REVIEW OF BUSINES AND MANAGEMENT

Theory Methodology Practice

University of Miskolc
Faculty of Economics

Volume 18 Number 1 July 2022
ISSN: 1589-3413

THEORY METHODOLOGY PRACTICE

REVIEW OF BUSINESS AND MANAGEMENT

Editorial Board

Faculty of Economics, University of Miskolc, Hungary

ISSN 1589-3413 (Print) 2415-9883 (Online)

TMP website: http://tmp.gtk.uni-miskolc.hu

THEORY METHODOLOGY PRACTICE

University of Miskolc
Faculty of Economics

Volume 18 Number 1 July 2022

CONTENTS

Appropriate Innovation for Asian Emerging Markets in a Digital World: A Strategic Framework

GEORGE ABONYI[i]
Senior Research Fellow and Visiting Professor
Sasin School of Management
CHULALONGKORN UNIVERSITY
e-mail: george.abonyi@sasin.edu

DAVID ABONYI
Senior Advisor
THAI-CANADA ECONOMIC COOPERATION
FOUNDATION, BANGKOK
e-mail: dave.abonyi@gmail.com

SUMMARY

Growth in spending in Asian emerging economies will be driven to a large extent by lower-middle income and lower-income households. They constitute a vast "2nd tier" underserved market, much of it located in smaller cities, towns, and rural areas. This study develops a framework for appropriate innovation strategy aimed at this substantial market. We identify key relevant characteristics of the leading Asian emerging economies of ASEAN, China and India; that often do not get sufficient attention. The proposed strategic framework then builds on selected examples of appropriate innovation; incorporates the potentially important role of unconventional partnership between business and social enterprise for this market; and develops the supporting role of digital technology, in particular, additive manufacturing (3D printing). We conclude by presenting policy implications of an appropriate innovation strategy, involving government-business collaboration.

Keywords: Appropriate innovation, Asian emerging economies (ASEAN, China, India), additive manufacturing (3D printing), export strategy, business-social enterprise partnership, government-business collaboration
Journal of Economic Literature (JEL) code: 031
DOI: http://doi.org/10.18096/TMP.2022.01.01

INTRODUCTION

This study develops a framework for *appropriate innovation strategy* aimed at Asian emerging economies' vast underserved markets. It builds on a different, and more granular analysis of these markets; incorporates the potentially important role of unconventional partnership between business and social enterprise; and develops the supporting role of digital technology, in particular, additive manufacturing (3D printing). The proposed approach to innovation is also more likely to be within the reach of small- and medium-scale enterprises (SMEs).

Different perspective on Asian emerging markets

The usual focus on Asian markets emphasizes factors such as rising per capita GDP, and a growing high income "urban upper middle class" in leading mega-cities cities such as Shanghai, Delhi, Bangkok and Jakarta. It is broadly suggested that Asia could account for 50% of the growth in global consumption by 2030, reaching 40% of total global consumption expenditures by 2040 (McKinsey Global Institute (MGI) 2019, 2021). The region is also projected to drive the post-COVID pandemic global recovery, led by the economies of ASEAN, China and India (IMF 2022; World Bank 2022).

On closer examination, the vast majority of people in Asian emerging economies will be lower-income for years to come -- but with high aspirations and significant buying power. The growth in spending in these economies will be driven to a large extent by lower-middle income and lower-income households. These constitute a huge underserved "2nd tier" market, much of it located in smaller cities, towns, semi-urban, and rural areas. Effective

innovation for this market requires a shift in perspective by firms and governments.

Different perspective on innovation

Innovation is central to the competitiveness of firms, and the growth of economies. The usual innovation strategy of governments and firms aims at developing advanced technology, through leading edge research and development (R&D), targeting high-value products and services (e.g. WIPO 2021; Global Trade and Innovation Policy Alliance 2019). This is essential for strengthening productivity and international competitiveness. However, it has often proven to be a challenge for many firms, particularly SMEs. It is also not essential for the very large 2nd tier markets in Asian emerging economies.
Substantial opportunities await firms that can tailor products, services, and business models to the specific needs and conditions of these markets. For this, the concept of innovation should go beyond preoccupation with novel new-to-the-world and highly advanced technologies.

The concept of *appropriate innovation* is aimed at addressing the unmet needs and constraints of consumers in the vast 2nd tier markets in Asian emerging economies (Abonyi and Abonyi 2021). Appropriate innovation builds on extensive consumer engagement, and creatively embraces local constraints as the basis for developing and commercializing new products, services and business models. Although at its core is product innovation, it is really a *business model innovation* that involves fundamentally changing the way firms do business, incorporating novel digital technology, and new types of collaboration (World Economic Forum (WEF) 2022). Appropriate innovation is also more likely to be within the reach of smaller firms (SMEs) with limited R&D resources and capabilities.

Organization of the paper

Given the market-driven nature of appropriate innovation, it is essential to have a granular understanding of Asian emerging economies. Therefore Section 2 summarizes key characteristics of *2nd tier markets* in ASEAN, China and India, not usually a focus of attention. The concept of *appropriate innovation* is defined in Section 3, illustrated by selected examples. *Social enterprise* as an important non-traditional partner for business in appropriate innovation is discussed in Section 4. The role of digital technology, in particular *additive manufacturing* (3D printing) to support user-responsive innovation, is presented in Section 5. These building blocks are integrated in Section 6 in a *framework for strategy of appropriate innovation*. Selected *policy implications* of appropriate innovation are in the concluding section (7).

ASIAN EMERGING ECONOMIES' 2ND TIER MARKETS: ASEAN, CHINA AND INDIA

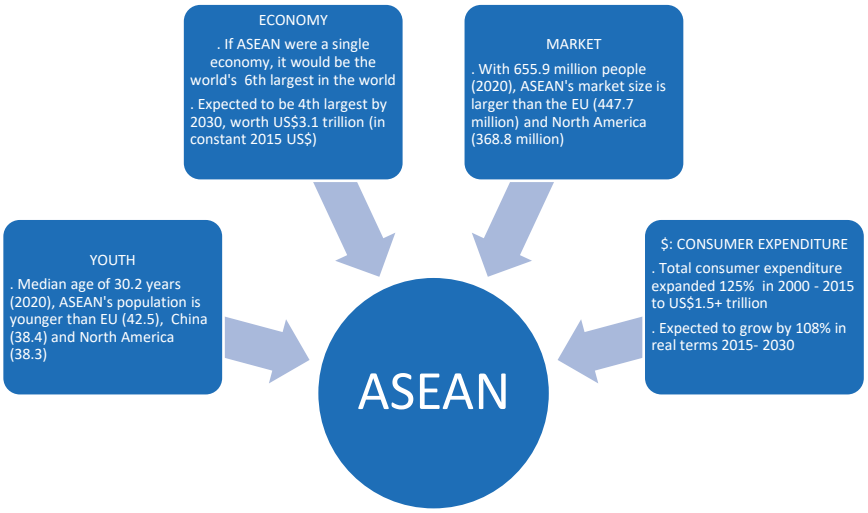
Usual perspective on Asian markets

General economic data on Asia are readily available from sources such as the World Bank, International Monetary Fund (IMF), and the Asian Development Bank (ADB). These are useful for giving firms a broad perspective for investments and exports. However, they are of limited usefulness for identifying particular market segments and consumer groups that can guide specific product market strategies. For example, knowing that GDP per capita in China in 2020 was US$10,430.73 (constant 2015 US$, World Bank) tells little about which groups of households, and in what geographic areas, are likely to have particularly promising buying power. Attention also tends to focus on what is seen as a growing high income class in the region's leading mega-cities, such as Shanghai, Delhi, Bangkok and Jakarta.

Detailed analysis of household income distributions in Asian emerging economies reveals a complex and fragmented market landscape. It shows that the vast majority of the households in these markets will be lower-income for years to come; but with substantial and rising buying power, and high aspirations. They constitute a huge 2nd tier market, much of it located in secondary cities, towns, and semi-urban, and rural areas, with significant potential for firms with focused and creative product market strategies. Therefore a deep understanding of the characteristics of this market is essential for competitive success.

ASEAN's 2nd tier market

Overview of ASEAN shows a very attractive region in a number of dimensions, with significant potential as a market, and projected consumer expenditures (Fig.1).

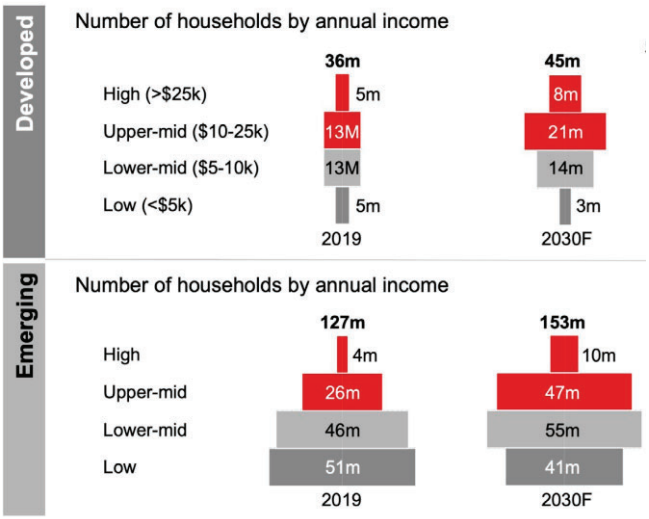


Sources: authors' own, incorporating data from *worldometer (https://www.worldometers.info/;* and *Euromonitor International (2016)*

Figure 1. Overview of ASEAN

A granular look at the ASEAN region provides a more useful picture to guide product market strategy (Fig. 2). In 2019 ASEAN's population was approximately 650 million (ASEAN 2019), comprising 163 million households (World Economic Forum (WEF) 2020). Of this total, 154 million households or 94.5%, had disposable incomes lower than US$25,000 per annum (p.a.); and 115 million households, or around 70%, had less than US$10,000 p.a.

By 2030 the ASEAN population is expected to increase to around 722 million, comprising approximately 198 million households. Of this total, 181 million households, or 91.4%, are expected to have disposable incomes less than US$25,000 p.a.; and 113 million households, or around 62.4% less than US$10,000 p.a. This reflects significant growth in ASEAN household real incomes, projected to create an estimated 140 million new consumers (WEF 2020). However, the vast majority of ASEAN households will continue to have disposable incomes less than US$25,000 p.a.



Source: World Economic Forum and Bain and Co. (2020). This generally aligns with other such analyses and projections, e.g. Euromonitor International (2016).

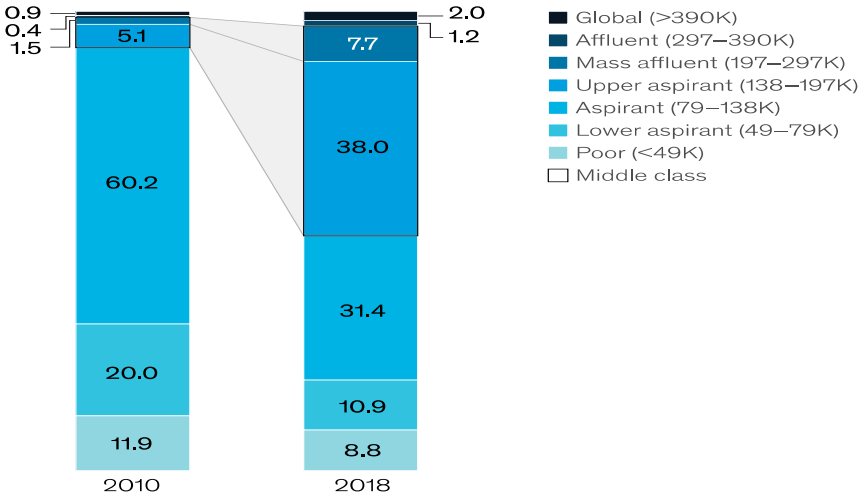
Figure 2. ASEAN households by annual disposable income

Contrary to common assumptions, the leading megacities of ASEAN may not be the main drivers of the region's future market growth. In a study of sales of 10 products in ASEAN urban areas, it was found that since 2010 demand in these megacities was no longer the fastest growing for half of these products (Nielsen 2017). The study predicted that by 2030 fastest growth for seven out of ten products will be in middleweight cities (500,000 – 5 million) and smaller urban centres -- such as Nakhon Ratchasima, Chonburi and Rayong in Thailand; Can Tho in Vietnam; Surabaya in Indonesia; Pampanga in the Philippines, as well as developing towns and rural areas. For example in Thailand, 2010 - 2017 country-level demand grew at 1.2% per annum; while in Chiang Mai (1+ million people), it grew seven times that rate.

China's 2nd tier market

Since the reform and opening of its economy in 1978, China's GDP growth has averaged almost 10 per cent per year, further accelerated by membership in the World Trade Organization (WTO) in late 2001. This growth lifted more than 800 million people out of poverty. China is now classed as an upper-middle-income country, with GDP per capita at US$10,430.73 (constant 2015 US$, World Bank). Growth slowed to 2.3 per cent in 2020 because of the impact of the COVID pandemic, but China's economy is projected to grow by 8.1 per cent in 2021, 4.4 per cent in 2022, and 5.1 per cent in 2023 (IMF 2022). Although it should be noted that to sustain future growth, China will have to address the challenges of increasing structural constraints, including demography leading to a declining growth of its labour force; slowing productivity; and falling returns on investment (Pettis 2020).

While the share of consumption in its domestic GDP is relatively very low, China's global share of consumption has grown significantly in recent years (McKinsey 2021). This growth is coming from "many Chinas", involving a range of income groups. Detailed breakdown of urban household disposable incomes provides a clearer picture of these groups (Fig. 3), and the overall size of the 2nd tier market.



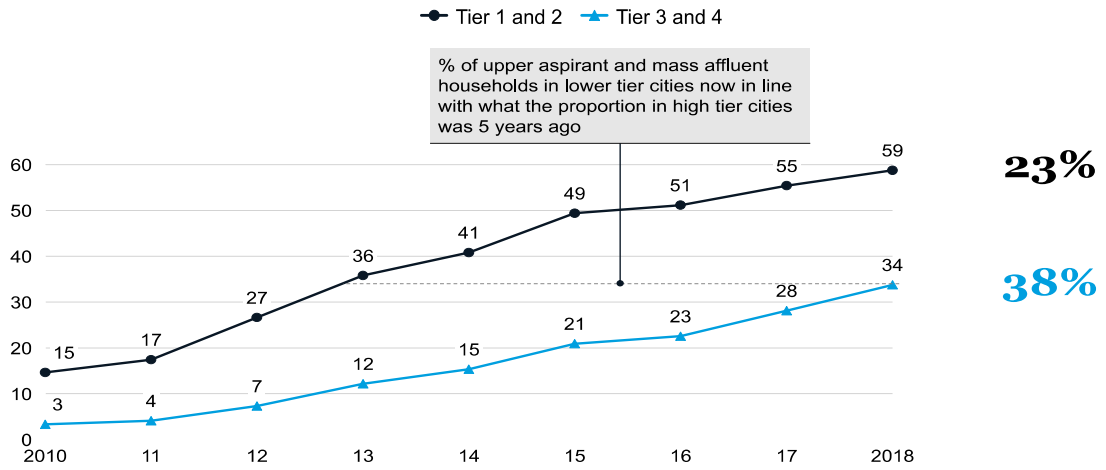
Source: McKinsey & Company (2019)

Figure 3. Urban Households in China by annual disposable income (%) (2018 real renminbi terms; US$1.0 = RMB 6.8785)

In 2018 over 90 per cent of China's households had disposable incomes less than US$43,178 (RMB 390,000); and over 80 per cent were in the interval US$7,124 - $43,178 (including in Fig. 3 "Lower Aspirant" from US$7,124 or RMB 49,000, and "Mass Affluent", up to US$43,178 or RMB 297,000). The "Poor" segment, with disposable incomes up to US$7,124 (RMB 49,000), constituting 8.8 per cent of urban households, are also not insignificant, given China's population size; and contain potentially relevant consumer groups for appropriately designed and priced products. The McKinsey assessment is broadly aligned with other detailed estimates of household disposable incomes (e.g. Economist Intelligence Unit, 2016).

The fastest growth in urban household annual disposable incomes in recent years has not been in the leading mega-cities such as Beijing and Shanghai, that tend to get most attention. It was in lesser known cities such as Mianyang and Zigong in Sichuan province, and Yancheng in Jiangsu province

(Figure 4). These are provinces with significantly lower GDP per capita than Beijing and Shanghai. Households with annual disposable incomes of US$20,000-$43,323 ("upper aspirant" and "mass affluent", RMB 138,000 – 297,000) now make up more than 34 per cent of the population in such cities. Furthermore, households in rural areas should not be neglected in innovative business strategies, as in 2019 China's per capita rural expenditures grew the fastest (China National Bureau of Statistics, 2020).



Source: McKinsey & Company (2019)

Figure 4. Household disposable incomes are growing fastest in lower tier cities (% of "Upper Aspirant" and "Mass Affluent" households)

In summary, China has a very large 2nd tier market that comprises a wide range of household income groups with significant spending potential. It reaches far beyond the wealthy in mega-cities such as Beijing and Shanghai, to include geographically distributed secondary urban areas and towns in less wealthy provinces.

India's 2nd tier market

India has been among the fastest growing economies in the world in recent decades. It averaged annual real GDP growth of 6.8 per cent since 1992, becoming the 6th largest economy with a pre-COVID GDP of US$2.81 trillion in 2019 (current US$, World Bank). Nominal per capita GDP increased 18 fold, and real capita GDP 3.6 fold. This growth lifted about 270 million people out of poverty (World Bank). The COVID pandemic resulted in an unprecedented -7.3 per cent contraction of the economy in 2019. However, it is projected to rebound and grow 8.9 per cent 2021, 8.2 per cent in 2022, and 6.9 per cent in 2023. (IMF 2022).

Domestic consumption has been the key driver of growth, accounting for close to 60 per cent of GDP. Consumer spending, which totaled approximately US$1.735 trillion in 2019 (IMF), is projected to reach US$6 trillion by 2030 (World Economic Forum (WEF), 2019); as the relatively young population is expected to increase from around 1.39 billion in 2021, to over 1.5 billion by 2030, bypassing China (UN projections).

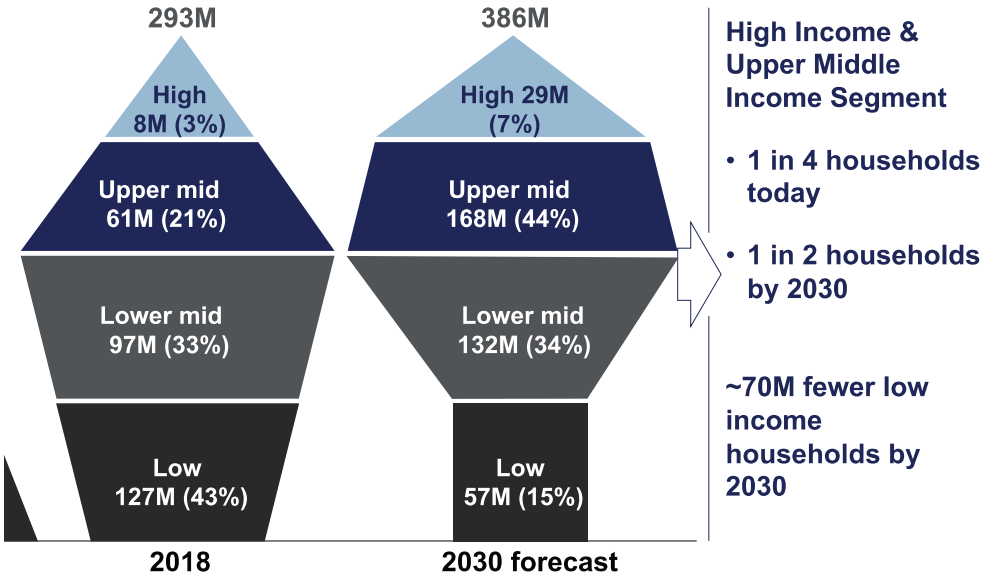
Demographic growth and increasing household disposable incomes are transforming the Indian market. As in the case of China and ASEAN, consumption growth is coming from a range of disposable income groups and geographic areas that comprise "many Indias". This provides market opportunities beyond the wealthy households in mega-cities such as Delhi and Mumbai, to households with significant growing disposable incomes located in smaller geographically dispersed urban centres and developing rural towns.

One of the most detailed and comprehensive ground-level assessments of Indian households is the periodic ICE360 Household Survey. It looks at a wide range of factors such as progress in household disposable incomes, household expenditure patterns, living conditions, and participation in the market economy. The survey (Fig. 5) shows that India has a large and increasing number of high income households. However, over 90% have disposable incomes less than US$40,000 per annum. This is broadly the 2nd tier market. Middle income households, including lower middle income (US$4,000 – $8,500) plus upper middle income (US$8,500 - $40,000), constituted a potential market of 158 million households in 2018. This is projected

to increase to 300 million households by 2030, when about 80 per cent of incremental spending will be by middle-income households (World Economic Forum (WEF) 2019).

At the same time, the low income group (less than U$4,000) of 127 million households in 2018, projected to decrease significantly to 57 million by 2030, also contains potential consumers for innovative products targeted to this particular market segment.

Household income per annum in 2017-18 prices by income segment:
Low < $4k; *Lower-middle*- $4k – 8.5k; *Upper-middle*- $8.5k – 40k; *High*: >$40k.
Poverty line at <$2 per day/person

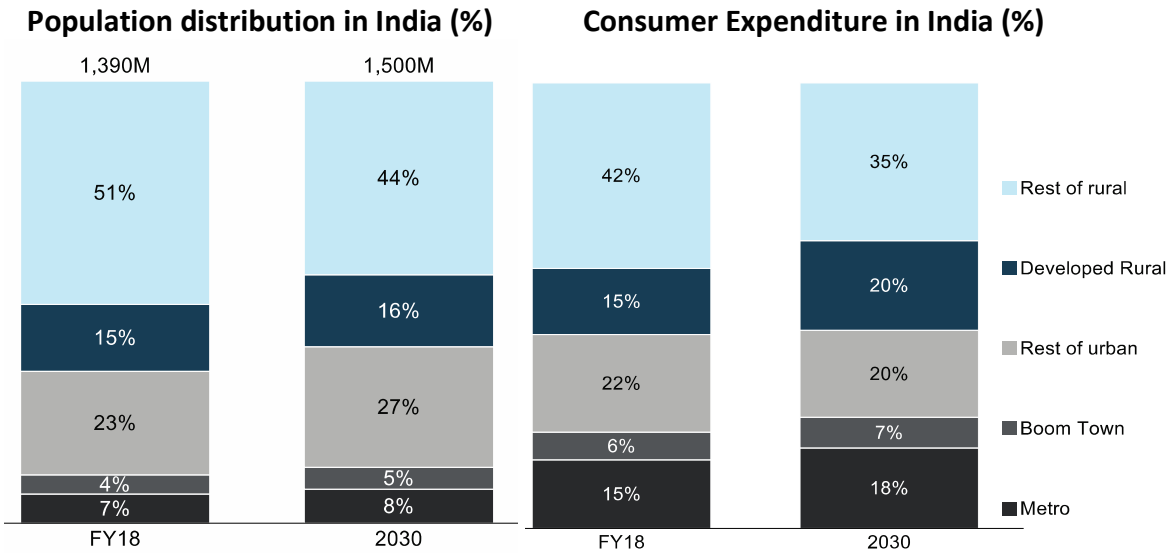


Source: People research on India's consumption economy (PRICE) projections, based on ICE 360 surveys (2016, 2018); World Economic Forum (2019)

Figure 5. India household disposable income distribution

Analysis of urban-rural distribution, population growth, and consumer expenditure patterns, provides further information for guiding product market strategy for India's 2nd tier market (Fig. 6). The "Metro" group of cities are the largest and generally richest cities with populations over 5 million, including Delhi, Mumbai, Bangalore, Hyderabad, Chennai, Kolkata, Pune, Surat, and Ahmedabad. The "Boom Towns" are the next largest and generally next wealthiest cities of 2-5 million, including around 30 cities such as Agra, Bhopal, Jodphur, Nagpur, Nasik, Ranchi, Lucknow, Vijayawada and Kochi. Together these two groups of approximately 40 cities are expected to provide a US$1.5 trillion market opportunity by 2030. The market potential of India's secondary cities is reflected in a pre-COVID projection that the 10 fastest growing cities in the world in terms of year-on-year GDP during 2018 – 2035, were all in India (Oxford Economics 2018).

Beyond India's larger cities, the thousands of dispersed smaller urban areas are expected to provide a similar size market of close to US$1.5 trillion. Furthermore, developed rural towns are projected to constitute an additional market of US$1.2 trillion by 2030. Rural per capita consumption in general, is expected to grow 4.3 times by 2030, outpacing the 3.5 times expected growth of overall urban consumption. With increased access to financing by India's underbanked and unbanked rural population through digital financial innovations (e.g. Paribas 2020), this may be turn out to be an under-estimate of potential town and rural market.



Source: World Economic Forum (2019), from Euromonitor, Oxford Economics, and People research on India's consumption economy (PRICE) projections, based on ICE 360 surveys (2016, 2018)

Figure 6. Changing Population Distribution and Consumer Expenditure in India (2018, 2030)

It should be noted that many of the "Boom Towns", including some of the projected fastest growing cities in the world, are located in relatively poor Indian states. For example, Agra is in Uttar Pradesh, one of the very poorest states, ranked 31st in GDP per capita of India's 28 states and 5 Union Territories; Vijawada is in Andra Pradesh, ranked 17th; and Chennai and Tiruchirappalli are in Tamil Nadu ranked 13th.

Implications

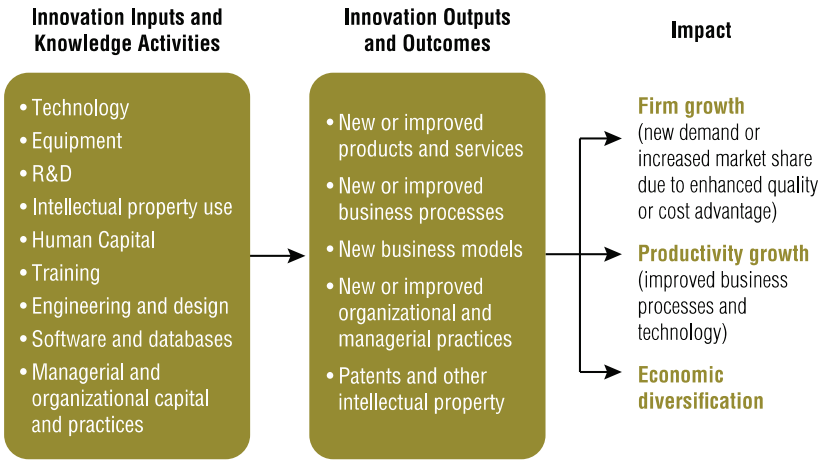
Detailed analysis of ASEAN, China and India, makes clear the fragmented and complex nature of these markets. It also illustrates the very significant opportunities that exist in the 2nd tier markets of these Asian emerging economies. To take advantage of these opportunities, firms must take a granular approach to understanding these markets, and in targeting product market strategies to specific customer segments and particular geographic areas. The nature of 2nd tier markets also suggests a different perspective on innovation for consumers in these markets, the focus of the next section (3).

APPROPRIATE INNOVATION FOR ASIAN EMERGING MARKETS

What is innovation

An innovation has to be *useful* in responding to existing or emerging market or social needs and demands; and *distinctive*, reflecting creative and novel ideas and actions. Ultimately it has to result directly or indirectly in new or better *value* in products and services for particular users. Innovation can come at all stages of the firm or industry value chain; from initial concept, design, development, production, sale, distribution, usage, and after-sale services. This concept of innovation is in line with generally accepted definitions, for example, as presented in the widely used *Oslo Manual 2018* (OECD and Eurostat 2018).

The usual perspective on innovation by both firms and governments tends to emphasize advanced science and technology (S&T) and leading-edge research and development (R&D), aimed at the technology frontier to create new-to-the-world inventions for high-value products. This reflects a supply-side perspective on innovation, with particular focus on inputs such as technology, R&D, and knowledge-related high-skill activities (Fig 7). This is essential for strengthening productivity and international competitiveness for both firms and economies. It is the approach taken by most governments' innovation strategies (see for example *National Innovation Policies: What Countries Do Best and How They Can Improve*, Global Trade and Innovation Policy Alliance, 2019; and WIPO 2021).



Source: Cirera and Maloney (World Bank, 2017)

Figure 7. Innovation process

The supply-side approach, anchored in high level S&T and R&D, also reflects a "closed system" perspective on innovation (Chesbrough 2019). This sees the market and users more as a "sink" for outputs, than a primary "source" for novel ideas to drive the innovation process.

Innovation strategy with an emphasis on high level S&T and leading edge R&D, aimed at very advanced technology and high value products, is beyond the capabilities of many enterprises, especially SMEs. This, despite considerable efforts of a wide variety of governments (Global Trade and Innovation Alliance 2019). However, it is also not essential for product innovation for the very large 2nd tier markets of Asian emerging economies.

Operationally, in approaching Asian emerging economies, foreign firms tend to offer products similar to their home market sales. In adjusting to these markets, usually price is varied in some form (e.g. discounts, rebates, promotions). There is generally limited effort at adapting product features to particular needs, demands and constraints of customers and conditions (Deloitte 2006). Yet growing evidence from extensive market research suggests that consumers in Asian emerging economies increasingly prefer products that are responsive to local requirements and culture (e.g. Bluebell 2021; Kadence 2021). This indicates that to be successful, firms need to fundamentally change their innovation strategy, particularly for Asia's 2nd tier markets.

Appropriate innovation Overview

The concept of *appropriate innovation* is a user-responsive and market-driven approach. It aims to address the underserved and/or unmet needs of many Asian emerging economies' consumers in the 2nd tier markets (Abonyi and Abonyi 2021). Appropriate innovation is also more within the reach of a wider range of enterprises, including smaller firms (SMEs). It starts from a deep understanding of specific market segments and knowledge of existing technologies. The focus of innovation is then on addressing particular consumer needs and demands, and reflecting the realities of local conditions and constraints.

The concept of appropriate innovation has its origins in the earlier idea of "appropriate technology" for developing economies. Appropriate technology typically refers to resource efficient, locally manufactured and maintained technology solutions in products and services for improving the lives and livelihoods of local communities and households (Lissenden, Maley, and Mehta 2014).

From a business perspective, appropriate innovation is related in spirit to approaches such as "frugal", "sustainable" and "jugaad" innovation (Christian Le Bas 2016; Brem and Wolfram 2014). They all share the general attributes of designing and developing affordable and accessible products and services that respond to the particular needs and constraints of consumers and communities in emerging markets.

Appropriate innovation: the concept and examples

Appropriate innovation creatively embraces local constraints as the basis for developing and commercializing new products, services and business models. It highlights the key role of breakthrough customer insights, alongside the usual focus on breakthrough technology. This user-

responsive and market-driven approach builds on extensive and on-going consumer engagement for innovating products and services to meet local needs, tastes and conditions.

Relevant constraints may relate to consumers, for example involving household income, and access to financing; to communities, for example local capacity to service products; and market conditions, for example infrastructure and logistics constraints that may limit distribution and access to service. Therefore appropriate innovation may involve designing or adapting existing products and technologies in novel ways to respond to local consumer needs and constraints. It may also include developing new distribution channels for addressing constraints of "last mile" market access; as well as new types of collaborations, for example with social enterprise to enhance local product market credibility and trust.

Resulting products may also be adjusted to serve global niche markets (*reverse innovation*), including in the developed economies of Europe and North America for customer groups that are similarly constrained (e.g. in terms of cost/price), or have frugal consumption habits. This is likely to be particularly relevant in a more value-conscious post-COVID world.

***Product Innovation*: Embrace Portable (Baby) Incubator**

Embrace Portable Incubator (Embrace Global 2022) is small, light, easy to manage, and inexpensive product developed by Stanford students from field work in Asia (Nepal). Using a hybrid organization structure, comprising *Embrace,* a non-profit, and *Embrace Innovations*, a for-profit social enterprise, this social need was also turned into a business opportunity.

The Embrace incubator costs a fraction of the traditional incubator (around US$25.00). It is simple in design, small, light, has no moving parts; made from locally readily available materials; and is easy and intuitive to use. It is therefore ideal in responding to an enormous underserved needs and constraints in secondary cities, towns, semi-urban, and rural areas in Asia's 2nd tier markets. *Embrace*/*Embrace Innovations* has developed and markets related products internationally, including in the U.S..

Product and Service Innovation: **Vortex Solar Powered Automated Teller Machine (ATM)**

India's *Vortex Engineering* designed an automated teller machine to meet the constraints of consumers in 2nd tier markets (Agarval and Brem 2017). The total cost of ownership and operation is less than half a conventional ATM. It is solar-powered, using only 10% of the energy of a conventional ATM since it generates much less heat, eliminating need for continuous air conditioning. Yet it is able to cope with temperatures ranging between 0C and 50C. The Vortex ATM has fewer mechanical and electrical parts, a fingerprint identification system so that a user number need not be entered, and it accepts crumpled and soiled banknotes, given more limited supply of freshly printed banknotes outside major urban areas. Over 8000 Vortex ATMs are now installed in previously under- and unserved emerging markets throughout Asia, Africa and the Middle East, as the largest brand of solar ATMs worldwide.

Vortex has also developed supporting *Multivendor ATM software* for the back-end management of ATM systems. The COVID-19 pandemic has led Vortex to innovate a software called *Perfo* that allows financial institutions real-time management of ATMs remotely from home, reducing the need for travel and physical presence.

***Product, Service and Business Model Innovation*: First Energy's Oorja Stove**

India's *First Energy* developed a "micro-gasification" stove with biomass-based pellet fuel for business and domestic users (Partnership for Clean Indoor Air 2022). Its *Oorja stove* provides a cleaner low smoke, healthier source of indoor cooking. The stove is also cheaper and more efficient alternative to gas (LPG) and diesel stoves. First Energy was acquired by *Thermax Limited*, global leader in the energy and environment sectors, extending Oorja's market reach.

The primary target market now is commercial, e.g. restaurants in smaller cities and towns. For its initial (and still key) market of rural and semi-urban households, First Energy partnered with social enterprises with strong links to local communities, for better understanding market needs and demands, and to link to local women entrepreneurs to market and service the Oorja stove and its pellets. This added to brand credibility and market reach, particularly since mostly women shape household expenditures, and also influence commercial purchases of stoves.

***Product, Process, Business Model, and Reverse Innovation*:**

GE Mac 400/600/800 Electrocardiogram (ECG/EKG)

GE developed in India and China electrocardiogram (ECG) machines, the MAC 400 and MAC 800 respectively (Singh 2014). The MAC 400 is very light at 1.3 kg., and small enough to fit in a backpack; using low-cost local components, and operating on long-life rechargeable batteries, given unreliable power supply. It has just four buttons and

a simple one-touch operation; small text-only display; small printer producing easy-to-read reports, adapted from portable ticket machines on buses. This allows for easy operation and servicing. The MAC 400 was initially priced around US$800 (now below US$500), as compared with the traditional ECGs at over $10,000, with under US$1 initially for a single ECG test (now around US$0.20 per scan). GE partnered with the State Bank of India to provide no-interest loans for buyers through its extensive branch network in secondary cities, towns, semi-urban and rural areas. Given China's higher incomes, the MAC 800 is somewhat larger, with a telephone-style keypad for data input, and a full-size colour display; priced around US$2,500.

GE introduced a modified MAC 800 as a new product category in developed markets such as the U.S., for primary care doctors' offices, rural clinics, emergency rooms, and first responders. This illustrates the concept of *reverse innovation* – from emerging to developed markets. GE then launched in 2009 a six year US$3 billion "healthymagination" global initiative to develop a variety of low cost, high quality, health care innovations to expand access to such services in underserved communities. This is now a part of GE Healthcare's business, offering a wide range of such products globally (GE REPORTS HEALTHYMAGINATION).

BUSINESS AND SOCIAL ENTERPRISE COLLABORATION

An important element of an appropriate innovation strategy is collaborations for addressing business model gaps. First Energy's commercialization of the Oorja stove in partnership with the social enterprise Sakhi, illustrates the value of such unconventional collaboration for Asia's 2nd tier markets. *Social enterprise (SE)* may be defined as a revenue-generating, market-responsive enterprise, with social purpose as its value proposition. This is reflected in the core objectives of Sakhi: "Creating a marketing and distribution network for affordable products that enhance the lives of consumers and socially relevant solutions" and "Empower rural women entrepreneurs in smaller cities, towns and rural villages by providing entrepreneurial skills and market-based opportunities"(SURE 2022). This complemented First Energy's overall product market strategy, and addressed gaps in its business model for commercializing the Oorja stove to smaller cities, towns, and rural households. Sakhi provided essential support in marketing, distribution, and service; and in building trust and acceptance with local communities and consumers, particularly women, who play a key role in household expenditures. Similarly, Embrace's hybrid structure for the portable (baby) incubator innovation demonstrated the creative role of social enterprise organization as part of a business structure to support commercial ventures in Asia's 2nd tier markets.

As the First Energy – Sakhi partnership illustrates, collaborating with social enterprise can be of significant practical benefit in addressing business challenges, while also contributing to positive environmental and social impact; attributes increasingly valued by consumers in all markets. Such collaboration can blend social and commercial innovation agendas with an effective market-driven strategy. Social enterprises are generally anchored in local communities, working directly with households and businesses in smaller cities, townships, and rural areas. They can provide deep insight into needs, wants, perceptions, behaviours and constraints. They can also bridge the gap to local communities and consumers through new distribution channels, marketing models, and service assistance. Social enterprises can provide vital support for building product awareness, credibility and trust; support innovation; and encourage acceptance and adoption of new products (C&E Advisory Services Limited 2020).

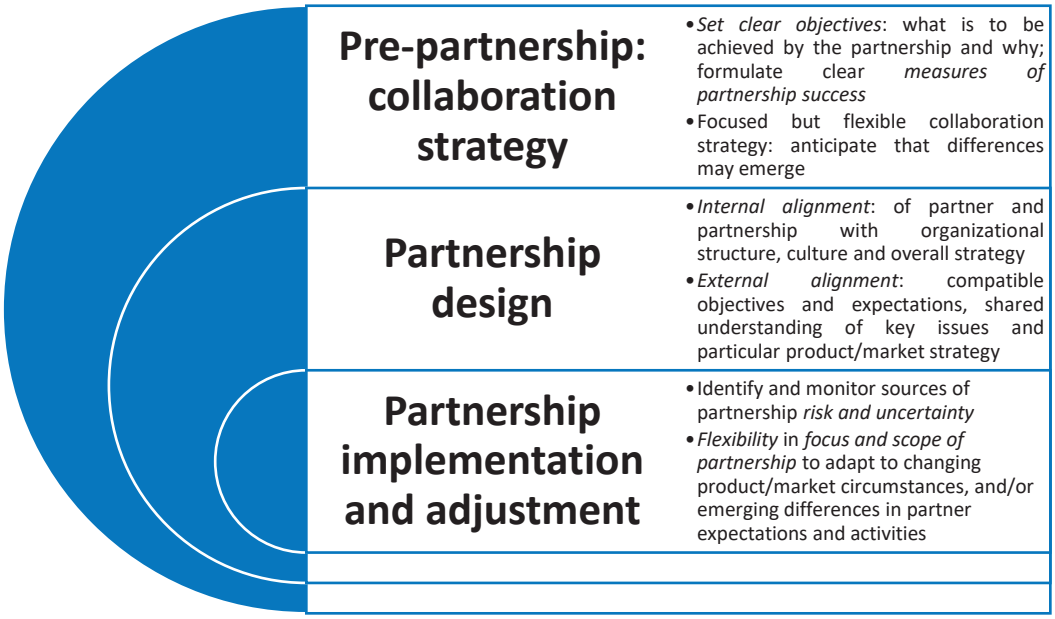
In approaching collaboration, although interests may be compatible and overlap with respect to particular product/market strategies and activities, a commercial firm's basic business model and value proposition are not the same as that of a social enterprise. Therefore a framework for planning effective collaboration should include the following key elements (Fig. 8).

- *Pre-partnership collaboration strategy* that clearly defines partnership objectives, and specific issues/problems the partnership is intended to address, with associated measures of success; and a readiness to anticipate potential differences to emerge between partners, as well as new, unexpected opportunities for the partnership;

- *Partnership design* that ensures basic alignment with the firm's organizational structure, culture, and overall strategy (*internal alignment*); and shared understanding and compatibility of objectives and expectations with the partner on the particular product/market strategy that is the basis of collaboration (*external alignment*); and

- *Partnership implementation and adjustment*, including identifying and monitoring potential sources of risk and uncertainty to the partnership, given differences; and flexibility to adjust product/market strategy to changing conditions in the focus and/or

scope of the partnership e.g. to market feedback or competitor entrance.



Source: adapted from Catalyst 2030 and Resonance, 2021

Figure 8. Framework for business-social enterprise collaboration

Role of Additive Manufacturing (3D Printing) in Appropriate Innovation

At the core of successful appropriate innovation is a deep, detailed, and on-going understanding of consumer aspirations, needs, demands and constraints. This information has to be translated into a practical, user-responsive product concept and prototype. An initial prototype then has to be adjusted and refined through interactive testing, and ideally low-cost experimentation, involving focused and guided interaction with potential consumers in their natural settings.

Digital technology in the form of additive manufacturing such as 3D printing, is introducing flexibility into the user-responsive market-driven innovation process, allowing firms, including SMEs, to explore and adjust design options through rapid development and market testing of prototypes. Furthermore, it allows for significant cost and time savings, as well as flexibility in moving from concept, to prototype, to pilot, to production. Whereas producing a functional prototype with traditional manufacturing can take months, with 3D printing firms can create a working prototype in less than a day to test market response. Existing technology and products may be adapted iteratively to local needs and constraints, or entirely new products generated.

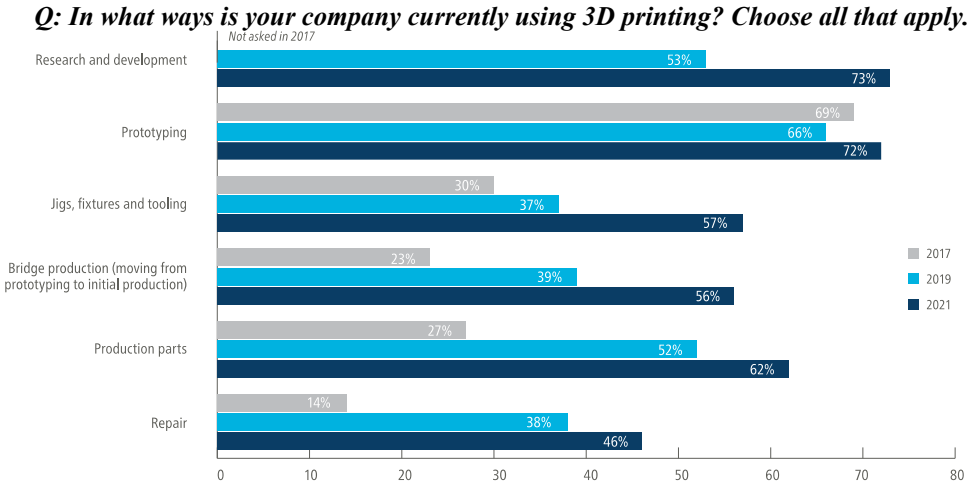
There are different types of additive manufacturing technologies (Engineering product design 2022). For the purposes of this paper, it may be used interchangeably with 3D printing. In general, the process involves adding layer upon layer of materials to make an object. Inputs can include plastic, metal or concrete; with new materials being rapidly developed and adapted. Products range from consumer goods to medical devices, auto parts and aerospace. With new class of better performing and reliable machines, more materials increasingly available, and greater ability to deliver well designed products, 3D printing is proving to be a significant time- and cost-saving option for product design and manufacturing.

The ability to flexibly design any structure with 3D printing, allows for more efficient “design for additive manufacturing”, empowering engineers to create better, lighter, and more complex parts and products. It also allows for significant process innovation through experimentation in manufacturing with parts in relation to the whole product, i.e. in novel ways of combining parts in the production the overall product. This can significantly reduce the number of discrete parts

required for final assembly, increasing efficiency and decreasing time and cost.

Linking 3D printers, and also locating them close to market, allows shortening the time to get products and parts to where they are needed, provide significant efficiencies, and allows mass customization. For example, leading automotive manufacturers are increasingly using 3D printing (3erp 2020). Jabil, the world's third largest contract manufacturer, introduced in 2018 a global network of additive manufacturing facilities in the United States, China, Hungary, Mexico, Singapore and Spain. It focused initially on footwear, industrial machines, transportation, aerospace, and healthcare; with further scaling up and diversification planned.

A survey of over 300 globally leading companies using additive manufacturing has shown its key role in innovation, with R&D and prototyping as the most popular applications, but with increasing use in flexible manufacturing as well (Fig. 9).



Source: Jabil (2021)

Figure 9. Trends in 3D printing

Application of 3D printing can also transform the innovation process itself, as illustrated by recent experiments with "rapid ideating" (Lifshitz-Assaf, Lebovitz, and Zalmanson, 2021). Instead of first brainstorming ideas, for example with whiteboards to create detailed new concepts, the traditional early stage of the innovation process, 3D printing technology can be used to guide and structure the creative process to rapidly generate multiple new possibilities for immediate experimentation. This allows fast convergence on practical design, and moving to the prototyping stage, which can then be quickly market tested.

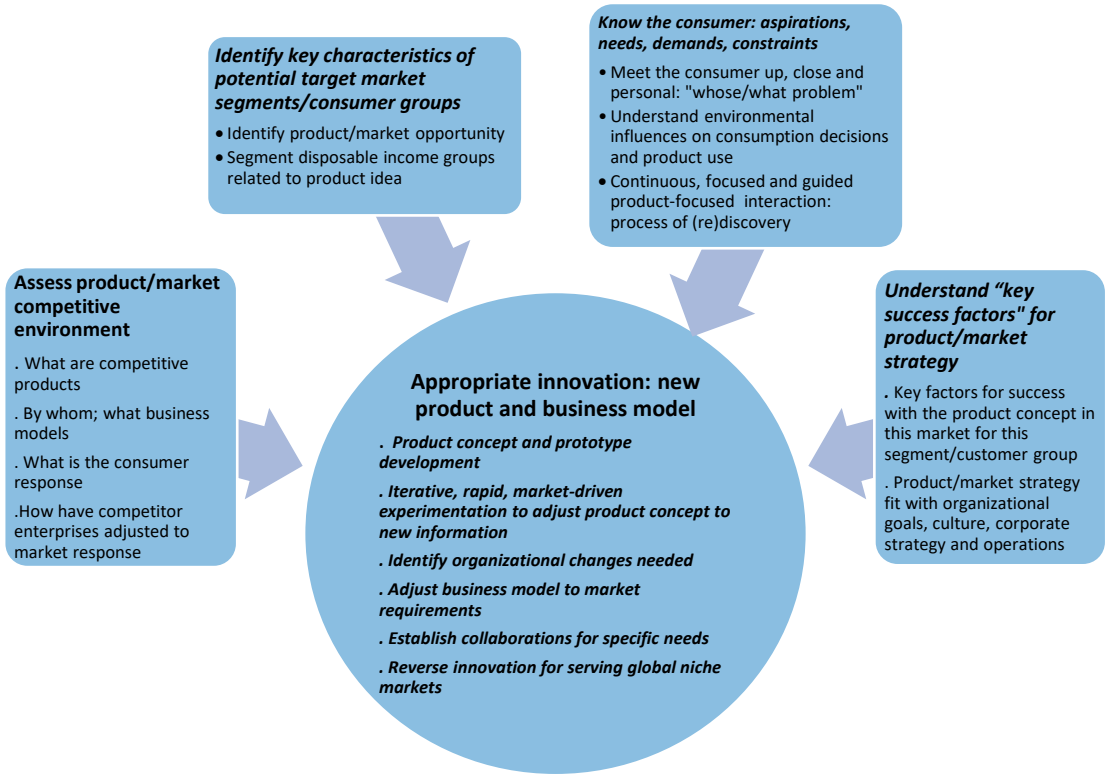
Key constraints on the wider adoption of 3D printing, particularly by SMEs, are qualified and skilled staff, and cost -- including both capital investment and life-cycle operating costs (Jabil 2021). Such investments involve risk and uncertainty of sufficient payoffs, especially for smaller firms with limited finances who generally operate in a resource-constrained environment. Therefore what is a very promising, but essentially speculative investment related to innovation, must compete with other core business functions.

An encouraging new approach to the utilization of 3D printing, especially by SMEs, involves linking such printers to a cloud-based smart network as a way of lowering cost and risk, and expanding availability (Cui, Jin, Lei Ren, Jingeng Mai, Pai Zheng, and Lin Zhang, 2022). This involves connecting geographically dispersed 3D printers in a network, under the control of a cloud platform. A 3D printer can then be remotely accessed as a cloud terminal by multiple users collaboratively over the network, including on a pay-per-user basis. This can lower significantly the capacity and skill requirements for a firm; as well the capital and life-cycle costs of such technology. In this way, SMEs can innovate and market test new products, without significant investment in technology, personnel, and R&D facilities.

STRATEGIC FRAMEWORK FOR APPROPRIATE INNOVATION

Appropriate innovation is fundamentally a general *business model innovation*. At its core is a new type of product (or service). But the process of developing and commercializing this product, starting with focused and continuing guided

interaction with consumers in Asian emerging economies' 2nd tier markets, differs from conventional ways of doing business. It involves fundamentally changing the way firms do business, incorporating new disruptive (digital) technology, and new types of collaboration (WEF 2022). Building on the earlier sections, key elements of a framework for an effective appropriate innovation strategy, are summarized in Fig. 10, then discussed in more detail.



Source: authors' work

Figure 10. Framework for Appropriate Innovation Strategy

Identify key characteristics of potential target market segments/consumer groups

Based on granular analysis of Asian emerging markets of interest, identify particular product/market opportunities: This involves identification and detailed assessment of a specific problem, need or demand that presently lacks an adequate market-based solution. It entails posing the following question: What is the nature of an unsolved problem (need) and/or unfilled demand, for a particular consumer group (e.g. households and/or businesses). This provides the basis for a product/market strategy in the form of a product concept, that is likely to respond to the perceived problem or need of a particular consumer group.

Examples: Identification of an opportunity can come from different sources. In the case of the Embrace Portable (Baby) Incubator it was the result of the identification of a social need for particular groups, that also became a commercial opportunity. In the case of the GE MAC 400 and 800, it was the result of the limited commercial success of existing products, leading to the identification of underserved/unserved market segments.

Finely segment potential customer groups related to the particular product concept: This involves usual market segment analysis, such as key characteristics of potential consumer group(s), size (e.g. number of households or business units), age distribution, geographic locations, purchasing power in disposable incomes, consumption/buying history, access to financing/credit. It also involves a different perspective on forecasting future demand in 2nd tier markets. As these economies develop, their structures transform, size of disposable income groups and related consumption patterns also evolve, more than in developed economies. This may have an impact on future demand for the product under consideration.

Know the consumer: aspirations, needs, demands, constraints

Meet the consumer up, close and personal - continuous, focused and guided interaction: This is the core foundation of an appropriate innovation strategy mapping in detail unmet needs/demands and constraints. It requires starting with asking the questions: "What and whose problem are we trying to solve?"; and "What new options does it create in terms of product market strategy?" (e.g. World Economic Forum (WEF) 2022).

It involves deep, detailed and continuing interaction with potential consumers in their natural settings, e.g. in smaller cities, towns, and rural areas. This requires understanding their aspirations, as well as their product-related perceptions of needs and constraints. It also involves probing in depth, why existing products are not appropriate or insufficient to address needs/demands, assessing what are missing product characteristics, shortcomings of existing business models, e.g. product familiarization, distribution and service network, credibility/trust in the brand or enterprise. This step also requires deep understanding of how the environment/market context influences purchasing decisions and existing or likely product use.

Examples: The detailed characteristics of the Vortex ATM machine, and GE's MAC 400 and 800, reflected a deep understanding of particular consumer needs and constraints. For example, in the case of the Vortex ATM, ease of operation, facility for using fingerprint identification, and acceptance of soiled banknotes, all responded to local retail user needs; as did software support that allowed back-end management remotely by banks. Similarly, every detail of the GE MAC 400 and 800 design involved extensive, on-going interactions with particular user groups, and reflected an explicit understanding of customer needs and constraints.

Assess the competitive environment for the particular product/market segment

What products are presently offered to respond to perceived need/demand: This involves a detailed analysis of products now being offered by competitors, and their key attributes, including price points and other characteristics. It requires an assessment of the number and nature of enterprises offering these products, asking the question: who are now, and are likely to be in the future, product/market competitors. It also requires a comprehensive assessment of the various business models being used, and their relative success and/or shortcomings, e.g. distribution and service networks, enterprise collaborations.

Examples: First Energy undertook a detailed analysis of the types of stoves being used by targeted households and commercial establishments, and their implications for competitive success, and suppliers of these stoves. This included an assessment of the range of stove offerings (e.g. gas and diesel stoves) and factors influencing their adoption. For example, in the case of gas powered stoves, an important factor was the cost of gas (LPG) and related subsidies; as well as existing networks for product distribution, key inputs, and service. These factors shaped product development and business model design.

What is the response of the target consumer groups to the products now offered: This involves analysis of the relative success of present product offerings to the target market segment. It includes analysis of why these products have not responded sufficiently to the perceived need/demand, leaving an unfilled gap in the market, e.g. price points, particular product characteristics, distribution and service networks. Much of this information has to come from detailed and on-going interaction with potential consumers.

Examples: Vortex' comprehensive analysis of existing ATM machines (and supporting services) in smaller cities, towns, semi-urban and rural areas revealed key problems/shortcomings of existing product offerings. This provided the basis for the identification and detailed assessment of underserved/unserved market segments.

How have (competitor) enterprises adapted products to market feedback: A key part of competitive analysis involves assessment of whether, how, and how successfully enterprises respond to market signals. This focuses on the extent and nature of innovations by competitors; including product, process and business model innovations, and their relative success. It is also vital information on key characteristics of the competitive environment, and likely nature and intensity of competitor response to new product introduction.

Examples: There were no similar products with respect to the innovations by Embrace, First Energy, Vortex, or GE. However, once product innovations were introduced and proved a viable market, the product/market evolved with new entrants. For example, GE's MAC 400 was the world's first ultra-portable ECG machine initially in emerging economies, and later in developed countries. Since its introduction, a variety of competitors followed (DAIC 2021).

UNDERSTAND "END-TO-END" KEY SUCCESS FACTORS FOR PRODUCT/MARKET STRATEGY

Identify and assess key factors for success with respect to this particular market segment/customer group: Given the nature of 2nd tier markets, price is a necessary consideration, but far from sufficient. The approach to identifying key product characteristics was discussed above, stressing breakthrough customer insights as much if not more than new technology. Beyond the product, commercial success requires assessment of all key dimensions of the product/market business model, including: marketing and distribution requirements, particularly the challenge of "last mile" delivery; after-sales service; effective options for familiarization of customers with a new type of product; building credibility and trust in both the product and the enterprise supplying it; customer access to finance; and opportunities and requirements for scaling up. Understanding the implications of government policy and the regulatory environment for product/market success is also essential, as these can provide both constraints (e.g. regulatory restrictions) and potential opportunities (e.g. aligning with government priorities and programs).

Examples: For First Energy, appropriate delivery and service networks for the Oorja stove were essential, in order to reach target households, and also to build credibility and trust in a new type of product from an essentially unknown supplier (First Energy). Partnering with social enterprises addressed these constraints; and created a focus on the role of women, who shaped expenditure decisions. In the case of GE, the firm was well known, but the product/market was entirely new. This required working closely with key customers (e.g. doctors in smaller cities, semi-urban and rural areas) to build product acceptance, and creating new types of partnerships for distribution (e.g. pharmaceuticals) and financing (State Bank of India).

Assess the "fit" of the product/market strategy with organizational goals, culture and overall strategy: As the examples illustrate, appropriate innovation often involves an entirely new and different product/market strategy, including business model. Therefore alignment with organizational goals, culture, general strategy, and operations is an important consideration. Unless there is such an alignment or fit, successful strategy implementation may be at risk, for example from capacity constraints, and also from resistance within the enterprise.

Examples: For Embrace, the original product concept responded to a social need. Therefore initially Embrace was established as a non-profit. Once a commercial market emerged for its portable baby warmer, it also evolved into a for-profit social enterprise. The resulting hybrid organization ensured a continuing alignment of strategy, operations, and structure. For GE, the entirely new product/market strategy associated with the initial MAC 400 innovation, required a basic change in organizational structure and culture (Singh 2014). It involved creating a new local India profit and loss (P&L) organizational structure that changed accountability from reporting externally and vertically to GE global headquarters, to reporting locally to the GE India CEO. This allowed both product development (R&D) and commercialization to be managed close to the market, including developing unconventional partnerships as needed.

APPROPRIATE INNOVATION: DEVELOPMENT OF NEW PRODUCT AND BUSINESS MODEL

Create or reconceptualize a new product for the target market segment/customer group : Building on the above (1 – 4), develop an initial *product concept* that responds to perceived need or demand, and related constraints. Adjust the initial product concept through low-cost and rapid experimentation, involving interactive testing of the product concept with target consumer group(s), and modifying product prototypes, for example using additive manufacturing (3D printing). This can include adapting technology from very different industries/sectors, as the bus printer for the GE MAC 400, and NASA phase-change material, a wax-like substance, for Embrace Portable (Baby) Incubators.

Identify and address particular gaps in the enterprise's present business model for success in the target product/market: Key issues related to business model adaptation for appropriate innovation have been discussed (1-4), including in the context of the examples. These could include adjustments and innovations for informing/educating consumer groups about the new product; new types of marketing, distribution and service networks; financing options; creating a manufacturing ecosystem for scaling up, including the role of local materials and skills.

Assess the organizational changes/adjustments needed. This involves asking the question what changes are needed in our existing organizational strategy, operations (e.g. new technology), structure, and collaborations (partnerships) in order to

successfully implement, sustain over time, and scale up the selected product market strategy.

Establish collaborations to address gaps in the required business model: Non-traditional collaborations and partnerships can play an essential role in an appropriate innovation strategy. This was illustrated in First Energy's partnership with social enterprise, and GE (India) partnerships with pharmaceuticals and financial institutions. Collaboration with social enterprise can play a particularly important role in Asian emerging economies' 2nd tier markets.

Assess opportunities and requirements for reverse innovation strategy for global niche markets: Products developed for Asian emerging markets may also fit global niche markets, particularly in a more frugal and value-conscious post-COVID world. Therefore it is useful to invest time and effort in identifying potential markets and their specific implications, in developed economies for modified product(s) (Fig. 11).

Example: The GE MAC 400 (India) and 800 (China) led to the development of portable ECG for global niche markets, and the formulation of a broader corporate strategy called "healthymagination" for GE Healthcare Systems.

Figure 11.a Conventional Innovation for Emerging Markets

Figure 11b. Appropriate and Reverse Innovation

Source: authors' work

Figure 11. From Conventional Innovation to Appropriate and Reverse Innovation

CONCLUSION: POLICY IMPLICATIONS

Appropriate innovation has practical implications for public policy, as well as business strategy. Diversifying exports and adoption of advanced technology, are challenging priorities for many governments, such as Hungary, especially with respect to SMEs (e.g. Ministry of Foreign Affairs and Trade of Hungary, Hungarian National Trading House, and International Trade Centre 2017). A focus on appropriate innovation linked to digital technology, can complement existing programs of trade development and new technology adoption. Initiatives of business-government collaboration can help implement this strategy.

- Financial incentives for funding traditional research and development (R&D) should be expanded from laboratories to markets. This includes support for early-stage, product-related interactions with potential consumers in Asian emerging economies. Support is particularly important for development and testing of product prototypes and for adapting existing technology to local user needs and constraints.

- Establishing a network of SME resource centres can accelerate digital technology adoption. These can reduce costs by sharing technology, and facilitate collaboration for new product markets through the exchange of ideas and experience. Successful examples exist in Europe (European Commission 2022)

and Singapore (Agency for Science, Technology and Research 2022); and in Taiwan they serve as industry incubators and accelerators for product development and exports (Taipei Times 2020). As noted, support for the development of new cloud-based smart network of 3D printers can also strengthen practical SME capabilities.

- Such SME centres can link digital technology with support for focused market analysis. This involves providing granular information on Asian emerging economies that can help identify market segments and customer categories, market-entry options, and assist firms in tackling trade barriers. By combining (co-locating) achievable export possibilities with clear payoffs linked to the role of advanced technology (e.g. 3D printers for prototyping), such centres can accelerate adoption of digital technology.

- Facilitating alliances of firms with foreign partners is generally a key focus of many countries' trade-related support services. Appropriate innovation for Asia's 2nd tier markets suggests expanding such programs to include unconventional partners, in particular, market-oriented social enterprises. As discussed, these can offer product credibility, local knowledge and market reach, particularly in Asian emerging economies where social innovation and commercial success may be closely linked.

The concept of *appropriate innovation* therefore provides the basis for effective business strategy, public policy, and government-business collaboration, aimed at Asian emerging markets. It builds on a different perspective of these markets, recognizing that growth in spending will be driven to a large extent by lower-middle income and lower-income households that constitute a huge underserved 2nd tier market outside of leading megacities. Appropriate innovation also links directly to effective application of digital technology, particularly additive manufacturing (3D printing). A strategy of appropriate innovation can therefore provide an important dimension to the competitive strategies of diverse economies.

REFERENCES

ABONYI GEORGE AND DAVID ABONYI (2021). "Innovating for Asian emerging markets will help diversify our economy." *Policy Options*. 11 March, 2021.
https://policyoptions.irpp.org/magazines/march-2021/innovating-for-asian-emerging-markets-will-help-diversify-our-economy/

AGARWAL, NIVEDITA AND ALEXANDER BREM (2017). "The Frugal Innovation Case of Solar-powered Automated Teller Machines (ATMs) of Vortex Engineering in India." *Journal of Entrepreneurship and Innovation in Emerging Economies* 3(2) 115–126
DOI: 10.1177/2393957517717895

AGENCY FOR SCIENCE, TECHNOLOGY AND RESEARCH (2022). *Tech Access: Gain Access to Advanced Manufacturing and Biotech/Biomedical Equipment & Expertise.* Retrieved: April 2022: https://www.a-star.edu.sg/enterprise/innovation-offerings/programmes-for-smes/tech-access

ASEAN (2019). *ASEAN Key Figures*. ASEAN Secretariat, Jakarta, October. Retrieved: April 2022: https://www.aseanstats.org/wp-content/uploads/2019/11/ASEAN_Key_Figures_2019.pdf

BLUEBELL (2021). *At Your Service: How brands are evolving to better serve Asia's consumers.* Market Insights by bluebell, July, 2021. Retrieved: April 2022: https://www.bluebellgroup.com/insights/whitepaper-2021/

BREM, A. AND P. WOLFRAM (2014). "Research and development from the bottom up-introduction of terminologies for new product development in emerging markets*." Journal of Innovation Entrepreneurship*, v. 3, n. 1, 2014.

CATALYST 2030 AND RESONANCE (2021). *Catalysing collaboration.* June, 2021. Retrieved: April 2022: https://catalyst2030.net/

C&E ADVISORY SERVICES LIMITED (2020). *C&E Corporate-NGO Partnerships Barometer 2020: Resilience amidst the turbulence.* Retrieved: April 2022: *https://www.candeadvisory.com/sites/default/files/C%26E-Corporate-NGO-Partnerships-Barometer-20-compressed.pdf*

CHESBROUGH, H. (2019). *Open Innovation Results: Going Beyond the Hype and Getting Down to Business.* Oxford University Press.

CUI, JIN, LEI REN, JINGENG MAI, PAI ZHENG, AND LIN ZHANG (2022). "3D Printing in the Context of Cloud Manufacturing". *Robotics and Computer-Integrated Manufacturing*. October. DOI: 10.1016/j.rcim.2021.102256

CIRERA, XAVIER, AND WILLIAM F. MALONEY (2017). *The Innovation Paradox: Developing-Country Capabilities and the Unrealized Promise of Technological Catch-Up*. Washington, DC: World Bank, 2017. doi:10.1596/978-1-4648-1160-9.

CIRERA, XAVIER, ANDREW D. MASON, FRANCESCA DE NICOLA, SMITA KURIAKOSE, DAVIDE S. MARE, AND TRANG THU TRAN (2021). *The Innovation Imperative for Developing East Asia*. World Bank East Asia and Pacific Regional Report. Washington, DC: World Bank, 2021. doi:10.1596/978-1-4648-1606-2. License: Creative Commons Attribution CC BY 3.0 IGO.

DAIC (2021). "6 Trends in ECG Systems.", January 20, 2021. Retrieved: April 2022: https://www.dicardiology.com/article/6-trends-ecg-systems

DELOITTE (2006). *Innovation in emerging markets: Strategies for achieving commercial success.* Deloitte Touche Tohmatsu. Retrieved: April 2022: https://www.iasplus.com/en/binary/dttpubs/0607emergingmarkets.pdf

ECONOMIST INTELLIGENCE UNIT (2016). *The Chinese Consumer in 2030*. London, 2016. Retrieved: April 2022. https://www.eiu.com/public/topical_report.aspx?campaignid=Chineseconsumer2030

EMBRACE GLOBAL (2022). Retrieved: April 2022: https://www.embraceglobal.org/

ENERGY SECTOR MANAGEMENT ASSISTANCE PROGRAM (ESMAP) (2020). *The State of Access to Modern Energy Cooking Services.* Washington, DC: World Bank, 2020.

ENGINEERING PRODUCT DESIGN (2022). Additive manufacturing. Retrieved: April 2022: https://engineeringproductdesign.com/knowledge-base/additive-manufacturing-processes/#7_types_of_Additive_manufacturing_technologies

EUROMONITOR (2021). *Current and future Drivers of Asia Pacific Consumer Markets*. August. Retrieved: April 2022: https://www.euromonitor.com/current-and-future-drivers-of-asia-pacific-consumer-markets/report

EUROMONITOR (2016). *Understanding the ASEAN Consumer*. Presentation, An Hodgson. Retrieved: April 2022: http://www.ukabc.org.uk/wp-content/uploads/2016/06/ASEAN-Festival-of-Business-An-Hodgson-002.pdf

EUROPEAN COMMISSION (2022). CORDIS EU research results. Retrieved: April 2022: https://cordis.europa.eu/article/id/125359-how-to-prepare-smes-for-the-uptake-of-additive-manufacturing

GE REPORTS HEALTHYMAGINATION. Retrieved: April 2022: https://www.ge.com/news/reports/tag/healthymagination

GLOBAL TRADE AND INNOVATION POLICY ALLIANCE (2019). *National innovation policies: What Countries Do Best and How They Can Improve*. Washington D.C., June, 2019.

INTERNATIONAL MONETARY FUND. (2022). *World Economic Outlook*, Washington D.C., April. Retrieved: April 2022: https://www.imf.org/en/Publications/WEO

INTERNATIONAL MONETARY FUND (2021). *India: Article IV Consultation*. Washington D.C., October, 2021. Retrieved: April 2022: https://www.imf.org/en/Publications/CR/Issues/2021/10/14/India-2021-Article-IV-Consultation-Press-Release-Staff-Report-and-Statement-by-the-492841

JABIL (2021). *3D Printing Technology Trends: A Survey of Additive Manufacturing Decision-Makers*, March, 2021. Retrieved: April 2022: https://www.jabil.com/dam/jcr:82f12c7a-7475-42a0-a64f-0f4a625587d8/jabil-2021-3d-printing-tech-trends-report.pdf

KADENCE INTERNATIONAL (2021). *Consumer Trends in Asia: 2021.* Retrieved: April 2022: https://kadence.com/

LE BAS, CHRISTIAN (2016). "Frugal Innovation, Sustainable Innovation, Reverse Innovation: Why Do They Look Alike? Why Are They Different?". *Journal of Innovation Economics and Management*, 2016/3, no. 21, p. 9 – 26, 2016. DOI 10.3917/jie.021.0009

LIFSHITZ-ASSAF, H., S. LEBOVITZ, AND L. ZALMANSON (2021). "Minimal and Adaptive Coordination: How Hackathons' Projects Accelerate Innovation Without Killing It," *Academy of Management Journal 64*, no. 3, June: 684-715, 2021.

LISSENDEN, JESSIE, SIRI MALEY, AND KHANJAN MEHTA (2014). "An Era of Appropriate Technology: Evolutions, Oversights and Opportunities". *Journal of Humanitarian Engineering*. January, 2014. DOI: 10.36479/jhe.v3i1.34

MCKINSEY GLOBAL INSTITUTE (2021). *Beyond income: Redrawing Asia's consumer map.* McKinsey & Company, September.
MCKINSEY & COMPANY (2020). *China consumer report 2021: Understanding Chinese Consumers: Growth Engine of the World.* McKinsey & Company, November.
MCKINSEY & COMPANY (2019). *China consumer report 2020: The many faces of the Chinese consumer.* McKinsey & Company, December, 2019.
MCKINSEY GLOBAL INSTITUTE (2019). *Asia's future is now.* McKinsey & Company, July, 2019.
MINISTRY OF FOREIGN AFFAIRS AND TRADE OF HUNGARY, HUNGARIAN NATIONAL TRADING HOUSE, AND INTERNATIONAL TRADE CENTRE (2017). *Promoting SME competitiveness in Hungary.* MNKH Hungarian National Trading House Cls, Budapest.
NIELSEN & ALPHABETA (2017). *Rethinking ASEAN.* Retrieved: April 2022: *https://alphabeta.com/our-research/rethinking-asean-new-research-by-alphabeta-and-nielsen-on-major-consumer-hotspots-in-asean/*
OECD AND EUROSTAT (ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT AND THE STATISTICAL OFFICE OF THE EUROPEAN UNION) (2018). *Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation.* 4th ed. Paris: OECD; Luxembourg: Eurostat.
OXFORD ECONOMICS (2018). *Global Cities: The Future of the World's Leading Urban Economies to 2035.* Oxford, November.
PARIBAS (2020). *Fintech in Emerging Markets - Cracking the code of financial inclusion.* BNP Paribas Asset Management, July. Retrieved: April 2022: https://investors-corner.bnpparibas-am.com/investing/fintech-in-emerging-markets-cracking-the-code-of-financial-inclusion/
PARTNERSHIP FOR CLEAN INDOOR AIR (2022). First Energy Private Limited. Retrieved: April 2022: https://pciaonline.org/first-energy-private-limited/
PETTIS, MICHAEL (2020). *China: Demand-side reform and long-term GDP growth*. Global Source Partners, December 17.
SHUKLA, SACHIN AND SREYAMSA BAIRIGANJAN (2011). *The Base of Pyramid distribution challenge: Evaluating alternate distribution models of energy products for rural Base of Pyramid in India*. Centre for Development Finance, Institute for Financial and Management Research, Chennai,
SINGH, JASJIT, 2014 (Rev.). *GE Healthcare (A): Innovating for Emerging Markets*. INSEAD Case 311-048-1.
SURE – Sakhi Unique Rural Enterprise (2022). Retrieved: April 2022: https://www.sureindia.co.in/
TAIPEI TIMES 2020. *EDITORIAL: Shifting the industrial base.* October 05, 2020.
WIPO (2021). *Global Innovation Index 2021: Tracking Innovation through the COVID-19 Crisis*. Geneva: World Intellectual Property Organization.
WORLD BANK GROUP (2022). *Global Economic Prospects*. Washington D.C., January, 2022. Retrieved: April 2022: https://www.worldbank.org/en/publication/global-economic-prospects
WORLD BANK INDICATORS. RETRIEVED: APRIL 2022: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=IN
WORLD ECONOMIC FORUM (2020). *Future of Consumption in Fast-Growth Consumer Markets: ASEAN.* Geneva, June.
WORLD ECONOMIC FORUM (WEF) (2022). *Unlocking Business Model Innovation through Advanced Manufacturing.* World Economic Forum White Paper, Geneva, January.
WORLD ECONOMIC FORUM. (2019). *Future of Consumption in Fast-Growth Consumer Markets: INDIA.* Geneva, January.
ZAIDMAN, YASHMINA, EMILY GANNAM, AND DAVID LEHR (2021). *Corporate Ready: How Corporations and Social Enterprises do Business Together to Drive Impact*. IKEA Social Entrepreneurship, ACUMEN.
3erp, 2020. *How 5 Major Automobile Manufacturers Use 3D Printing.* Retrieved: April 2022: https://www.3erp.com/blog/how-5-major-automobile-manufacturers-use-3d-printing/

[i] *Senior Advisor, Fiscal Policy Research Institute (FisPRI), affiliated with the Ministry of Finance, Royal Thai Government*

Management Challenges in State-Owned Export Credit Agencies in the 2020s; Case Studies in Iran and Hungary

ROSA ALAMIAN
PHD CANDIDATE
UNIVERSITY OF MISKOLC
e-mail: szvar@uni-miskolc.hu

KÁROLY BALATON, DSc
PROFESSOR EMERITUS
UNIVERSITY OF MISKOLC
e-mail: szvbk@uni-miskolc.hu

SUMMARY

In the 2020s, Export credit agencies alongside other industries face many critical challenges such as new technologies (like Artificial Intelligence and Blockchain), environmental issues, and new financial crises that force change or modification to the organizations. State-owned ECAs have some limitations in their regulations and are inherent in the way of the change process. This paper aims to investigate the management challenges in ECAs in facing the changes needed in the 2020s and how they face them. ECAs in Iran and Hungary are used as case studies. Content analysis with an inductive approach is done to interpret the conducted interviews.

Keywords: Export credit; ECAs; Management Challenges; Change management; crisis.
Journal of Economic Literature (JEL) codes: F30; G20; M10; O30
DOI: http://doi.org/10.18096/TMP.2022.01.02

INTRODUCTION

Businesses have been faced with several challenges that force some organizations to terminate their activities as they could not follow the challenges. Accordingly, organizations need to track the challenges, cope with them, and make opportunities from them. Like other businesses, in the 2020s challenges like new technologies, the rapidly transforming technology, environmental issues, and economic downturn because of COVID-19 should be noticed among the management issues of the export credit agencies. For the credit finance industry, the probability of a financial crisis and damaging financial stability is a very critical issue. For example, the newest crisis that every country is facing is the economic downturn because of COVID-19. This crisis for the financial services sector can be more crucial because first, they should survive this crisis, and second they should insure their customers financially. Especially in the public finance credit organizations, the aim is mostly to serve and support financially their customers rather than focusing on the profitability side. Besides, the implementation of new technologies helps ECAs to be more efficient in providing support for their customers and also be a powerful organization. However sometimes, especially under the direct control of the government, the state-owned export credit agencies face serious limitations such as strict rules, administrative bureaucracy, strong supervision of adjudication unit and so on that make it considerably hard, intolerable, and less motivated for managers to apply changes regarding the new technologies and other challenges.

The study aims to investigate the management challenges state-owned export credit agencies face in the 2020s. We used Iran and Hungary as case studies to implement empirical research on the subject. Accordingly, in the next part of the study, some literature is discussed. The third part of the study is describing the methodology and data. The result and discussion parts are debated in sections 4 and 5, respectively. And finally, in part 6 the conclusion is given.

LITERATURE REVIEW

To discuss the literature review of the study, five questions are going to be answered. First, what are the characteristics of export credit agencies (ECAs)? Second, what challenges do the ECAs face in the 2020s? Third, how can managers cope with these challenges? Forth, what are the change management approaches? And finally, what are the management limitations in ECAs to cope with challenges?

The export credit agencies

According to OECD, "Governments provide officially supported export credits through Export Credit Agencies (ECAs) in support of national exporters competing in export sales. Such support can take the form either of 'official financing support', such as direct credits to foreign buyers, refinancing or interest-rate support, or of 'pure cover support', such as export credits insurance or guarantees covering for credits provided by private financial institutions". The aim behind the establishment of ECAs has been to increase export, to grow the production of domestic industries, and make it possible for local enterprises especially the small and medium-sized businesses to enter international markets by providing them credit insurances and giving guarantees to bank financing (Gianturco 2001). The most important role of ECAs is to cover the exporter's risks where other credit insurers and banks are unwilling to accept their cases. As Gianturco (2001) mentioned, ECAs are the "flexible instruments of national policy". Regardless of the considerable role of ECAs in international trade support, neither the society nor the academics give enough attention to them. In this context, Gianturco (2001) called ECAs "unsung giants".

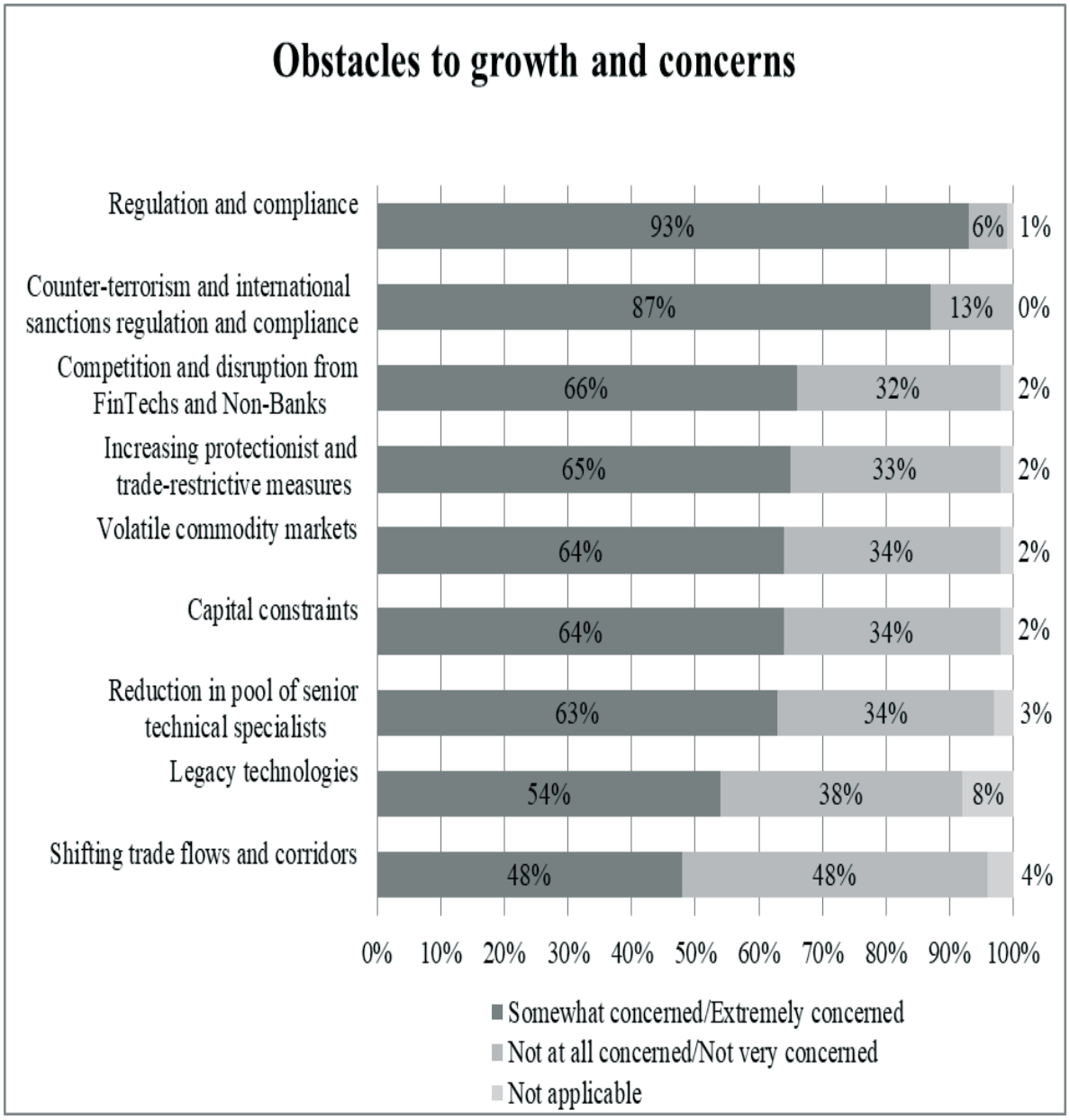
Export credit insurances cover the political, economic, and commercial risks that may cause nonpayment from buyers (Posner 1997). However, according to Salcic (2014), based on the country's economic situation, the goods and services which are exported, and the history of trade in the country may make a difference on ECAs service for risk-taking and the conditions for providing their support. In most countries, political risks are not covered by private insurers and banks. Then in this case ECAs cover the risks. "ECAs' activities continue to grow, while their risks of doing business also rise" (Gianturco 2001). According to Gianturco (2001), the organizational structure of the ECAs may differ based on the services they provide, their dependency on government and their level of autonomy, the extent of their work, the management perspectives, and so on. He identified 12 elements for ECAs' success factors that are capital adequacy, organizational autonomy, support from the government, proper risk-sharing, appropriate fee structure, diversity of operations, quality of management, efficiency of procedures, aggressive marketing, skill in credit analysis, appropriate collateral and guarantees, and technical sophistication. In order to survive in the long term, ECAs should be professional and efficient in all these 12 elements. Accordingly, to be financially dependent on the government and in a managerial way does not make an ECA a successful one. Therefore, having a professional management system is so vital in the success of ECAs.

What challenges do the ECAs face in the 2020s?

ECAs alongside other organizations in the financial services sector are facing considerable challenges, most of which are technology-driven challenges (Team Linchpin, 2020). Among them, we may mention the spread of Artificial Intelligence (AI), robotics, digital businesses, FinTech (Financial Technology), Blockchain and cybersecurity (PwC 2020). According to Shelley Schad in Berne Union (2019, p.24), the export credit industry, along with other financial services sectors, should respond to the needs regarding the 'ever-evolving technological world'. She added that "Adapting to these changes will become increasingly important as higher levels of regulation require more finely tuned data capture and startups challenge the marketplace." PwC (2020) has stated that fast-growing technology can become a vital constraint for industries to be able to compete if they cannot adjust their organization to these changes. In addition to the challenges regarding technology, there are some others for the financial services sector in the 2020s. These challenges can be to continue handling the regulations (PwC 2020), the probability of financial crisis like the business lock-down because of the COVID-19, environmental issues and climate change. According to Georgieva (2020), "the financial sector will have to grapple with preventing the traditional type of crisis and handle newly emerging ones".

One of the very important technologies that are required for organizations to survive in international business is Blockchain. According to Hilamn (2018), the basic concept of Blockchain is "to decentralize the storage of data so that such data cannot be owned, controlled or manipulated by a central actor". In this way, the issue of data transparency can be fixed. One of the problems for ECAs is the lack of transparency that causes the lack of data accessibility or the lack of accurate data. Accordingly, as Shelly Schad and Jérôme Pezé in Berne Union (2019) mentioned, by a Blockchain efficiency increase, operational excellence cost decreases, and provides trade finance organizations to finance the small and medium-sized enterprises (SMEs). By block chain, ECAs will be able to access the result of KYC (Know your customer) done by another agency/organization. Accordingly, once it is done by an agency, it will be accessible to others. The speed of the work increases and the cost and the energy will be saved. She mentioned an example from a survey done by Rabobank that "onboarding a new client is so arduous that 30 percent of 722 corporate respondents claim it can take more than two months, while 10 percent answered it exceeds four months". This problem can be easily fixed by access to Blockchain technology. However, in

addition to having the technology, the regulation should also become updated to let organizations share the information and cooperation among ECAs and other organizations to apply the technology. Otherwise, it won't make any sense. According to the survey by ICC (2018), the biggest obstacles to growth are regulations and compliance (see Figure 1).



Source: ICC (2018, p. 58)

Figure 1. Obstacles to growth and concerns

According to Shelly Schad in Berne Union (2019), Euler Hermes (A famous credit insurance company) in 2018 launched a fully digital platform in which the insured can look for the creditworthiness of their future customers, which not only give benefits to the insured but also to the ECAs, as their possible damage may decrease besides customer satisfaction benefits. According to Shelly Schad in Berne Union (2019) "Bain estimates that Blockchain trade finance, if adopted by all participants in the trade ecosystem, could reduce trade finance operating costs by 50 to 70 percent and cut the turnaround time for trade finance processes by three to four times".

Fabio Rescalli and Mariangela Siciliano in Berne Union (2019, p. 29) noted that "digital transformation is not only about reorganizing processes through technology or moving services and products online. It is about establishing a relationship of trust with businesses, safeguarding their data and delivering better services in line with their different needs." Besides, the new technology enables ECAs to give support with fewer limitations to customers who "provide governance, transparency & reliable risk control processes" as Jérôme Pezé in Berne Union (2019, p. 32) noted. He added that these new technologies increase the efficiency of the reporting system and the skills of employees that can increase the profitability of the insurance system. If all ECAs and other credit finance organizations collaborate and share their insights and information, the technology can be a considerable accelerator in data accessibility.

How can managers cope with the challenges?

These challenges can be opportunities or constraints depending on how managers can cope with them. With efficient change and crisis management, the challenges can transform into opportunities and competitive advantages for organizations. To what extent they can face them effectively is the crucial job of managers in ECAs. Both may need to change, modify, or reform some processes and structures in the organizations. Cohen and Eimiske (2002) mentioned that "effective public managers learn to foresee changes in policy direction and build agile organizations capable of rapid redirection". According to Gonçalves and Campos (2018, p. xix) "the most common change drivers include: technological evolution, process reviews, crises, and consumer habit changes, as well as pressure from new business entrants, acquisitions, mergers, and organizational restructuring". Besides, Kuzmanova and Ivanov, (2019, p.257) implied that "flexibility and adaptability of organizations play an essential role in the process of overcoming the chaos and the crisis". Accordingly, the challenges mentioned are one of the important drivers of the necessity of change in the credit finance sector. Hye et al. (2020, p. 123) referred to Serra, & Kunc (2015), and Hornstein (2015) mentioned that "change is a predictable consequence of applying various tech and functionality"

Efficient change management creates a structure that gives the ability to the system to implement the changes needed for the organization (Hye et al. 2020) which makes the process of the change a routine. In this way, organizations can follow the challenges very efficiently and be a 'Pioneer' in the marketplace. However, some literature implied that most public organizations are not so successful in implementing technology adaption because of the "lack of change management" (Hye et al. 2020). In the next section some literature in change management are discussed.

Change Management

Moran and Brightman, (2001, p. 111) defined change management as "the process of continually renewing an organization's direction, structure, and capabilities to serve the ever-changing needs of external and internal customers" (Hussain et al. 2018 and By 2005).

According to Bamford and Forrester (2003), there are two main approaches to change management that are planned or emergent change. The planned approach recognizes the need of comprehending the several states that an organization should do to transit from an undesirable condition to the desired condition. However, the emergent approach to change implies that change should be viewed as a continuous, open-ended process of adjustment to changing situations (By 2005). The planned change is based on the work of Lewin. A very famous planned approach is the three-step model of Lewin that describes three stages: Unfreezing, changing (moving), and refreezing (Al-Haddad and Kotnour 2015). In his model, the change process should begin with unfreezing the present situation of the organization, then move on to making the necessary changes by choosing the appropriate leadership style, and finally, refreezing the state once the desired organizational change has been achieved. Lewin mentioned that a successful change process needs a clear understanding of the problem, identifying the solution, and implementing it (Al-Haddad and Kotnour 2015). Later, there were also some other famous planned change models like the four-phase model of Bullock and Batten (1985). However, there are some criticisms by some studies to planned change models like it is not applicable for rapid changes, in this approach it is assumed that organizations are working in a consistent environment, this approach overlooks situations in which more directive approaches are needed like in crisis times, and it assumes that all the stakeholders are in the same page to implement the changes and

ignore the probable conflict of viewpoints in organizations (By 2005). To respond to these criticisms emergent approach has gained more attraction. According to By (2005, p.375), there are some models of emergent approaches that are more practical than others like "Kanter et al. (1992)'s Ten Commandments for Executing Change, Kotter (1996)'s Eight-Stage Process for Successful Organizational Transformation, and Luecke (2003)'s seven steps".

There are lots of studies that discuss how change management can be successful. Beer et al. (1990) believe that a task-alignment-based method to change, which begins at the periphery and gradually moves into the corporate core, is the most successful way to create long-term organizational transformation. In this view, change is initiated from general managers, not the top managers. Ad hoc organizational adjustments are created by them to address the specific business issue. In the change process, instead of focusing on abstractions like culture or participation, they focus on the work itself. Also, they added that in order to avoid failing the change process, organizations should consider the essentiality of coordination or teamwork, a high level of commitment, and new competencies. They mentioned six steps to effective change management and called it the 'critical path'. Kotter (1995) in his 8 stages model pointed out that to increase the chance of success in transforming the organization should follow 8 stages. He added that not following each of these steps correctly makes an error in the process that may cause failure in transformation efforts. The errors are: "1. Not Establishing a Great Enough Sense of Urgency, 2. Not Creating a Powerful Enough Guiding Coalition, 3. Lacking a vision, 4. Undercommunicating the Vision by a Factor of Ten, 5. Not Removing Obstacles to the New Vision, 6. Not Systematically Planning for, and Creating, Short-Term Wins, 7. Declaring Victory Too Soon, 8. Not Anchoring Changes in the Corporation's Culture".

It is hard to say which model is best to choose. However, based on the organizational culture, leadership style, and other organizational characteristics, the organization may use the probably applicable method for them.

According to Cummings and Worley (2009), Organizational development (OD) practitioners in the public sector must be fully aware of the distinctions between the public and private sectors, as well as the fact that OD applications might be difficult to implement due to complicated political and bureaucratic settings in public sector (Williams 2012). When the debate comes to the public sector, many limitations come through the way of effective management or in changing the approaches. In the next section, the limitations are discussed.

What are the management limitations in ECAs to cope with challenges?

According to Cohen and Eimiske (2002), a successful manager is the one who knows the company the best. According to the risky nature of ECAs, some managers face non-programmed decisions. In managing an organization when managers face non-programmed decisions, more creativity and flexibility are needed for effective decision-making (Kittisarn 2003). These situations are sometimes challenging and complex for managers. As McCall and Kaplan (1990) mentioned "it is no surprise that the consequences of managerial action are not always clear victories or defeat". Managers always face some limitations. State-owned ECAs as public organizations face many limitations especially in applying changes.

By reading the studies of Ostroff (2006) and Rainy (2003) some main limitations for effective change management in public organizations can be summarized as follows:

- *The way of choosing public organizations' managers*: Managers in public organizations are mostly selected based on political connections or commands and/or their working experience in the organization's technical expertise in the agency but not because of their experience in successful change management.
- *The limited time of public organizations' managers to see a change result:* Because of the way of being chosen, the agency's managers usually come with the new president of the country and are changed when the president changes.
- *Strict rules and regulations in the public agency and the strong role of the adjudication unit:* this inflexibility in obligations makes it hard for managers to become persuaded to apply changes in the organizations as in public organization the punishments for failure is a serious issue. Sometimes managers don't want to take the risk for change to not lose what Cohen and Eimiske (2002) called the "public image".
- *The public bureaucracy*: It makes the change process and decision-making process for change slow. Ostroff (2006), recommended managers in public organizations to be less bureaucratic and be more leaders.
- *Values and the preferences of employees*: To implement the decision on change, it is very important how much committed they are to the values of the ECA, how free and valued they feel to give their opinions about decisions and the pros and cons of the ways of implementation.

METHODOLOGY AND DATA

To investigate our study topic in the ECAs in Iran and Hungary, semi-structured, face-to-face, and in-depth interviews were conducted. After reading the 13 conducted interviews with Iranian ECA's managers and 2 interviews from a manager in Hungarian ECA, the qualitative content analysis with the inductive approach is applied to find the answer to the research question which is:

- What are the management challenges of state-owned ECAs in facing the changes needed in the 2020s and how do they face it?

The focus will be on middle managers as they may be better judges with less authority than top managers and have a closer view on implementation. Nevertheless, we interviewed one of the senior managers in Iran to have his viewpoint to have a more comprehensive result.

Short introduction of the companies

In this study, we conducted semi-structured interviews with the managers in Export Credit Agencies (ECAs) in Iran and Hungary. Iran's export credit agency's name is Export Guarantee Fund of Iran (EGFI). Hungary's export credit agency's name is EXIM, which is the integrated organization of Hungarian Export-Import Bank Plc. (Eximbank) and the Hungarian Export Credit Insurance Plc. (MEHIB). In our study, there is more focus on Iran's ECA and Hungary's case will mostly be used to have a comparative look.

The Profile of EGFI

Export Guarantee Fund of Iran (EGFI) is the official Export Credit Agency of Iran that is an affiliate of the Ministry of Industry, Mine and Trade, with an independent legal and financial entity, but relying on government support. The services EGFI provides are short-term, medium and long-term export credit insurance contracts, and also Credit and Bank guarantees.

Its vision is "turning to the best, the most professional and effective Export Credit Agency (ECA) across the Southwest Asia region", and its mission is "relying on the knowledge of the Fund's expertise, EGFI intends to support and encourage the exporters to expand their exports, alleviate their concerns via mitigating the commercial and political risks involved and tries to render customized services to its clients with minimum costs, shortest time and through optimal use of resources". The organizational chart of EGFI shows that the management system of the organization is defined as one CEO and twelve middle managers who are under the power of the general assembly and the board of directors (EGFI 2017-2018).

The Profile of EXIM

The official Hungarian export credit agency is EXIM. EXIM is an integrated organization of Eximbank and MEHIB that are working in a uniform framework under the name EXIM. The owner of both organizations is the Hungarian State with 100% ownership. "The state-owned Eximbank and MEHIB, supervised by the Ministry of Foreign Affairs and Foreign Trade, perform export-credit agency tasks in Hungary, regulated by OECD and EU frameworks, with the basic objective of promoting the sale of Hungarian goods and services on foreign markets" (EXIM about us n.d.). "The two ECAs (Eximbank and MEHIB) work very closely, share one management structure, as well as their headquarters in Budapest and their joint website" (Bankwatch Network 2017). EXIM provides Cross-border Financing and Insurance, Domestic Financing, Guarantees, and Equity and Venture Capital Funds for its customers.

The EXIM's vision is "having clear financial solutions for the export activity of enterprises" (EXIM strategies 2017-2021), and its mission is "to support Hungarian exporting enterprises in facilitating the retention of jobs, growth in employment, and an expansion of Hungary's export capacities" (EXIM about us n.d.).

To explain the management structure of EXIM, by looking at its website (EXIM Management n.d.), it is shown that the management of EXIM contains the Board of Directors, the Supervisory board, the Deputy Chief Executive Officers, twenty-one directors, and three head offices (the head of Nur-sultan Office, the head of Beograd Office, and the head of Istanbul Office).

Research process and Data Analysis

In this study, 13 semi-structured interviews were conducted from the ECA in Iran and two semi-structured interviews (from the same person at different times) from the ECA in Hungary. It was done one by one and face to face with each manager in the ECAs. The interviewees in Iran were all the 12 middle managers in EGFI and one senior manager who is also a member of the board of the organization. The interviews were conducted in summer 2019. In Hungary's ECA, the interviews were conducted with one middle manager twice in June 2019 and September 2021. The languages of the interviews with Iranian interviewees were in Persian and with the Hungarian Interviewee in English. In this study, all of the interviewees have considerable experience working in ECAs and management experience. Interviewees 1 to 13 are from EGFT and interviewee 14 is from EXIM.

To analyze data, we used qualitative content analysis with an inductive approach. This method allows having an open look at the interview data. To analyze the data we did not use pre-defined codes. So, at first, we implemented the 'Open Coding' by reading the transcript word by word and line by line. By open coding, long texts are split into manageable parts (Easterby-Smith et al. 2015). After open coding, we defined the basic codes from transcripts and coded the others based on these codes. However, when we faced some data that could not be defined by those codes then we made some emergent code. After finishing this step we tried to compare, categorize, and grouping the wide variety of codes to find more focused codes and labeled the parts in a more systemized way. For a better analysis of the data, we needed categorization. Then, we put related and similar coded segments into groups with the same concepts. For a better interpretation of data, we categorized the themes into three main concepts (see below) that will be discussed in detail in the Results section:

1. Lack of authority,
2. Reaction to change (and/or willingness to change),
3. Efficient knowledge and information infrastructure.

RESULTS

Lack of authority

The importance of developing technology and new IT systems is valued by interviewees. However, they mentioned some limitations on the process of development. One of the important limitations is the lack of authority of managers especially the related managers in the IT sector for making the decisions. In EGFI, decisions about the projects related to new technology and development are made directly by the CEO and the board of directors. The information technology director can propose the project to the CEO and the board of directors and then the final decision is made by them. Interviewee 10 mentioned that the reason behind this process is that these projects are usually expensive and need considerable money from the organization's budget. So it is a big responsibility that is done by the CEO and the board of directors. However, he believes that giving the decision-making authority to middle managers and decreasing bureaucracy in this area could make the process more effective. Also, it sometimes occurs that some members of the board are not available. Accordingly, it makes it even more time-consuming to make decisions (Interviewee 10). Moreover, interviewee 1 also mentioned that the bureaucracy in the ECA sometimes can make the management process slow. Time is very important in the rapid technology change and dynamic environment of businesses. Nowadays technology changes really fast. Accordingly, to be updated needs a fast decision-making process.

The other issue in EGFI is that the viewpoint of the CEO and the board of directors as main decision-makers is very important: how they think about the importance of IT development in the ECA and how up-to-date they are regarding the critical value of IT for the agency. They should have broad knowledge about managing ECAs, their needs, and how to develop them. As it is mentioned in section 2.4, one of the management limitations in public organizations is that usually senior managers in these companies are chosen based on political relations and on the command of powerful people in government that may be the reason for not having a broad vision and experienced-based decision regarding changes. In addition to the CEO, the HR department when hiring people should consider the applicants knowledge and point of view about IT and development. Interviewee 10 mentioned that:

> "[…] Personal taste should not be interfering with the decision-making process […] The viewpoint of the CEO on IT is very important […] As the processes in IT need big money, the macro decisions about IT will be made by the CEO and the board of directors. […] Support of the CEO from IT projects is very important. We need more support for the IT sector in the organization and in the time for selection of people in the organization, the factor that how much they know the IT area should be considered".

Interviewee 5 also mentioned that:

> "[…]the CEO and the board should have an open-minded look to problems and should not decide based on their personal opinion".

And also Interviewee 1 pointed out that:

> "[…] the organization should be managed more based on science and experience and less on management's taste. These people change by the government choice and sometimes they may not have any experience of working in ECAs. If there is a stable pattern and system, it may be possible to avoid these kinds of situations. […] It would be much better if these managers were chosen from inside the organization and were the ones who have gone through the hierarchy of the organization in order to have a more specialized view for decision-making".

Interviewee 2 also mentioned the value of knowledge and experience of managers and other employees in directing the ECA effectively:

> "…In the management-related decision-making process by ECAs, the following factors are important regarding effectiveness: expertise of the experts (the understanding of the expert from the case), and the experience of the experts and

managers (based on how many cases they solve or worked on)."

The interviewee in EXIM also mentioned that experience and knowledge of decision makers in the ECAs play important roles in the quality of the decisions made. He also pointed out that in order to pursue development they have a development plan based on the goals of the organization. The plan and the requested cost to follow the plan should be approved by the operational committee and more supreme decision-making bodies. Then its implementation plan "is set to be in place of specific task of development". In case of "additional request arises in terms of some specific IT issue or business issue, it can be added to the development plan".

Reaction to change (and/or willingness to change)

Usually, in EGFI change does not happen too often and easily, and the most important reason behind this issue is the bureaucratic nature of a governmental institute. Permission is required from various layers of people in the hierarchy which can be time-taking (a couple of months) and energy-consuming, considering that managers sometimes prefer to avoid it. As interviewee 5 mentioned:

"[…] so sometimes because of the difficult and time-taking process, the ECA's managers prefer to not change the routine. It prevents the growth and development […]".

About the need to get permission from the government to apply any change, Interviewee 12 noted that:

"[…] we need permission from the government for change; we cannot change the methods without their permission. The process of getting permission is very slow and time-consuming".

However, some interviewees in Iranian ECA (EGFI) mentioned that some changes in management or decision-making process may happen that can be due to changing the decision-makers (CEO and the board members). It shows that the institute is mostly person-oriented rather than system-oriented. Noticeably, interviewee 1 also criticized that:

"[…] the decisions should be based on the experts' experiences and reports. We should have a methodology for every process and system […]".

According to the senior managers' policy, vision, and point of view, some changes may happen in the ECA. As interviewee 1 mentioned:

"[…] change may happen by changing the board members or CEO. If it happens frequently it causes avoidance in making long-term decisions and plans. Every person has a different view which causes not continuing the previous manager's decision and approach. […] by changing the board's members or the CEO, the system may change because of different viewpoints, educational background, character, deeds, specialty, and work experience […]".

Also, interviewee 7 believes that:

"[…] changing the senior managers may bring a new management approach to the organization […]".

Interview 10 mentioned a disadvantage for this issue:

"[…] if it happens frequently, it causes not making long-term decisions and plans. Every person has a different viewpoint which causes not continuing the previous manager's decision and approach".

Also, there are few cases when temporary changes in the way of management decision-making may happen in the face of some crisis. In some cases when a crisis happens or in the case of a situation when there is a need for urgent reaction or decision to cases, some shortcuts are defined in EGFI. The process becomes more flexible to change when a crisis happens. The managers would collaborate more and be more flexible about the process of decision-making and its implementation. For example, if a manager requests an urgent decision, 'emergency meetings' in an informal way with available or selected committee members can be held to solve the issue within the permitted authorities. Or in some cases, there is a shortcut to the CEO or to the board without having a meeting to decide about the urgent case. Interviewee 4 mentioned that:

"[…] during a crisis, or when there is a lack of time for waiting for the next committee meeting or the board meeting, we organize an urgent meeting or even several times a week to solve the case and decide about it […]".

Interviewee 3 pointed out that:

"[…] however, when the case is really urgent and the time of the technical committee's meeting is not soon, then they take the middle managers' signature manually, and then the final signature from the CEO […]".

However, in Hungarian ECA (EXIM) as interviewee 14 mentioned, in urgent or unusual cases, "they can put any process on hold because putting something on hold is not a decision. It is quite a quiring time of a decision". For example, if the case has some political issues, they would put the process on hold to investigate the case more precisely. In the second interview with him, he mentioned that during COVID-19 they had a 'COVID committee' for some operational issues which were hard to present to the regular operational

committee. However the decision-making process itself has not faced any changes.

The interviewee in EXIM also noted that in EXIM, concerning the process of analyzing data, the issue is mostly related to the regulations in these terms; however, after the crisis of 2008-2009 the issues regarding data became considerably more regulated than before, especially in the European Union. He sees the regulations regarding data collection and data analysis to be better than before. However, in general, he sees that sometimes the ECA is overregulated and it may be considered as limitation for the decision-making process. He mentioned in his second interview that:

> "[…] this over-regulation is specifically touching the issues in general about what kind of activities financial institutions do and how they need to decide on that activity […]".

Maybe not in the management process itself but regarding support levels and their conditions, the EU gave more freedom to the state-owned ECAs during the COVID-19 pandemic as Gergely Jakli, EXIM's CEO and chairman of the board of directors in his interview with TXF (2021) mentioned:

> "Given the current epidemiological situation, the EU is giving Member States more scope to support businesses on their territory. As long as it is maintained, the state and public background institutions have the opportunity to stimulate companies operating in their territory with higher support levels or looser support conditions; there is more room for maneuver among state-subsidized loan schemes and grants".

However, it also shows the obstacle of regulation and their dependency on EU regulations. They should wait till the EU eases the regulations in case of need. It seems to be the same issue for EU member States.

Efficient knowledge and information infrastructure

One of the very important topics in the interviews could be understood as the 'efficient knowledge and information infrastructure'. To provide efficient knowledge and information infrastructure, the facilities, conditions and human resources should be chosen effectively. According to interviewee 13, "HR process should be based on the goals of the system and on knowledge". Employees should be up-to-date and have enough knowledge and skills related to the ECAs' work. What's more, both managers and employees should always get new knowledge and be educated during their work.

As interviewee 8 emphasized that:

> "[…] we should use the correct and efficient evaluation modeling of credit risks to avoid human mistakes. But we should also add the skill, experience, and knowledge of managers and employees to the result of evaluations. We should be up-to-date about the political and economic situation of the country and the world […]".

Most of the interviewees pointed out the importance of data availability, data transparency, and correct validation that require up-to-date technology, good relationship with other ECAs and related unions, and accessibility to the required data. The most important technology for this aim is Blockchain. By Blockchain technology, they can have access to the customers' background and creditworthiness done by other organizations inside and outside the country. Also, they need the data for calculations of the level of creditworthiness of foreign buyers that is also easily accessible by Blockchain. This tech improves the quality of data, accuracy of information, transparency of information, speed of work, and financial situation by paying fewer claims and gets more recovery payment, and it decreases errors and cognitive limitations. So generally speaking, the work efficiency of ECA increases. However, Iran is facing political and economic sanctions in recent years. According to the sanctions, they cannot easily access some international information and data centers of ECAs. The exchange of information and improving networking systems is emphasized by some interviewees. However, despite the sanctions which limit access to international data, as interviewee 4 mentioned, access to inside Iranian data center, e.g. the Central bank database is also limited:

> "[…] it is really good to be connected to the information center of the country and to be able to reach it easily. Inaccessibility to the bank information of customers is an important limitation for the ECA because we are not connected to the central bank's information systems and don't have online information. So we need to ask the exporter to bring the financial statements from banks. But to what extent can we trust these documents? […]"

Interviewee 4 also believed that "access to the Central Bank's database prevents fraud and lack of data. It leads to faster, more accurate, more precise and fair decisions regarding insuring customers or giving them guarantees. And also because of the privacy of customer information, we cannot ask for this data directly from the banks. This problem is because of the weakness of regulations in the country". Data accessibility has benefits for both sides of the contract because by faster service to customers, their satisfaction increases. Besides the weakness of regulations, some interviewees considered limited budget and capital as one of the important limitations for applying change in the ECA.

For having efficient work in the ECA interviewee 8 mentioned that:

> "[…] IT and information technology should always be available to all managers. All the software in all sections should be harmonious and integrated which increases the management effectiveness and decreases the time needed for the processes […]".

Interviewee 5 mentioned that knowledge and experience should be mixed to get the best results:

> "[…] effectiveness is increased by designing easy working (user-friendly) models, updating the patterns and models, and for damage payment and recovery we will need the correct and effective validation, and managers should decide based on less personal opinions and more on validation (There should be a balance between experience and knowledge) […]".

Interviewee 5 mentioned the ECA's solution to the lack of data because of sanction:

> "[…] before the sanctions we were using data from OECD for creditworthiness. After the sanctions, we face some discriminatory policies between members and nonmembers of OECD to provide information. Accordingly, we tried to make our own models using Neural Networks. In this model, we use historical data. However, by being a member of Berne Union and Oman institute, we can have some data […]".

Interviewee 1 pointed out that:

> "[…] by the intelligence patterns we use, the risks have been identified correctly in about 80 % of cases but in 20 % they may have errors […]".

Interviewee 9 suggested that to develop knowledge, a one good plan could be to have more collaboration between universities and the industry.

Finally, interviewee 10 implied that "We need more support for the IT sector in the organization and in the selection of people in the organization. Also, the factor of how much knowledge they have in the IT area should be considered".

The interviewee in EXIM Hungary pointed out their good ability of collecting and managing data:

> "[…] we were, to be honest, even previously quite focused on data collection. We work in a market that hardly can be characterized as an understandable and open market that is covered by information sources to the maximum extent. You may know that the majority of the activities of ECAs are in non-marketable risk countries with lesser quality information and less information. Still, those who work in these markets (not only us), other ECAs, commercial banks, and so on, know how to collect, evaluate and manage the data […]".

However, in the second interview we had with him he mentioned that in Hungary, financial institutions are lagging behind the Blockchain technology in comparison to Russia, China, the US and also some eastern Asian countries, and it is not only the issue of Hungary but in most of the European countries it is almost the same.

In the end, the interviewee in EXIM mentioned that as a public organization they are strict, transparent, and prudent. Private companies have more freedom to pursue the goals of profits and operative effectiveness, and also in their decision-making levels and authority. Regarding this issue, interviewee 1 in EGFI also pointed out that effectiveness and development can be more frequently observed in private companies.

DISCUSSION

In this section, we are discussing the overall understanding of the three concepts 'Lack of authority, 'Reaction to change (and/or willingness to change)', and 'Efficient knowledge and information infrastructure'.

In EGFI, it is understood that in developing technologies and IT systems, and also reacting to a crisis, middle managers are not authorized to make any decision or implementation. They can only make proposals to the senior levels and implement their decisions. In very expensive projects they should get permission even from government bodies. However, this process is very slow and sometimes takes months for the development proposal to be approved. Today technological development is rapid. To be efficient and up-to-date the organization needs to have the newest approved technology by world-famous ECAs. The traditional and bureaucratic hierarchy of a management system may not be too effective and efficient as speed sometimes matters more. The reason is that in the period from development proposal to decision-making and then during the implementation of the technology, the more upgraded one may arrive to the world: so even if the decision is accepted still they are behind the time. This time-taking process may sometimes inhibit change and ask for change, as it is a long and tiring process that may not even be approved.

The other issue that occurs when the related manager does not have the authority is that the senior managers may not have enough insight into the IT system and it considerably affects better support for customers and also developing the ECA itself. They may involve their personal opinion in the decisions which are not very much approved in nowadays very systematic way of organizations' management. However, the result shows the tendency of having a person-oriented approach in managing the ECA. To be more precise, it is mentioned that change may happen by change in decision-makers that are the

senior managers or the government bodies. The management approach in the ECA may face some changes by the new decision-maker. However, by being a system-oriented organization they will be able to make more development plans and they won't face problems from the replacement of decision-makers. In EGFI, when a crisis happens, short-term reactions may happen in the decision-making process of the organization such as: 'urgent meetings' in an informal way, 'shortcuts to the CEO or the board of directors' without committee meetings, and getting the signatures manually without having a committee.

The importance of having efficient knowledge and information infrastructure is pointed out several times in the interviewees in EGFI. The Human Resources (HR) Department, Information Technology Department (IT), and Risk Management Department have decisive roles in this process. Human Resources should work on increasing the knowledge of employees and consider it essential in hiring new employees as well. Employees should be well-educated, well-skilled, have the willingness to grow and gain more updated knowledge, and good at applying technology. For the Risk Management Department it is important to apply correct, user-friendly and up-to-date evaluation models. As access to some models is restricted for Iran, they tried to be innovative and develop their own models. In addition, with the collaboration of the IT sector, they should try to access more data centers. They should implement Blockchain technology for their organization that considerably increases the efficiency of the ECA. However, without support and access from other financial institutions, it is not effective. Iran is in a challenging time because of its political situation with lots of economic and political sanctions. These sanctions made it really hard for the ECA to access international information. However, inside the country, it is not a sanction but a limitation of regulation. These strict regulations do not allow organizations to share customer information with others. Accordingly, they cannot benefit from of using the result of KYC (Know your customer) done by other sectors especially the Central Bank. Accordingly, the weakness of the country's related regulations is a vital limitation that should be considered and solved by the government.

However, the case for EXIM is a bit different with considering some similarities. In EXIM, for being up-to-date in technology and using efficient IT systems, they have development plans that should be approved by the operational committee and more supreme decision-making bodies. This development plan can be edited by additional requests in terms of IT or business issues. However, in using Blockchain technology it is not very advanced. Similarly to the Iranian case study, this issue should be taken into consideration by the government in Hungary.

Decision-makers in EXIM act a bit differently in facing unusual decisions, e.g. when political issues arise. There won't be any changes in the process but they would put it on hold to investigate it carefully and do some negotiations with different parties. As mentioned before, in the COVID-19 period, the EU gave more freedom to the ECAs to ease the regulations in order to support exporters in such a difficult period. However, dependency on the EU to make decisions can become an obstacle for making decisions based on a country's needs and can reduce the speed in supporting exporters.

In EXIM after the crisis 2008-2009, the issues regarding data accessibility, data collection and data analysis become more regulated in an efficient way. This is also similar to other European Union countries. According to the result, EXIM is well capable of gathering necessary data, evaluating them, and managing the data. In general, it was mentioned that being a governmental organization gives some ineffectiveness in the management process as they don't care about profit and for them supporting customers is a priority as Iranian interviewees have also pointed it out in this issue.

CONCLUSION

In the 2020s, Export credit agencies (ECAs) face considerable challenges like rapidly growing technologies, global and financial crises, and so on. According to the vital role of these organizations in the economy of a country, it is necessary to take these challenges seriously to make them drivers of the success of the organizations. To cope with the challenges efficiently, effective change and crisis management should be applied in the organizations. However, in state-owned ECAs, there are some limitations and constraints that make these organizations to react to changes less efficiently than private ones. According to the case studies, these limitations are mostly related to the weakness of regulations, political constraints, inefficiency of the bureaucratic system in public organizations, and personal orientation in public organizations.

We recommend that, by considering public organization's values and real mission, some modifications should be applied in the ECAs management system especially in Iran that can be transformed to a less hierarchical, less bureaucratic, and less person-oriented system, with managers having leadership skills, and considering efficient change managing as a necessity in the organization.

REFERENCES

AL-HADDAD, S. AND KOTNOUR, T., (2015). Integrating the organizational change literature: a model for successful change. Journal of Organizational Change Management, 28(2), pp. 234-262. https://doi.org/10.1108/JOCM-11-2013-0215

ASMUNDSON, I. (2020). Financial Services: Getting the Goods. IMF entry. Retrieved: Nov 2010: https://www.imf.org/external/pubs/ft/fandd/basics/finserv.htm .

BAMFORD, D. R. AND FORRESTER, P. L. (2003). Managing planned and emergent change within an operations management environment. International Journal of Operations & Production Management, 23(5), pp. 546–564. https://doi.org/10.1108/01443570310471857

BANKWATCH NETWORK. (2017). ECAs go to market: A critical review of transparency and sustainability at seven export credit agencies in Central and Eastern Europe. Retrieved August 2021: https://bankwatch.org/wp-content/uploads/2018/02/ECAs-go-to-market.pdf.

BEER, M., EISENSTAT, R.A. AND SPECTOR, B., (1990). Why change programs don't produce change. Harvard business review, 68(6), pp.158-166.

BERNE UNION, (2019): Yearbook 2019. Retrieved: March 2021: https://www.berneunion.org/Publications

BULLOCK, R. J. AND BATTEN, D. (1985). It's just a phase we're going through: a review and synthesis of OD phase analysis. Group and Organization Studies, 10(December), pp. 383–412. https://doi.org/10.1177/105960118501000403

BY, R.T., (2005). Organisational change management: A critical review. Journal of change management, 5(4), pp.369-380. https://doi.org/10.1080/14697010500359250

COHEN, S., & EIMICKE, W. (2002). The effective public manager: Achieving success in a changing government. John Wiley & Sons.

CUMMINGS, T. G., & WORLEY, C. G. (2009). Organizational Development & Change, 9th Ed. Canada: South-Western.

EASTERBY-SMITH, M., THORPE, R., & JACKSON, P. R. (2015). Management and business research. Fifth edition. Sage.

EGFI (2017-2018) .annual report (2017-2018). Retrieved: April 2021: https://egfi.ir/

EXIM about us, (n.d.). "About us". Retrieved: April 2021: https://exim.hu/en/exim-en

EXIM Management, (n.d.). "Management". Retrieved April 2021: https://exim.hu/en/exim-en/management

EXIM strategies, (2017-2021). "EXIM Stratégia 2017-2021". Retrieved June 2019: https://exim.hu/images/docs/Exim-Strategia-2017-2021.pdf

GEORGIEVA, K. (2020). The financial sector in the 2020s: Building a more inclusive system in the new decade. International Monetary Fund. Jan, 17. Retrieved: Nov 2020: https://www.imf.org/en/News/Articles/2020/01/17/sp01172019-the-financial-sector-in-the-2020s

GIANTURCO, D. E. (2001). Export credit agencies: the unsung giants of international trade and finance. Greenwood Publishing Group.

GONÇALVES, V., AND CAMPOS, C. (2018): The Human Change Management Body of Knowledge (HCMBOK®). Taylor & Francis Group, LLC. Third Edition. https://doi.org/10.1201/9781351032827

HILEMAN G. (2018). Chatham House Primer: Blockchain. Retrieved April 2021: https://www.chathamhouse.org/events/all/members-event/chatham-house-primer-blockchain?gclid=Cj0KCQjwrsGCBhD1ARIsALILBYo9LQyBoz_a5Tfe0dq19fAt-hScZR19cnxfruwxtsMF_s5GGqSeGYwaAk0gEALw_wcB .

HORNSTEIN, H.A., (2015). The integration of project management and organizational change management is now a necessity. International journal of project management, 33(2), 291-298. https://doi.org/10.1016/j.ijproman.2014.08.005

HUSSAIN, S.T., LEI, S., AKRAM, T., HAIDER, M.J., HUSSAIN, S.H. AND ALI, M., (2018). Kurt Lewin's change model: A critical review of the role of leadership and employee involvement in organizational change. Journal of Innovation & Knowledge, 3(3), pp.123-127.

HYE, A.M., MIRAZ, M.H. AND HABIB, M.M. (2020). Factors Affecting Change Management through Technology Adoption in Public Organizations in Bangladesh. Int. J Sup. Chain. Mgt Vol, 9(4), p.122.

ICC (2018). ICC Global Survey 2018: Securing future growth. Retrieved: March 2021: https://iccwbo.org/publication/global-survey-2018-securing-future-growth/ .

INVESTOPEDIA, (2020): Financial Services Sector. Retrieved: Nov 2020: https://www.investopedia.com/ask/answers/030315/what-financial-services-sector.asp .

KANTER, R. M., STEIN, B. A. AND JICK, T. D. (1992). The Challenge of Organizational Change. The Free Press, New York .

KITTISARN, A. (2003). Decision making: being a study to develop a decision-making style to amalgamate best management practice with traditional Thai society and culture. DBA thesis, Southern Cross University, Lismore, NSW.

KOTTER, J.P., (1995). Leading change. Harvard business review, 2(1), pp.1-10.
KOTTER, J. P. (1996). Leading Change. Harvard Business School Press. https://doi.org/10.1002/cir.3880080221
KUZMANOVA, M. AND IVANOV, I. (2019). Relation between Change Management and Crisis Management: Survey Evidence. In International conference KNOWLEDGE-BASED ORGANIZATION, Vol. 25, No. 1, pp. 255-260. Sciendo. https://doi.org/10.2478/kbo-2019-0042
LUECKE, R. (2003). Managing Change and Transition. Harvard Business School Press.
MCCALL, M. M. AND KAPLAN, R. E. (1990). Whatever it takes- The reality of Management decision making. Second Edition, Englewood Cliffs: Prentice Hall.
MORAN, J. W. AND BRIGHTMAN, B. K. (2001). Leading organizational change. Career Development International, 6(2), pp. 111–118.
OECD. "Export Credits". Retrieved: April 2021: https://www.oecd.org/trade/topics/export-credits/
OSTROFF, F. (2006). Change management in government. Harvard business review, 84(5), 141-7. Retrieved: Nov 2020: https://hbr.org/2006/05/change-management-in-government .
POSNER, M. (1997). Export credit. Credit Management: The Key to Profitable Trading, 155-185.
PWC (2020). Financial services technology 2020 and beyond: Embracing disruption. Retrieved: Nov 2020: https://www.pwc.com/gx/en/industries/financial-services/publications/financial-services-technology-2020-and-beyond-embracing-disruption.html
RAINEY, H. G. (2003). Understanding and managing public organizations. John Wiley & Sons. Third edition.
SALCIC, Z. (2014). Export Credit Insurance and Guarantees: A Practitioner's Guide. Springer.
SERRA, C. E. M., & Kunc, M. (2015). Benefits realization management and its influence on project success and on the execution of business strategies. International Journal of Project Management, 33(1), 53-66. https://doi.org/10.1016/j.ijproman.2014.03.011
TEAM LINCHPIN, (2020). Financial Services Industry Challenges & Opportunities in 2021. Retrieved: Nov 2020: https://linchpinseo.com/common-challenges-in-the-financial-services-industry/
TXF (2021). The growing role of EXIM Hungary. Retrieved: Sep 2021: https://www.txfnews.com/News/Article/7115/The-growing-role-of-EXIM-Hungary
WILLIAMS, H.E., (2012). Influential managers in the public sector: How can OD prepare managers in the public sector for today's challenging working environment. Journal of Leadership, Accountability and Ethics, 9(5), pp.125-136.

Same old story: Hungary's development over the 2000–2020 period

ZOLTÁN BARTHA, PHD
ASSOCIATE PROFESSOR
UNIVERSITY OF MISKOLC
e-mail: zoltan.bartha@ekon.me

SUMMARY

Hungary's convergence to the developed western economies has been much slower than initially expected. Applying the FOI model, this study investigates whether there were any changes in the convergence process during the first two decades of the 21st century. It is found that the future potential (influencing the long-term competitiveness of the economy) and inside potential (determining the current well-being of the country) of the Hungarian economy did not improve at all compared to the 34 countries that were OECD members in 2010. Hungary's position is in fact very poor; it is ranked 33rd in both areas. The country does somewhat better in the outside potential (characterising its world market position), prompting the conclusion that Hungary follows a growth model that is focused on external resources. This feature is not new, however: the same development model patterns were detected in 2010, too.

Keywords: development path; economic convergence; Hungary; institutions; OECD
Journal of Economic Literature (JEL) codes: F63; O11
DOI: http://doi.org/10.18096/TMP.2022.01.03

INTRODUCTION

Hungary joined the OECD in 1996 and the EU in 2004. In the late 1980s, when the transition process was started, the general expectation was that the economic convergence of Hungary would be relatively quick. By the mid 1990s, however, the high hopes were much reduced; Balázs in his 1997 paper remarked that "the results achieved lag behind the expectations of the candidate countries" (Balázs 1997, p. 954). Economic convergence has been a highly debated topic ever since (e.g. Csaba 2011; Lengyel and Kotosz 2018; Győrffy 2022). I will only mention a few general figures to illustrate the difficulties one faces when discusses the topic: in 1996 the Hungarian PPP GDP/capita was 41% of the Austrian, 53% of the Irish, and 134% of the Polish value; by 2022 it moved to 63% (Austria), 33% (Ireland), and 98% (Poland) (IMF WEO 2022). Austria has been in the minds of highly ranked Hungarian government officials for the past decade anyway. György Matolcsy, the governor of the Hungarian National Bank, famously claimed during the release of his book in 2016 that Hungary may well catch up to Austria within a couple of decades(H.J. 2016), and he repeated this claim many times in the following years; in 2022 newly nominated cabinet ministers also mentioned the general aim of converging to Austria's/the EU's level by 2030 (Sztojcsev 2022).

Not only the mere question of convergence is debated, but there is also disagreement on the development path Hungary has taken since its accession to the OECD/EU. The governor of the Hungarian National Bank persistently argues that Hungary has taken a revolutionary new path since 2010 (Matolcsy 2021), which is in line with the suggestion of a "Hungarian" model of development (Víg 2014). Győrffy (2022), on the other hand, concludes that the 2010s did not bring significantly new policies or models for Hungary, that the country is stuck in the middle income trap, and that it still pursues the cost-based growth model. The communique that suggests 144 policy reforms released by the Hungarian National Bank in 2022 seems to agree with Győrffy: although it states that the 2010s were a golden age for the economy, it also remarks that Hungary has been lagging behind in productivity, digitisation, and smart, sustainable solutions (MNB 2022).

This study seeks answers to two questions: 1) Is there evidence for a convergence in the Hungarian economy over the 2000–2020 period, and 2) What

are the characteristics of the Hungarian development path? The individual contribution of this study is that it uses a comparative method by evaluating the performance of Hungary relative to the performance of other OECD members and it detects the individual traits of the development path by considering the future, outside and inside pillars of development using the FOI (Future-Outside-Inside) model.

The rest of this study is divided into four parts. First it gives a short literature review on Hungary's development over the past two decades; then it introduces the FOI model and the data sources used. In part three the model calculations are presented, finally, in part four I discuss the results.

Short literature review

Most researchers agree that in GDP/capita terms Hungary has been converging to the EU average over the 2000–2020 period, with a major slowdown in the years before, during, and after the great financial crisis. There seem to be two debated issues related to Hungary's development, however. Many authors claim that the growth of the Hungarian economy obscures the fact that what was achieved is just simply not good enough. Furthermore, a feature of the Hungarian growth that causes great concern is that the growth model chosen is not sustainable, and so it does not guarantee the long-term convergence of the country. Other authors – often having a vested interest in the Hungarian government –like to emphasize the extraordinary nature of the Hungarian growth following the financial crisis.

Baksa and Kónya (2021) evaluate the convergence patterns of the Visegrad-4 countries (V4) and Slovenia over the period of 1996–2019 using a stochastic, neoclassical growth model. They find a general convergence throughout most of those 25 years and remark that EU funds have played a considerable part in the growth and investment patterns. Hungary was characterised with a positive investment climate until 2007, but the period also led to a high level of indebtedness, which caused a major reversion and meant that Hungary had the highest interest rates until 2017. Policy changes in the early 2010s lead to an increase in the labour supply and a more flexible labour market. Tóth (2019) concludes that although the GDP/capita of Hungary has been getting closer to the EU mean since the early 2000s (rising from 60% to 70%), the number of years required to reach the mean is still extremely high (35–50 years).

Regional level analysis can be one of the ways to explain why the picture painted about the Hungarian growth trends is so bleak. Wołkonowski (2019), over the 2004–2015 period, investigates the beta-convergence of the countries that joined the EU in 2004 or later on different levels: country, NUTS1, NUTS2, and NUTS3. The strongest evidence of beta-convergence is found on the country level, however Wołkonowski concludes that the lower the level of the unit investigated, the weaker the beta-convergence level. On the NUTS3 level he even finds that there is divergence in case of the Hungarian regions.

Szakálné Kanó and Lengyel (2021) also focus on the NUTS3 regions of the V4 countries for the period of 2000–2016. They cluster the NUTS3 regions into 5 clubs by testing the convergence of their relative transition path. While Budapest and Győr-Moson-Sopron are clustered into Club 2, which shows a strong convergence, all of the other Hungarian NUTS3 regions (basically: counties) were in Clubs 4 (11 counties) or 5 (6 counties), the two worst groups, characterised by a poorly educated labour force, high unemployment, and decreasing population. One county (Nógrád) was such an outlier that it could not even be clustered into any of the five clubs.

Another possible reason why researchers are pessimistic about the convergence of the Hungarian economy is the broader picture, when indicators of the socioeconomic environment are also considered. Soreg and Bermudez-Gonzalez (2021) select three development pillars (Economic and business performance, Socio-political performance, and Human development and quality of life performance) and use 21 different indicators to measure the performance of Hungary, Croatia, Romania and Bulgaria between 1996 and 2019. They find that all four countries show a relative high dependence on foreign direct investment (FDI) and have a dual economic structure, which makes them very vulnerable to exogenous shocks. By comparing these countries to the other members of the V4, Soreg and Bermudez-Gonzalez conclude that Hungary has been converging to the Balkan states and has been falling behind the other V4 countries.

Bokros (2021) who was one of the masterminds behind the mid-1990s macroeconomic stabilisation reform, goes much further, and suggests that following the 1995 reform Hungary had been on a sustainable growth path, which deteriorated in the first decade of the 2000s, and starting from the 2010s the decade of decay set in. This, of course, is in stark contrast with the views of Matolcsy (2021), who believes that the 2010s were the most successful decade of the Hungarian economy in the last 100 years.

Given that the two authors are positioned at the two opposing sides of the political spectrum, their disagreement does not come as a major surprise. The contradicting view on the Hungarian model comes in a period of policy convergence. As Bielik (2021) shows, the economic activity of the V4 countries is not significantly related to who governs the country, as he finds that the economic effect of governments characterised by different political ideologies on economic activity was neither substantial nor meaningful.

One of the lessons of this review is that indicators signalling about the deeper layers of the Hungarian socioeconomic environment can offer a better understanding about the development path the country has taken. This study addresses this point by adopting the FOI model as the main method of analysis.

Methodology and data sources

In my study I calculate the position of Hungary and the other OECD members along three main development pillars (future, outside, and inside pillars) for 2000, 2010, and 2020. The methodology of the FOI model was described in detail in Bartha and Gubik (2014); here I only summarise the main points.

1. The model is based on the idea that institutional factors determine the long-term development path of a country. To identify the traits of the development path taken by Hungary, the FOI model is set up to measure the future, outside, and inside potential of the economy. The future potential considers the long-term competitiveness of the economy; the outside potential determines the current world market position of the economy; while the inside potential summarizes factors that are crucial for the current well-being of the community.
2. The three potentials are measured using the F, O, and I indices.
   a. Eleven variables are used to derive the value of the F index, namely: a measure of social responsibility/sustainability, labour market cooperation, flexibility of labour force, reliability of energy infrastructure, expenditure on education, aging of the society, share of renewable energy, life expectancy, ecological footprint, expenditure on research & development, efficiency of the education system.
   b. Five variables contribute to the O index: trade openness, country credit rating, financial sector stability, exchange rate stability, foreign language skills.
   c. The eight variables involved in the I index: efficiency of government intervention, quality of life, tax revenues, pension system stability, GDP/capita, entrepreneurial soundness, labour market flexibility, availability of skilled labour.

   The 2000 and 2010 FOI calculations were done almost a decade ago, and some of the variables used for the indices have changed since then. The 2020 FOI indices therefore are slightly different from the previous ones, but the discontinued variables were replaced by ones with similar content, so this should only cause a minor distortion in the output.
3. In 2022 there are 38 members in the OECD – an increase of 4 since 2010. Since some of the variables required are not available for the years 2000 and 2010 in case of the four new members, I only included the 34 countries in the analysis that were already OECD members in 2010.
4. To calculate the three indices, all variable values are standardised to a 1–7 scale using the minmax method. There are a total of 24 variables (11 for F, 5 for O, and 8 for I), and ideally all variables should have 34 values for the 34 countries for the years 2000, 2010, and 2020. For every year and variable there is a best and a worst value; these best/worst values are used to calculate the standardised value of the variable using this simple formula: 6×(actual country value – worst value)/(best value – worst value)+1. This formula converts all figures to a 1–7 scale, where the country with the best value will have standardised value of 7, and the country with the worst value has a standardised value of 1.
5. The FOI indices are then calculated as the mean of the standardised values of the variables belonging to the F, O, and I pillar. The country with the highest F index in 2020 (Iceland with 5.3) can then be declared as the country with the highest future potential for growth.
6. The obtained indices can be used for several purposes. In this study I use them to conduct a cluster analysis, and this helps to identify development paths among OECD members. The indices are also a relative measure of a country's performance (compared to the best/worst performing OECD member). The index score, as well as the country rank according to the score, can be used to check the development level of a country.

The variables used for the calculations were obtained from the following sources:

1. OECD.Stat: https://stats.oecd.org/
2. WEF Global Competitiveness Report (Schwab 2019)
3. IMF World Economic Outlook Database, April 2021 Edition: https://www.imf.org/en/Publications/WEO/weo-database/2021/April
4. World Bank Doing Business database: https://www.doingbusiness.org/en/doingbusiness
5. Solability Sustainable Intelligence: https://solability.com/
6. WHO, the Global Health Observatory: https://www.who.int/data/gho/data/indicators
7. Global Footprint Network: https://www.footprintnetwork.org/
8. Trading Economics: https://tradingeconomics.com/
9. ETS TOEFL results: https://www.ets.org/

Results and discussion

Table 1 lists all the F, O, and I-index scores for the 34 OECD countries for 2000, 2010, and 2020. The table also shows the rank of the country among

the 34 members according to the given index. The rank is probably an even better expression of a country's performance, as it is not only dependent on the best, worst and own variable values, but it also reflects the changes taking place in all the other countries.

Table 1.
The FOI index scores and country ranking (in parenthesis) for 34 OECD members in the years 2000, 2010, and 2020

Country	**F-2020**	**F-2010**	**F-2000**	**O-2020**	**O-2010**	**O-2000**	**I-2020**	**I-2010**	**I-2000**
Australia	3.8 (24)	4.6 (13)	4.5 (18)	5.3 (4)	5.3 (10)	4.6 (11)	4.6 (12)	4.4 (6)	4.3 (14)
Austria	4.4 (10)	5.1 (9)	5.3 (7)	5.1 (8)	5.4 (8)	4.2 (16)	3.9 (18)	4 (12)	4.7 (7)
Belgium	3.8 (22)	4.2 (17)	5.1 (11)	4.9 (14)	5.6 (5)	4.9 (7)	3.6 (22)	3.5 (21)	4.3 (16)
Canada	4 (17)	4.2 (18)	4.9 (15)	4.9 (11)	5.4 (7)	5 (4)	4.6 (11)	4.5 (2)	4.7 (8)
Chile	3.6 (27)	3.8 (21)	3.9 (23)	3.9 (29)	5 (14)	4 (20)	3.8 (19)	4.1 (9)	2.9 (31)
Czechia	3.8 (25)	3.4 (27)	3.1 (31)	4.2 (25)	5 (15)	2.4 (33)	3.2 (25)	3.6 (20)	3.3 (27)
Denmark	4.9 (4)	5.3 (8)	5.2 (9)	5 (10)	5.8 (2)	4.4 (14)	4.7 (9)	4.3 (7)	4.8 (5)
Estonia	4.2 (16)	3.2 (30)	3.1 (30)	4.7 (16)	4.9 (16)	3.7 (22)	3.6 (21)	3.1 (25)	3.3 (26)
Finland	4.6 (7)	5.4 (7)	5.6 (5)	5.1 (9)	5.7 (3)	4.6 (12)	4.9 (6)	4 (13)	5.1 (2)
France	4.2 (15)	4.7 (12)	5 (13)	4.3 (22)	4.5 (21)	4 (19)	3.5 (23)	3 (27)	4.3 (15)
Germany	4.4 (11)	4.8 (11)	4.9 (14)	4.7 (17)	5.3 (11)	4.3 (15)	4.5 (15)	3.7 (18)	4.3 (13)
Greece	3.3 (30)	3.1 (31)	3 (32)	2.9 (34)	3.7 (32)	2.8 (31)	1.9 (34)	2.5 (34)	3.2 (29)
Hungary	3.1 (33)	3.2 (29)	3.4 (28)	4.4 (21)	4.6 (19)	3.2 (26)	2.6 (33)	2.5 (33)	3.4 (24)
Iceland	5.3 (1)	5.8 (3)	5.6 (2)	4.2 (24)	2.3 (34)	4.1 (17)	5 (4)	4.4 (5)	5.1 (3)
Ireland	4.3 (14)	4.2 (19)	4.1 (20)	4.6 (18)	4.2 (28)	4.7 (10)	5 (5)	3.9 (16)	4.5 (12)
Israel	4.5 (9)	3.6 (26)	4.2 (19)	4.6 (19)	4.9 (17)	4.1 (18)	4.1 (17)	4.1 (10)	4.3 (17)
Italy	3.5 (28)	3.7 (22)	3.9 (24)	3.5 (32)	3.8 (30)	3.2 (28)	2.7 (32)	2.7 (32)	3.6 (21)
Japan	4.7 (6)	5.5 (5)	5.6 (3)	3.7 (30)	3.7 (31)	3.5 (24)	4.1 (16)	4 (14)	3.5 (22)
Korea	4.3 (12)	4.5 (14)	4 (22)	4.3 (23)	4.3 (26)	3.5 (25)	3.8 (20)	3.3 (22)	3.3 (28)
Luxembourg	3.8 (23)	6.1 (1)	5.4 (6)	6.1 (1)	6.6 (1)	5.8 (1)	4.6 (13)	4.5 (4)	5.7 (1)
Mexico	3 (34)	2.6 (34)	3 (33)	4.1 (26)	4 (29)	3 (30)	3.3 (24)	2.9 (30)	2.4 (34)
Netherlands	4.3 (13)	4.9 (10)	5.1 (10)	5.3 (6)	5.5 (6)	5 (3)	5.3 (2)	3.8 (17)	4.6 (9)
New Zealand	4.5 (8)	4.4 (15)	4.7 (17)	5.1 (7)	4.5 (20)	4.5 (13)	4.8 (8)	4 (15)	4.1 (18)
Norway	4.7 (5)	5.5 (4)	5.2 (8)	4.9 (13)	5.7 (4)	5 (5)	4.9 (7)	4.1 (11)	4.6 (10)
Poland	3.7 (26)	3.1 (32)	3.2 (29)	4 (28)	4.4 (22)	3.2 (29)	3.1 (29)	3.1 (26)	2.8 (32)
Portugal	3.9 (19)	3.7 (25)	3.6 (26)	3.7 (31)	4.3 (24)	3.9 (21)	3.1 (28)	2.9 (29)	3.4 (23)
Slovakia	3.4 (29)	3.3 (28)	3.6 (27)	4.8 (15)	4.8 (18)	2.6 (32)	2.9 (31)	3.3 (23)	3.1 (30)
Slovenia	4 (18)	3.7 (23)	4.1 (21)	4.5 (20)	5.1 (13)	3.2 (27)	3.2 (26)	2.7 (31)	3.3 (25)
Spain	3.2 (31)	3.7 (24)	3.7 (25)	4 (27)	4.2 (27)	3.7 (23)	3.1 (27)	3 (28)	4 (20)
Sweden	4.9 (3)	5.5 (6)	5.6 (4)	4.9 (12)	5.2 (12)	4.8 (9)	4.6 (14)	4.1 (8)	4.7 (6)
Switzerland	5.2 (2)	5.9 (2)	5.9 (1)	5.4 (3)	5.4 (9)	4.8 (8)	5.6 (1)	4.9 (1)	4.9 (4)
Turkey	3.1 (32)	3 (33)	2.9 (34)	3.2 (33)	3.6 (33)	1.9 (34)	3.1 (30)	3.1 (24)	2.6 (33)
UK	3.8 (21)	4.3 (16)	4.8 (16)	5.3 (5)	4.3 (23)	5 (6)	4.7 (10)	3.6 (19)	4.1 (19)
USA	3.9 (20)	4.1 (20)	5 (12)	5.4 (2)	4.3 (25)	5 (2)	5.3 (3)	4.5 (3)	4.5 (11)

Source: own calculations

As the three potentials of the FOI model were introduced to capture the different aspects of development, one would expect the rank of the countries to differ according to the three indices. This is true in case of some countries (e.g. Iceland is among the best in the future and the inside pillar but towards the back in the outside pillar; Canada, on the other hand, is highly ranked according to O, & I, but

is close to the middle in the F rank), but there are countries with very similar ranking numbers as well (e.g. Switzerland, Luxembourg, or Norway are very highly ranked, while Greece, and Turkey are very lowly ranked in all categories). Hungary has quite low rankings, although the country seems to perform somewhat better in its outside potential.

Table 2 helps us to get a clearer picture about Hungary's relative position. The inside potential (the level of well-being of the population) dropped significantly during the 2000s, and it has not recovered since then. The future potential (measuring the long term competitiveness of the economy) was rather low to begin with and the ranking of Hungary has been continuously dropping. The outside potential (the world market position) of Hungary is stronger than the other two pillars, placing the country in the midfield.

Table 2.
Hungary's rank according to the FOI indices

Year	F rank	O rank	I rank
2020	33rd	21st	33rd
2010	29th	19th	33rd
2000	28th	26th	24th

Source: own calculations

The rankings shown in Table 2 seem to back those researchers who concluded that Hungary's convergence has stalled. The measures of well-being put Hungary among the worst within the OECD, and the chance of a recovery is small as the future potential of the country is also very poor. The relatively higher ranking in outside potential suggests that Hungary continues to rely heavily on external resources in its development model.

In order to identify the special traits of the Hungarian development path within the OECD, a hierarchical cluster analysis was conducted using the 2020 FOI indices as variables. Between-groups linkage was used as the cluster method with the Squared Euclidean distance measure of intervals. Since the OECD had 38 members in 2020, all 38 countries were included in the clusters. Table 3 shows the countries that go into the same cluster as Hungary as we change the number of clusters from 3 to 11. The countries closest to Hungary based on their FOI index scores are Slovakia, Spain, Mexico, and Poland.

Table 3.
Members of Hungary's cluster and their relative proximity to Hungary

Number of clusters	Cluster members
3-8	Belgium (1.72), Chile (1.95), Czechia (0.9), Estonia (2.27), France (2), Italy (0.97), Korea (2.85), Latvia (0.84), Lithuania (1.32), Mexico (0.5), Poland (0.79), Portugal (1.53), Slovakia (0.33), Slovenia (1.19), Spain (0.44)
9-10	Chile (1.95), Czechia (0.9), Italy (0.97), Latvia (0.84), Lithuania (1.32), Mexico (0.5), Poland (0.79), Portugal (1.53), Slovakia (0.33), Spain (0.44)
11	Slovakia (0.33)

Source: own calculations

Although it would be better to obtain more homogeneous groups, the 3-cluster classification seems to be the best option when using the hierarchical cluster method. Compared to the 3-cluster solution, Hungary is only moved to a smaller group if the number of clusters is increased to 9, but this is a very unbalanced classification where 2 clusters only have 2 members, and there are 4 countries that form individual clusters (Iceland, Japan, Luxembourg, and Switzerland).

Table 4 features the FOI index means for the three clusters. Hungary is in Cluster 2. At first glance, the clustering does not seem to reveal major insights about the development paths of countries: Cluster 1 has the highest index scores in all three potentials, Cluster 2 has lower ones, while the lowest means belong to Cluster 3. The one feature of Table 4 worth highlighting is the fact that Cluster 2 has an above the average outside potential, meaning that it is not only Hungary but a whole group of countries that base their development on external resources. This is what Győrffy (2022) calls the cost-based growth model, but this finding is also in line with those studies that found that Hungary relies heavily on FDI and EU funds (Baksa and Kónya 2021; Soreg and Bermudez-Gonzalez 2021).

Table 4.
FOI index means for the 3-cluster solution

Cluster	F-index	O-index	I-index
1	4.5	5.0	4.7
2	3.7	4.2	3.3
3	3.2	3.1	2.5

Source: own calculations

To better distribute the outliers among the dominant clusters, I tried an artificial clustering method, the result of which is shown in Table 5. The indices have a value between 1 and 7, meaning that

4 is the middle value. Every country can have a High (index is larger than 4) or a Low (index is lower than 4) index value in all three potentials, which means that a half-scale method can also be used to classify the countries into different groups. As we have three indices, the possible numbers of clusters is 8 but in 2020 37 of 38 OECD members went into 5 of these artificial, half-scale clusters.

Table 5.
Clusters of OECD countries according to the half-scale method

Cluster	Members
High F, O, I (FOI)	Denmark, Finland, Germany, Iceland, Ireland, Israel, Netherlands, New Zealand, Norway, Sweden, Switzerland
High F, O, low I (FOi)	Austria, Estonia, France, Korea
High F, I, low O (FoI)	Japan
Low F, high O, I (fOI)	Australia, Luxembourg, United Kingdom, United States
High F, low O, I (Foi)	-
Low F, I, high O (fOi)	Belgium, Czechia, Hungary, Latvia, Lithuania, Mexico, Poland, Slovakia, Slovenia, Spain
Low F, O, high I (foI)	-
Low F, O, I (foi)	Chile, Colombia, Costa Rica, Greece, Italy, Portugal, Turkey

Source: own calculations

Hungary is in the fOi cluster, characterised by high outside and low future and inside potential. Again, this does not come as a surprise, as similar features were found during the hierarchical clustering. Table 5 is still useful because it adds two extra pieces of information about development models. One is that the outside-focused development model is the second most common even among OECD members. The other added value of the half-scale clustering method is that it allows us to compare Hungary's current position to the one calculated for 2010 (Bartha and S. Gubik 2013).

Ten years ago we also found that Hungary was part of the fOi cluster, which was the second most populous group within the OECD back then, too (Bartha and S. Gubik 2013, p. 448). This suggests that there have been no fundamental changes in the growth model of Hungary; the 2010s did not bring major changes compared to the 1990s and 2000s. While Hungary's path seems to be unchanged, some countries did manage to make advances: Estonia and especially Israel have moved to more sustainable development models; Mexico joined the fOi group from the low-everything cluster. There are examples of dropping down as well: Belgium joined the Hungarian group from a more prestigious group, while Chile dropped to the foi cluster.

CONCLUSION

The two questions this study sought answers to were: 1) Is there evidence for a convergence in the Hungarian economy over the 2000-2020 period, and 2) What are the characteristics of the Hungarian development path? The analysis was conducted using the FOI model, and the results revealed that Hungary's relative position to the 34 OECD members did not improve significantly over the 2010–2020 period and, if anything, it got worse. The index measuring the future potential of the Hungarian economy ranked the country 33rd among the 34 countries investigated (a drop of 4 places compared to 2010 and 5 places compared to 2000), and 33 was Hungary's rank according to the inside potential as well (just as in 2010; in 2000 it ranked 24th). The factors that measure the current level of well-being and influence the future sustainability of growth put Hungary towards the back end of the OECD members. The conclusion is that there are no signs of convergence when we compare Hungary's performance to the club of most developed countries.

Hungary does somewhat better in outside potential (ranked 21st). The outside potential measures the world market position of an economy; countries with a high outside potential rely heavily on international markets and resources. But when the external focus is not paired with a high inside or future potential, the economy develops a dual structure, preventing the country from achieving long-term convergence (Bartha and S. Gubik 2013). The outside-focused growth model therefore is considered to be fragile, leading to the so-called middle income trap (Győrffy 2022). The external focus of Hungarian development is not a novel thing; Hungary showed similar patterns in 2010 and even before that. The second conclusion therefore is that there are no major changes in Hungary's development model; what happened in the 2010s is not fundamentally different from what went on in the 1990s and the 2000s.

REFERENCES

BAKSA, D., KÓNYA, I., 2021. Convergence stories of post-socialist Central-Eastern European countries. The Manchester School 89, 239–258. https://doi.org/10.1111/manc.12360

BALÁZS, P., 1997. Integrációs "csapdák" az Európai Unió és Kelet-Közép-Európa kapcsolatában (Integration "traps" in the relationship of the European Union and Central-Eastern Europe). Közgazdasági Szemle 44, 954–969.

BARTHA, Z., GUBIK, A.S., 2014. Characteristics of the large corporation-based, bureaucratic model among OECD countries - an FOI model analysis. Danube 5, 1–20. https://doi.org/10.2478/danb-2014-0001

BARTHA, Z., S. GUBIK, A., 2013. Future-, Outside-, and Inside-focused Development Paths. International Journal of Business and Management Studies 2, 435–452.

BIELIK, I., 2021. The effect of the cabinet's ideological composition on economic growth in the Visegrád countries. Journal of Contemporary Central and Eastern Europe 29, 69–84. https://doi.org/10.1080/25739638.2021.1958479

BOKROS, L., 2021. The Tragedy of Transition: Development, Deterioration, Decay. The Case of Hungary, 1990-2020. CEBR 10, 21–41. https://doi.org/10.18267/j.cebr.280

CSABA, L., 2011. A magyar átalakulás és fejlődés néhány általánosítható elméleti tanulsága (A few generalised theoretical lesson from the Hungarian transformation and development). Közgazdasági Szemle 48, 813–831.

GYŐRFFY, D., 2022. The middle-income trap in Central and Eastern Europe in the 2010s: institutions and divergent growth models. Comp Eur Polit 20, 90–113. https://doi.org/10.1057/s41295-021-00264-3

H., J., 2016. Matolcsy szerint utolérjük Ausztriát (Matolcsy claims that we will catch up to Austria). VG.hu. https://www.vg.hu/vilaggazdasag-magyar-gazdasag/2016/02/matolcsy-szerint-utolerjuk-ausztriat, downloaded on 29 May 2022

LENGYEL, I., KOTOSZ, B., 2018. Felzárkózás és/vagy távolságtartó követés? A visegrádi országok térségeinek fejlődéséről (Catching up and/or following at a distance? On theprospect of the regions of the Visegrad countries). TéT 32, 5–26. https://doi.org/10.17649/TET.32.1.2910

MATOLCSY, G., 2021. Economic Balance and Growth - 2010-2019. From the last to the first (2nd revised edition). Magyar Nemzeti Bank, Budapest.

MNB, 2022. Fentartható egyensúly és felzárkózás (Sutainable balance and convergence). Magyar Nemzeti Bank. https://www.mnb.hu/letoltes/fenntarthato-egyensuly-es-felzarkozas-144-javaslat-20220519.pdf

SOREG, K., BERMUDEZ-GONZALEZ, G., 2021. Measuring the Socioeconomic Development of Selected Balkan Countries and Hungary: A Comparative Analysis for Sustainable Growth. Sustainability 13, 736. https://doi.org/10.3390/su13020736

SZAKÁLNÉ KANÓ, I., LENGYEL, I., 2021. Convergence clubs of NUTS3 regions of the V4 group. E+M 24, 22–38. https://doi.org/10.15240/tul/001/2021-4-002

SZTOJCSEV, I., 2022. Nem tudnak leszokni róla: 131 éve valaki mindig megígéri, hogy már csak kis idő, és utolérjük Ausztriát (They can't help it: for 131 years someone has promised that we will catch up to Austria in a little bit). HVG.hu. https://hvg.hu/gazdasag/20220520_utolerjuk_Ausztriat_eu_gdp_novekedes, Downloaded on 29 May 2022.

TÓTH, Z., 2019. The Levels To Measure Real Convergence - Catching-Up Issues In Hungary. DETUROPE 11, 74–94.

VÍG, I., 2014. Magyar modell, növekedés és felzárkózás (Hungarian Model of Economic Grrowth and Convergence). Polgári Szemle 10, 123–138.

WOŁKONOWSKI, J., 2019. The Beta-Convergence of the EU–10 Countries and Regions in the Years 2004–2015. CER 22, 87–104. https://doi.org/10.2478/cer-2019-0014

Reward-Based Crowdfunding. How to Make it Work?

DANIELA HADAČOVÁ

TECHNICAL UNIVERSITY OF KOŠICE,
e-mail: daniela.hadacova@tuke.sk

LENKA MALIČKÁ, PHD.
ASSOCIATE PROFESSOR

TECHNICAL UNIVERSITY OF KOŠICE,
e-mail: lenka.malicka@tuke.sk

SUMMARY

The paper aims to identify attributes having a significant impact on the successful financing of crowdfunding campaigns published on the largest crowdfunding platform based on reward models in the Czech Republic. The paper's motivation arises from the theoretical background of crowdfunding and related empirical research, where crowdfunding based on rewards is analysed. The paper aims to identify the determinants of the success of selected crowdfunding projects using logistic regression analysis. Results of the logit estimation show that the number of fans on the campaign's Facebook page, the use of video in the campaign and the size of the campaign's financial goal have a significant impact on the campaign's success. The last part of the paper also includes the limitations of the performed analysis and suggestions for further analysis of crowdfunding.

Keywords: Logistic regression; Reward-based crowdfunding; Determinants of success
Journal of Economic Literature (JEL) codes: G32 - Financing Policy • Financial Risk and Risk Management • Capital and Ownership Structure • Value of Firms • Goodwill
DOI: http://doi.org/10.18096/TMP.2022.01.04

INTRODUCTION

Raising start-up capital is a milestone many entrepreneurs have to overcome in the initial stages of implementing their business idea. In recent years, we have witnessed the emergence of a new form of fundraising: crowdfunding. Crowdfunding, also called group funding, has become an increasingly important phenomenon; as compared to traditional forms of funding, it is a process where individuals or groups have the opportunity to concentrate relatively small contributions from a relatively large number of Internet users without financial institutions.

Therefore, in the last decade, the undeniable attention of researchers has been on crowdfunding and its various types. This paper examines one type of crowdfunding, namely, crowdfunding based on rewards. The research is explicitly conducted to analyse the impact of individual attributes to project campaigns on the success of these crowdfunding projects published on the most prominent Czech crowdfunding platform Hithit, based on a unique set of 3,694 projects.

The paper's primary goal is to analyse the determinants of crowdfunding projects using logit regression. Since there is a need to consider many explanatory variables in the analysis, a logistic regression model is employed, where the aim is to identify which independent variables have strong predictive power in terms of campaign success.

This paper consists of five chapters: the first is devoted to a literature review of crowdfunding, followed by a chapter on the methodology and data used. The third section of the paper is dedicated to describing the results of logistic regression. At the end of the paper, there is a discussion on the paper's results, possible extensions of the research and the overall conclusion.

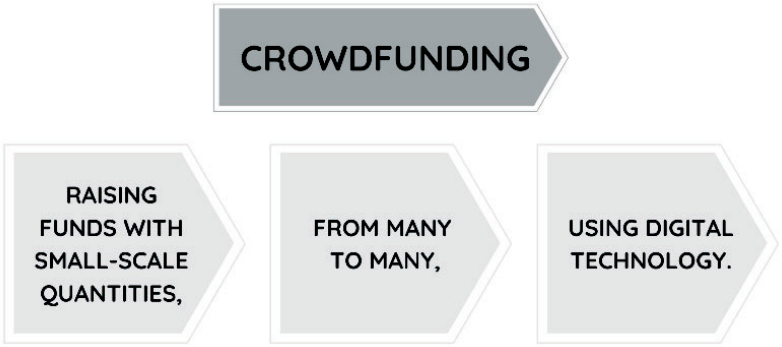
Crowdfunding: A Literature Review

We encounter the term crowdfunding nowadays more often also in our latitudes, but it is still an unusual phenomenon of the modern age for the majority of the Czech and Slovak population.

Crowdfunding is perceived by the European Commission (2016, p. 12) as part of the broader world of financial innovation allowed by

technological advances, also known as FinTech. One of the FinTech subcategoriesis the Alternative Financing (AltFi) subcategory. AltFi refers to technology-based market financing outside the traditional financial system and includes crowdfunding, online marketplaces for consumer and commercial lending, invoicing and third-party platform payments (Terry et al. 2015).

However, the definition of crowdfunding meets a myriad of different definitions (GPFI 2016, p. 19; Kirby & Worner 2014, p. 4; European Commission 2016, 2019; FCA 2020; SEC 2019; World Bank 2013); they all have three key components in common, shown in Fig. 1.

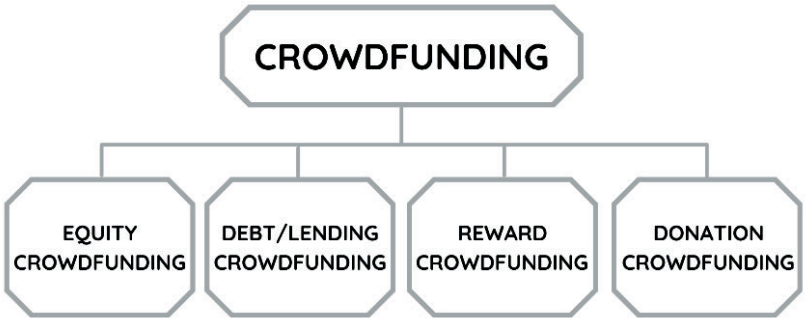


Source: authors' processing based on Jenik et al. 2017, p. 7

Figure 1. Key components of crowdfunding

According to Jenik et al. (2017, p. 7), a critical disruptive effect of crowdfunding is that intermediation by traditional financial institutions is kept to a minimum, as funds are channelled directly from backers to fundraisers through the platform.

A project is considered successful in the crowdfunding industry when it can obtain sufficient financial support from crowd funders. Different types of crowdfunding on the market are generally divided into four models, shown in Fig. 2.



Source: authors' processing based on Zhao et al. 2019

Figure 2. Types of crowdfunding

The results of Di Pietro & Butticè (2020) study suggest that, for different group funding models, both formal and informal institutions play an essential role in determining what can be considered a prudent decision.

In particular, Di Pietro and Butticè (2020) show that the size of the collective finance market is more significant in countries with a favourable business-friendly legal environment and a well-developed financial market. They also emphasise that individualistic societies are more open to group financing in all its forms.

Thanks to the rapid development of Internet technologies and the prosperity of e-commerce, reward-based crowdfunding has become a new star in online retail commerce and is of tremendous importance in raising finance in exchange for additional rewards (Guan et al. 2020). The rewards for contributors are mostly product samples, early rights to purchase a product or service, or even honourable mention (Zaggl & Block 2019).

According to Zhao et al. (2019), the basis for this type of funding is that reward-based crowdfunding platforms are not producers, publishers or marketers but a sophisticated intermediary that connects activists with supporters and allows them to communicate with each other to assess campaign benefits and prospects.

Factors influencing the success of online crowdfunding campaigns

Just as we distinguish between individual crowdfunding models, the factors that affect them, whether positive or negative, also differ. Thus, the factors influencing the success of crowdfunding campaigns are not universally valid for all available crowdfunding models. Shneor and Vik (2020) identified factors influencing the success of crowdfunding campaigns based on individual crowdfunding models; those influencing the success of reward-based crowdfunding campaigns are

- non-profit sector;
- female campaign creator;
- the historical accompanying other campaigns by the current campaign creator;
- the fundraiser's previous experience of successfully obtaining funding;
- the number of contacts in the fundraiser's social networks;
- levels of the concept of creativity and innovation;
- the use of precise language in the campaign texts;
- campaign text length;
- the number of updates provided;
- video inclusion;
- perception of the quality of campaign elements;
- perception of the level of preparedness of the campaign;
- use of prosocial stimuli;
- the number of rewards offered;
- external support;
- the number of comments and interactions with contributors;
- sharing on social networks by supporters;
- fake advertising on social networks;
- the state of the level of support at the time of view of the potential supporter and
- funding in the early stages of the campaign.

Zooming out and in on crowdfunding

The impact and role of alternative financing worldwide continue to grow, with alternative financing platforms raising as much as US$304.5 billion in 2018. This volume represents funds that have been raised through online alternative financing platforms and successfully delivered to individuals, businesses and other fundraisers but does not include platform or transaction fees (Cambridge Centre for Alternative Finance 2020, p. 24). In 2019, the amount collected was significantly lower at $175.7 billion. The declining trend was also recorded in the following year, i.e. in 2020, when "only" $113.7 billion was collected (Cambridge Centre for Alternative Finance 2021, p. 70).

This decline in global volume is mainly due to a sharp decline in alternative financial activity in China, where it fell by 35% between 2019 and 2020. Without the Chinese market, the global alternative financing market increased by 24%, from $91 billion in 2019 to $113 billion in 2020 (Cambridge Centre for Alternative Finance 2021, p. 70).

The European alternative financing market boomed until 2020, when it saw its first decline since 2013, from $23.2 billion in 2019 to $22.6 billion in 2020. The United Kingdom continued to be the most significant contributor, accounting for $12.6 billion in 2020 (Cambridge Centre for Alternative Finance 2021, p. 70). However, the share of the European Union's crowdfunding funding markets (not including the United Kingdom) is still low, with little cross-border activity (Chervyakov & Rocholl 2019). That is exacerbated by the fact that although the existence and market distribution of crowdfunding types in Slovakia and the Czech Republic are similar at the global level, the country's low level of awareness and conservatism is hampering the pace of development of this type of funding/accumulation in these areas (Šoltés & Štofa 2016).

Central European countries are considered small, and their markets have limited absorption capacity, including crowdfunding markets, so it is necessary to raise funds abroad. Domestic platforms focus on regional projects, which may differ in type, budget and area of implementation, rather than those located on international portals (Elexa et al. 2018).

Elexa et al. (2018) found that crowdfunding platforms have decreased recently, especially in Slovakia. The decrease can be caused by the effect of a small economy and relatively intense competition from the Czech Republic, as Czech platforms are relatively easily accessible and attractive for the Slovak donor crowd, mainly due to a low language barrier.

Proof of this statement is the relatively small base of crowdfunding platforms of individual models of crowdfunding operating in the conditions of the Slovak Republic (Table 1).

Table 1.
Crowdfunding platforms actively operating in Slovakia

Crowdfunding model		Name of the crowdfunding platform	Year of launch of the platform	Platform website
Equity crowdfunding		Crowdberry	2015	https://www.crowdberry.eu/
		Investícia Slovensko	2019	https://investiciaslovensko.sk/
Lending crowdfunding	**Business loans**	Conda	2013	https://www.conda.sk/sk/home-slovakia/
		Finnest	2014	https://www.finnest.com/sk/
		PORT Invest	2017	https://www.portinvest.sk/
	P2P	Žltý melón	2012	https://www.zltymelon.sk/
		Zinc Euro	2015	https://www.zinceuro.sk/
		Finzo	2016	https://finzo.sk/sk/
		Majak.sk	2018	https://majak.sk/#/
		Wishmaker	2018	https://www.wishmaker.sk/
		Pôžičky od ľudí	-	https://www.pozicky-od-ludi.sk/
Donation crowdfunding		Dobrá krajina	2009	https://www.dobrakrajina.sk/sk/
		ĽudiaĽudom	2011	https://www.ludialudom.sk/
		Srdce pre deti	2011	https://www.srdcepredeti.sk/
		DARUJME.SK	2012	https://darujme.sk/
Reward crowdfunding		Hithit	2014	https://www.hithit.com/sk/home
		StartLab	2015	https://www.startlab.sk/domov/
		startovač	2017	https://www.startovac.cz/

Source: the websites of crowdfunding platforms and Creative Industry Forum, Interreg Central Europe; authors' processing

The Slovak Republic has a less developed sector of collective financing than the Czech Republic, as evidenced by the fact that Czech portals for the crowdfunding model based on rewards (Table 2) are the main driving force behind the growth of reward-based crowdfunding in Slovakia. On the other hand, it should be noted that donation-based models and loan models play a more important role in Slovakia than in the Czech Republic. The unexplored territory remains the equity/capital model, a relatively new and underused type of crowdfunding for both countries (Šoltés & Štofa 2016).

Table 2.
Crowdfunding platforms actively operating in the Czech Republic

Crowdfunding model		Name of the crowdfunding platform	Year of launch of the platform	Platform website
Equity crowdfunding		Crowdberry	2015	https://www.crowdberry.eu/
		Penězdroj	2015	https://penezdroj.cz/
		Fundlift	2016	https://www.fundlift.cz/#/cs/
		Crofungo	2019	https://crofungo.cz/
		INVESTOWN	2020	https://www.investown.cz/
Lending crowdfunding	**Business loans**	Roger	2013	https://www.roger.cz/
		Fingood	2015	https://fingood.cz/
		SymCredit	2015	https://www.symcredit.com/cs/
		Upvest	2017	https://www.upvest.cz/
	P2P	Žlutý meloun	2012	https://www.zltymelon.sk/?lang=cs_CS
		Zonky	2015	https://zonky.cz/
		Bondster	2017	https://www.bondster.com/cz

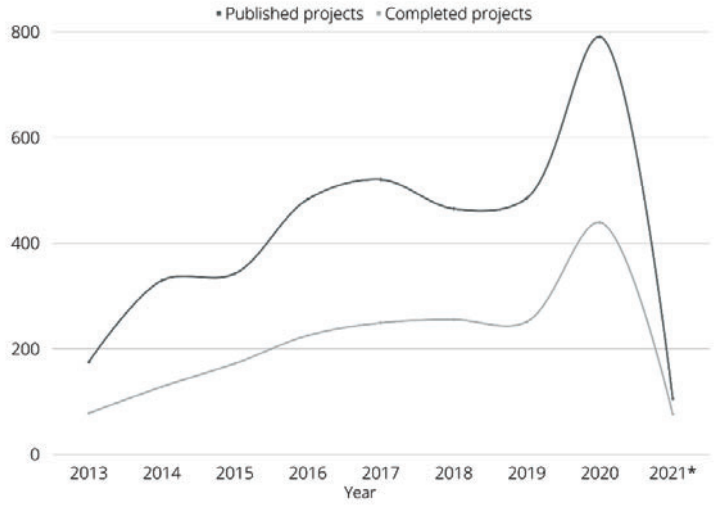
Donation crowdfunding	Nadační fond pomoci	2012	https://www.nfpomoci.cz/
	Darujme.cz	2012	https://www.darujme.cz/
	Donio	2019	https://www.donio.cz/
Reward crowdfunding	Hithit	2012	https://www.hithit.com/cs/home
	SPORTSTARTER	2014	http://www.sportstarter.cz/cs/
	Vision Partners	2014	https://www.visionpartners.cz/
	Penězdroj	2015	https://penezdroj.cz/
	startovač	2017	https://www.startovac.cz/
	Donio	2020	https://www.donio.cz/

Source: the websites of crowdfunding platform; Creative Industry Forum, Finlord; authors' processing

METHODS AND DATA

In line with the paper's goal, the logistic regression analysis was run to analyse the determinants of crowdfunding projects. The data employed in the empirical analysis were manually obtained from the official website of the Hithit platform using the Octoparse program. The data set consisted of 3,694 projects, representing all the published projects on the platform until March 2021. However, this sample was adjusted for extreme values; we removed all projects with a target amount higher than €50,000 (14 projects) and those with a fulfilment percentage exceeding 500% (13 projects). Based on this modification, 3,667 published Czech and Slovak project campaigns on the Hithit platform entered the subsequent logit model analysis.The Hithit platform is the best-known and largest Czech crowdfunding platform based on the reward model, also operating in the Slovak market. According to its marketing, Hithit connects creative people with those who want to support them. It is a place that fulfils the dreams of artists, creatives, designers, developers, and geniuses. Hithit is a space only for financing new ideas and creative intentions, publishing music albums, filming, producing innovative or newly designed products, developing software, mobile applications, etc. (Hithit).

Since its inception in 2012, the Hithit platform has "received" more than €12,634,882 out of more than 1,873 successfully funded projects published on the platform by March 2021*. Interestingly, the platform experienced its most remarkable growth in 2020, when 790 project campaigns were developed, with up to 439 successfully completed, representing the highest percentage of success since the platform was launched.



Source: authors' processing based on obtained data from Hithit

*Figure 3. Evolution of the projects on the Hithit platform in 2013–2021**

Several variables were under consideration to examine the impact on crowdfunding campaigns' success. Their selection was preceded by a study of existing research on crowdfunding. A detailed overview of all used variables is listed in Appendix A, and descriptive statistics on the variables are given in Table 3.

Table 3.
Descriptive statistics on the majority of the variables

Variable	Mean	Standard deviation	Minimum value	Median	Maximum value
Updates	2.64	3.83	0	1	47
Contributors	101.92	194.04	0	46	4576
Comments	0.93	2.08	0	0	36
Target Set	5255.74	5589.63	191	3295	49732
Number of reward options	14.02	8.31	2	12	82
Number of photos	10.54	5.73	0	10	21
Min	3.18	2.98	0	2,34	58.51
Max	465.90	278.97	5	390,09	999
Year	-	2.22	2013	2017	2021
Words in name	4.48	2.40	0	4	13
Words in text	734.53	300.20	0	703	2292
Number of attempts	1.14	0.81	1	1	18
Fans	1631.57	7497.73	0	0	206889

Source: authors' processing

When including the *Updates* variable in the model, we were inspired by Shneor and Vik (2020), Mollick (2014), Aleksina et al. (2019) and Kromidha and Robson (2016). In selecting the *Contributors* variable, we were inspired by Song et al. (2019), Zhao et al. (2019) and Mollick (2014). Shneor and Vik (2020), Mollick (2014), Aleksina et al. (2019) and Kromidha and Robson (2016) inspired us to include the variable *Comments* in our model. The inclusion of the *Target Set* variable was inspired by Song et al. (2019) and Mollick (2014). Mollick (2014) also used the *Category* variable, which we then included in the model. When including the *Country* variable in the model, we were inspired by Song et al. (2019), Mollick (2014) and Kromidha and Robson (2016). Authors Shneor and Vik (2020) and Byrnes et al. (2014) inspired us to include *Number of reward options* variable in the model. The *Video variable* was included in the model based on an inspection by Shneor and Vik (2020), Mollick (2014) and Aleksina et al. (2019). The variable *Number of photos* was included in the model thanks to the inspiration of Aleksin et al. (2019). Lukkarinen et al. (2016) inspired us to include the *Min* and the *Max* variable in the model. The variable *Year* was included in the model based on inspiration from Song et al. (2019). The variable *Words in text* was used by Shneor and Vik (2020) and Thapa (2020) in their models. We included the *Fans* variable, representing the number of registered users of the Facebook social network that liked the campaign's Facebook page, in the model based on inspiration from Shneor and Vik (2020), Mollick (2014), Lukkarinen et al. (2016), Kromidha and Robson (2016) and Byrnes et al. (2014).

Using a logistic regression model, we subsequently analysed the data obtained mainly from the crowdfunding platform Hithit, supplemented with the social network Facebook. The analysis was performed in the RStudio program, using a binary logistic regression model. The use of logistic regression analysis was decided based on our literature study, looking at the motivation of crowdfunding researchers who analyse factors that significantly influence the success of campaigns implemented on crowdfunding platforms (e.g. Thapa 2020; Song et al. 2019; Mollick 2014; Kaur & Gera 2017).

Our logistic regression model belongs to binary models, where the dependent variable can take only two values: 1 (success) and 0 (failure). Compared to the linear probability model, the logit model serves as a convenient nonlinear alternative because it ensures that the adjusted probabilities are strictly between 0 and 1 (Wooldridge 2012; Aldrich & Nelson 1984).

The logit scale solves this problem by mathematically transforming the original linear regression equation to provide the logit or natural logarithm of the probability of being in one result category versus another (Stoltzfus 2011, p. 1099–1104):

$$P(y = 1|X) = P(y|x_1, x_2, \ldots, x_k) \quad (1)$$

However, since the logistic model does not require the fulfilment of most assumptions of linear regression and general linear models based on the OLS method, it is mainly the assumption of linearity, residue normality and homoscedasticity (Statistics Solutions 2021). The only assumption tested was multicollinearity (null hypothesis: all explanatory variables are orthogonal).

The logit model assuming the cumulative distribution function G (Wooldridge 2012) can be expressed as

$$P(y = 1|X) = G(\beta_0 + \beta_1 * x_1 + \ldots + \beta_k * x_k), \quad (2)$$

where β_0 is an intercept and $\beta_1, \ldots, \beta_k$ are parameters associated with the variable $x_1, \ldots, x_k$.

In our case, using Equation (2), the main logit model based on data obtained from the crowdfunding portal Hithit and the social network Facebook was defined in the form:

$$P(y = 1|X) = G(\beta 0 + \beta 1 * \text{updates} + \beta 2 * \text{contributors} + \beta 3 * \text{comments} + \beta 4 * \log(\text{target set}) + \beta 5 * \text{category} + \beta 6 * \text{country} + \beta 7 * \text{number of reward options} + \beta 8 * \text{video} + \beta 9 * \text{number of photos} + \beta 10 * \text{min} + \beta 11 * \text{max} + \beta 12 * \text{links} + \beta 13 * \text{year} + \beta 14 * \text{words in name} + \beta 15 * \text{words in text} + \beta 16 * \text{number of attempts} + \beta 17 * \text{fans}) \quad (3)$$

RESULTS

The estimated logit model results are shown in detail in Appendix B. Statistically significant variables are displayed in Table 4. The model does not suffer from multicollinearity, as the generalised variation inflation factor and the reduced generalised variation inflation factor are very low (Appendix C). Before the further estimation of the model, we also tested the power of the model, using McFadden's pseudo R^2, known as a likelihood-ratio index, which was 0.7253328 and Nagelkerke pseudo R^2, which came to 0.8455200. Based on those results, we can fairly say that our model quite neatly predicts the outcome, and therefore, we continued our estimating process.

Considering the results of applying logit regression to our model, we can say that the variables *Updates*, *Contributors*, the logarithm of *Target Set* and *Max* belong to the statistically significant variables at the level of significance $\alpha = 0.001$. *Number of reward options* and *Words in text* are statistically significant at the 10% level, while the categories *Arts* and *Country Slovakia* are equally essential. The categories *Theatre*, *Sports*, *Technology and Education* are significant at the 5% level. The variables *Fans* and *Video* are significant at the 1% level, as is the *Music category*.

Based on the regression results, it is shown that although the variable *Fans* is significant, the odds ratio corresponding to this variable is very close to 1 and therefore has no real impact on a success of a campaign.

Among the variables whose increase positively affects the campaign's odds of success, we include *Updates*, where an increase by one unit, ceteris paribus, increases the odds of success by 11.6%. Increasing the number of contributors while maintaining the other variables fixed will also increase the likelihood of the campaign succeeding by 8%. Including a video in a campaign, ceteris paribus, will increase the likelihood of a campaign succeeding by up to 66.7%. Increasing the maximum amount of a one-time contribution by €1 will increase the campaign's odds of success by 0.13%, assuming that the rest of the variables remain fixed.

Number of reward options is included among the variables whose increase negatively affects the campaign's odds of success: increase by one reward option, ceteris paribus, reduces the likelihood of success by 2.5%. Increasing the number of words in the campaign text by one reduces the campaign's odds of success by 0.05% while maintaining the other variables fixes. The Target Set variable is another variable whose 1% increase in logarithm, ceteris paribus, causes up to a 94% decrease in odds of project success.

Table 4.
Results of logit estimation: statistically significant variables

Variable		β coefficient (significance level)	Standard errors	Ratio of chances
Intercept		2.4510	0.7191	11.5999
Updates		0.1100 (****)	0.0261	1.1163
Contributors		0.0777 (****)	0.0032	1.0808
Target Set		-2.8830 (****)	0.1634	0.0559
Category	**Theatre**	1.0730 (**)	0.4758	2.9232
	Music	0.9385 (***)	0.3611	2.5561
	Sport	0.9613 (**)	0.4294	2.6152

	Technology	1.2440 (**)	0.5176	3.4708
	Arts	0.6790 (*)	0.3815	1.9720
	Education	1.2800 (**)	0.5174	3.5980
Country	**Slovakia**	0.6697 (*)	0.3803	1.9536
Number of reward options		-0.0253 (*)	0.0143	0.9750
Video		0.5107 (***)	0.1801	1.6665
Max		0.0013 (****)	0.0003	1.0013
Words in text		-0.0005 (*)	0.0003	0.9995
Fans		-0.00002306 (***)	0.000008107	0.9999

Note: Significance codes marked as (*), (**), (***) and (****) correspond to significance levels $p < 0.1$; $p < 0.05$; $p < 0.01$ a $p < 0.001$

Source: authors' processing

For the *Category* variable, six of its categories are significant, and for all of them, the chance of success is higher than the reference value, i.e. the *Antivir* category. The Antivir category was chosen as a benchmark because of the perfect balance of success and failure (50% success rate) of the campaigns included in this category. If the project belongs to the *Theatre* category, the odds of success, ceteris paribus, increase by 192% compared to the *Antivir* category. The same is true if the project belongs to the *Music* category, where the odds of success, ceteris paribus, increase by 155% compared to the *Antivir* category. The odds of success, ceteris paribus, increase by 161.5% compared to the *Antivir* category if the project is included in the *Sports* category. A slightly lower percentage of the increase in the odds of success, ceteris paribus, than the *Antivir* category is demonstrated in the *Arts* category, precisely 97%. If the project belongs to the *Technology* category or the *Education* category, the odds of success, ceteris paribus, increase by more than 240% compared to the *Antivir* category.

For the variable *Country*, the regression results show that if the project is included in the regional area of Slovakia, the odds of success of the campaign increase by 95% compared to the reference category Czech Republic, assuming that the rest of the variables remain fixed.

To evaluate the predictive power of the logit model, an estimate was made, and its results are summarised in Tables 5 and 6.

Table 5.
Predictive ability of the logistics model with p=0.9

		Status	
		0	1
Forecast / Estimate	0	1785	459
	1	27	1396

Source: authors' processing

The values suggest that the accuracy of the prediction of the estimated model can be assessed as solid. Of the 3,667 projects, 3,181 were correctly predicted, which represents an accuracy rate of 87% for the prediction when p=0.9.

Table 6.
Predictive ability of the logistics model with p=0.5

		Status	
		0	1
Forecast / Estimate	0	1711	151
	1	101	1704

Source: authors' processing

The values suggest that the accuracy of the prediction of the estimated model when p=0.5 can be assessed as solid. Of the 3,667 projects, 3,415 were correctly predicted, which represents even better accuracy than when p=0.9, with accuracy rate of 93%.

An estimate of the predictive power also serves as a check that the predictors included in the estimated model play an important role in terms of the likelihood of success of the campaign.

As we were interested in the importance of the variable fans, we subsequently adjusted the sample by removing all campaigns that did not have a

Facebook page. With this adjustment, we reduced the number of campaigns to 1,803. Detailed results of the regression analysis are in Appendix D, with the variable for fans remaining essentially unchanged from the primary model. Thus, the ratio of chances is again practically equal to 1.

Changes from the model containing all projects (except deleted projects based on extreme values) are visible in statistically significant variables. There is no significance in the Arts category within the Category variable nor the *Video* or *Words in text* variable. In contrast, the variable *Number of photos* is significant in this model, where increasing the number by one photo, ceteris paribus, will increase the odds of success of the campaign by 4.2%.

DISCUSSION

Before summarising the findings arising from this paper, it is necessary to realise that although the analysis revealed some forms of relationship between dependent and independent variables considered in the logit model, there is no evidence of why such mechanisms exist. However, the significance of these coefficients does not directly induce a causal effect on the campaign's outcome, nor does it mean that the factors in question are those that persuade individuals to contribute.

This paper analyses 3,667 published project initiatives of the most significant Czech crowdfunding platform Hithit from the beginning of its existence (June 2012) to March 2021.

As the use of social networks to engage the audience is a necessary step, we incorporated the variable Fans in our model. In the logistic regression, we discovered that the increase in the number of fans on the campaign's Facebook page or on the page of the campaign's creator had a negative impact on the odds of the campaign's success, which is borderline with almost no effect due to the ratio of chances equal to 1. However, the findings suggest that a crucial aspect of the campaign's success is the reasonable determination of the financial objective of the campaign, which is in line with several existing works, such as Mollick (2014). Findings also indicate that a more significant number of supporters, i.e. contributors, increases the likelihood of financing the campaign. This result aligns with several existing works, such as Thapa (2020).

The model results also suggest that the inclusion of video in a campaign has a positive and significant impact on the likelihood of success of the campaign, which is in line with several existing papers (see Mollick 2014). In the analysed sample, almost 79% (2,914 out of 3,694) of projects included a short video clip in their campaign. This model also implies the significant importance of the number of reward options offered per percentage of campaign funding, with their increase harming the likelihood of campaign success.

The logistic regression analysis also showed that the increase in the number of updates positively affects the odds of success. A similar conclusion that frequent updates are associated with tremendous success was reached by Mollick (2014). The positive effect was also shown at the maximum amount of the one-off contribution. On the contrary, a negative impact on the campaign's success was shown by the number of words contained in the campaign's text where a text containing a high number of words is less effective than a standard reference text. This finding is consistent with several existing works, such as Thapa (2020) who identified that campaigns in which the description contained 2,000 - 3,000 words, had maximum probability of funding success, as readers are reluctant to read more than 5 minutes.. The regression also revealed that the project's inclusion in Slovakia increases the campaign's odds of success compared to its inclusion in the Czech Republic, while in the sample analysed by us, only 3.3% (122) of projects were included in this country.

As in previous academic work on crowdfunding by Mollick (2014), our analysis also showed that the categorization of projects is significant to increased campaign success odds.

Restrictions and possible extensions

As this paper analyses non-experimental data, it encounters several limitations.

The Hithit project policy is a constraint that could prevent the generalisation of the results; if the target amount is not collected from project fans and the community, the project creators can pay the rest themselves. As a result, the lack of information on the number of projects co-financed by their founders may compromise the reliability of the published results.

An insufficient number of explanatory variables included in the analysed file can also be considered as an aspect influencing the results. Despite our efforts to include as many relevant variables as possible in the models, many more could help us better understand how online crowdfunding campaigns work. In further studies, it would be beneficial to pay even more attention to the Facebook pages of campaigns and focus on other, in some cases perhaps more widespread, social networks today, such as Instagram, TikTok or Twitter. It would also be interesting to study whether the frequency of contributions is constant throughout the campaign on social media or whether changes occur as the end of the campaign approaches.

It would also be worth considering investigating whether synchronised publication of updates on the crowdfunding platform and on social networks has any effect on success.

Like most scientific work, this paper focuses on what happens during the campaign implementation phase. However, it could be interesting to examine the events after the end of the campaign, as at this stage, supporters have the highest expectations and campaign creators are expected to meet their social responsibilities. An analysis of the supporter-campaign creator relationship would be beneficial, as the interaction of campaign creators with their donor audience may well be the key to other successful projects or collaborations.

The analysis performed in this work provides the reader with a view only on projects published on the most significant Czech reward-based crowdfunding platform, Hithit. In addition to this would also be interesting to analyse other operators operating in both Slovakia and the Czech Republic. By comparing the results of these analyses, it would be possible to form a better picture of the use of the remuneration crowdfunding model and the effectiveness and use of the crowdfunding intermediaries themselves.

The pandemic associated with the spread of COVID-19 has also led to a boom in crowdfunding, as a new category of Antivir has been created on the Hithit platform. Since its launch in 2020, 183 projects have been published, with more than 50% of them (92) successfully funded. For this reason, it would be interesting to shift the focus from campaign creators to those who support them. Understanding the motivation and identifying the incentives contribute to the decision of whether to donate funds would be in the interests of all those seeking collective funding, in whatever form.

CONCLUSION

Reward-based crowdfunding is an innovative way of financing that allows individuals or companies to raise the funds needed to implement their project ideas. This work analyses 3,667 project campaigns published on the most prominent Czech crowdfunding platform, Hithit. The data set represents all published projects from the platform's launch in 2012 to March 2021. The main goal of the work was to determine which variables significantly impacted the campaign's success.

Because several explanatory variables had to be considered, this work uses a logistic regression model. Based on the estimated results of the analysis, it is possible to transform significant findings into general recommendations for future creators of crowdfunding campaigns.

The regression analysis showed that the result of the campaign affects the number of fans on the Facebook pages of the campaigns. This finding aligns with previous findings of crowdfunding researchers perceived by supporters/fans on social networks of campaigns as the equivalent of the usual fundraising from family and friends. It has also been shown that including video in a campaign positively affects its success. The campaign's success significantly and negatively depends on the set financial goal of the campaign, thus the higher the goal, the lower the chance of success. This finding is also in line with previous findings of crowdfunding researchers. Project creators should thus focus on adequately setting the financial goal of the project and on including video in the campaign, as well as paying sufficient attention to the presentation of their idea on social networks since the interaction with supporters of their ideas is important, as they are likely to be an initial source of significant funding for other projects.

The above findings also suggest that there may be other factors that significantly affect the success of a crowdfunding campaign. For example, the model estimated here did not include information about other social networks or information about the funders of campaigns.

Overall, findings can serve as a basis for further research focusing on both crowdfunding based on reward and the use of this method of financing in the conditions of Slovakia and the Czech Republic. It might also make sense to focus on researching the activities of campaign creators on other social networks or watching what happens after the campaign ends.

REFERENCES

ALDRICH, J. H., & NELSON, F. D. (1984). *Linear Probability, Logit, and Probit models*. Iowa: Sage Publications.

ALEKSINA, A., AKULENKA, S., & LUBLÓY, Á. (2019). Success factors of crowdfunding campaigns in medical research: perceptions and reality. *Drug Discovery Today, 4*(7), 1413-1420. https://doi.org/10.1016/j.drudis.2019.05.012

BYRNES, J. E. K., RANGANATHAN, J., WALKER, B. L. E., & FAULKES, Z. (2014). To Crowdfund Research, Scientists Must Build an Audience for Their Work. *PLoS ONE* 9(12), Art. No. e110329. https://doi.org/10.1371/journal.pone.0110329

CAMBRIDGE CENTRE FOR ALTERNATIVE FINANCE. (2020). The Global Alternative Finance Market Benchmarking Report: Trends, Opportunities and Challenges for Lending, Equity, and Non-Investment Alternative Finance Models Judge Business School, University of Cambridge. https://www.jbs.cam.ac.uk/wp-content/uploads/2020/08/2020-04-22-ccaf-global-alternative-finance-market-benchmarking-report.pdf

CAMBRIDGE CENTRE FOR ALTERNATIVE FINANCE. (2021). The 2nd Global Alternative Finance Market Benchmarking Report - Trends, Opportunities and Challenges for Lending, Equity, and Non-Investment Alternative Finance Models. Judge Business School, University of Cambridge.https://www.jbs.cam.ac.uk/wp-content/uploads/2021/06/ccaf-2021-06-report-2nd-global-alternative-finance-benchmarking-study-report.pdf

CHERVYAKOV, D., & ROCHOLL, J. (2019). How to make crowdfunding work in Europe? [Research Report]. Bruegel Policy Contribution, No. 2019/6, Bruegel, Brussels. https://www.econstor.eu/bitstream/10419/208041/1/166885452X.pdf

CREATIVE INDUSTRY FORUM (2018). CF platformy. https://crowdfunding.ciforum.sk/platforms.

DI PIETRO, F., & BUTTICÈ, V. (2020). Institutional characteristics and the development of crowdfunding across countries. *International Review of Financial Analysis, 71*. Article 101543. https://doi.org/10.1016/j.irfa.2020.101543

ELEXA, Ľ., HVOLKOVÁ, L., KLEMENT, L., KLEMENTOVÁ, V., KOVAĽOVÁ, M., & ELEXOVÁ, Ľ. (2018). Crowdfunding campaigns in smallscale economy and determinants of their success. *International Journal for Quality Research*, *13*(2), 433 - 450. https://doi.org/10.24874/IJQR13.02-12

EUROPEAN COMMISSION. (2016). Capital Markets Union: Commission Supports Crowdfunding as Alternative Source of Finance for Europe's Start-Ups. https://ec.europa.eu/commission/presscorner/detail/en/IP_16_1647

EUROPEAN COMMISSION. (2016). Crowdfunding in the EU Capital Markets Union. https://ec.europa.eu/info/sites/info/files/crowdfunding-report-03052016_en.pdf

EUROPEAN COMMISSION. (2019). Capital Markets Union and Fintech: Commission welcomes political agreement to boost crowdfunding in the EU. https://ec.europa.eu/commission/presscorner/detail/en/IP_16_1647

FCA. (2020). Crowdfunding. London: Financial Conduct Authority, 2020. https://www.fca.org.uk/consumers/crowdfunding#revisions

FINLORD. (2019). P2P in the Czech Republic: A large comparison of Czech P2P platforms. https://finlord.cz/2019/04/p2p-cr-velke-srovnani-ceskych-p2p-platforem/

GPFI. (2016). Global Standard-Setting Bodies and Financial Inclusion: The Evolving Landscape. Global Partnership for Financial Inclusion. http://www.gpfi.org/sites/gpfi/files/documents/GPFI_WhitePaper_Mar2016.pdf

GUAN, X., DENG, W.-J., JIANG, Z.-Z., & HUANG, M. (2020). Pricing and advertising for reward-based crowdfunding products in E-commerce. *Decision Support Systems, 131*. Article 113231. https://doi.org/10.1016/j.dss.2019.113231

HITHIT (2021). What is Hithit. Retrieved: March 2021: https://www.hithit.com/sk/article/whatIsHithit

INTERREG CENTRAL EUROPE (2019 a). Find the best platform for your campaign! Country Slovakia. https://www.crowdcreator.eu/platform-search/?_country=158

INTERREG CENTRAL EUROPE (2019 b). Find the best platform for your campaign! Country Czech Republic. https://www.crowdcreator.eu/platform-search/?_country=154

JENIK, I., LYMAN, T., & NAVA, A. (2017). *Crowdfunding and Financial Inclusion*. [Working Paper:]. Washington: Consultative Group to Assist the Poorest. https://www.cgap.org/sites/default/files/Working-Paper-Crowdfunding-and-Financial-Inclusion-Mar-2017.pdf

KAUR, H., & GERA, J. (2017). Effect of Social Media Connectivity on Success of Crowdfunding Campaigns. *Procedia Computer Science*, *122*, 767-774. https://doi.org/10.1016/j.procs.2017.11.435

KIRBY, E., & S. WORNER. (2014). CrowdFunding: An Infant Industry Growing Fast. [Working Paper]. IOSCO Research Department. https://www.iosco.org/research/pdf/swp/Crowd-funding-An-Infant-Industry-Growing-Fast.pdf

KROMIDHA, E., & ROBSON, P. (2016). Social identity and signalling success factors in online crowdfunding. *Entrepreneurship & Regional Development*, *28*(9-10), 605–629. https://doi.org/10.1080/08985626.2016.1198425

LUKKARINEN, A., TEICH, J. E., WALLENIUS, H., & WALLENIUS, J. (2016). Success drivers of online equity crowdfunding campaigns. *Decision Support Systems, 87*(3), 26–38. https://doi.org/10.1016/j.dss.2016.04.006

MOLLICK, E. (2014). The dynamics of crowdfunding: An exploratory study. *Journal of Business Venturing, 29*(1), 1-16. https://doi.org/10.1016/j.jbusvent.2013.06.005

SEC. (2019). Spotlight on Crowdfunding. U.S. Securities and Exchange Commission. https://www.sec.gov/spotlight/crowdfunding.shtml

SHNEOR, R., & VIK, A. A. (2020). Crowdfunding success: A systematic literature review 2010-2017. *Baltic Journal of Management*, 15(2), 149-182. https://doi.org/10.1108/BJM-04-2019-0148

ŠOLTÉS, M. & ŠTOFA, T. (2016). Crowdfunding – The case of Slovakia and the Czech Republic. *Quality Innovation Prosperity, 20*(2), 89-104. https://doi.org/10.12776/qip.v20i2.807

SONG, Y., BERGER, R., YOSIPOF, A., & BARNES, B. R. (2019). Mining and investigating the factors influencing crowdfunding success. *Technological Forecasting and Social Change, 148.* Article 119723. https://doi.org/10.1016/j.techfore.2019.119723

STATISTICS SOLUTIONS. (2021). Assumptions of Logistic Regression. https://www.statisticssolutions.com/assumptions-of-logistic-regression/

STOLTZFUS, J. C. (2011). Logistic Regression: A Brief Primer. *Academic Emergency Medicine, 18*(10)*,* 1099-1104. https://doi.org/10.1111/j.1553-2712.2011.01185.x

TERRY, H., D. SCHWARTZ, T., & SUN, T. (2015). *The Future of Finance, Part 3: The Socialization of Finance*. New York: Goldman Sachs.

THAPA, N. (2020). Being cognizant of the amount of information: Curvilinear relationship between total-information and funding-success of crowdfunding campaigns. *Journal of Business Venturing Insights, 14,* Article e00195. https://doi.org/10.1016/j.jbvi.2020.e00195.

WOOLDRIDGE, J. M. (2012). *Introductory Econometrics: A Modern Approach* (5th ed.). Mason: South-Western Cengage Learning.

WORLD BANK. (2013). Crowdfunding's Potential for the Developing World. http://www.infodev.org/infodev-files/wb_crowdfundingreport-v12.pdf

ZAGGL, M. A., & BLOCK, J. (2019). Do small funding amounts lead to reverse herding? A field experiment in reward-based crowdfunding. *Journal of Business Venturing Insights*, *12.* Article e00139. https://doi.org/10.1016/j.jbvi.2019.e00139

ZHAO, Y., HARRIS, P., & LAM, W. (2019). Crowdfunding industry—History, development, policies, and potential issues. *Journal of Public Affairs*, *19.* Article e1921. https://doi.org/10.1002/pa.1921

Acknowledgment

The paper is published within the project VEGA 1/0873/21.

Appendices

Appendix A. Key variables used in regression analysis

Variable	Description of the variable	Source
Updates	The number of announcements campaign creators add to a project during an ongoing campaign on the Hithit platform.	Hithit platform
Contributors	The number of contributors who decided to support the project during the campaign.	Hithit platform
Comments	The number of comments on the project from project supporters on the Hithit platform.	Hithit platform
Target Set	The financial objective of the campaign (in EUR) that needs to be raised for a project to be considered successful.	Hithit platform
Category	A group of variables corresponding to the classification of a project into a specific category on the Hithit platform. Each project falls into one of the following categories: Music, Literature, Community, Arts, Education, Film, Sports, Food, Design, Technology, Theatre, Fashion, Photography, Impact Hub, Games, Dance, Media, Ecology, Summer School, and Vodafone Foundation Note: Since 2020, during the pandemic associated with the new coronavirus (COVID-19) and the abovementioned categories, it is also possible to include the project in the Antivir category.	Hithit platform
Country	A categorical variable corresponding to the classification of the project into a particular geographical area, with the following four categories of variable: Czech Republic, Slovakia, Other and Unclassified.	Hithit platform
Number of reward options	The number of reward options that campaign creators offer in exchange for donations to the campaign. Each donor will choose one of these rewards when making a financial contribution, which will only be delivered to him/her if the campaign is successful.	Hithit platform

Video	A binary variable representing the value 1 (TRUE) if the project has a video published on the Hithit platform, otherwise 0 (FALSE).	Hithit platform
Number of photos	The number of photos published for the project on the Hithit platform.	Hithit platform
Min	The minimum amount of a one-time contribution to the campaign.	Hithit platform
Max	The maximum amount of a one-time contribution to the campaign.	Hithit platform
Links	A binary variable that is TRUE if the project on the Hithit portal contains links to either the project/project creator's website or the project/project creator's social media page, otherwise FALSE.	Hithit platform
Year	A number that reflects the calendar year the project was published on the Hithit portal.	Hithit platform
Words in name	The number of words that make up the name of the campaign.	Hithit platform
Words in text	The number of words in the campaign description.	Hithit platform
Number of attempts	The number of times campaign creators launched a campaign on the Hithit platform.	Hithit platform
Fans	The number of registered users of the Facebook social network that liked the campaign's Facebook page.	Facebook

Source: authors' processing

Appendix B. Detailed results of logistic regression

Variable		**β coefficient (significance level)**	**Standard errors**	**Ratio of chances**
Updates		0.1100 (****)	0.0261	1.1163
Contributors		0.0777 (****)	0.0032	1.0808
Comments		-0.0752	0.0479	0.9275
Target Set		-2.8830 (****)	0.1634	0.0559
Category	**Theatre**	1.0730 (**)	0.4758	2.9232
	Design	0.3741	0.5257	1.4537
	Ecology	0.6090	0.7586	1.8387
	Film	0.6235	0.4214	1.8654
	Photography	-2.5700	3.4520	0.0765
	Games	0.0068	0.7797	1.0068
	Music	0.9385 (***)	0.3611	2.5561
	Impact Hub	-0.6622	1.2200	0.5157
	Food	-0.9832	0.6024	0.3741
	Community	0.4194	0.3753	1.5211
	Summer School	-0.6610	3.8080	0.5163
	Literature	0.6112	0.3869	1.8426
	Media	-0.4595	1.1570	0.6316
	Fashion	0.8933	0.9750	2.4431
	Vodafone Foundation	-0.1059	2.0190	0.8995
	Sports	0.9613 (**)	0.4294	2.6152
	Dance	0.3133	1.3140	1.0318
	Technology	1.2440 (**)	0.5176	3.4708
	Arts	0.6790 (*)	0.3815	1.9720

	Education	1.2800 (**)	0.5174	3.5980
Country	**Other**	0.2816	0.3999	1.3252
	Unclassified	0.0011	0.1780	1.0115
	Slovakia	0.6697 (*)	0.3803	1.9536
Number of reward options		-0.0253 (*)	0.0143	0.9750
Video		0.5107 (***)	0.1801	1.6665
Number of photos		0.0187	0.0133	1.0189
Min		0.0254	0.0246	1.0257
Max		0.0013 (****)	0.0003	1.0013
Links		-0.5024	0.4179	0.6051
Year		0.0077	0.0356	1.0077
Words in name		0.0178	0.0301	1.0180
Words in text		-0.0005 (*)	0.0003	0.9995
Number of attempts		0.1309	0.1180	1.1399
Fans		-0.00002306 (***)	0.000008107	0.9999

Note: Significance codes marked as (*), (**), (***) and (****) correspond to significance levels $p < 0.1$; $p < 0.05$; $p < 0.01$ a $p < 0.001$. Source: authors' processing

Appendix C. Results of multicollinearity test for main logit model

Variable	**GVIF**	**Df**	**GVIF$^{(1/(2*Df))}$**
Updates	1.0369	1	1.0183
Contributors	1.1564	1	1.0753
Comments	1.8890	1	1.3744
Target Set	1.1281	1	1.0621
Category	1.9682	20	1.4029
Country	2.5760	3	1.0239
Number of reward options	1.2383	1	1.0363
Video	1.4528	1	1.2053
Number of photos	1.1852	1	1.0886
Min	1.1784	1	1.0855
Max	1.1608	1	1.0774
Links	1.3208	1	1.1493
Year	1.0768	1	1.0377
Words in name	1.3842	1	1.1765
Words in text	1.0881	1	1.0431
Number of attempts	1.2669	1	1.1255
Fans	1.0395	1	1.0195

Source: authors' processing

Appendix D. Detailed results of logistic regression for campaigns with Facebook pages

Variable	**β coefficient (significance level)**	**Standard errors**	**Ratio of chances**
Intercept	17.5300 (****)	1.675	41037629.65
Updates	0.1268 (***)	0.04273	1.1352
Contributors	0.07632 (****)	0.004481	1.0793
Target Set	-2.8590 (****)	0.2368	0.0573

Category	**Theatre**	1.5530 (**)	0.6742	4.7256
	Music	1.2980 (**)	0.5239	3.6620
	Sports	1.4630 (**)	0.6438	4.3189
	Technology	1.5170 (*)	0.7740	4.5585
	Education	1.5080 (**)	0.6838	4.5177
Number of reward options		-0.0577 (***)	0.01959	0.9439
Number of photos		0.0411 (**)	0.01954	1.0420
Max		0.0014 (****)	0.0004028	1.0014
Fans		-0.00002308 (***)	0.000008312	0.9999769

Note: Significance codes marked as (*), (**), (***) and (****) correspond to significance levels $p < 0.1$; $p < 0.05$; $p < 0.01$ a $p < 0.001$. Source: authors' processing

Continuous Intention to Use Mobile Banking Apps: Empirical Study in Iraq

AL LAHEEBI GHAYTH ALI JARAD
PH.D. CANDIDATE
UNIVERSITY OF MISKOLC
e-mail: Write2ghayth@gmail.com

SUMMARY

Mobile banking on applications is increasingly becoming an effective channel in the development of banking services. The increase in smartphone penetration globally and customers spending more time on business applications raise questions for bank managers on how to entice customers to continue using mobile banking applications. This study examines factors influencing the continuous intention to use mobile banking applications by combining, the technology acceptance model TAM model and trust factor. Research indicates that perceived usefulness and trust directly influence continuous intention to use mobile banking apps, while perceived ease-of-use and perceived risk indirectly influence continuance *intention to use mobile banking apps through the trust factor. the moderating effect of demographics factors found that higher age will negatively affect the relationship between trust and* continuous *intention to use mobile banking apps.*

Keywords: Technology acceptance model (TAM); Mobile banking; Iraq
Journal of Economic Literature (JEL) codes: O10; G20; G29
DOI: http://doi.org/10.18096/TMP.2022.01.05

INTRODUCTION

Consumer demand for Internet banking solutions has risen in recent years (Ezzi 2014), banks have endeavoured to facilitate bank transfers and to provide a measure of safety to deliver these services to customers through the latest means and methods. The development in the provision of financial services over the internet and smartphones led to a drop in the demand for old traditional methods in developed countries (Murinde et al.).

Mobile banking applications on smartphones have become a necessary and integral banking channel that empower clients to carry out monetary exchanges such as balance inquiries, financial transactions, paying loan instalments utilising smartphones, tablets, or other personal digital assistants (Alalwan et al. 2016). The penetration of smartphones and wearable devices plays a critical role in banking services that will less depend on traditional banking and allow clients to be able to conduct their financial transactions anytime and anywhere (Mullan et al. 2017). According to one source of mobile banking statistics, about three quarters of the UK population use mobile devices to manage their finances (Perić 2022). Especially during the period of the Covid-19 pandemic, people tend to spend more time using mobile devices and mobile applications (Santamaria, et al. 2020).

Most studies in field of mobile banking adoption have only focused on the behaviour intention to adopt mobile banking services (Phan 2020). However, there is much less information about which factors influence the customers' behaviour in the post-adoption stage of mobile banking services. Studies on continuous behaviour in using information systems are as important as the initial use, and even more beneficial in terms of cost to acquire new customers (Bhattacherjee 2001). Understanding customer's behaviour toward continuous usage of a technology was always of interest to researchers and industry, and several studies have been presented in this topic, some of which adopt the technology acceptance model (TAM) expectation-confirmation model, and others used different models.

Susanto et al. (2016) extended the expectation-confirmation model (ECM) to investigate the determinants of continuance intention to use banking services on smartphones. The study revealed that user satisfaction, perceived usefulness and self-efficacy have a significant impact on continuance intention to use services. The study highlighted the role of trust in customer relationships and suggests

that customers have more concerns about security and privacy when using mobile banking services on smartphones. In a study on a mobile fintech payment services in Korea, Lim et al. (2018) combined the expectation-confirmation model with additional factors such as fintech knowledge and perceived security and found that among studied variables only perceived usefulness PU and satisfaction have a direct influence on continious intention to use. A study conducted by Albashrawi & Motiwalla (2019) found that perceived usefulness and perceived ease-of-use had significantly positive impacts on the satisfaction of mobile banking customers, and that satisfaction would influence the continued usage of mobile banking services. This study also highlighted that only perceived ease-of-use and personalization directly impact on continued usage of mobile banking.

However, these findings of these previous studies are not consistent and need more evidence. Moreover, most previously published studies are limited to developed countries with strong IT capabilities. Therefore, there is a lack of research in developing countries such as Iraq; there is still a knowledge gap that needs to be narrowed. To achieve this purpose, this study investigates the proposed model based on TAM theory and the factor of trust. The objective of this paper is to evaluate the integrated TAM model and trust in continuous intention to use MB in Iraq. Firstly, this study begins with a brief introduction to mobile banking. In the second section, a literature review about the continuous intention to use MB and the proposed model is provided. The third section is concerned with the methodology used for this study and the fourth section presents the main findings. The last three sections include discussion, contributions, limitations, and conclusion.

LITERATURE REVIEW

Continuous intention to use mobile banking

Mobile banking adoption has been conducted by many previous studies. By applying the established theories such as the technology acceptance model (TAM), the unified theory of acceptance and use of technology (UTAUT), the Task-Technology Fit (TTF), The theory of planned behavior TPB, factors found to be influencing the intended use of mobile banking have been explored in several studies. So far, however, there has been little discussion about which factors influence the decision to continue using MB applications. Recently, some researchers have suggested using the expectation-confirmation theory and extended post-acceptance model to provide a comprehensive understanding of which factors affect the decision to continue using mobile services (Al-Emran et al. 2020; Lim et al. 2018; Susanto et al. 2016). The ECM model is built on expectation-confirmation theory (ECT) (Oliver 1980), which is further refined using auxiliary theories and empirical findings from prior information systems (IS) use research. To explain IS use behaviour in the post-acceptance context, Bhattacherjee (2001) developed the ECT and concluded that perceived usefulness and confirmation are the most important factors influencing users' satisfaction in using IS. Thus, satisfaction directly impacts the continuance of the intention to use. Susanto et al. (2016) extended the expectation-confirmation model (ECM) to investigate the determinants of continuous intention to use banking services on smartphones. The study revealed that user satisfaction, perceived usefulness and self-efficacy have a significant impact on continuous intention to use. The study highlighted the role of trust in customer relationships and suggests that customers would have more concern about security and privacy when using mobile banking services on smartphones.

Technology acceptance model (TAM)is the most-used model in the study of the adoption of new technology. In the TAM model, it was agreed that continuous usage covaries with the acceptance for the use of new technology (Davis et al. 1989). Some previous studies have confirmed the impact of factors in TAM affecting continuous decisions. In TAM there are two factors perceived usefulness PU and perceived ease of use PEOU. Although the effect of PU on the decision to use both pre-adoption and post-adoption stage is consistent, the concern about the impact of PEOU might be removed from those of experienced users in using new technology (Karahanna et al. 1999). In the context of the current fast-changing digital era, however, firms often upgrade their information systems and update new features into applications, so it is suggested by (Sarkam & Jamil, 2022) that perceived ease-of-use would influence the decision to continue using one mobile application. Recently, in a study on the continued use of mobile learning technology, Al-Emran et al. (2020) found that PEOU has a direct impact on users' decision to continue using it. The TAM theory provides a useful account of how to explain the behaviour of customers toward IT innovations (Albashrawi & Motiwalla 2017). A few studies have begun to extend the TAM model to explain the post-adoption behaviour stage. Al-Emran et al. (2020) combined TAM, TPB, and ECM to explain the continued use of mobile learning in the United Arab Emirates.

Trust is considered to be the most important factor when explaining mobile banking adoption (Kim et al. 2009). Conducting a financial transaction on mobile financial service involving value and intangibility that are often riskier and more uncertain so building customers' trust is more important to the success of mobile services (Kim et al. 2009). Many

previous studies have identified the impact of trust on mobile banking services (Hanafizadeh et al. 2014). It must be said that the category of trust previously mentioned is often quite broad and the notion of trust is also different. According to Hanafizadeh et al. (2014), the trust of customers in planning to use mobile banking has three parts: trust in the service provider bank, trust in the cell-phone producer, and trust in telecommunication providers. These are also the three main players involved in the mobile banking service. Among these trusts, trust in banking service providers is the strongest indicator of trust.

For services using new technology, the initial trust of customers which refers to a kind of trust created from lack of trying or previous experiences plays a vital role (McKnight et al. 1998). This means that after a period of using MB apps, customers' trust is formed, including trusting that legal and technological structures adequately protect customers from problems on mobile banking, trusting that the mobile app is reliable, trusting that in the mobile banking app banks will maintain the same terms and commitments they made for other means of service . The evidence presented in this section suggests that a combination of TAM theory and trust can provide more important insights into explaining customers' behaviour in the post-adoption stage of mobile banking services. This paper will use the definition of "continuous intention to use mobile banking applications" suggested by Lim et al. (2018) who saw it as the phenomenon that "consumers who have the experience to use a mobile Fintech service intend to continuously use the mobile Fintech service". Table1 includes details about recent studies on continuous intention to use mobile applications

Table 1
Recent studies on continuous intention to use mobile applications

Author	Subject	Theory	R^2 (continuous intention to use mobile services)	Findings (on continuous intention to use)	Countries
Lim et al. (2018)	Mobile payment	Extended post acceptance model	0.61	PU and satisfaction significant impact on continuous intention to use mobile payment.	Korea
Al-Emran et al. (2020)	Mobile learning	TAM, ECM, TBP	0.703	PEOU, AT, PBC, SN significant impact on continuous intention to use m-learning	UAE
Jamshidi et al. (2018)	Mobile banking	Flow experiences	0.59	Flow, trust, individual mobility, brand equity positive affect continuous intention to use Mobile banking.	Iran
Albashrawi & Motiwalla (2017)	Mobile banking	TAM, privacy, personalization	0.459	PU, privacy, and satisfaction have insignificant impact on continuous usage of MB. PEOU and personalization impact directly on continuous usage of MB.	US
Yang et al. (2015)	Mobile banking	Task-Technology Fit & User Context Fit	0.523	TTF, UCF, perceived utilitarian value, perceived hedonic value have significant impact on mobile channel continuance.	China
Susanto et al. (2016)	Mobile banking	Extended expectation-confirmation model (ECM)	0.722	Satisfaction, PU, self-efficacy positively affect continuance use intention of MB. trust has no impact on continuous intention to use.	Korea

Source: AT, Attitude; ECM, extended expectation confirmation; PU, perceived usefulness; Perceive behaviour control PBC; PEOU, perceived ease of use; Subjective norms SN; TAM, technology acceptance model; TTF, task-technology fit; TPB, theory of planed behaviour

Research model and hypotheses

In our study, the TAM model and trust were expanded with a combination of a situational context: perceived risk and perceived cost. The study will assess the impact of factors of extended TAM and trust on continuous intention to use MB.Perceived ease of use (PEOU) According to TAM, PU and PEOU are the most important constructs influencing pre-adoption decision from

new technology users. Davis (1989) uses the term *perceived ease of use* to refer to the extent to which a person believes that using MB applications is effortless and uncomplicated. Previous research has established that PEOU did not directly impact behaviour intention to use mobile banking services, but did so indirectly through facilitating the relationship between PU and the intention. These findings refer to that banking users are willing to use MB services when they perceive that the ease of use or simply using them will contribute to improving their working performance and save time on conducting financial transactions (Alalwan et al. 2016; Luarn & Lin 2005; Makanyeza 2017). Drawing on the post-adoption stage, Karahanna et al. (1999) highlighted the diminishing impact of perceived ease of use when users become more familiar with an IT system. In case customers have previous experience in using banking services via telephone or the internet, the influence of PEOU will be no longer significant. However, in Iraq, it is different from other countries While in other countries internet banking has usually been introduced before mobile banking, this is not the case in Iraq, therefore, users' experience with online banking is somewhat limited. Furthermore, in a previous study on mobile learning, PEOU was found to have a direct impact on the continued use of mobile learning (Al-Emran et al. 2020). At the same time, the ease of understanding and the clarity in MB apps will reduce customers' concerns and improve confidence in the continuous use of MB. Previously, perceived ease of use has also been used to explain the trust in the mobile system (Kumar et al. 2018; Nel & Boshoff 2017).

Therefore, we hypothesise that:

H1: PEOU has a positive significant influence on PU

H2: PEOU has a positive significant influence on trust

H3: PEOU significantly influences continual intention to use MB app.

Perceived usefulness refers to the degree to which an individual believes that his or her job performance would be improved by using a particular system. Thus far, several studies have found evidence that perceived usefulness was the most influential factor impacting behaviour and intention to use/adopt mobile banking (Alalwan et al. 2016; Hanafizadeh et al. 2014; Shaikh & Karjaluoto 2014; Tran & Corner 2016). In some studies of IS continuance use, Lim et al. (2018) and Venkatesh et al. (2011) highlighted that perceived usefulness has become so important that it explains user behaviour in the post-using stage. Lim et al. (2018) suggested that service providers should be aware that customers have the continuous intention to use MB services provided that they confirm their security perceptions in terms of service, platform, network, and devices and the services that are useful and finally, they are satisfied with the services. Susanto et al. (2016) confirmed that PU plays an important role in using mobile banking services on smartphones. Chen & Li (2017) found that perceived usefulness after adoption has a significant impact on continuous intention to use mobile payment services. Moreover, Suh & Han (2002) found that perceived usefulness has a significant impact on trust in the acceptance stage of internet banking. Likewise, Afshan & Sharif (2016), Kumar et al. (2018), and Sarkar et al (2020) hold the view that the perception of mobile service users toward usefulness has a positive correlation with trust. Similarly, in context of mobile banking services, using the TAM model, Afshan & Sharif (2016) affirmed that both PU and PEOU have a significant impact on the trust of customers.

Therefore, we hypothesise that:

H4: Perceived usefulness has a positive effect on continuous intention to use

H5: Perceived usefulness positively affects trust

H6: Perceived usefulness has a significant influence pn the relationship between PEOU and continuous intention to use MB apps.

Perceived risk refers to the degree of probability that there is a loss incurred from using innovative technology (Pavlou 2001). Because banking transactions on mobile devices have special features such as intangibility and value, customers' concerns are considered one of the key obstacles in deciding to use mobile banking applications (Hanafizadeh et al. 2014; Devaraj et al. 2002). Susanto et al. (2016) have revealed that risk, privacy, and security are the key concerns of trust. If the perceived risk of customers using the mobile banking application is greater, the trust of customers in that application would decrease, and then the intention to continue using the application in the future would decrease (Hanafizadeh et al. 2014). Sarkar et al. (2020) found that perceived risk has a significantly negative effect on trust in using mobile commerce.

Therefore, we hypothesise that:

H7: Perceived risk negatively affects trust

Perceived costs refer to the customer believing that using online banking will require some amount of money (Luarn & Lin 2005). For mobile services, the costs of using the service often negatively impact the use of that service (Wu & Wang 2005). When using mobile banking on smartphones, bank customers must pay fees such as a one-time set-up fee, maintenance fee, and service fees for some transactions on smartphones. Martin (2003) argued that the fees associated with these ITC services create barriers to using banking services for low-income people. Yu (2012) affirmed that the cost of using mobile banking services is one of the most important barriers affecting customers' behavioural intention toward using mobile banking.

Therefore, we hypothesise that:

H8: Perceived cost(PCO) negatively affects continuous intention to use MB app.

Trust has been considered as one of the most important barriers to the adoption of mobile services (Jamshidi et al. 2018). A number of studies have examined the effects of trust on intention behavior in using mobile banking (Hanafizadeh et al. 2014). However, the definitions of trust vary among studies. McKnight et al. (2002) noted that there are four constructs of trust, including disposition to trust, institution-based trust, trusting beliefs, and trusting intentions. Other researchers, however, found that three inherent building factors of trustworthiness should be taken into consideration, namely: the trustee's ability, benevolence, integrity (Luarn and Lin 2005). Therefore, the definition of trust should be based on the type of service and the relationship. In our research, trust in mobile banking refers to a customer's belief that banks would have enough capability to be trusted (Das & Teng 2001). Wang & Lin (2017) found that perceived trust has a positive influence on continual intention to use an IS. Previous research has revealed that trust is a critical factor impact on continual intention to use mobile commerce (Chong 2013). When bank customers perceive that mobile banking providers have enough abilities to assure customers' interests and performance meet customers' expectations, then customers intend to continue using mobile banking apps.

Therefore, we hypothesise that:

H9: trust positively affects continuous intention to use MB apps

H10: trust significantly influences the relationship between PU and continuous intention to use MB apps.

H11: trust significantly influences the relationship between PEOU and continuous intention to use MB apps.

H12: trust significant influence the relationship between PR and continuous intention to use MB apps.

Moderating variable: Age

In a study investigating the mobile banking adoption in Taiwan, Yu (2012) found that age has significant moderating effects between facilitating conditions and perceived self-efficacy on customers' behaviour in adopting mobile banking. Similarly, Chiu et al. (2017) and Laukkanen (2016) concluded that age has been considered as one of the most significant demographic variables in context of internet/mobile banking services. This result can be explained by the fact that older customers tend to be more resistant to using mobile banking services (Laukkanen 2007, 2016). Moreover, in a study conducted by (Laukkanen & Pasanen 2008), it was shown that the proportion of customers aged 30 to 49 was (much) larger than the younger group of customers in using mobile banking services.

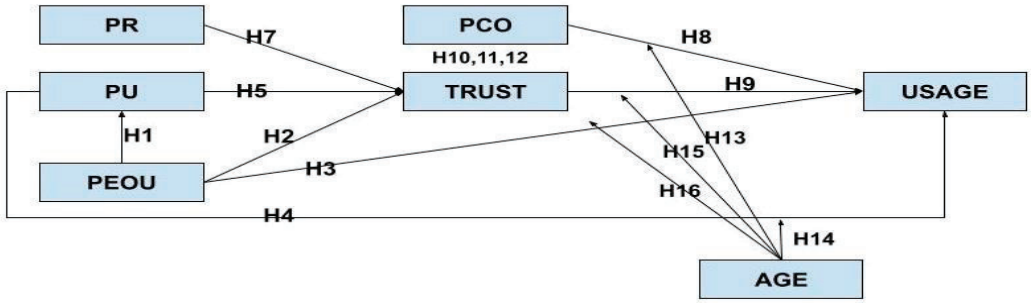
Therefore, we hypothesis that:

H13: The influence of PCO on continuous intention to use MB apps will be moderated by age.

H14: The influence of PEOU on continuous intention to use MB apps will be moderated by age.

H15: The influence of perceived usefulness PU on continual intention to use MB apps will be moderated by age.

H16: The influence of trust TRU on continuous intention to use MB apps will be moderated by age.



Source: own work

Figure 1. Research model

RESEARCH METHODOLOGY

An online survey questionnaire was used to collect the data. The questionnaire was distributed through social media networks and by email. A random sampling method was used. We asked the participants whether they are using mobile banking applications, then only MB application customers moved to the next stage which required to answer all the questions. As a result, after screening and removing duplicated cases or unintentional responses there were 188 valid cases for the analysis. The structure of studied questionnaire was divided

into two parts: basic demographic information and perception. The descriptive analysis shows that 60% are males while the rest are females. Manyof the respondents are aged between 20-40. Just a half of participants are employees and 11% is unemployed, while the others are students or retired. All of the respondents are smartphone users, 60% of them use mobile banking services once a month or less frequently, while 40 percent are weekly or daily users (more details from Table 2). In the second part, all participants were asked to respond using a 5-point Likert scale ranging from 1 to 5.

Table 2
Descriptive data

Category		Number of respondents	Percentage
Gender	Male	113	60%
	Female	75	40%
Age	Less than 20-year-old	16	8.5%
	20-30 years old	70	37.2%
	30-40 years old	70	37.2%
	40-50 years old	26	13.8%
	Above 50 years old	6	3.3%
Occupation	Student	54	28.7%
	Employed	110	58.5%
	Unemployed	21	11.1%
	Retired	3	1.7%
Education	High school	21	11.1%
	Diplomat	9	4.8%
	Bachelor's degree	64	34%
	Master's degree	74	39.4%
	Ph.D. Degree	20	10.7%
What kind of devices do you have?	Smartphone	188	100%
	Tablet	30	16%
	Smartwatch	9	4.8%
How often do you use mobile banking?	Daily	40	21.3%
	Weekly	32	17%
	Monthly	56	29.7%
	Less frequently	60	32%

Source: own work

RESULTS

Measurement model

The data management and analysis were performed using SmartPLS 3 (Ringle et al. 2015). A major advantage of SmartPLS 3 is that this software is useful in analysing variance-based structural equation modelling instead of a covariance-based SEM method.

For assessing the quality of the measurement model, firstly, examining construct reliability, convergent validity, and discriminant validity was performed. To begin this process, the reliability was calculated using the composite reliability, average variance extracted, and Cronbach's alpha. The value for composite reliability ranged between 0.814 and 0.889 which far exceeded the minimum level of 0.7 (Hair et al. 2013). The average variance extracted were greater than the threshold of 0.7 (Nunnally & Bernstein 1994) and the Cronbach's alpha values were also greater than the cut-off value of 0.7 (Hair et al 2014). Nevertheless, two indicators that had an outer loading below 0.70 (PR2=0.699, EE3<0.5) did not meet this minimum acceptance level. However, instead of automatically eliminating these indicators, we decided to keep PR2 based on the suggestion of Hair et al. (2011, 2014). After removing the item with low Cronbach's alpha value (EE3), all criteria

of reliability were checked again, and we found that all Cronbach's alpha values and composite reliability exceeded the minimum level of 0.7, and the average variance extracted were above the value of 0.5. Therefore, there was no reason for removal item PR2 (Hair et al. 2014). All constructs satisfied the criteria for convergent validity (Chin 1998).

For establishment of the discriminant validity, the cross-loading value of all measurement items and the square root of AVEs were checked. As shown in Table 3, all of the intercorrelations among the items were below the square root of the AVEs (Fornell & Larcker 1981). The results from assessing the measurement model indicated that the measurement model is reliable and valid.

Table 3
Outer loading, Cronbach's alpha, composite reliability, and average variance extracted

Factor	Items	Outer Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
	COST1	0.827			
	COST2	0.702			
	COST3	0.77			
Perceived Cost	COST4	0.849	0.87	0.868	0.623
	PEOU1	0.841			
Perceived ease of use	PEOU2	0.816	0.814	0.814	0.687
	PU1	0.844			
	PU 2	0.754			
	PU 3	0.851			
Perceived usefulness	PU 4	0.815	0.889	0.889	0.667
	PR1	0.797			
	PR2	0.699			
Perceived risk	PR3	0.96	0.861	0.863	0.682
	TRU1	0.824			
	TRU2	0.843			
	TRU3	0.82			
Trust	TRU4	0.732	0.881	0.881	0.65
	USAGE 1	0.769			
	USAGE 2	0.803			
	USAGE 3	0.774			
continuous intention to use	USAGE 4	0.778	0.862	0.862	0.61

Source: own work

Table 4
The correlation of latent variables

	COST	PEOU	PU	PR	Trust	USAGE
COST	**0.789**					
PEOU	0.077	**0.829**				
PU	0.004	0.702	**0.817**			
PR	0.452	-0.042	-0.049	**0.826**		
Trust	-0.281	0.411	0.473	-0.21	**0.806**	
USAGE	-0.126	0.567	0.765	0.001	0.71	**0.781**

(The square root of AVE values is shown on the diagonal and printed in bold)
Source: own work

Structural model

The partial least squared analysis was used to examine the relationship between proposed factors and continuous intention to use mobile banking applications. The tables below provide important insight into customers' behaviour. The striking result in Table 6 shows that for our data PU and trust (TRU) have a significantly positive impact on USAGE. The R^2 value of continuous intention to use (0.742), trust (0.271), and PU (0.493), as shown in Table 6, can be considered to be at moderate level (Hair et al. 2014). This is a rather significant outcome, especially considering that an R^2 level of above 0.2 would be considered high in disciplines like consumer behaviour. The criteria evaluated were the path coefficient and hypothesis testing, which shows the strength of connections between latent constructs of research model. To assess different proposed hypotheses, the bootstrapping process was performed using 5,000 bootstrap samples as recommended by Hair et al. (2014). Thus, an examination of different hypotheses was conducted, focusing on path coefficients and t-values, as well as p-values.

Results of the study shows that for our sample PU is the strongest predictor of continuous intention to use MB apps, followed by trust. The statistical tests for the collected data revealed that there was a significant positive effect of PEOU on PU (β=0.702, ρ<0.01), however, PEOU was shown to have an insignificant positive influence on trust (β=0.152, ρ>0.05) and continuous intention to use (β=-0.01, ρ>0.05); therefore, hypotheses H2 & H3 were rejected. As Table 6 shows, a significant positive influence of PU on both trust (β=0.358, ρ<0.01) and continuous intention to use MB apps (β=0.559, ρ<0.01) was found, which means that hypotheses H4 & H5 were accepted. Perceived risk was found to have a negative and significant influence on trust (β=-0.186, ρ<0.05). However, perceived cost was found to have an insignificant influence on continuous intention to use (β=-0.001, ρ>0.05). Therefore, hypothesis H8 was rejected. Trust has a positive and significantlinfluence on continuous intention to use MB apps (β=0.45, ρ<0.01). Therefore, H9 was accepted.

Using smartPLS, it is not possible to determine the overall fit statistics. Tenenhaus et al. (2014) suggest that the Goodness of Model Fit (GoF) can be more useful for calculating. It was recommended that the Global Goodness of Fit should be higher than the acceptable value of 0.36 (Chen & Sharma, 2015). Based on our results, $GoF=\sqrt{(R^2 * AVE)} = \sqrt{(0.502*0.653)} =0.572$. This technique also has been adopted by Susanto et al. (2016).

Mediating effect:

The analysis of the data shows that PEOU does not have a direct impact on continuous intention to use but has a significant indirect effect through PE. Perceived risk and perceived usefulness are also found to have a significant indirect effect on the dependent variable (continuous intention to use) through influencing trust.

Table 5
Mediating effect results

Hypothesis	Relationship	Mediator	Standardized indirect coefficient	Standard Deviation	t- value	Note
H10	PU -> USAGE	Trust	0.393**	0.088	4.463	accept
H11	PEOU -> USAGE	Trust	0.161**	0.062	2.602	accept
H12	PR -> USAGE	Trust	-0.084*	0.034	2.474	accept

(*p<0.05; **p<0.01; ***p<0.001)
Source: own work

Moderating effect:

The result from our analysis shows that the relationship between trust and continuous intention to use MB apps was moderated by age. This moderating effect is significant and negative, which means that the higher the age group, the lower the impact of trust on continuous intention to use MB apps.

Table 6
Structural model results

Relationship	path coefficient	Standard Deviation	t-value	Note
COST -> USAGE	-0.001	0.059	0.011	reject
PEOU -> PU	**0.702*** **	**0.064**	**11**	**accept**
PEOU -> Trust	0.152	0.12	1.27	reject
PEOU -> USAGE	-0.01	0.108	0.093	reject
PU-> Trust	**0.358****	**0.119**	**3.004**	**accept**
PU -> USAGE	**0.559*** **	**0.112**	**4.992**	**accept**
PR -> Trust	**-0.186***	**0.072**	**2.573**	**accept**
Trust -> USAGE	**0.45*** **	**0.079**	**5.676**	**accept**
R^2=0.742				
Age*COST -> USAGE	0.013	0.049	0.271	reject
Age*PEOU -> USAGE	0.073	0.085	0.858	reject
Age*PU-> USAGE	0.193	0.1	1.937	reject
Age*Trust -> USAGE	**-0.222****	**0.069**	**3.212**	**accept**
Age -> USAGE	0.021	0.057	0.369	reject
R^2=0.796				

(*p<0.05; **p<0.01; ***p<0.001)
Source: own work

DISCUSSION

Little information was found in the literature on the question of what determinants impact on customers' continuous intention to use mobile banking on smartphone. This study set out with the aim of accessing the importance of TAM elements and trust on the decision to continue using mobile banking on smartphones in the context of a developing country. From the results of the partial least square model, the level of R^2 was found to be 74.2%, higher than previously reported levels. For example, in a study on continual intention to use m-learning, Al-Emran et al. (2019) found that the value of R^2 was 70.3%.

the statistical results for the collected data show that PEOU has an insignificant impact on the USAGE. This outcome is contrary to that of Al-Emran et al. (2020), who found a direct impact of PEOU on continuous intention to use mobile learning. However, this finding is in accord with other studies on mobile banking usage (Luarn & Lin 2005; Alalwan et al. 2016; Makanyeza 2017). The results cannot be generalized due to the sample size, yet the sample revealed that most of the studied customers from Iraq already had some knowledge of

using smartphone applications. Besides, the current MB apps are quite simple and do not have many complicated functions. That may be the reason to explain why PEOU has an insignificant effect on USAGE.

The result of this study indicate that perceived ease-of-use has a positive impact on the perceived usefulness. This finding seems to be consistent with other research on mobile payment and mobile banking topics (Luarn & Lin 2005; Alalwan et al. 2016; Makanyeza 2017). Even experienced customers who already have enough knowledge and skills to use mobile banking applications want the app to be easy to use in order to increase their working performance.

These results reveal that the perceived ease of use does not influence trust within the studied sample. This result is not in line with results of previous research, which found a relationship between PEOU and trust (TRU) (Kumar et al. 2018; Nel & Boshoff 2017). A possible explanation for this result may be that from the perception of the customers in this study, the ability to maintain safe transactions on mobile banking applications is not affected by how easy it is to use. This finding is unexpected and suggests that customers with high experience in using mobile applications strongly favour more complicated features to secure safe transactions.

Another important finding was that perceived usefulness has a significantly positive impact on the continuous intention to use MB apps. This finding is contrary to a study from Al-Emran et al. (2020) which suggested that PU and continuous intention have no relationship in the UEA context because of the higher expectation from customers about the performance of mobile-learning. However, this result matches those observed in most earlier studies (Lim et al. 2018; Venkatesh et al. 2011; Bhattacherjee, 2001; Chen & Li 2017). Understandably, customers select mobile banking apps to help them work efficiently and save time, since they do not need to go to branches and can do their financial transaction anywhere, anytime.

Our statistic regression reveals that perceived usefulness has a positive impact on the trust factor. This result is consistent with previous studies from Afshan & Sharif (2016), Kumar et al. (2018), and Sarkar et al. (2020). This finding implies that customers will trust MB applications provided that they have experience with the efficiency of mobile banking and understand that MB apps perform properly and securely.

The statistical results support the negative relationship between perceived risk and trust in the context of continuous intention to use mobile banking applications. This finding is in accord with recent studies from Susanto et al. (2016), Wang & Shan (2013), and Sarkar et al. (2020). MB customers are concerned about the risks of exposing their personal information or losing money in their account; they will reduce customers' perceptions that banks will ensure the safety of transactions and the safety of assets when trading on apps, thereby negatively impacting the continued use of MB apps. This finding from the study suggests to banks that they should provide a higher standard of security to gain trust from customers.

The results of this study indicate that trust has a significantly positive impact on continuous intention to use MB apps. It implies that customers perceive their MB apps as reliable; they will continue to use them in the future. The result from our moderating effect shows that the age variable can negatively influence the relationship between trust and continuous intention to use MB apps. This result implies that the impact of trust on continuous intention to use MB apps will be stronger with young customers. It is difficult to explain this result, but it might be due to young customers often having simple trading demands, a small number of transactions, and are early adopters of MB services, therefore, the lack of technical problems is rather unlikely; with a larger sample size the results might be different. The results also showed that older customers within our sample tends to demand a higher quality of service and express more doubts about MB apps. Therefore, this finding suggests that banks should concentrate more on raising the level of trust for older customers.

Our statistical results show that there is no significant relationship between perceived cost and continuous intention to use MB apps. This can be explained by the fact that most of the cost related to connection or having a smartphone are already paid for in their daily lives. They do not have to pay any costs for using MB apps except the monthly maintenance fee, which is not so high. This finding suggests to banks that if their customers in Iraq use MB for the first time, the cost will be no longer have an impact on continuously using in the future. But maybe in the future, customers will take the cost into their consideration in case of increasing competition among banks. It is important to note that the limitations of the sample size make it difficult to generalize the results of the study to the entire population, but these results remain important and must be considered.

CONTRIBUTIONS, LIMITATIONS, AND FUTURE RESEARCH SUGGESTIONS

Theoretical contribution

The combination of findings provides some support for theoretical development. In the context of the post-adoption stage of using mobile technology, the extended technology acceptance model and trust factor can provide valuable insights. This differs from previous related studies, most of which have assessed separately how trust and the TAM model influence customers' behaviour in adopting mobile banking services. This study contributes to our understanding of the continual intention to use MB apps. Furthermore, the research has provided new evidence about the relationship between TAM factors with trust. Firstly, the model shows that perceived usefulness continues to be the most significant factor in the post-adoption stage. This study also explores the relationship between perceived usefulness and continual intention to use mobile banking applications through two paths. Directly, perceived usefulness has a significant positive impact. Indirectly, the influence of perceived usefulness on continuous intention to use can be facilitated through trust. For the mediating effect, the study confirmed that the trust factor as acts as a vital mediator to influence the relationship of perceived usefulness and perceived risk on continual intention to use. Secondly, perceived ease of use seems to be critical with the early stage of IS adoption. However, when customers get acquainted with adopting smartphone applications, the impact of the ease-of-use variable on the continual intention to adopt should be neglected. Thirdly, according to the moderating effect, this study adds to the growing body of research that indicates the importance of the age variable in the research model. The impact of age on the post-adoption stage of new technology is analysed, finding that higher age leads to a lower relationship between trust and usage.

Practical implications

Mobile banking applications on smartphones in Iraq are still in the early stage of adoption, and the paper provides some valuable suggestions to bank managers to spend more efforts on developing mobile banking services and to gain more customer satisfaction and encourage clients to continue to use their services. The findings from this study may be applied to other developing countries that are still in the same stage of diffusing new technology. Another important practical implication is that banks should improve the usefulness of mobile banking by upgrading their apps with more efficient functions, making them more convenient to save time and enhance user experiences. Great efforts are needed to ensure that banks should be committed to their responsibility for mobile banking by making their applications more reliable, using advanced technologies for data protection, as well as reducing the potential risks related to bank transactions. The challenge now in Iraq is that the level of protection does not reach the desired level. Mobile banking providers should apply more protection layers by utilising new security technology. Banks should determine their priorities for broadening the ecosystem of mobile banking, cooperating with third parties in providing more added-value services such as buying tickets, paying for rent and utilities, or online shopping on their apps. These new practical features would help customers perceive the usefulness of mobile banking applications.

Limitation of research and future suggestions

The research model provides a good explanation ability, however, the small sample of respondents is one of the main limitations of this research, as the sample size cannot be representative for the whole country. More studies using a bigger sample size are needed to generalize the determinants of continuously using mobile banking applications. Secondly, the study was conducted during the coronavirus pandemic, therefore, the perceptions of customers could have been affected by the new situation. Therefore, further research might explore the longitude impact among factors affecting customers' behaviour.

CONCLUSION

This study provides new insights into the post-adoption stage of mobile banking services. While some research has investigated the intention to adopt mobile banking services, there is still little scientific understanding of mobile banking services at the post-adoption stage. Furthermore, this is the first study exploring the determinants of continual intention to use a digital financial service in Iraq. The combination of the TAM model and Trust factor could be useful in understanding the customer's continuous acceptance and intention to use mobile banking. In the industrialization 4.0 era, mobile platforms are considered one of the efficient technologies in many industries. In banking services, mobile banking platforms are necessary, especially with smartphone penetration in many countries. In a developing country like Iraq, where mobile banking service is new, this paper makes a significant contribution to not only academic but also practical life. The research shows that mobile banking adoption for the studied sample in Iraq needs to be

more developed in terms of usefulness and trust. The integration of the TAM model and trust can provide a good understanding of the continuous usage of mobile banking in Iraq.

REFERENCES

AFSHAN, S., & SHARIF, A. (2016). Acceptance of mobile banking framework in Pakistan. *Telematics and Informatics*, *33*(2), 370–387. https://doi.org/10.1016/j.tele.2015.09.005

AL-EMRAN, M., ARPACI, I., & SALLOUM, S. A. (2020). An empirical examination of continuous intention to use m-learning: An integrated model. *Education and Information Technologies*, *25*(4), 2899–2918. https://doi.org/10.1007/s10639-019-10094-2

ALALWAN, A. A., DWIVEDI, Y. K., RANA, N. P. P., & WILLIAMS, M. D. (2016). Consumer adoption of mobile banking in Jordan: Examining the role of usefulness, ease of use, perceived risk and self-efficacy. *Journal of Enterprise Information Management*, *29*(1), 118–139. https://doi.org/10.1108/JEIM-04-2015-0035

ALBASHRAWI, M., & MOTIWALLA, L. (2017). Privacy and Personalization in Continued Usage Intention of Mobile Banking: An Integrative Perspective. *Information Systems Frontiers*, 1–13. https://doi.org/10.1007/s10796-017-9814-7

BHATTACHERJEE, A. (2001). Understanding information systems continuance: an expectation-confirmation model. *MIS Quarterly*, *25*(3), 351–370.

CHONG, A. Y. L. (2013). Understanding mobile commerce continuance intentions: an empirical analysis of Chinese consumers. *Journal of Computer Information Systems*, *53*(4), 22-30.

CHEN, X., & LI, S. (2017). Understanding continuance intention of mobile payment services: an empirical study. *Journal of Computer Information Systems*, *57*(4), 287-298.

CHEN, R., & SHARMA, S. K. (2015). Learning and self-disclosure behavior on social networking sites: the case of Facebook users. European Journal of Information Systems, 24(1), 93-106.

CHIN, W. W. (1998). The partial least squares approach to structural equation modeling. In: G. A. Marcoulides (Ed.), *Modern Methods for Business Research* (pp. 295–336), Mahwah, NJ: Lawrence Erlbaum,.

CHIU, J. L., BOOL, N. C., & CHIU, C. L. (2017). Challenges and factors influencing initial trust and behavioral intention to use mobile banking services in the Philippines. *Asia Pacific Journal of Innovation and Entrepreneurship*, *11*(2), 246–278. https://doi.org/10.1108/APJIE-08-2017-029

DEVARAJ, S., FAN, M., & KOHLI, R. (2002). Antecedents of B2C channel satisfaction and preference: validating e-commerce metrics. *Information systems research*, *13*(3), 316-333.

DAS, T. K., & TENG, B. S. (2001). Trust, control, and risk in strategic alliances: An integrated framework. *Organization Studies*, *22*(2), 251–283. https://doi.org/10.1177/0170840601222004

DAVIS, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, *13*(3), 319–340. https://doi.org/10.2307/249008

DAVIS, F. D., BAGOZZI, R. P., & WARSHAW, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, *35*(8), 982–1003. https://doi.org/10.1287/mnsc.35.8.982

EZZI, SHAZA W. A Theoretical Model for Internet Banking: Beyond Perceived Usefulness and Ease of Use. no. 2, 30 Apr. 2014, pp. 31–46, https://doi.org/ 10.14738/abr.22.184.

FORNELL, C., & LARCKER, D. F. (1981). Structural Equation Models With Unobservable Variables and Measurement Error : Algebra and Statistics. *Journal of Marketing Research*, *XVIII*(August), 382–388.

HAIR, J. F., RINGLE, C. M., & SARSTEDT, M. (2013). Partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance. *Long range planning*, *46*(1-2), 1-12.

HAIR, J. F., SARSTEDT, M., HOPKINS, L., & KUPPELWIESER, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM) An emerging tool in business research. *European Business Review*, *26*(2), 106–121. https://doi.org/10.1108/EBR-10-2013-0128

HANAFIZADEH, P., BEHBOUDI, M., ABEDINI KOSHKSARAY, A., & JALILVAND SHIRKHANI TABAR, M. (2014). Mobile-banking adoption by Iranian bank clients. *Telematics and Informatics*, *31*(1), 62–78. https://doi.org/10.1016/j.tele.2012.11.001

JAMSHIDI, D., KESHAVARZ, Y., KAZEMI, F., & MOHAMMADIAN, M. (2018). Mobile banking behavior and flow experience: An integration of utilitarian features, hedonic features and trust. *International Journal of Social Economics*, *45*(1), 57–81. https://doi.org/10.1108/IJSE-10-2016-0283

KARAHANNA, E., STRAUB, D. W., & CHERVANY, N. L. (1999). Information technology adoption across time: A cross-sectional comparison of pre-adoption and post-adoption beliefs. *MIS Quarterly*, *23*(2), 183–213.

KIM, G., SHIN, B., & LEE, H. G. (2009). Understanding dynamics between initial trust and usage intentions of mobile banking. *Information Systems Journal*, *19*(3), 283–311. https://doi.org/10.1111/j.1365-2575.2007.00269.x

KUMAR, R. R., ISRAEL, D., & MALIK, G. (2018). Explaining customer's continuance intention to use mobile banking apps with an integrative perspective of ECT and Self-determination theory. *Pacific Asia Journal of the Association for Information Systems*, *10*(2), 79–112. https://doi.org/10.17705/1pais.10204

LAUKKANEN, T. (2007). Measuring mobile banking customers' channel attribute preferences in service consumption. *International Journal of Mobile Communications*. https://doi.org/10.1504/IJMC.2007.011812

LAUKKANEN, T. (2016). Consumer adoption versus rejection decisions in seemingly similar service innovations: The case of the Internet and mobile banking. *Journal of Business Research*, *69*(7), 2432–2439. https://doi.org/10.1016/j.jbusres.2016.01.013

LAUKKANEN, T., & PASANEN, M. (2008). Mobile banking innovators and early adopters: How they differ from other online users?. *Journal of Financial Services Marketing*, *13*(2), 86-94.

LIM, S. H., KIM, D. J., HUR, Y., & PARK, K. (2018). An Empirical Study of the Impacts of Perceived Security and Knowledge on Continuous Intention to Use Mobile Fintech Payment Services. *International Journal of Human-Computer Interaction*, *35*(10), 886–898. https://doi.org/10.1080/10447318.2018.1507132

LUARN, P., & LIN, H.-H. (2005). Toward an understanding of the behavioral intention to use mobile banking. *Computers in Human Behavior*, *21*(6), 873–891. https://doi.org/10.1016/j.chb.2004.03.003

MAKANYEZA, C. (2017). Determinants of consumers' intention to adopt mobile banking services in Zimbabwe. *International Journal of Bank Marketing*, *35*(6), 997–1017. https://doi.org/10.1108/02652323199400002

MARTIN, S. P. (2003). Is the digital divide really closing? A critique of inequality measurement in a nation online. IT & society, 1(4), 1-13.

MCKNIGHT, D. H., CUMMINGS, L. L., & CHERVANY, N. L. (1998). Initial trust formation in new organizational relationships. *Academy of Management Review*, *23*(3), 473–490. https://doi.org/10.5465/AMR.1998.926622

MULLAN, J., BRADLEY, L., & LOANE, S. (2017). Bank adoption of mobile banking: stakeholder perspective. *International Journal of Bank Marketing*, *35*(7), 1154–1174. https://doi.org/10.1108/02652323199400002

MURINDE, VICTOR, et al. *The Impact of the FinTech Revolution on the Future of Banking: Opportunities and Risks*. 0 0 2022, https://doi.org/https://doi.org/10.1016/j.irfa.2022.102103.

NEL, J., & BOSHOFF, C. (2017). Development of application-based mobile-service trust and online trust transfer: an elaboration likelihood model perspective. *Behaviour and Information Technology*, *36*(8), 809–826. https://doi.org/10.1080/0144929X.2017.1296493

NUNNALLY, J. C. AND BERNSTEIN, I.H. (1994). *Psychometric Theory*, New York, McGraw-Hill.

OLIVER, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of marketing research*, *17*(4), 460-469.

PAVLOU, P. (2001). Integrating trust in electronic commerce with the technology acceptance model: model development and validation. In *Amcis 2001 proceedings* (p. 159).

PERIĆ, JOVAN . "DIGITAL BANKING STATISTICS UK EDITION [2022]." *Digital Banking Statistics UK Edition [2022]*, 8 Apr. 2022, https://doi.org/https://doi.org/10.1016/j.irfa.2022.102103.

PHAN, D. T. (2020). I have seen the future, and it rings-What we know about mobile banking research. *THEORY METHODOLOGY PRACTICE: CLUB OF ECONOMICS IN MISKOLC*, *16*(2), 69-80.

RINGLE, C.M., WENDE, S. AND BECKER, J.-M. (2015), SmartPLS 3, SmartPLS GmbH, Bönningstedt, available at: www.smartpls.com (accessed October 2, 2018).

SANTAMARIA, C., SERMI, F., SPYRATOS, S., IACUS, S. M., ANNUNZIATO, A., TARCHI, D., & VESPE, M. (2020). Measuring the impact of COVID-19 confinement measures on human mobility using mobile positioning data. A European regional analysis. *Safety Science*, *132*, 104925.

SARKAR, S., CHAUHAN, S., & KHARE, A. (2020). A meta-analysis of antecedents and consequences of trust in mobile commerce. *International Journal of Information Management*, *50*, 286-301.

SARKAM, N. A., & JAMIL, N. I. (2022). *Attitudes, Security, and Perceived Ease of Use Influence The Consumers' Decision to Use An E-payment System* (pp. 2147–4478). https://doi.org/DOI: 10.6007/IJARBSS/v12-i3/12884

SHAIKH, A. A., & KARJALUOTO, H. (2014). Mobile banking adoption: A literature review. *Telematics and Informatics*, *32*(1), 129–142. https://doi.org/10.1016/j.tele.2014.05.003

SUH, B., & HAN, I. (2002). Effect of trust on customer acceptance of Internet banking. *Electronic Commerce research and applications*, *1*(3-4), 247-263.

Susanto, A., Chang, Y., & Ha, Y. (2016). Determinants of continuance intention to use the smartphone banking services. *Industrial Management & Data Systems*, *116*(3), 508–525. https://doi.org/10.1108/IMDS-05-2015-0195

TENENHAUS, A., PHILIPPE, C., GUILLEMOT, V., LE CAO, K. A., GRILL, J., & FROUIN, V. (2014).

Variable selection for generalized canonical correlation analysis. *Biostatistics*, *15*(3), 569-583.
TRAN, H. T. T., & CORNER, J. (2016). The impact of communication channels on mobile banking adoption. *International Journal of Bank Marketing*, *34*(1), 78–109. https://doi.org/10.1108/IJBM-06-2014-0073
YANG, S., LU, Y., CHEN, Y., & GUPTA, S. (2015). Understanding consumers' mobile channel continuance: An empirical investigation of two fitness mechanisms. *Behaviour and Information Technology*, *34*(12), 1135–1146. https://doi.org/10.1080/0144929X.2014.988176
YU, C. S. (2012). Factors affecting individuals to adopt mobile banking: Empirical evidence from the UTAUT model. *Journal of electronic commerce research*, *13*(2), 104.
VENKATESH, V., THONG, J. Y., CHAN, F. K., HU, P. J. H., & BROWN, S. A. (2011). Extending the two-stage information systems continuance model: Incorporating UTAUT predictors and the role of context. *Information Systems Journal*, *21*(6), 527-555.
WANG, EDWARD SHIH-TSE, AND RUENN-LIEN LIN. "Perceived quality factors of location-based apps on trust, perceived privacy risk, and continuous usage intention." *Behaviour & Information Technology* 36, no. 1 (2017): 2-10.
WANG, B., & SHAN, C. (2013). The effect of online-to-mobile trust transfer on the foundation of mobile banking trust. Communications and Network, 5(1), 112-115.
WU, J. H., & WANG, S. C. (2005). What drives mobile commerce?: An empirical evaluation of the revised technology acceptance model. *Information & Management*, *42*(5), 719-729.

Determinants of Financial Performance of Commercial Banks in Jordan: Application of CAMELS Model

SALEH JAWARNEH
PH.D. CANDIDATE
UNIVERSITY OF MISKOLC
email: Saleh1jaw@gmail.com

SUMMARY

This study aims to evaluate and analyse the financial performance of the banks listed on the Amman Stock Exchange (ASE) for the period 2016-2020. The study covers 13 commercial banks and excludes the three Islamic banks from the listed banks on the ASE. The study also examines the relationship between CAMELS model components and banks profitability represented by Return on Assets (ROA) and Return on Equity (ROE). All data are collected from the financial statements of the Jordanian commercial banks, the Central Bank of Jordan, previous studies, and the Amman Stock Exchange. Sufficient and adequate analysis is used to analyse the data in this research – Regression Analysis, Coefficient Correlation, and Cluster Analysis using SPSS. The findings show that the Capital Adequacy Ratio, Earning Ability, and Liquidity have a positive but non-statistically significant influence on the financial performance of the Jordanian Commercial banks, as measured by the ratio of ROA and the ratio of ROE. The results also demonstrate that the Asset Quality, Management Efficiency, and Sensitivity to Market Risks all have a negative and non-statistically significant impact on Jordanian Commercial banks financial performance as evaluated by the ROA and the ROE ratios.

Keywords: Financial Performance, CAMELS Model, commercial banks, Ranking, Jordanian Banks, Regression, Cluster
JEL Classification: B26, G21, O16,
DOI: http://doi.org/10.18096/TMP.2022.01.06

INTRODUCTION

Banks and other financial institutions play a crucial role in the economy, they are what make financial markets work. Without banks, financial markets would be unable to transfer cash from savers to those with profitable investment possibilities (Mishkin and Serletis 1995). The financial sector is critical in terms of delivering and directing capital investment. In addition to providing short-term financing for businesses day-to-day operations and other short-term cash needs, they are also sources of long-term financing (OECD 2013).

Banking sector problems were a key factor in causing and prolonging the two most severe economic crises in the last century: the Great Depression of 1929 and the Great Recession of 2008. In both situations, insufficient banking sector regulation was thought to have contributed to the crises (Kumhof and Jakab 2016). Therefore, the presence of a strong, tight, and adequate system for analyzing the performance of banks is of indispensable importance in the current era in order to avert any future financial crises that would severely impact local and worldwide economies.

The Jordanian Banking Industry is regulated by the Central Bank of Jordan (CBJ). The CBJ Act was passed in 1959 and the institution itself was established in 1964. The Jordanian government owns the entire capital of the Central Bank, which has been increased in stages, from 1 million to 18 million Jordanian dinars, and despite the government's ownership of its capital, the Central Bank enjoys, according to the provisions of its law, an independent legal personality (Central Bank of Jordan, Fifty seventh annual report 2020). It is the only organisation entitled to issue and regulate banknotes and coins, as well as preserve and

administer the Kingdom's gold and foreign exchange reserves in order to ensure monetary stability.

This study aims to analyse the financial performance of commercial banks listed in the Amman Stock Exchange (ASE) covering the period 2016 to 2020 using the CAMELS model and to study the relationship between the CAMELS model components and profitability represented by Return on Assets (ROA) and Return on Equity (ROE).

The significance of this study is in tying the aspects of the CAMELS model to the profitability of Jordanian Commercial Banks, as the CAMEL/CAMELS model is one of the most significant instruments used by central banks to analyse and manage banks. Furthermore, using SPSS software, this research classifies banks into clusters.

CAMELS Model

The CAMELS model is a rating method to assess a bank's overall health. The model is a rating system used to analyse bank performance according to six different factors (Capital Adequacy, Asset Quality, Management Efficiency, Earning Ability, Liquidity, and Sensitivity to Market Risks). It was first developed and used in the United States in the 1970s by three federal banking supervisors (the Federal Reserve, the Federal Deposit Insurance Corporation, and the Office of the Comptroller of the Currency) and modified in 1997. It applies to every bank and credit union in the United States and it is also enforced by numerous financial supervisory authorities outside the United States (Girija and Nayak 2020).

In 1997, a sixth component, Sensitivity to Market Risk (S), was introduced to the CAMELS rating model to cover pricing and interest rate concerns (IRR). Each component of the CAMEL model is rated on a scale of 1 to 5, with 1 standing for the best and 5 for the worst (National Credit Union Adminstration 2021). The following factors are examined under CAMELS.

- C–Capital Adequacy
- A–Asset Quality
- M–Management Efficiency
- E–Earning Ability
- L–Liquidity
- S-Sensitivity to Market Risk

LITERATURE REVIEW

Many previous studies have examined the CAMELS model, and some of these studies have examined the effect of this model on the performance of commercial banks. Samuel (2018) evaluated the financial performance of three chosen commercial banks in India covering a period of five years from 2011 to 2016. The study concluded that all three banks included in the study had succeeded in maintaining a higher Capital Adequacy Ratio than the prescribed level at 9% and the ratio of non-performing loans to total advances was increasing, which indicates that the management is ineffective in providing loans to customers. All banks showed a somewhat stable ratio for business per employee, the average operating profit ratio was low which indicated that the profitability of banks was not satisfactory, the Liquidity ratio indicated good liquidity of the banks and finally, the research showed that all the banks in the sample had the risk measurement and reporting systems in place to deal with the sensitivities arising from market risk (Samuel 2018).

Misra and Aspal's 2013 study aimed to evaluate the performance and financial safety of the Indian State Bank Group, which includes six banks during the period 2009-2011, with the CAMEL model and using the descriptive analysis and one-way ANOVA analysis. The study came up with results related to the classification of the six banks of the group according to the CAMEL model. Based on its results, the study presented a set of recommendations for banks that achieved low performance according to CAMEL evaluation criteria, including the need to improve the quality of their assets and improve the Capital Adequacy Ratio, in addition to the need to improve Management Efficiency and Profitability (Mishra and Aspal 2012).

The study of Dzeawuni and Tanko (2008) aimed to assess the efficiency of the CAMEL model in measuring general bank performance, to find a relative weight for the importance of the elements of the model, and to determine the best ratios that the supervisory bodies must adopt to assess the efficiency of banks. The study was based on a sample of 11 commercial banks in Nigeria during the period 1997–2005. The results showed the inability of each factor alone in the CAMEL model to measure the overall performance of the bank. The results also showed that the most important factor is Capital Adequacy Ratio, followed by Liquidity, then Profitability, then Asset Quality, and finally Management Efficiency, and therefore the study suggested re-arranging the acronym of the model according to the importance of its components to become CLEAM. Furthermore, the study identified the best ratio for each factor. For example, the best ratio for Capital Adequacy was found to be the ratio of total shareholders' fund to total risk-weighted assets, for Asset Quality the best ratio was the ratio of loan loss provision to total net loans, for Management Quality the best ratio was the ratio of risk-weighted assets to total assets, for Earning Ability the best ratio was the ratio of net profit after tax to total shareholders' fund and finally the best

ratio for Liquidity was the ratio of demand liabilities to the total deposit (Dzeawuni and Tanko 2008).

Mishra and Agarwal (2013) aimed to analyse the financial performance of the banks under study and to undertake the factors leading to financial performance in two nationalised banks (Central Bank of India (CBI) and Indian Bank (IB)), covering the five years of 2008–2012. The study found that the Capital Adequacy Ratio of CBI was better than that of IB, debt-to-equity ratio should be less so IB is holding it less than CBI, Asset Quality CBI is better than IB, in case of management quality Mishra and Agarwal concluded that CBI is managing better than IB, in terms of earning quality IB is performing better and in terms of Liquidity both the banks are comparatively equivalent (Mishra and Agarwal 2013)

Ongore and Kusa (2013) tested the factors affecting the performance of commercial banks in Kenya during the period 2001-2010. The study used three indicators of bank performance: the Return on Assets , the return on Equity, and the interest rate margin, while the independent variables included two groups, the first the elements of the CAMEL model, and the second the macroeconomic factors, including the gross domestic product and the rate of inflation. The study found that the elements of the CAMEL model, with the exception of Liquidity, have a significant impact on the regression analysis. As for the macroeconomic variables, they did not have a statistically significant effect on the indicators of the financial performance (Ongore and Kusa 2013).

Trung (2021) aimed to identify the determinants of Vietnamese commercial banks' performance for the period 2009 to 2020 using the CAMELS model and Tobin's Q ratio. The regression analysis resulted in ten statistically significant variables at 5%, including all CAMELS model components (Capital Adequacy Ratio, Asset Quality, Management, Earnings, Liquidity, Sensitivity, Ownership, Gross Domestic Product, and Inflation Rate) (Trung 2021).

Studies on Jordanian Banks

Al-Abedallat (2019) aimed to assess the performance of Jordanian banks and identify the impact of the components of the CAMELS model on the banks' performance measured by returns on the assets, returns on equity, and net income. The study sample consisted of the top 11 Jordanian banks in terms of capital and assets during the time under consideration (2003-2017). The study concluded that Jordanian banks have Capital Adequacy Ratios above 12%, that Jordanian banks have low ratios of Return on Assets and return on Equity, and that commercial banks have an advantage over Islamic banks in the components of the CAMELS model and performance measures, due to the high level of liquidity, serious reservations in fund investment, and increased income tax in Jordan. The research proposed that the Central Bank of Jordan fully use the CAMELS model in order to analyse the performance of Jordanian banks and to focus more on the performance of Islamic banks (Al-abedallat 2019).

Bashatweh and Al-sheikh (2020) aimed to evaluate the financial performance of 13 commercial banks listed in Amman Stock Exchange in Jordan based on the CAMELS model covering the period of five years, 2014–2018. The study showed that the overall average for the evaluation of CAMELS elements in the Jordanian commercial banks within that period was acceptable (Bashatweh and Al-sheikh 2020).

Bawaneh and Dahiyat (2019) study used the CAMELS rating model to present a comprehensive financial evaluation of commercial banks listed in Amman Stock Exchange (ASE). And this study aimed to study the effect of the CAMELS model on the performance of the banks. The study was based on a sample of 13 commercial banks in Jordan during the period 2012-2018. The results of this study found that there is a significant effect of the CAMELS dimensions of Management Efficiency, Earning Quality, Liquidity, and Risk Sensitivity on the financial performance of commercial banks, but there is no statistically significant effect of the CAMELS dimensions of Capital Adequacy and Asset Quality on the performance of commercial banks (Bawaneh & Dahiyat, 2019).

Kaddumi (2017) aimed to analyse the factors influencing the performance of Jordanian banks using the elements of the CAMELS model for the period 2003–2017. The researcher concluded that banks in Jordan have a Capital Adequacy Ratio of more than 12%. Also, they have an increase in Asset Quality, Management Efficiency, Profit Margins, good Liquidity and high Sensitivity to Market Risk. The Jordanian banks have a lower ratio of profit represented by the Return on Assets and Return on Equity (Kaddumi 2017).

RESEARCH METHODOLOGY

The methodology describes the research path to be followed, the tools to be used, the population and the sample for the study, the analysis tools to be used, and the pattern of conclusions drawn. Considering the objectives that this study seeks to achieve, a standard model has been developed, which tests the impact of the components of the CAMELS model variables on the performance of Jordanian commercial banks represented by Return on Assets and Return on Equity.

Sample of the study

There are 16 banks listed on Amman Stock Exchange (ASE), among these banks, there were 13 Jordanian commercial banks and 3 Islamic banks. Islamic banks are excluded from this research, as Islamic banks do not treat credit facilities as commercial banks do. This study covers a period of five years, 2016–2020.

Data and tools

The study mainly relies on two main sources for data collection: a collection of secondary data from previous research, such as scientific journals, books periodicals, and publications related to the subject of study and primary sources of data, mainly annual reports for the 13 listed Jordanian banks, whose reports can be downloaded from the banks' websites and from the Amman Stock Exchange (ASE) website. For analysis of the data, this research uses proper and adequate tools, including Descriptive statistics, Linear Regression Analysis and Cluster Analysis; to arrive at a conclusion in a scientific way.

The model can be formulated as follows:

$$ROA = \beta_0 + (\beta_1 \times CAR) + (\beta_2 \times A) + (\beta_3 \times M) + (\beta_4 \times E) + (\beta_5 \times L) + (\beta_6 \times S) + \varepsilon \quad (1)$$

$$ROE = \beta_0 + (\beta_1 \times CAR) + (\beta_2 \times A) + (\beta_3 \times M) + (\beta_4 \times E) + (\beta_5 \times L) + (\beta_6 \times S) + \varepsilon \quad (2)$$

where ROA is Return on Assets , ROE is Return on Equity, β^0 is intercept, β^1 β^2 β^3 β^4 β^5 β^6 are coefficients of each independent variable, CAR is Capital Adequacy (Tier I + Tier II capital/Risk-Weighted Assets), A is Asset Quality (Non-Performing Loans to Total Loans), M is Management Efficiency (Operation Expenses to Gross income), E is Earning Ability (Net Interest Margin), L is Liquidity (Liquid Assets to Total Assets), S is Sensitivity to Market Risk (Total Securities to Total Assets) and ε is an Error Term.

RESULTS

This part includes the descriptive statistics of the study variables and the results of the regression analysis to find out the effect of the components of the CAMELS model on the financial performance of Jordanian commercial banks.

Descriptive Statistics

Table 1 shows the CAMELS Model ratings applied to the sample banks over the period 2016-2020.

Table 1
CAMELS rating applied to sample banks 2016-2020.

Name of Bank	C	A	M	E	L	S	ROA	ROE
Arab Bank	13.92%	7.88%	42.78%	2.75%	27.74%	18.91%	1.01%	7.02%
Jordan Ahli Bank	14.66%	8.25%	66.68%	3.09%	14.70%	26.25%	0.52%	4.74%
Bank of Jordan	18.82%	6.40%	45.12%	4.18%	27.65%	12.74%	1.59%	9.70%
Cairo Amman Bank	16.14%	4.94%	60.60%	3.50%	21.22%	25.55%	0.98%	8.20%
Societe Generale De Banque - JORDANIE	18.21%	5.95%	48.04%	1.52%	16.92%	32.42%	0.58%	6.35%
Capital Bank of Jordan	15.99%	9.23%	48.48%	2.70%	18.25%	25.91%	1.23%	9.08%
Invest Bank	16.06%	6.87%	53.06%	3.16%	16.38%	15.78%	1.27%	8.07%
Bank El Eithad	14.16%	4.95%	51.04%	3.34%	19.20%	19.16%	0.92%	9.38%
Arab Jordan Investment Bank	16.08%	1.75%	52.50%	2.40%	20.62%	33.62%	0.86%	8.50%
The Housing Bank for Trading	17.14%	5.95%	42.55%	3.48%	20.36%	24.14%	1.17%	9.12%
Jordan Commercial Bank	12.64%	10.14%	40.26%	2.52%	11.60%	23.86%	0.36%	3.37%
Jordan Kuwait Bank	18.65%	8.61%	51.10%	3.24%	18.21%	17.18%	0.90%	5.45%
Arab Banking Corporation (Jordan)	19.69%	6.26%	54.80%	3.07%	14.23%	27.70%	0.71%	5.02%

Source: Jawarneh, S. (2021).

Table 2 shows the descriptive statistics of study variables. From the table, it can be noted that the average Return on Assets (ROA) for Jordanian commercial banks was about 0.93% during the study period, and this rate ranged from -0.16 % to 1.8%, with a standard deviation of 0.49%, which indicates a clear discrepancy in the Return on Assets between commercial banks. The Average ROA in the

Bashatweh and Al-sheikh (2020) study was 1.14% and 1% in Al-abedallat (2019) study.

The average Return on Equity (ROE) for Jordanian commercial banks during the study period was about 7.23%, and this rate ranged from -0.99% to 12.93%, with a standard deviation of 3.19%, which indicates a clear discrepancy in the Return on Equity among commercial banks. The Average ROE reported in Al-abedallat (2019) was 10%.

As for the elements of the CAMELS model, the average Capital Adequacy Ratio of Jordanian commercial banks during the study period was 16.32%, and the ratio ranged from 11.16% to 22.50%, with a standard deviation of 2.42%. Previous statistics indicated that Jordanian commercial banks enjoy high Capital Adequacy Ratios that exceed the minimum of 12% required by the Central Bank of Jordan, as well as the minimum of 8%. required by the Basel Committee The average Capital Adequacy Ratios in the Al-Abedallat (2019) and Bashatweh and Al-sheikh (2020) studies were 20% and 16.49%, respectively. For Asset Quality, the mean is 6.62% and the ratio ranged from 10.27% to 11.90% with a standard deviation of 2.45%, which reflects good quality of the assets of Jordanian commercial banks in general, but it is noted that some banks suffer from a high ratio, which indicates low quality of their assets. The averages for Asset Quality in Al-Abedallat (2019) and Bashatweh and Al-sheikh (2020) studies were 6% and 6.74%, respectively. For Management Efficiency, the mean is 50.54% and the ratio ranged between 36.15% to 69.28% with a standard deviation of 7.89%, which indicates that the Jordanian commercial banks enjoy similar levels of operating expenses. The average Management Efficiency ratio in Al-Abedallat (2019) and Bashatweh and Al-sheikh (2020) studies were 2% and 60%, respectively; the large variance in the results can be explained by the fact that Al-Abedallat (2019) used operating expense to total assets ratio, while Bashatweh and Al-sheikh (2020) used operating expense to total income as the Management Efficiency indicator. As for Earning Ability, the mean is 3.12% and the ratio ranged from 1.24% to 7.22% with a standard deviation of 1%, which indicates that the Jordanian banks have good Earning Ability. The average Earning Ability ratio in Al-Abedallat (2019) and Bashatweh and Al-sheikh (2020) were 70% and 1.34%, respectively, with Al-Abedallat (2019) using interest margin to gross income, while Bashatweh and Al-sheikh (2020) used ROA as the Earning Ability indicator, which explains the big variance in the results. The average Liquidity ratio for Jordanian banks is 19% and the ratio ranged from 7.78% to 31.97% with a standard deviation of 5.23%, which indicates that Jordanian banks maintain a good and sufficient Liquidity ratio to meet any unexpected needs. The average Liquidity ratio in the Al-Abedallat (2019) and Bashatweh and Al-sheikh (2020) studies were 25% and 11.42%, respectively. The mean Sensitivity to Market Risk of the Jordanian commercial banks during the study period is 23.33%, and the ratio ranged from 9.73% to 34.81%, with a standard deviation of 6.41%, which indicates that about a quarter of the assets of Jordanian commercial banks are exposed to market risks, reflecting their high Sensitivity to Market Risks. The average Liquidity ratio in the Al-Abedallat (2019) and Bashatweh and Al-sheikh (2020) studies were 17% and 22.81%, respectively.

Table 2
Descriptive statistics for study variables during the period 2016–2020, N=65

	Range	Minimum	Maximum	Mean	Std. Deviation
ROA	1.96	-0.16	1.80	0.9305	0.48589
ROE	13.92	-0.99	12.93	7.2310	3.18703
Capital Adequacy	11.34	11.16	22.50	16.3207	2.42084
Asset Quality	10.27	1.63	11.90	6.6200	2.44656
Management Efficiency	33.13	36.15	69.28	50.5395	7.89293
Earning Ability	5.98	1.24	7.22	3.1234	0.99701
Liquidity	24.18	7.78	31.97	19.0042	5.22896
Sensitivity to Market Risk	25.08	9.73	34.81	23.3250	6.40582

Source: Own work

Linear Regression Analysis

This part aims to test the effect of the components of the CAMELS model on the financial performance of Jordanian commercial banks by using Pooled Data Regression due to its relevance to the nature of the data used in the study. This method

is used if the data includes a time series and cross-sectoral data.

Table 3 shows the outputs of the regression analysis for the two models of the study, and based on this table, it can be noted that the Capital Adequacy Ratio, Earning Ability and Liquidity have a positive but not statistically significant impact at the level of significance of 5% on the Return on Assets (ROA) and on the Return on Equity (ROE), which indicates that higher Capital Adequacy Ratio, higher Earning Ability, and higher Liquidity will help improve the financial performance of the bank. Asset Quality, Management Efficiency, and Sensitivity to Market Risk have a negative but not statistically significant effect at a significance level of 5% on the Return on Assets (ROA) and on the Return on Equity (ROE), which indicates that the lower quality of the banks assets, Management Efficiency and Sensitivity to Market Risk contribute to improving the bank's financial performance.

Return on Equity has a statistically significant negative relationship with Asset Quality at a significance level of 1%, which means a decrease in the ratio of non-performing loans to total advances increases improvement in the bank's financial performance.

R^2 quals 0.400 for the ROA model and 0.343 for the ROE model, which means that 40% and 34.4 % of the total variation in the value of the models, respectively, were attributed to the effect of the CAMELS model variables.

Following the general rule of thumb, a Variance Inflation Factor (VIF) exceeding 4 requires further investigation and exceeding 10 indicates signs of serious multi-collinearity requiring correction or changes in variables. The result of data analysis shows that the VIF of all independent variables is less than 4 so there is no requirement for any changes, and the data are valid for analysis.

Moreover, the Durbin-Watson statistics are used to detect the presence of autocorrelation. The value of this test could help us to find out the existence of problems between the data. The Durbin-Watson results range in value from 0 to 4. A value near 2 specifies non-autocorrelation. A value toward 0 shows positive autocorrelation and a value toward 4 shows negative autocorrelation. The value of Durbin-Watson statistics is 1.5, showing that there is no autocorrelation.

Table 3
Regression analysis results during the period 2016–2020

	Return on Assets				**Return on Equity**			
ANOVA Sig.	0.000				0.000			
R^2	0.400				0.343			
Durbin-Watson	1.554				1.531			
F-statistic	6.450				5.038			
Variables	Coefficient	t-Statistic	Sig	VIF	Coefficient	t-Statistic	Sig	VIF
Constant	0.901	1.264	0.211		11.462	2.342	0.023	
C	0.037	1.779	0.080	1.051	0.009	0.065	0.949	1.051
A	-0.039	-1.607	0.113	1.474	-0.539	-3.201	0.002	1.474
M	-0.011	-1.635	0.108	1.239	-0.075	-1.561	0.124	1.239
E	0.103	1.756	0.084	1.388	0.678	1.691	0.096	1.388
L	0.021	1.728	0.089	1.619	0.096	1.162	0.250	1.619
S	-0.020	-1.911	0.061	1.767	-0.042	-0.599	0.552	1.767

Source: Own work

From the previous analysis, we can formulate the following equations:

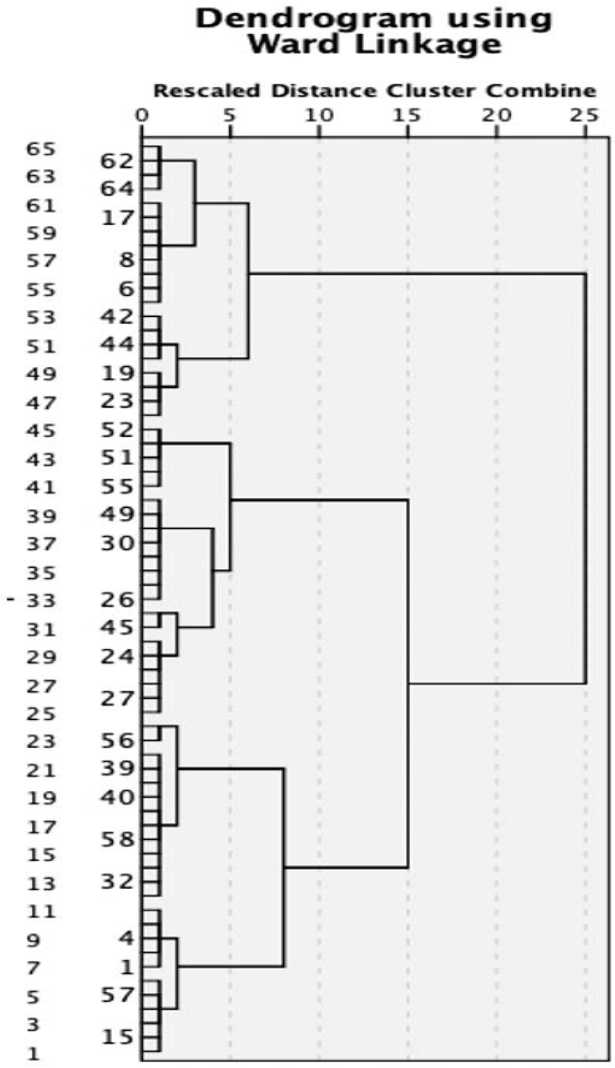
$$ROA = 0.901 + (0.037 \times C) + (-0.039 \times A) + (-0.011 \times M) + (0.103 \times E) + (0.021 \times L) + (-0.020 \times S) + \varepsilon$$

$$ROE = 11.462 + (0.009 \times C) + (-0.539 \times A) + (-0.075 \times M) + (0.678 \times E) + (0.096 \times L) + (-0.42 \times S) + \varepsilon$$

Cluster Analysis

Cluster analysis results allowed us to observe that there are some dissimilarities between the Jordanian banks in terms of banking structure, although they are working under the same authority and the same governing policies. The regulators hope to create a fair and competitive market for all financial institutions. Some of the very important ratios of the Jordanian banking system have proven to be differentiated in many banks. As an example, Arab Bank, Bank of Jordan, Invest Bank, and Jordan

Kuwait bank formed a group (cluster 2) for the period examined. Figure 1 presents cluster results.



Members of Cluster 1
Societe Generale De
Capital Bank of Jordan
The Housing Bank for Trading
Jordan Commercial Bank

Members of Cluster 2
Arab Bank
Bank of Jordan
Invest Bank
Bank El Eithad
Jordan Kuwait Bank

Members of Cluster 3
Jordan Ahli Bank
Cairo Amman Bank
Arab Jordan Investment Bank
Arab Banking Corporation

Source: Own work

Figure 1. Cluster dendrogram and memberships

Common characteristics of clusters

- The average Capital Adequacy Ratio is 16% for Cluster 1, 16.32% for Cluster 2 and 16.64% for Cluster 3.
- The average Asset Quality Ratio is 7.82% for Cluster 1, 6.94% for Cluster 2 and 5.30% for Cluster 3.
- The average Management Efficiency Ratio is 44.83% for Cluster 1, 448.62% for Cluster 2 and 58.65% for Cluster 3.
- The average Earning Quality Ratio is 0.84% for Cluster 1, 1.14% for Cluster 2 and 0.77% for Cluster 3.
- The average Liquidity Ratio is 16.78% for Cluster 1, 21.83% for Cluster 2 and 17.69% for Cluster 3.
- The average Sensitivity to Market Risk Ratio is 26.58% for Cluster 1, 16.75% for Cluster 2 and 28.28% for Cluster 3.

CONCLUSION

Using the features of the CAMELS model, this study attempts to assess the variables impacting the performance of Jordanian commercial banks and determine the aspects that have the greatest impact on their performance. The results indicated that Jordanian commercial banks enjoy high Capital Adequacy Ratios that exceed the minimum of 12 % required by the Central Bank of Jordan and 8% by the Basel Committee. They are also characterised by the good quality of their assets, the efficiency of

their management, and their ability to achieve relatively high-profit margins. The Jordanian commercial banks enjoy good and sufficient Liquidity ratios to meet any unexpected needs; however, there was an increase in their sensitivity to market risks. The results indicate that Capital Adequacy Ratio, Earning Ability, and Liquidity have a positive and not statistically significant impact on the financial performance of banks in Jordan as measured by both the ratio of Return on Assets (ROA) and the ratio of return on Equity (ROE). The results also indicate that the Asset Quality, Management Efficiency, and sensitivity have a negative and not statistically significant impact on the financial performance of banks in Jordan as measured by the ratio of ROA and the ratio of ROE.

The study recommends the Central Bank of Jordan use the CAMELS model when evaluating the financial performance of banks. This can contribute to stakeholders' analysis, which will help stakeholders interested in Jordanian commercial banks to access these analyses and make comparisons between them to facilitate the decision-making process. Also, it can help identify potential weak points in banks.

REFERENCES

AL-ABEDALLAT, A. (2019). The Factors Affecting the Performance of the Jordanian Banks using Camels Model. *European Journal of Scientific Research*, 152, 116-127.

AMMAN STOCK EXCHANGE. (2020). Annual Report.

ASSOCIATION OF BANKS IN JORDAN . (2020). Annual Report.

BASHATWEH, A., & AL-SHEIKH, E. (2020). Financial Performance Evaluation of the commercial banks in Jordan: Based on the CAMELS Framework. *International Journal of Advanced Science and Technology*, 29(05), 985-994.

BAWANEH, A., & DAHIYAT, A. (2019). Performance Measurement of Commercial Banks in Jordan Using the Camels Rating System. *Academy of Accounting and Financial Studies Journal*, 23(6).

CENTRAL BANK OF JORDAN. (2020). Central Bank of Jordan: Fifty seventh annual report 2020. Amman: Central Bank of Jordan. Retrieved October 26, 2021, from https://www.cbj.gov.jo/Pages/viewpage.aspx?pageID=34

DZEAWUNI, W., & TANKO, M. (2008). CAMELs and Banks Performance Evaluation: The Way Forward. Available at https://ssrn.com/abstract=1150968 or http://dx.doi.org/10.2139/ssrn.1150968.

GIRIJA , S., & NAYAK, B. (2020). A CAMEL Model Study for Financial Performance of Public and Private Sector Banks in Odisha. *Journal of Critical Reviews*, 7(13), 2486–2492.

JAWARNEH, S. (2021). Financial Performance of Commercial Banks in Jordan: Application of the CAMELS Model. *Prosperitas*, 8(2), 4. https://doi.org/10.31570/prosp_2021_0004

KADDUMI, T. (2017). Soundness of Jordanian banks – Camel approach. *International Journal of Economic Research*, 14(10), 119-127.

KUMHOF, M., & JAKAB, Z. (2016). The Truth about Banks. *Finance & Development*, 53(1), 50–53.

MISHKIN, F., & SERLETIS, A. (1995). *The Economics of Money, Banking, and Financial Markets.* Toronto: Pearson Canada Inc.

MISHRA, S., & AGARWAL, D. (2013). Measuring performance of banks using the CAMELS model: a comparative study of CBI and IB. *International Journal of Management Research and Review*, 3(5), 2914–2922.

MISHRA, S., & ASPAL, P. (2012). A CAMEL model analysis of state bank group. Proceedings of 19th International Business Research Conference. Available at SSRN: https://ssrn.com/abstract=2177081 or http://dx.doi.org/10.2139/ssrn.2177081

NATIONAL CREDIT UNION ADMINISTRATION. (2021). CAMELS Rating System. Proposed Rules (March 9), pp. 13494 - 13498. Retrieved October 26, 2021, from Regulations.gov: https://www.regulations.gov/document/NCUA-2021-0030-0001

OECD. (2013). The role of banks, equity markets, and institutional investors in long-term financing for growth and development: Report for G20 Leaders. February. OECD. https://www.oecd.org/finance/private-pensions/G20reportLTFinancingForGrowthRussianPresidency2013.pdf

ONGORE, V., & KUSA, G. (2013). Determinants of Financial Performance of Commercial Banks in Kenya. *International Journal of Economics and Financial Issues*, 3(1), 237–252.

SAMUEL, D. (2018). Comparative Performance Evaluation of Selected Commercial Banks in India using CAMELS Rating Model. *International Journal of Global Sustainability*, 2(1), 24–38.

TRUNG, N. (2021). Determinants of bank performance in Vietnamese commercial banks: an application of the camels model. *Cogent Business & Management*, 8(1). http://dx.doi.org/10.1080/23311975.2021.1979443

Changing in-Store Customer Behaviour in Hungary During the Covid-19 Pandemic

TAMÁS SIKOS T.
FULL PROFESSOR

UNIVERSITY OF MISKOLC
e-mail: sikos.t.tamas@uni-miskolc.hu

CSABA JÓZSEF KOVÁCS
RESEARCHER

FOOD CHAIN RESEARCH DEPARTMENT;
INSTITUTE OF AGRICULTURAL ECONOMICS
e-mail: kovacs.csaba@aki.gov.hu

SUMMARY

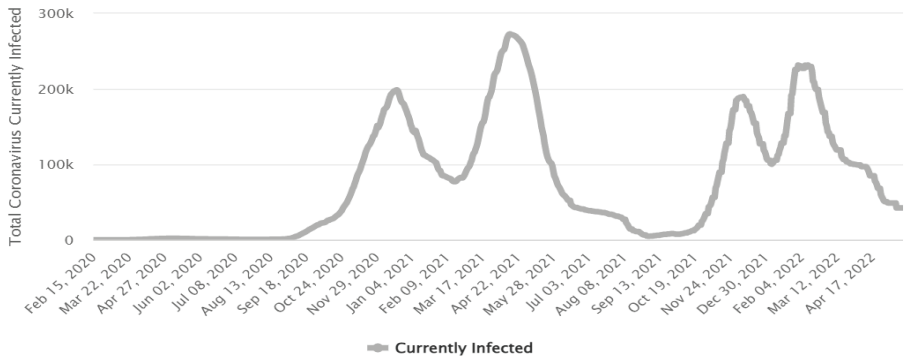
The spread of the coronavirus pandemic has fundamentally changed all aspects of our lives, but the new situation has certainly had the greatest impact on mobility and the way we use space. The health crisis and the strict restrictive measures have had a major impact on the retail sector as well, and have changed our shopping habits. Although the epidemic threat is still not over, the accessibility to coronavirus vaccines has led to more relaxed measures in Hungary than in the past. The high vaccination rate of the population was also an important milestone for shops, as this measure allowed customers to freely visit their favourite stores. The main objective of the study is to show how store visiting habits of Hungarian shoppers have changed until the end of third pandemic wave in Hungary. Results are based on primary researches conducted independently and in collaboration with our colleagues. On the basis of these researches, we have attempted to track the main changes in shopping habits during the different waves of the coronavirus pandemic in Hungary.

Keywords: COVID, store visits, shopping behaviour, retail business, Hungary
Journal of Economic Literature (JEL) code: L81, R12
DOI: http://doi.org/10.18096/TMP.2022.01.07

INTRODUCTION

The coronavirus pandemic has had a significant impact on the retail sector, to which retail stores have had to adapt at a rapid pace (Vizuete-Luciano et al. 2022). The fear of the COVID-19 virus has accelerated the consumer acceptance of online shopping and different types of delivery systems among customers, especially in the case of Fast Moving Consumer Goods (FMCG) products (Kovács Cs. J. 2021). It has changed their shopping habits with a speed unimaginable before the coronavirus pandemic. Mobility restrictions to slow down the spread of the virus have also supported these retail channels. As a result of these processes, studies about changes in shopping habits have recently become a popular research topic in both the Hungarian literature (e.g. Németh et al. 2021, Keller & Huszka 2021, Madarász et al. 2022) and the international marketing literature (e.g. Jensen et al. 2021, Baarsma & Groenewegen 2021, Rossolov et al. 2022).

The main aim of this study is to identify and describe changes in shop-going behaviour in Hungary from the declaration of a health emergency[i] until the abolition of the face mask wearing obligation[ii] (11 March 2020 - 3 July 2021). In Hungary, the timing of the coronavirus waves (Figure 1) was very similar to that of other countries in the Eastern-Central European region. However, the national immunization schedule in Hungary progressed more rapidly than other European countries during the spring of 2021. The gradual lifting of restrictions was linked to the number of first vaccinations, which was undoubtedly an important factor motivating motivating to become vaccinated (Szabó 2021).



Source: Worldometer (2022)

Figure 1. Number of active coronavirus cases in Hungary since the beginning of the epidemic

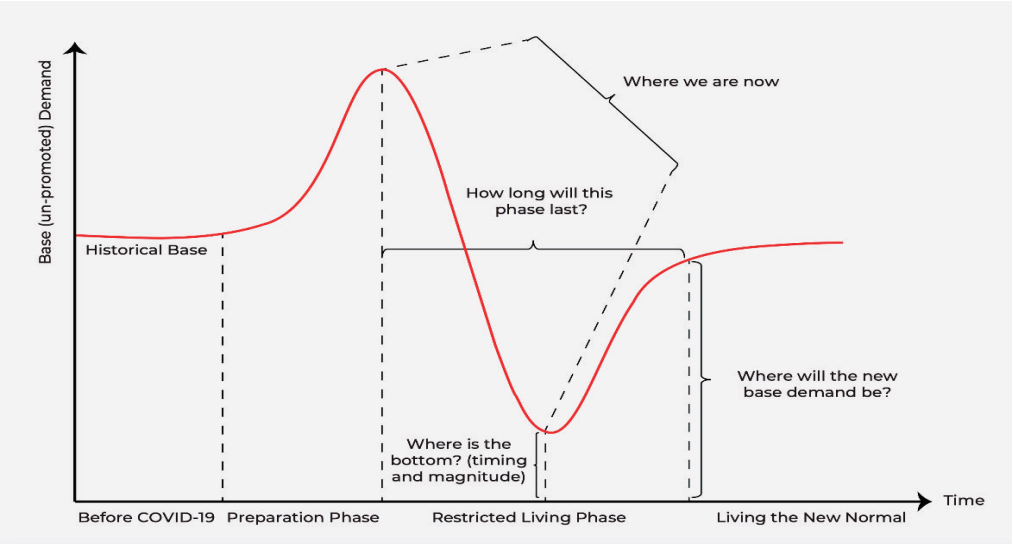
In this paper, we review the literature on the international trends that have characterised the behaviour of retail customers during the Coronavirus pandemic in the previous years. We also created a logical framework that has been applied to identify and distinguish the main stages in the spread of the coronavirus. In the methodological section of the study, we presented the research that we have conducted over the previous years to get a better understanding of the store visiting behaviour of Hungarian shoppers. Finally, we summarized main research findings and draw conclusions in the last section.

EVOLUTION OF SHOPPING HABITS IN THE EPIDEMIC PHASES – LITERATURE REVIEW

Some new shopping behaviours and attitudes could be observed in all stages of the coronavirus pandemic, but there were also a number of them that were only related to a smaller, more limited period of the coronavirus crisis. Therefore, it was crucial to delineate and characterise the main stages of the COVID pandemic on the basis of marketing literature in the first phase of the research work.

The market research company Nielsen (2020) published a threefold approach on its website. Firstly, they distinguished the stage of preparation for an epidemic, which is essentially a period of panic buying and stockpiling. They envisaged the middle phase as a period of uncertain outcomes, characterised by both closures and easing of restrictions. According to this model, new shopping habits become embedded in daily routines and a transformed consumer mindset emergesing after the end of coronavirus pandemic in the last phase of the crisis.

The tripartite approach is suitable to the examination of basic necessities (Ayer & Gurman 2020), as it provides an adequate reflection for the expected evolution of the demand curve for basic needs (Figure 2).



Source: Ayer & Gurman (2020)

Figure 2. Demand for essential categories during and after the outbreak

According to GKI Digital (2021), the on-going health emergency should be broken down into five key periods. This approach can be best applied when the analysed product category is not among the essential needs. In accordance to this five-stage approach, consequences of the coronavirus pandemic had already begun before the declaration of the emergency. Though the danger of coronavirus epidemic was perceived by market actors, there were no general responses to the potential risks ("the calm before the storm"). In the second stage, there was a mass preparation and panic buying ("panic buying"). This was followed by the period of restrictions, when the frequency of store visits was significantly reduced ("quarantine period"). In the fourth stage, the discipline of communities was reduced and the restrictive measures were relaxed ("habituation to the health crisis"). In the final phase, all restrictive measures will be phased out at the very end of the emergency ("the new normal").

In the models described above, a one-epidemic-wave scenario was envisaged by economists. Therefore, we considered that it is necessary to modify their model to account for the effects of the second and third epidemic waves in the course of our research in order to place changes in consumer behaviour into a more suitable logical framework. (Sikos T. & Kovács Cs. J. 2022). For this purpose, we developed a new time series in the model to reflect the key specifities of the pandemic more properly in the study (Table 1).

Table 1
Changes in shopping habits over time in the wake of the COVID-19 epidemic

Period	Most important feature	Shopping turnover
Before coronavirus pandemic	Normality	Normal
Preparing for pandemic	Accumulation, panic buying	Extreme increase
Curfews & restrictions	Consumer awareness, the purchase of essential goods	Decrease
After mass vaccination	Non-purchase of products, "revenge shopping"	Increase
At the end of the pandemic	"New normality" (adaption)	Decrease

Source: Sikos T. & Kovács Cs. J. (2021)

In the first phase of the outbreak, people prepared for a period of restrictions on movement. During this stage of the crisis, the fear of the virus and a sudden surge in demand for retail products led to panic shopping in stores (Sikos T. et al. 2021a). During the period of panic shopping, the stocking of basic food products generated the highest turnover in the FMCG retail sector (Tyagi et al. 2020). In large part of the rapid growth of the online retail sector, the impending coronavirus epidemic has led to an even greater increase in the Courier, Express and Parcel Services (CEP) as well. The turnover in the sector almost doubled by April 2020 compared to the previous year (KSH 2020). In addition to these, the popularity of various digital solutions in stores also skyrocketed. The main driver of the grown acceptance of these solutions was the increased customer demand for contactless shopping (Pintér 2020). It is also worth highlighting the importance of generational differences between new online shoppers, as older generations have been more affected by the digitalisation in consumer behavior caused by the health crisis than younger generations (Jordan 2020).

Subsequently, during the phase of restrictive mobility measurements, the number of in-store purchases and the length of time that was spent in the shops dropped significantly. Meanwhile, shopper

awareness has become an increasingly important factor in the composition of shopping baskets. This stage of the pandemic situation, partly due to the declining impulse purchases and partly because of the economic uncertainty and the worsening living conditions of households, the total value of shopping baskets showed a downward trend in the retail sector (Portfolio 2020). An increase in price sensitivity has been an other major consequence of the pandemic crisis, but health and environmental awareness have also increased in shopping decisions (Orîndaru et al. 2021). However, the importance of these aspects varied widely across countries, mainly depending on avarage income levels (Nielsen 2021).

The mass vaccination and the easing of the epidemic situation in the number of active cases led to a gradual or complete abolition of lockdown measures in many European countries in the summer of 2021 (Hotrec 2021). The new situation allowed for the replacement of previously postponed purchases of products and the experience of in-store shopping in most of these advanced economies. Here we see a phenomenon which is often associated with purchases that exceed the real needs of customers, a behaviour known in the international marketing literature as "revenge shopping" (Lins et al. 2021). Revenge shopping occurs when customers suddenly get access to goods or services after a frugal consumer spending period (Ström 2021). At this stage of the epidemic crisis, new buying habits were already established, and therefore there were no significant changes in customer behaviour expected in the wake of the new epidemic waves.

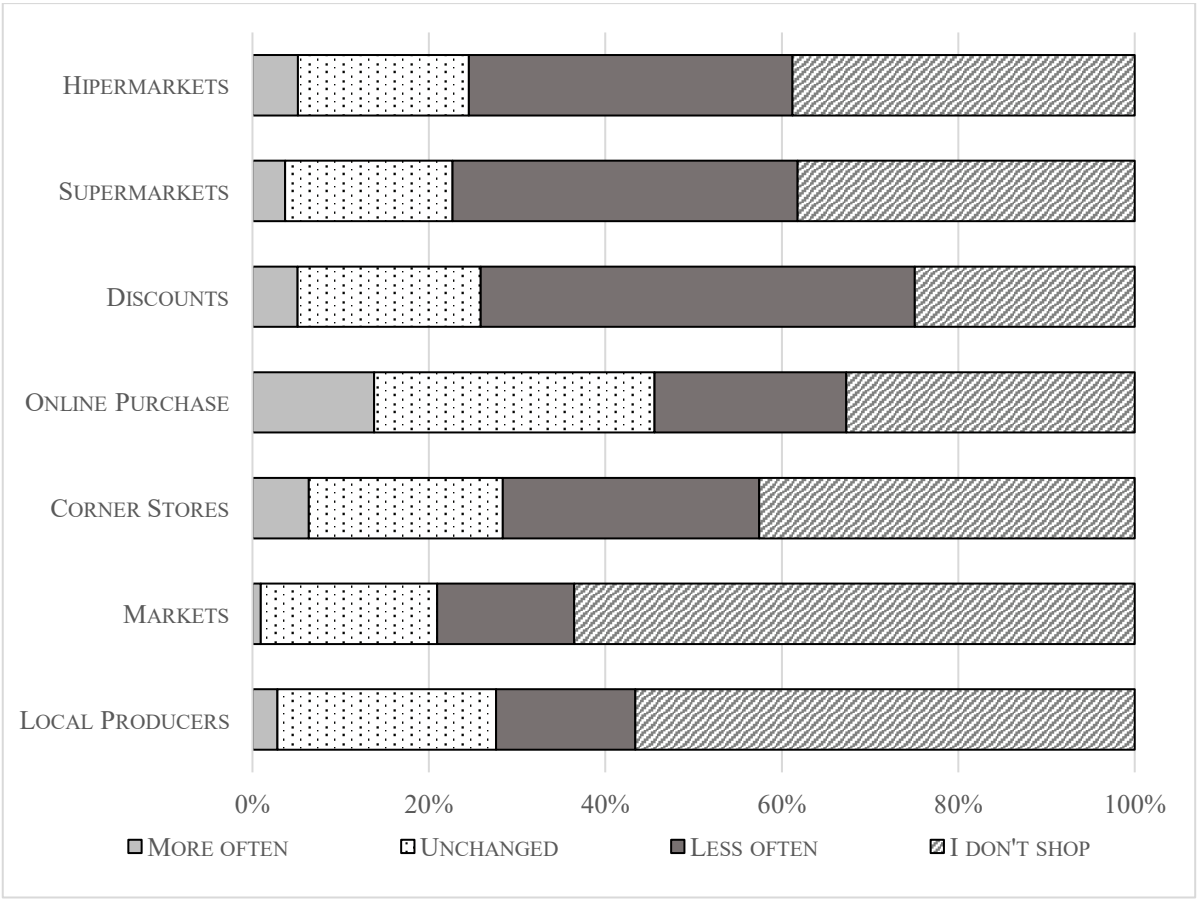
However, the period of "new normal" has not yet arrived. The economic consequences of the epidemic situation continue to have a major impact on consumer behaviour. The main reasons for this can be attributed to a number of factors, two of which are highlighted in this section. Supply chains are still disrupted, leading to shortages of many retail products in shops (Kavilanz 2022). Besides of it, the prolonged epidemic situation and the rising inflation due to restrictive measures are decreasing shoppers' living standards. This has an impact on the size of shopping baskets and negatively affects shoppers' price sensitivity as well (Yang et al. 2022).

METHODOLOGY

In this paper, we present results of our three previous studies to identify main changes in shopping behaviours in Hungary. Primary data were gathered anonymously through a self-completed online questionnaire survey in Google form on the Facebook social networking site in all three previous studies, but at distinctly different stages of the epidemic. The aim of the first customer survey was to observe the impact of the first wave of the coronavirus epidemic on a sample of 450 people, including in particular consumer reactions to panic buying. The questionnaire survey was conducted in March 2020 (see Sikos T. et al. 2021b for more details). The number of respondents for the second survey was 353 people. Data were collected after the lifting of the spring restrictive measures in June 2020 (for more details see Kovács 2021). The third survey was carried out at the end of May 2021 and a total of 310 respondents completed the questionnaire (for more information see Sikos T. & Kovács Cs. J. 2022). All samples were characterised by an over-representation of women, residents of the capital and respondents with tertiary education compared to the actual demographic composition of the Hungarian population. For these reasons, surveys cannot be considered to representative of the entire society. The use of a similar methodology makes primary data that were extracted from the three questionnaire samples comparable to each other. Analyses were carried out with descriptive and mathematical-statistical methods.

RESEARCH RESULTS

The results of the first survey confirmed the hypothesis that the retail sector has been severely affected by the impact of the coronavirus situation. When analysing the data as a proportion of respondents, the frequency of food shopping occasions for retail shoppers in March 2020 across all sales channels decreased significantly compared to March of the previous year due to the emergency (Figure 3).

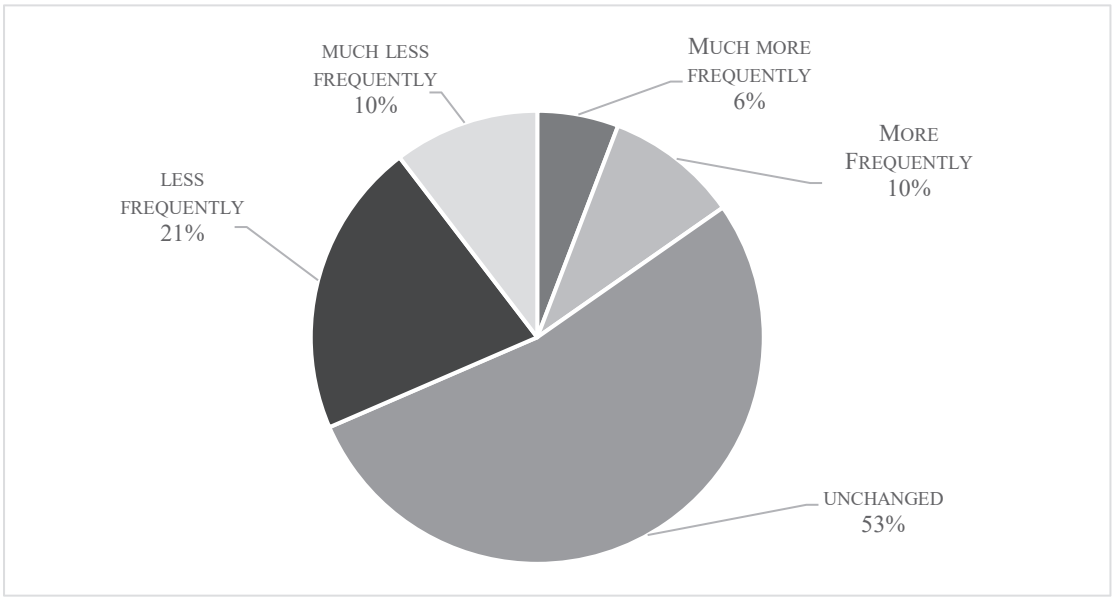


Source: Sikos T. et al (2021)

Figure 3. Comparison of the frequency of food shopping before and at the beginning of the COVID-19 pandemic in Hungary, March 2020, N= 423-432 (varies by store format)

Shops selling through online channels were clearly in the best market position, with 46% of shoppers buying online as often as or more often than before the coronavirus pandemic. In contrast, all in-store formats were in a significantly worse situation. Shoppers reported that they were shopping less often in these store formats, because of the epidemic situation (28.4 – 20.9%). There was a particularly large difference in the category of more frequent buyers, which also indicates a weakening of the position of in-store sales channels compared to internet retailers. Local markets and producers were in the most difficult market position, because there were a particularly high proportion of people who did not shop at all in these retail formats. Meanwhile discount retail chains proved to be the most resistant in this respect. Only 24.9% of shoppers did not visit these shops. Other types of retail formats showed almost the same level of dispersion, ranging from 38.2% to 42.6%.

We compared these research results with from responses of another questionnaire survey (Kovács Cs. J. 2021). It also shows the lasting impact of the coronavirus crisis on the trend in the frequency of store visits. Nearly 53% of the respondents in the second questionnaire survey at the time of the temporary lifting of the stict mobility restrictions in spring 2020 answered that they did not plan to change the frequency of their store visit occasions compared to the period before the coronavirus epidemic (Figure 4).

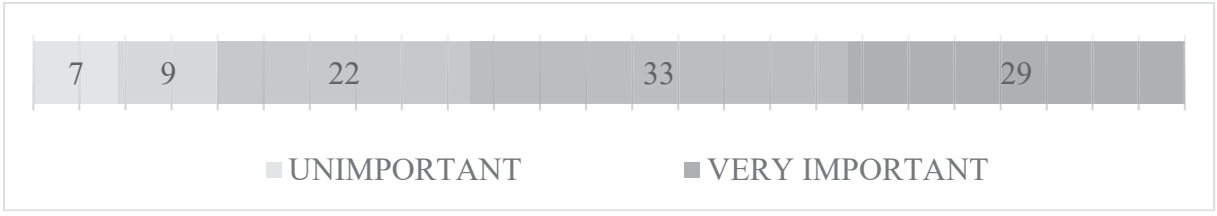


Source: Kovács Cs. J. (2021)

Figure 4. Planned frequency of shop visits after the epidemic, compared to 2019, N=327

Among those respondents who wanted to make a lasting change in their in-store visiting behaviour after the coronavirus pandemic, the majority planned to reduce shopping occasions. There was no statistically verifiable correlation between the age and the place of residence of respondents. Roughly, a third of potential shoppers intended to increase the number of occasions they go to the stores, while two thirds would shop less often in the stores in the future. These are particularly drastic shifts in shopper preferences given that only a quarter of a year had elapsed between the two surveys. However, it is important to stress that there is no comparison between the respondents' perceptions and the evolution of actual sales figures. These results only provide information for the analysis of customer expectations, which may change in a short period of time, depending on how the epidemic situation develops.

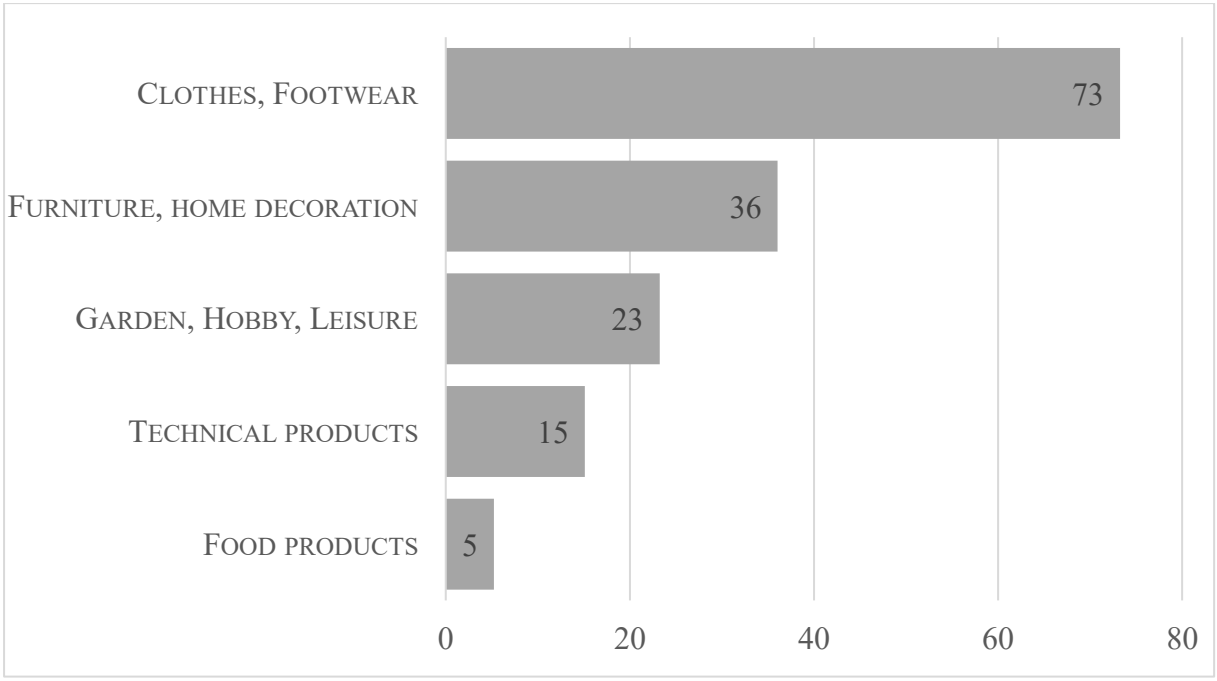
In addition to these conclusions, the third questionnaire survey (Kovács Cs. J. 2021) shows that respondents still feel the importance of viewing products in person, despite the rapid growth of online retailing in market share (Figure 5).



Source: Sikos T. & Kovács Cs. J. (2021)

Figure 5. Preference for personal viewing as a percentage of responses (%), N=309

According to the primary data, 62% of respondents feel that face-to-face visits are rather important or very important when shopping, while only 16% of them consider it a less relevant influencing factor when purchasing retail products. No statistically significant relationship between age groups could not be detected in the questionnaire sample based on the cross-tabulation analysis. These results suggest that the majority of shoppers in product categories requiring personal viewing are likely to prefer in-store locations for products, even with the significant improvements in logistics solutions following the end of the epidemic. Finally, we examined whether shoppers plan to make up for their postponed product purchases after mass vaccination and the reopening of stores (Figure 6).



Source: Sikos T. & Kovács Cs. J. (2021)

Figure 6. Breakdown of postponed purchases by product category (%), N=272

The results showed that a narrow majority of respondents (56%) would like to make up their postponed purchases in at least one product category. The highest proportion of respondents (73%) will make up for their postponed purchases in the clothing and footwear product categories. Undoubtedly, this is an exceptionally high propotion, even taking into account that the rotation rate for clothing is higher than for the next-most-popular product category. Within the furniture and housing product categories, 36% of respondents plan to make purchases. Public subsidies for the renovation and modernization of houses from the Hungarian government certainly have an important impact on this category. In addition, puchases in the case of garden, hobby, leisure (23%) can be considered a moderately high proportion as well. However, it must be noticed that answers were gathered after the spring seasonal peak of this product category.

CONCLUSION

In this study, we examined the impact of the coronavirus on store-visiting patterns at different stages of the COVID-19 epidemic. Overall, results of the research about shoppers in Hungary are in line with consumer responses that were identified in the international literature. Our findings were conducted by empirical research methods through questionnaire surveys. Among other things, the analyses have contributed to a better understanding of the panic shopping phenomenon in Hungary. Results of questionaire responses confirmed that shoppers became more conscious of their purchase decisions in stores during a transitional period of restrictions and relaxations. This mainly showed up in an overall increase in price sensitivity and in spending shorter shopping time, but it could be clearly observed in the increased importance of environmental and in health-consciousness among consumers as well. Besides these phenomena, the presence of 'revenge shopping' was also detected from the survey responses in Hungary, though the extent of the impact varied by product categories.

The market position of small shops has been further weakened by the coronavirus epidemic in relation to multinational retail companies. While the in-store shopping experience remained an important influencing factor, digital solutions and product delivery, in particular home delivery, have become an essential claim for all retailers. Research findings in the study confirmed that the process of adaptation to digital technologies has accelerated significantly during the epidemic, especially among the older generations. Online retail sales increased significantly in the coronavirus pandemic, with the most dynamic growth in FMCG. If not for the recent health crisis, the distribution of online purchases among retail channels and the prevalence of use of various digital solutions in retail stores by customers would have reached its current level in the next 5-10 years.

REFERENCES

AYER, A. & GURMAN, S. (2020): COVID-19: It is All About the Baseline for Retail & CPG. WNS website. https://www.wns.com/insights/articles/articledetail/764/covid-19-it-is-all-about-the-baseline-for-retail-and-cpg (downloaded: 02.02.2022.)

BAARSMA, B. & GROENEWEGEN, J. (2021): COVID-19 and the Demand for Online Grocery Shopping: Empirical Evidence from the Netherlands. *De Economist*, Springer, 169(4), 423-426.

GKI DIGITAL (2020): A koronavírus nyertese?! – lendületben az e-kereskedelem [Profiting from the coronavirus?! - e-commerce on the rise]. 7 May. GKI Digital marketing research firm homepage. https://gkidigital.hu/2020/05/07/koronavirus/ (downloaded: 03.07.2021.)

HOTREC (2021): Lockdown measures eased throughout Europe over the course of summer 2021. 15 September. HOTREC Hospitality Europe website. https://www.hotrec.eu/newsletter/live-from-brussels-issue-105/lockdown-measures-eased-throughout-europe-over-the-course-of-summer-2021/ (downloaded: 02.02.2022.)

JENSEN, K., YENERALL, J., CHEN, X. & YU, T. (2021). US Consumers' Online Shopping Behaviors and Intentions During and After the COVID-19 Pandemic. *Journal of Agricultural and Applied Economics*, 53(3), 416-434. doi:10.1017/aae.2021.15

JORDAN, K. (2020): How COVID-19 is impacting boomers' shopping behavior. The pandemic has shifted boomers' priorities. 9 June, blog. National Retail Federation website. https://nrf.com/blog/how-covid-19-impacting-boomers-shopping-behavior (downloaded: 03.06.2021)

KAVILANZ, P. (2022). Here's why grocery stores are struggling to stock their empty shelves. 11 January. CNN website. https://edition.cnn.com/2022/01/11/business-food/grocery-store-shelves-empty/index.html (downloaded: 29.01.2022)

KELLER, V. & HUSZKA, P. (2021): Élelmiszer-vásárlási szokások a koronavírusjárvány második hullámában. [Food Purchasing Habits in Times of the Second Wave of the Coronavirus Pandemic] *Gazdálkodás*, 65(2), 158-171.

KOVÁCS, CS. J. (2021). Vásárlói döntések az online és offline térben. [Customer Buying Decisions in Online and Offline Environments]. PhD thesis, Hungarian University of Agriculture and Life Sciences.

KSH (2020): A kiskereskedelmi forgalom többéves növekedését törte meg áprilisban a koronavírus okozta járvány gazdaságba begyűrűző hatása. [Several years of growth in retail sales interrupted in April by the economic spill-over of the coronavirus outbreak]. Hungarian Central Statistical Office. https://www.ksh.hu/docs/hun/xftp/idoszaki/kiskereskedelmi-forgalom/index.html (downloaded: 03.09.2021)

LINS, S., AQUINO, S., COSTA, A. R. & KOCH, R. (2021). From panic to revenge: Compensatory buying behaviors during the pandemic. *International Journal of Social Psychiatry*. doi: https://doi.org/10.1177/00207640211002557

MADARÁSZ, T., KONTOR, E., ANTAL, E., KASZA, G.,SZAKOS, D. & SZAKÁLY, Z. (2022). Food Purchase Behavior during the First Wave of COVID-19: The Case of Hungary. *International Journal of Environmental Research and Public Health*, 19, 872. doi: https://doi.org/10.3390/ijerph19020872

NÉMETH, P., LÁZÁR, E., SZŰCS, K. & TÖRŐCSIK, M (2020). Vásárlási szokások változása a koronavírus okozta járványhelyzet hatására - az online vásárlási magatartás vizsgálata. [Changes in shopping habits due to the coronavirus epidemic – examination of online shopping behavior] In: Ercsey, I. (Ed.), Marketing a digitalizáció korában (pp. 305–315). Széchenyi István Egyetem: Győr.

NIELSEN (2020): Key consumer behavior thresholds identified as the coronavirus outbreak evolves. Nielsen website. https://www.nielsen.com/us/en/insights/article/2020/key-consumer-behavior-thesholds-identified-as-the-coronavirus-outbreak-evolves/ (downloaded: 08. 08. 2020)

NIELSEN (2021): Unlocking consumption: Four consumer groups driving spend. 22 February. Nielsen website. https://nielseniq.com/global/en/insights/analysis/2021/unlocking-consumption-four consumer-groups-driving-spend/ (downloaded: 03.06. 2021)

ORÎNDARU, A., POPESCU, M., CĂESCU, Ș., BOTEZATU, F., FLORESCU, M. S. & RUNCEANU-ALBU, C. (2021). Leveraging COVID-19 Outbreak for Shaping a More Sustainable Consumer Behavior. *Sustainability*, 13 (11), 1-19.

PINTÉR, R. (2020). Beköszönthet-e az érintésmentes vásárlás korszaka? [Could the era of contactless shopping be dawning?] 5 May. g7 website. https://g7.hu/tech/20200505/bekoszonthet-e-az-erintesmentes-vasarlas-korszaka/ (downloaded: 09.10.2021)

PORTFOLIO (2020). A koronavírus-járvány nagy változásokat hozott az üzletekben [The coronavirus outbreak has brought big changes to business]. 13 December. Portfolio website. https://www.portfolio.hu/uzlet/20201213/a-koronavirus-jarvany-nagy-valtozasokat-hozott-az-uzletekben-461568

(downloaded: 2021.09.03)

ROSSOLOV, A., ALOSHYNSKYI,Y. & LOBASHOV, O. (2022). How COVID-19 Has Influenced the Purchase Patterns of Young Adults in Developed and Developing Economies: Factor Analysis of Shopping Behavior Roots. *Sustainability*, 14 (2), 941. https://doi.org/10.3390/su14020941

SIKOS T., T. & KOVÁCS, CS. J. (2022). Generációk fogyasztási szokásai: Y generáció és 60 év fölötti nemzedékek. [Consumption patterns of generations: Generation Y and generations over 60] In: Sikos T., T. & Molnár, D. (Eds.): A COVID-19 világjárvány hatása a kiskereskedelemre. Akadémiai Kiadó, Budapest (in press)

SIKOS T., T. & PAPP, V. & KOVÁCS, A. (2021a). Panic Buying in Hungary During Covid-19 Pandemic '*Review of Business and Management' Theory, Methodology, Practice* 17 (1), 53–65. http://doi.org/10.18096/TMP.2021.02.06

SIKOS T., T. & PAPP, V. & KOVÁCS, A. (2021b). A vásárlói magatartás változása a COVID-19 idején [Changes in Hungarian shopping behavior during the first wave of COVID-19] *Területi Statisztika,* 61 (2), 135–152. https://doi.org/10.15196/TS610201

STRÖM, B. (2021). Revenge Shopping 101: What Is It and Why Is It Important? https://ombori.com/blog/revenge-shopping (downloaded: 13.05. 2022)

SZABÓ, K. (2021). Magyarország lassan elveszti előkelő helyét az európai első adagos oltási ranglistán [Hungary slowly losing its place in the European first-dose vaccination ranking]. 28 May. Atlatszo website. https://atlatszo.hu/adat/2021/05/28/magyarorszag-lassan-elveszti-elokelo-helyet-az-europai-elso-adagos-oltasi-ranglistan/
(downloaded: 23.01.2022)

TYAGI, P., SINGH, U. & SHARMA, R. (2020). Panic shopping in COVID 19 pandemic: A comparative study of eastern and western culture. *International Journal of Creative Research Thoughts,* 8 (8), 44–49.

VIZUETE-LUCIANO, E., BORIA-REVERTER, S., SOLÉ-MORO, M.L. & GIL-LAFUENTE, A.M. (2022). Adaptation of Grocery Stores to the Post-Covid-19 Environment. The Case of Barcelona. In: Gil-Lafuente, A.M., Boria, J., Torres, A., Merigó, J.M., Kacprzyk, J. (eds) Computational and Decision Methods in Economics and Business. REDCID 2019. Lecture Notes in Networks and Systems, vol 388. Springer, Cham. https://doi.org/10.1007/978-3-030-93787-4_17

Worldometer (2022). Active Cases in Hungary https://www.worldometers.info/ coronavirus/country/hungary/ (downloaded: 13.05. 2022)

YANG, B., ASCHE, F. & LI, T. (2022). Consumer behavior and food prices during the COVID-19 pandemic: Evidence from Chinese cities. *Economic Inquiry,* 60 (3), 1437–1460. doi: https://doi.org/10.1111/ecin.13067

[i] A Kormány 40/2020. (III. 11.) Korm. rendelete veszélyhelyzet kihirdetéséről [Government Decree 40/2020 (III. 11.) on the declaration of a state of emergency]

[ii] 365/2021. (VI. 30.) Korm. rendelet a védelmi intézkedések lépcsőzetes feloldásának hatodik fokozatára tekintettel a veszélyhelyzet idején alkalmazandó védelmi intézkedéseket szabályozó kormányrendeletek módosításáról [Government Decree 365/2021 (30.VI.) amending the Government Decrees regulating the protection measures to be applied during an emergency with regard to the sixth stage of the staggered lifting of protection measures]

Paper submission

For information on our paper admission and peer reviewing policies please contact the T(heory) M(athodology) P(ractice) website at: http://tmp.gtk.uni-miskolc.hu/

Formatting guidelines for submitted papers

All submitted papers should include the following sections

- Title of the paper
- Name of the author(s)
- Academic degree (e.g. PhD.) and title (e.g. Professor) of the author(s)
- E-mail address of the author(s)
- Institutional affiliation (e.g. university) of the author(s)

+

- Abstract of the paper
- Keywords
- Journal of Economic Literature (JEL) codes
- Introduction, Research question
- Literature review
- Data and/or methods
- Main findings and their relation to the reviewed literature
- Conclusion
- References

Further formatting details

- **Authors are encouraged not to use any special text formatting at all**
- The **text** should be single-spaced, using Times New Roman 12-point font, no blank lines between paragraphs, no pagination
- The **abstract** should be 50-100 words long, in a single paragraph
- For library indexing and on-line searching you are encouraged to provide up to 5 **keywords**, separating them with semicolons (e.g. apple; pear; grapes)
- Within the text of an article references are to be cited by the last name of author(s) and year of publication; the **text citation of references** should be within parentheses – e.g. (Porter 1997), (Otley & Wilkinson 1988), (James et al. 2001)
- **Figures and tables** are to be inserted in the text, and are numbered consecutively; reference citation is also to be provided; when preparing the figures please consider that the final copy will be published in black and white format
- Please use **footnotes** sparingly, and indeed, try to avoid footnotes altogether; you can include all peripheral remarks in the text within parentheses, if you prefer
- Only black and white **photographs** can be published in the proceedings
- **References** to original sources for cited material is to be listed together at the end of the paper; the list of references shall be arranged in alphabetical order
  - Authors should check if a DOI is available for the cited work (using http://search.crossref.org/); if yes, it should be put in the references in the following format: http://dx.doi.org/DOI
- The list of references may only contain items cited in the text; an English translation of the title of non-English papers in the references must be added
- Recommended references format:
  - **Journal articles**: Author, A, & Author, B. (2010). Title of journal article. Title of journal, volume number (issue number), first page-last page. http://dx.doi.org/xxx.xxxx
  - **Books**: Author, A., Author, B., & Author, C. (2010). Title of book. City: Publisher. http://dx.doi.org/xxx.xxxx
  - **Edited books**: Author, A., & Author, B. (2010). Title of chapter. In E. Editor (Ed.), Title of book (pp. first page-last page). City: Publisher.
  - **Conference papers**: Author, A. (2010). Title of paper, in Title of conference proceedings, date of conference, place of conference, first page-last page. Place of publication: Publisher of proceedings.
  - **On-line sources**: Author, A. (2010): Title of web article. Retrieved: December 2010: http://www.website.edu/webarticle.html