications for the mall management to cohesively work with tenants to synergize MADs which affect consumer emotions due to experiences. Mall attractive dimensions should evoke experiential pleasure and arousal to attract visitors, make customers loyal and retain them as advocates.

9 REFERENCES

Ali, F., Rasoolimanesh, S. M., Sarstedt, M., Ringle, C. M. and Ryu, K. 2018. An Assessment of the Use of Partial Least Squares Structural Equation Modeling (PLS-SEM) in Hospitality Research. *International Journal of Contemporary Hospitality Management*, 30 (1), 514–538. DOI: 10.1108/IJCHM-10-2016-0568.

Anuradha, D. and Manohar, H. L. 2011. Customer Shopping Experience in Malls with Entertainment Centres in Chennai. *African Journal of Business Management*, 5 (31), 12319–12324. DOI: 10.5897/AJBM11.902.

Anuradha, A., Jambulingam, M. and Arumugam, T. 2020. Entertainmerce and Phygital Consumers – Changing Preferences for Retail Shopping Destinations and Retailtainment Options. *Journal of Xidian University*, 14 (6), 2830–2843. DOI: 10.37896/jxu14.6/331.

Babin, B. J., Darden, W. R. and Griffin, M. 1994. Work and/or Fun: Measuring Hedonic and Utilitarian Shopping Value. *Journal of Consumer Research*, 20 (4), 644–656. DOI: 10.1086/209376.

Bærenholdt, J. O. and Haldrup, M. 2006. Mobile Networks and Place Making in Cultural Tourism: Staging Viking Ships and Rock Music in Roskilde. *European Urban and Regional Studies*, 13 (3), 209–224. DOI: 10.1177/0969776406065431.

Baker, J., Parasuraman, A., Grewal, D. and Voss, G. B. 2002. The Influence of Multiple Store Environment Cues on Perceived Merchandise Value and Patronage Intentions. *Journal of Marketing*, 66 (2), 120–141. DOI: 10.1509/jmkg.66.2.120.18470.

Bakker, I., van der Voordt, T., Vink, P. and de Boon, J. 2014. Pleasure, Arousal, Dominance: Mehrabian and Russell Revisited. *Current Psychology*, 33 (3), 405–421. DOI: 10.1007/s12144-014-9219-4.

Basupattad, V. and Kothari, M. 2016. Retailing Shift in India – Driving the Rural Growth in Food & Grocery Retailing, Formats and Models to Penetrate Smaller Towns and Villages. *International Journal of Latest Technology in Engineering, Management & Applied Science*, 5 (11), 39–44. ISSN 2278-2540.

Bayley, G. and Nancarrow, C. 1998. Impulse Purchasing: A Qualitative Exploration of the Phenomenon. *Qualitative Market Research*. 1 (2), 99–114. DOI: 10.1108/13522759810214271.

Bellenger, D. N. and Korgaonkar, P. K. 1980. Profile the Recreational Shopper. *Journal of Retailing*, 56 (3), 77–92.

Bellizzi, J. A., Crowley, A. E. and Hasty, R. W. 1983. The Effects of Color in Store Design. *Journal of Retailing*, 59 (1), 21–45.

Berlyne, D. E. 1970. Novelty, Complexity, and Hedonic Value. *Perception & Psychophysics*, 8 (5), 279–286. DOI: 10.3758/BF03212593.

Bitner, M. J. 1992. Servicescapes: The Impact of Physical Surroundings on Customers and Employees. *Journal of Marketing*, 56 (2), 57–71. DOI: 10.1177/002224299205600205.

Bloch, P. H. and Richins, M. L. 1983. A Theoretical Model for the Study of Product Importance Perceptions. *Journal of Marketing*, 47 (3), 69–81. DOI: 10.1177/002224298304700308.

Bloch, P. H., Ridgway, N. M. and Dawson, S. A. 1994. The Shopping Mall as Consumer Habitat. *Journal of Retailing*, 70 (1), 23–42. DOI: 10.1016/0022-4359(94)90026-4.

Booms, B. H. and Bitner, M. J. 1981. Marketing Strategies and Organization Structures for Service Firms. In Donnelly, J. H. and George, W. R. (eds.). *Marketing of Services*, 47–51. American Marketing Association.

Browne, M. W. and Cudeck, R. 1992. Alternative Ways of Assessing Model Fit. *Sociological Methods & Research*, 21 (2), 230–258. DOI: 10.1177/0049124192021002005.

Clark, L. A. and Watson, D. 1995. Constructing Validity: Basic Issues in Objective Scale Development. *Psychological Assessment*, 7 (3), 309–319. DOI: 10.1037/1040-3590.7.3.309.

Das, G. 2013. The Effect of Pleasure and Arousal on Satisfaction and Word-of-Mouth: An Empirical Study of the Indian Banking Sector. *Vikalpa: The Journal for Decision Makers*, 38 (2), 95–104. DOI: 10.1177/0256090920130206.

Das, G. 2015. Impact of Store Attributes on Consumer-Based Retailer Equity: An Exploratory Study of Department Retail Stores. *Journal of Fashion Marketing and Management*, 19 (2), 188–204. DOI: 10.1108/JFMM-11-2013-0124.

Dash, G. and Paul, J. 2021. CB-SEM vs PLS-SEM Methods for Research in Social Sciences and Technology Forecasting. *Technological Forecasting and Social Change*, 173, 121092. DOI: 10.1016/j.techfore.2021.121092.

Dinev, T. and Hart, P. 2004. Internet Privacy Concerns and Their Antecedents – Measurement Validity and a Regression Model. *Behaviour & Information Technology*, 23 (6), 413–422. DOI: 10.1080/01449290410001715723.

Donovan, R. J. and Rossiter, J. R. 1982. Store Atmosphere: An Environmental Psychology Approach. *Journal of Retailing*, 58 (1), 34–57.

Donovan, R. J., Rossiter, J. R., Marcoolyn, G. and Nesdale, A. 1994. Store Atmosphere and Purchasing Behavior. *Journal of Retailing*, 70 (3), 283–294. DOI: 10.1016/0022-4359(94)90037-X.

Elmashhara, M. G. and Soares, A. M. 2020. Entertain Me, I'll Stay Longer! The Influence of Types of Entertainment on Mall Shoppers' Emotions and Behavior. *Journal of Consumer Marketing*, 37 (1), 87–98. DOI: 10.1108/JCM-03-2019-3129.

Eroglu, S. A., Machleit, K. A. and Davis, L. M. 2001. Atmospheric Qualities of Online Retailing: A Conceptual Model and Implications. *Journal of Business Research*, 54 (2), 177–184. DOI: 10.1016/S0148-2963(99)00087-9.

Essawy, M. 2017. The Impacts of E-atmospherics on Emotions and on the Booking Intentions of Hotel Rooms. *Tourism and Hospitality Research*, 19 (1), 65–73. DOI: 10.1177/1467358417692393.

Floyd, M. F. 1997. Pleasure, Arousal, and Dominance: Exploring Affective Determinants of Recreation Satisfaction. *Leisure Sciences*, 19 (2), 83–96. DOI: 10.1080/01490409709512241.

Gahinet, M.-C. and Cliquet, G. 2018. Proximity and Time in Convenience Store Patronage: Kaïros More Than Chronos. *Journal of Retailing and Consumer Services*, 43, 1–9. DOI: 10.1016/j.jretconser.2018.02.008.

Ghosh, P., Tripathi, V., Saini, S. and Agrawal, S. 2010. Shopping Orientation and Behavioural Patterns of Indian Consumers: Study of a Tier II City. *International Journal of Services, Economics and Management*, 2 (2), 121–136. DOI: 10.1504/IJSEM.2010.030915.

Gold, A. H., Malhotra, A. and Segars, A. H. 2001. Knowledge Management: An Organizational Capabilities Perspective. *Journal of Management Information Systems*, 18 (1), 185–214.

Goyal, R. 2021. *Modernization of Kirana Stores in India* [online]. Available at: `https://www.investindia.gov.in/team-india-blogs/modernization-kirana-stores-india`. [Accessed 2021, August 20].

Hair, J. F., Ringle, C. M. and Sarstedt, M. 2011. PLS-SEM: Indeed a Silver Bullet. *Journal of Marketing Theory and Practice*, 19 (2), 139–152. DOI: 10.2753/MTP1069-6679190202.

Hair, J. F., Risher, J. J., Sarstedt, M. and Ringle, C. M. 2019. When to Use and How to Report the Results of PLS-SEM. *European Business Review*, 31 (1), 2–24. DOI: 10.1108/EBR-11-2018-0203.

Hair, J. F., Ringle, C. M. and Sarstedt, M. 2014. Corrigendum to "Editorial Partial Least Squares Structural Equation Modeling: Rigorous Applications, Better Results and Higher Acceptance" [LRP 46/1–2 (2013) 1–12]. *Long Range Planning*, 47 (6), 392. DOI: 10.1016/j.lrp.2013.08.016.

Hair, J. F., Matthews, L. M., Matthews, R. L. and Sarstedt, M. 2017. PLS-SEM or CB-SEM: Updated Guidelines on Which Method to Use. *International Journal of Multivariate Data Analysis*, 1 (2), 107–123. DOI: 10.1504/ijmda.2017.10008574.

Hemalatha, G. K. and Ravichandran, K. 2009. Mall Visit Behaviour of Older Generation – Y Consumers. *Serbian Journal of Management*, 4 (2), 169–182.

Henseler, J., Hubona, G. and Ray, P. A. 2016. Using PLS Path Modeling in New Technology Research: Updated Guidelines. *Industrial Management and Data Systems*, 116 (1), 2–20. DOI: 10.1108/IMDS-09-2015-0382.

Holbrook, M. B. and Hirschman, E. C. 1982. The Experiential Aspects of Consumption: Consumer Fantasies, Feelings, and Fun. *Journal of Consumer Research*, 9 (2), 132–140. DOI: 10.1086/208906.

Hosany, S. and Witham, M. 2009. Dimensions of Cruisers' Experiences, Satisfaction, and Intention to Recommend. Journal of Travel Research, 49 (3), 351–364. DOI: 10.1177/0047287509346859.

Hsu, S. H.-Y., Tsou, H.-T. and Chen, J.-S. 2021. "Yes, We Do. Why Not Use Augmented Reality?" Customer Responses to Experiential Presentations of AR-Based Applications. *Journal of Retailing and Consumer Services*, 62, 102649. DOI: 10.1016/j.jretconser.2021.102649.

Hu, L.-T. and Bentler, P. M. 1998. Fit Indices in Covariance Structure Modeling: Sensitivity to Underparameterized Model Misspecification. *Psychological Methods*, 34 (3), 424–453. DOI: 10.1037/1082-989X.3.4.424.

Hu, L.-T. and Bentler, P. M. 1999. Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria versus New Alternatives. *Structural Equation Modeling*, 6 (1), 1–55. DOI: 10.1080/10705519909540118.

IBEF. 2021. *Indian Retail Industry Analysis* [online]. Indian Brand Equity Foundation. Available at: `https://www.ibef.org/industry/indian-retail-industry-analysis-presentation`. [Accessed 2021, August 20].

Jantzen, C., Fitchett, J., Østergaard, P. and Vetner, M. 2012. Just for Fun? The Emotional Regime of Experiential Consumption. *Marketing Theory*, 12 (2), 137–154. DOI: 10.1177/1470593112441565.

Jeong, S. W. 2007. *The Effects of Product Presentation on Consumer Experiences, Emotion, and Website Patronage Intention towards an Apparel Website*. Retrospective Theses and Dissertation, Iowa State University. DOI: 10.31274/rtd-180813-16035.

Jeong, S. W., Fiore, A. M., Niehm, L. S. and Lorenz, F. O. 2009. The Role of Experiential Value in Online Shopping: The Impacts of Product Presentation on Consumer Responses towards an Apparel Web Site. *Internet Research*, 19 (1), 105–124. DOI: 10.1108/10662240910927858.

Kashyap, A. and Raghuvanshi, J. 2020. A Preliminary Study on Exploring the Critical Success Factors for Developing COVID-19 Preventive Strategy with an Economy Centric Approach. *Management Research*, 18 (4), 357–377. DOI: 10.1108/MRJIAM-06-2020-1046.

Kashyap, P. 2012. The Rural Boom in India. *International Journal of Rural Management*, 8 (1–2), 133–141. DOI: 10.1177/0973005212462117.

Kesari, B. and Atulkar, S. 2016. Satisfaction of Mall Shoppers: A Study on Perceived Utilitarian and Hedonic Shopping Values. *Journal of Retailing and Consumer Services*, 31, 22–31. DOI: 10.1016/j.jretconser.2016.03.005.

Khan, M. F. A. and Ahmad, I. 2020. Impact of Organized Retail Strategy on Buying Behavior – A Case Study of Saudi Arabian Region. *Review of Professional Management*, 18 (2), 64–76. DOI: 10.20968/rpm/2020/v18/i2/156060.

Khare, A. 2011. Mall Shopping Behaviour of Indian Small Town Consumers. *Journal of Retailing and Consumer Services*, 18 (1), 110–118. DOI: 10.1016/j.jretconser.2010.10.005.

Kiran, R. and Jhamb, D. 2011. A Strategic Framework for Consumer Preferences towards Emerging Retail Formats. *Journal of Emerging Knowledge on Emerging Markets*, 3, 437–453. DOI: 10.7885/1946-651x.1058.

Koronaki, E. and Theodoridis, P. K. 2020. Crafting Food Shopping Experiences: the Case of Food Halls in Luxury Departments Stores. In Doppler, S. and Steffen, A. (eds.). *Case Studies on Food Experiences in Marketing, Retail, and Events*. A volume in Woodhead Publishing Series in Consumer Sci & Strat Market, 51–63. DOI: 10.1016/B978-0-12-817792-1.00005-8.

Kotler, P., Armstrong, G. and Saunders, J. 2002. *Principles of Marketing*. 3rd ed. Pearson.

Krause, A. E. and North, A. C. 2016. Pleasure, Arousal, Dominance, and Judgments about Music in Everyday Life. *Psychology of Music*, 45 (3), 355–374. DOI: 10.1177/0305735616664214.

Kumar, A., Kashyap, K. A. and Bhagwat, S. 2021. An Exploratory Analysis of Mall Attractive Dimensions from the Perspective of Tier-II Cities Customers. *International Journal of Business Innovation and Research*, 25 (1), 78–93. DOI: 10.1504/IJBIR.2021.115044.

Kushwaha, T., Ubeja, S. and Chatterjee, A. S. 2017. Factors Influencing Selection of Shopping Malls: An Exploratory Study of Consumer Perception. *Vision: The Journal of Business Perspective*, 21 (3), 274–283. DOI: 10.1177/0972262917716761.

Kusumowidagdo, A., Sachari, A. and Widodo, P. 2016. Visitor' Perceptions on the Important Factors of Atrium Design in Shopping Centers: A Study of Gandaria City Mall and Ciputra World in Indonesia. *Frontiers of Architectural Research*, 5 (1), 52–62. DOI: 10.1016/j.foar.2015.11.003.

Laroche, M., Teng, L., Michon, R. and Chebat, J. 2005. Incorporating Service Quality into Consumer Mall Shopping Decision Making: A Comparison between English and French Canadian Consumers. *Journal of Services Marketing*, 19 (3), 157–163. DOI: 10.1108/08876040510596830.

Lee, H. and Lee, E. 2021. Effects of Coloured Lighting on Pleasure and Arousal in Relation to Cultural Differences. *Lighting Research & Technology*, 54 (2), 145–162. DOI: 10.1177/1477153521999592.

Lee, T. H. and Chang, Y. S. 2012. The Influence of Experiential Marketing and Activity Involvement on the Loyalty Intentions of Wine Tourists in Taiwan. *Leisure Studies*, 31 (1), 103–121. DOI: 10.1080/02614367.2011.568067.

Levy, M., Weitz, B. and Pandit, A. 2017. *Retailing Management*. 8th ed. New Delhi: McGraw Hill Education.

Liasidou, S. 2018. Unveiling the Potentials of Wine Tourism: the Way Ahead for Limassol. *Journal of Place Management and Development*, 11 (1), 26–45. DOI: 10.1108/JPMD-07-2017-0065.

Maps of India. 2019. *Map of Tier I and Tier II Cities of India* [online]. Available at: `https://www.mapsofindia.com/maps/india/tier-1-and-2-cities.html`.

Mathur, N. 2010. Shopping Malls, Credit Cards and Global Brands: Consumer Culture and Lifestyle of India's New Middle Class. *South Asia Research*, 30 (3), 211–231. DOI: 10.1177/026272801003000301.

Mathwick, C., Malhotra, N. and Rigdon, E. 2001. Experiential Value: Conceptualization, Measurement and Application in the Catalog and Internet Shopping Environment. *Journal of Retailing*, 77 (1), 39–56. DOI: 10.1016/S0022-4359(00)00045-2.

McCarthy, E. J. 1964. *Basic Marketing: A Managerial Approach*. 2nd ed. Homewood: R. D. Irwin.

Mehrabian, A. and Russell, J. A. 1974. The Basic Emotional Impact of Environments. *Perceptual and Motor Skills*, 38 (1), 283–301. DOI: 10.2466/pms.1974.38.1.283.

Menon, S. and Kahn, B. 2002. Cross-Category Effects of Induced Arousal and Pleasure on the Internet Shopping Experience. *Journal of Retailing*, 78 (1), 31–40. DOI: 10.1016/S0022-4359(01)00064-1.

Michon, R., Yu, H., Smith, D. and Chebat, J.-C. 2008. The Influence of Mall Environment on Female Fashion Shoppers' Value and Behaviour. *Journal of Fashion Marketing and Management*, 12 (4), 456–468. DOI: 10.1108/13612020810906128.

Milman, A. and Tasci, A. D. A. 2018. Exploring the Experiential and Sociodemographic Drivers of Satisfaction and Loyalty in the Theme Park Context. *Journal of Destination Marketing & Management*, 8, 385–395. DOI: 10.1016/j.jdmm.2017.06.005.

Ministry of Housing and Urban Affairs. 2011. *Number of Cities Towns by City Size Class* [online]. Available at: `http://mohua.gov.in/cms/number-of-cities--towns-by-city-size-class.php`.

Mittal, A. and Jhamb, D. 2016. Determinants of Shopping Mall Attractiveness: The Indian Context. *Procedia Economics and Finance*, 37, 386–390. DOI: 10.1016/S2212-5671(16)30141-1.

Oh, H., Fiore, A. M. and Jeoung, M. 2007. Measuring Experience Economy Concepts: Tourism Applications. *Journal of Travel Research*, 46 (2), 119–132. DOI: 10.1177/0047287507304039.

Ortegón-Cortázar, L. and Royo-Vela, M. 2019. Nature in Malls: Effects of a Natural Environment on the Cognitive Image, Emotional Response, and Behaviors of Visitors. *European Research on Management and Business Economics*, 25 (1), 38–47. DOI: 10.1016/j.iedeen.2018.08.001.

Patel, V. and Sharma, M. 2009. Consumers' Motivations to Shop in Shopping Malls: A Study of Indian Shoppers. *Advances in Consumer Research*, 8, 285–290.

Pelletier, M. J. and Collier, J. E. 2018. Experiential Purchase Quality: Exploring the Dimensions and Outcomes of Highly Memorable Experiential Purchases. *Journal of Service Research*, 21 (4), 456–473. DOI: 10.1177/1094670518770042.

Phillips, L. W. and Sternthal, B. 1977. Age Differences in Information Processing: A Perspective on the Aged Consumer. *Journal of Marketing Research*, 14 (4), 444–457. DOI: 10.1177/002224377701400402.

Pine, B. J. and Gilmore, J. H. 1998. Welcome to the Experience Economy. *Harward Business Review* [online]. Available at: `https://hbr.org/1998/07/welcome-to-the-experience-economy`.

Pine, B. J. and Gilmore, J. H. 2013. The Experience Economy: Past, Present and Future. In Sundbo, J. and Sørensen, F. (eds.). *Handbook on the Experience Economy*, Chapter 2, pp. 21–44. DOI: 10.4337/9781781004227.00007.

Prashar, S., Singh, H., Parsad, C. and Vijay, T. S. 2017. Predicting Indian Shoppers' Malls Loyalty Behaviour. *Vikalpa: The Journal for Decision Makers*, 42 (4), 234–250. DOI: 10.1177/0256090917731431.

Prashar, S., Verma, P., Parsad, C. and Vijay, T. S. 2015. Factors Defining Store Atmospherics in Convenience Stores: An Analytical Study of Delhi Malls in India. *The Journal of Asian Finance, Economics and Business*, 2 (3), 5–15. DOI: 10.13106/jafeb.2015.vol2.no3.5.

Priya, A. 2009. Global Business Environment, Understanding Multicultural Behaviour. *Review of Professional Management*, 7 (2), 128. DOI: 10.20968/rpm/2009/v7/i2/100922.

Raja, M. W., Anand, S. and Allan, D. 2019. Advertising Music: An Alternative Atmospheric Stimulus to Retail Music. *International Journal of Retail & Distribution Management*, 47 (8), 872–892. DOI: 10.1108/IJRDM-08-2018-0157.

Sadachar, A. 2014. *Indian Consumers' Patronage Intention Toward Shopping Malls: Application of an Experience Economy Perspective*. Dissertation. Iowa State University. DOI: 10.13140/RG.2.1.4353.6484.

Sadachar, A. and Fiore, A. M. 2018. The Path to Mall Patronage Intentions is Paved with 4E-based Experiential Value for Indian Consumers. *International Journal of Retail & Distribution Management*, 46 (5), 442–465. DOI: 10.1108/IJRDM-07-2017-0152.

Sahu, S. R. 2016. An Case Study Approach for Identifying Factors Responsible for Failed Shopping Malls in India. *International Journal of Research in Finance and Marketing*, 6861 (5), 33–42.

Sherman, E., Mathur, A. and Smith, R. B. 1997. Store Environment and Consumer Purchase Behavior: Mediating Role of Consumer Emotions. *Psychology & Marketing*, 14 (4), 361–378. DOI: 10.1002/(SICI)1520-6793(199707)14:4<361::AID-MAR4>3.0.CO;2-7.

Sinclair-Maragh, G. 2016. Assessing Tourism Experiences: The Case of Heritage Attractions. In Sotiriadis, M. and Gursoy, D. (eds.). *The Handbook of Managing and Marketing Tourism Experiences*, 487–506. DOI: 10.1108/978-1-78635-290-320161021.

Singh, H. and Dash, P. C. 2012. Determinants of Mall Image in the Indian Context: Focus on Environment. *Asia-Pacific Journal of Management Research and Innovation*, 8 (4), 407–415. DOI: 10.1177/2319510X13481897.

Singh, H. and Prashar, S. 2014. Anatomy of Shopping Experience for Malls in Mumbai: A Confirmatory Factor Analysis Approach. *Journal of Retailing and Consumer Services*, 21 (2), 220–228. DOI: 10.1016/j.jretconser.2013.08.002.

Singh, H. and Sahay, V. 2012. Determinants of Shopping Experience. *International Journal of Retail & Distribution Management*, 40 (3), 235–248. DOI: 10.1108/09590551211207184.

Tauber, E. M. 1972. Marketing Notes and Communications: Why Do People Shop? *Journal of Marketing*, 36 (4), 46–49. DOI: 10.1177/002224297203600409.

Teo, T. S. H., Srivastava, S. C. and Jiang, L. 2008. Trust and Electronic Government Success: An Empirical Study. *Journal of Management Information Systems*, 25 (3), 99–132. DOI: 10.2753/MIS0742-1222250303.

van Rompay, T. J. L., Tanja-Dijkstra, K., Verhoeven, J. W. M. and van Es, A. F. 2011. On Store Design and Consumer Motivation: Spatial Control and Arousal in the Retail Context. *Environment and Behavior*, 44 (6), 800–820. DOI: 10.1177/0013916511407309.

Vilnai-Yavetz, I., Gilboa, S. and Mitchell, V. 2021. Experiencing Atmospherics: The Moderating Effect of Mall Experiences on the Impact of Individual Store Atmospherics on Spending Behavior and Mall Loyalty. *Journal of Retailing and Consumer Services*, 63, 102704. DOI: 10.1016/j.jretconser.2021.102704.

Wakefield, K. L. and Baker, J. 1998. Excitement at the Mall: Determinants and Effects on Shopping Response. *Journal of Retailing*, 74 (4), 515–539. DOI: 10.1016/S0022-4359(99)80106-7.

Wirtz, J., Mattila, A. S. and Tan, R. L. P. 2000. The Moderating Role of Target-Arousal on the Impact of Affect on Satisfaction – An Examination in the Context of Service Experiences. *Journal of Retailing*, 76 (3), 347–365. DOI: 10.1016/S0022-4359(00)00031-2.

Zerlang, M. 2015. Entertainment. In Wright, J. D. (ed.). *International Encyclopedia of the Social & Behavioral Sciences*, pp. 669–674. 2nd ed. Elsevier. DOI: 10.1016/B978-0-08-097086-8.95015-3.

10 ANNEX

Tab. 5: Measurement Items used in the study (Scale)

Scale-Items	Reference
(1) Mall Attractive Dimensions	Kumar et al. (2021)
Mall environment, Convenience, Mall staff, Mall hygiene, Entertainment and Security	
(2) Four realms of an experience	Oh et al. (2007), Pine and Gilmore (1998)
Educational experience, Entertainment experience, Escapist experience and Esthetic experience	
(3) Responders' emotions	Bakker et al. (2014), Mehrabian and Russell (1974)
Pleasure (Unhappy – Happy, Bored – Relaxed, Annoyed – Pleased, Unsatisfied – Satisfied, Despairing – Hopeful)	
Arousal (Unaroused – Aroused, Dull – Jittery, Sleepy – Wild awake, Calm – Excited, Sluggish – Frenzied, Relaxed – Stimulated)	

Tab. 6: Measurement Items used in the study (Questionnaire)

Constructs	Indicator	Statements
Mall Attractive Dimension (MADs)	MAD1	Mall environment factors like interesting design, attractive interior wall and floor colour schemes, attractive architecture, attractive lightings, spacious corridors, comfortable temperature and aroma – stimulate me for selecting this Mall for shopping
	MAD2	Mall convenience factors like operational timings, restrooms, lockers, escalators, lifts, spacious parking, mall location and proximity – stimulate me for selecting this Mall for shopping
	MAD3	Mall staff being pleasing, helping, polite, presentable, prompt and caring – motivate me for selecting this Mall for shopping
	MAD4	Entertainment factors like cinema and movie screens, restaurants, play and game area, acoustics in mall, hang-out facilities during celebrations and festivals – motivate me for selecting this Mall for shopping
	MAD5	Security factors for personal and belongings against theft, secure parking for vehicles and process of scanned entry – motivate me for selecting this Mall for shopping
	MAD6	Mall hygiene facilities like well clean washrooms, proper ventilation, clean floors, fragrant and clean air, enclosed facilities, dust free arena – motivate me for selecting this Mall for shopping
Educational Experience (EDUE)	EDU1	My visit to this mall has stimulated my curiosity to learn new things
	EDU2	I consider my visit to mall as real learning experience
	EDU3	I found something new related to my interest in the mall
	EDU4	Exploring the mall during visit helped me to find different merchandise
	EDU5	I noted mall as a place with multiple activities under one roof
Entertainment Experience (ENTE)	ENT1	All of the activities of the mall have been amusing to watch
	ENT2	I really enjoyed observing all the activities in the mall
	ENT3	All of the activities of the mall have been pleasurable to see
	ENT4	It was fun to watch all activities of the mall
	ENT5	I found myself happy during my stay at mall
Escapist Experience (ESCE)	ESC1	During this mall visit, I have felt I am living in a different time or place
	ESC2	I have felt I played a different character during this mall visit
	ESC3	This mall experience has let me imagine being someone else
	ESC4	During this mall visit, I forget my daily routine work stress
	ESC5	I feel relaxed during my mall visit
Esthetic Experience (ESTE)	EST1	I found the mall setting has a good sense of design harmony
	EST2	The interior design of the mall attracted me
	EST3	The environment (i.e., lighting, decoration and aroma) in the mall has excited me
	EST4	I found myself in a good mood during my stay at mall
	EST5	It has been pleasant just being in this mall
Pleasure (PLE)	PLE1	I felt happy with the mall experience
	PLE2	I felt relaxed with the mall experience
	PLE3	I felt pleased with the mall experience
	PLE4	I felt satisfied with the mall experience
	PLE5	I felt hopeful with the mall experience
	PLE6	I felt fulfilled with the mall experience
Arousal (ARO)	ARO1	I felt aroused with the mall experience
	ARO2	I felt jittery with the mall experience
	ARO3	I felt awake with the mall experience
	ARO4	I felt excited with the mall experience
	ARO5	I felt over enthusiastic with the mall experience
	ARO6	I felt stimulated with the mall experience

Tab. 7: Summary of Discriminant Validity – Fornel-Larckel Criteria

Latent Variables	ARO	EDUE	ENTE	ESCE	ESTE	MAD	PLE
ARO	0.871						
EDUE	0.312	0.884					
ENTE	0.392	0.509	0.856				
ESCE	0.428	0.626	0.754	0.909			
ESTE	0.422	0.582	0.742	0.906	0.910		
MAD	0.143	0.556	0.463	0.553	0.486	0.905	
PLE	0.386	0.344	0.518	0.589	0.604	0.324	0.882

Tab. 8: Summary of Discriminant Validity – Heterotrait-Monotrait Ratio (HTMT)

Latent Variables	ARO	EDUE	ENTE	ESCE	ESTE	MAD	PLE
ARO							
EDUE	0.332						
ENTE	0.422	0.545					
ESCE	0.453	0.665	0.804				
ESTE	0.445	0.618	0.788	0.955			
MAD	0.151	0.590	0.492	0.581	0.509		
PLE	0.409	0.364	0.555	0.622	0.636	0.341	

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