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FACTORS INFLUENCING FEMALE YOUTH PARTICIPATION IN AGRICULTURAL LIVELIHOOD GENERATING ACTIVITIES FOR SELF-CARE IN GWAGWALADA AREA COUNCIL, ABUJA, NIGERIA

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Abstract: *This study examines female youth participation in agricultural livelihood generating activities for self-care in Gwagwalada Area Council, Abuja. The objectives were to: examine the extent of female youth participation in agricultural livelihood generating activities and the income generated, determine the levels of female youth self-care responsibilities and perceived contribution of participation in agricultural livelihood activities on their wellbeing, determine factors influencing female youth participation in agricultural livelihood activities in the study area. A multistage sampling procedure was used to select 133 female youths from 13 registered youth associations. Structured questionnaire was used to collect data while descriptive statistics and Logit regression model were used to analyze the data. The results showed that 30.1% of the respondents were engaged in crop production and generated an average income of ₦420,093.02 while only 3.0% were engaged in crop produce processing and generated ₦29,250.74. Also, almost half (47.4) of them spent money to take care of themselves of between 3-4 self-care responsibilities and about 41.5 spent an average of 130,078.95 on food per day. It also showed The logit regression results indicated that factors influencing female youth participation in agricultural livelihood generating activities include age, educational status, household size, income, occupation, and distance. While the study indicates that a significant portion of female youths is engaged in crop and poultry production, their overall participation in agricultural activities is limited. The study provides critical insights into the potential of agriculture as a viable solution to youth unemployment and is an instrument of female vulnerability reduction in Nigeria. The study recommends implementing policies to improve land access for female youths, including land reform initiatives that prioritize youth ownership and leasing options. Additionally, it suggests exploring strategies to reduce production costs through input subsidies, partnerships with agricultural suppliers, and community-based resource-sharing initiatives.*

Keywords: *youth participation, agricultural livelihood, income generating activities, self-care, perceived contribution*
(JEL code: Q12, J13, J16)

INTRODUCTION

The word livelihood does not just mean what people do in order to make a living, but the resources that provide them with the capability to build a satisfactory living, the risk factors that they must consider in managing their resources, and the institutional factors that either helps or hinders them in their struggle in improving their living (Khan et al., 2020). In Nigeria people pursue multiple agricultural livelihood activities to enhance their level of living through the income they generate. The activities include crop farming, livestock rearing, trading, fishing, gathering of non-timber forest product, selling of cooked foods or snacks, food vending, tailoring and hairdressing among others (Nyitagher, 2019). Hence, the agricultural sector is viewed as an entire activities generating venture, giving the players an

ample opportunity to explore its potentials for their wellbeing and that of the society in general. It has been projected by McKinsey Global Institute, that Africa's agriculture will grow by 6% per year up to 2030 (FAO, 2020). This estimate could be realistic because of the growing number of females (youth and women) that are engaging in agricultural ventures, and are playing very important roles in all aspects of agriculture. They are undertaking in wide range of activities relating to food production, poultry, livestock, fishery production, processing, marketing among others. This is aside their role in labor supply in most agricultural operations such as ridging, planting, weeding, fertilizer application, harvesting, poultry management (WFP and WHO, 2020).

According to the 2009 gazzeted Nigerian national population headcount of 2006, by the National Population Commission, the population of youth between the ages of 20 to 40 years was 47% (ladies inclusive), thus, constituting a very important segment of the population (Adisa, 2019). This population segment provides the country the potential opportunities for higher growth of the economy and the impetus for poverty reduction, especially given the critical role of women in strengthening the nation's economy. So the need for female youth to engage in agricultural livelihood generating activities becomes very paramount (Abiala and Ojo, 2019; Fashogbon et al. 2023). This is because their engagements in agricultural livelihood provides a sort of social protection and addresses the problem of unemployment. It is indeed an openings in the agricultural sector through which the youth are inspired to venture into or participate in any area of agriculture to earn their living, which includes both on-farm and off-farm as well as non-economic activities which people indulge in to earn their income and for the future (Bello et al., 2021). Female youth are getting more involved in multiple agricultural livelihood generating activities to increase incomes and to reduce their vulnerability by bearing the responsibilities to carter for their needs. They are doing so amidst the declining returns on agricultural investment in Nigeria. This is predicated on the fact that the female youth possess innovative attributes, a fast-learning rate, unassuming endurance, knowledge acquisition propensity, minimal risk aversion, less fear of failure, capacity and ability to produce an excellent source of ideas in the agricultural sector (International Labour Organization (ILO, 2020).

Despite their contribution to the agricultural sector, female youth and women globally experience more challenges than their male counterparts. They face more restricted access to productive resources and assets, financial services, low provision of social protection (Fuhrman and Rhodes, 2020; ILO, 2020). At the same time, social norms, institutional barriers and laws limit their involvement in profitable work (Leon-Himmelstine & Phiona, 2021). It has been reported that female youth/young rural women (aged 15 to 24) globally are at a greater disadvantage than young men in terms of their participation in employment, education or training (ILO, 2020). This shows that gendered social norms have detrimental effects on female youth who are interested in participating in agricultural income generating activities and even in paid jobs. Thus, constituting serious setback to female youth and women empowerment in general. It is on this note that the study was conceived to specifically

achieve the following objectives:
i.   determine the extent of female youth participation in agricultural livelihood generating activities and the income generated;
ii.   determine the extent of female youth self-care responsibilities and perceived impact of agricultural livelihood activities on their wellbeing, and
iii.   determine the factors influencing female youth participation in agricultural livelihood generating activities.

MATERIALS AND METHODS

Description of the Study Area
The study was conducted in Gwagwalada Area Council of the Federal Capital Territory, Abuja. The area council lies in coordinates 8o57'2.9988" N and 7o4'36.2532' E and it is bordered by the Kwali Area Council in the north, by Niger State and Kuje Area Council in the east and Abuja Municipal Area Council in the north-east. Gwagwalada Area Council has a population of 507,000 people, a 6.74% increase from 2022 (Dutse et al., 2023). The area has ten wards which include: Zuba, Ibwa, Dobi, Kutunku, Tungan Maje, Gwako, Paiko, Ikwa, Staff Quarters and Gwagwalada Center. It has an alternate wet and dry season, with a mean annual rainfall of around 1500 mm and an average annual temperature which ranges from 30°C to 37°C, with the highest temperature in March. Because of the favourable climatic and soil conditions, agriculture is a prominent economic activity, aside civil and private sector's work in the Area Council. Thus, cultivating different and varying crops, livestock husbandry at small and large scale, fishing, logging, and irrigation farming. The primary food crops grown include Yam, maize, sorghum, millet, groundnut, rice, beans, melon, sweet potato, cassava, and vegetables like pepper and tomato.

Sampling Procedure and Sample Size
This study was conducted in Gwagwalada Area Council of Federal Capital Territory, Abuja. A multi-stage sampling procedure was used in selecting the respondents. In the first stage, 4 peri-urban communities having the highest registered female youth groups engaged in agricultural ventures in the Area Council were purposively selected. These are Dobi, Zuba, Paikonkore and Tunga maje Central. In the second stage, 5 official members and 5 other non-official members of each female youth groups/associations were also purposively selected from 13 youth groups, with additional 3 members selected from the largest group, giving a total sample size of 133 female youth. The selection was done based on the lists of registered female youth groups obtained from the Agricultural Development Project's (ADP's) office of the area council. A Structured questionnaire instrument was used to obtain responses from the respondents.

Method of Data Analysis
Descriptive statistics such as frequency distribution, percentages and mean were used to describe the livelihood activities engaged by the respondents and the income generated. Income generated and income spent on self-care were meas-

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ured based on averages per year, season, weeks and days respectively. While a 3 Point-type Likert Scale (Agree=3, Neutral= and Disagree=1) was used to measure perceived impact of agricultural livelihood. A mean threshold (MTH) of 2.0 was obtained from the 3point scale: 3+2+1=6 divide by 3=2. Any weighted mean greater than 2.0 constitutes agree and any mean less constitute disagree in the perception index. Also, Logit regression model was used as the inferential component to analyze the data. The cumulative logistic probability function is stated as:

$$P_i = F(Y_i) = F(\alpha) + \sum \beta_t X_{ti} = (\frac{1}{1 + e^{-(\alpha + \sum \beta_t X_{ti})}}) \quad 1)$$

Where:

e is the base of natural logarithms; X_ti denotes the tth explanatory variable (t=1,2, 3, …, k) for the ith individual; P_i is the probability that ith individual will make a certain choice (in this case participate or do not participate in agricultural livelihood generating activities) given k explanatory variables; α and $β\_t$ are parameters to be estimated (t=1,2, 3, …, k; k is number of explanatory variables). Stating the logistic model in terms of odds and log of odds will make the interpretation of the coefficients clearer (Sperandei, 2014). The odds ratio indicates the ratio of the probability that an individual would select an option (P_i) to the probability that he or she would not select it (1-P_i). When expressed in terms of odds ratio, the logit model has the following form:

$$Y_i = ln\left(\frac{P_i}{1-P_i}\right) = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_k X_{ki} + \varepsilon_i \quad (2)$$

Consequently, equation (2) was applied in this study and was treated against potential variables assumed to influence participation in agricultural livelihood generating activities. The model was estimated using the iterative maximum likelihood estimation procedure which yields unbiased and asymptotically efficient and consistent parameter estimate (Ketema et al., 2021). The explanatory variables used in the regression analysis were measured as:

X1 = Age (in years)
X2 = Marital Status (Married = 1, Otherwise = 0)
X3 = Years of formal education (in years)
X4= Household size (Numbers)
X5 = Income of respondents (Naira)
X6 = Poverty status (poor=1, non-poor=0)
X7 = Primary occupation (Farming = 1, Non-Farming = 0)
X8 = Location/Distance to Local or State Headquarters (Km)
X9 = Access to credit facility (No=1, Yes=0)
X10= cooperative membership (in years)
εi = Error Term

RESULTS AND DISCUSSIONS

Extent of Female Youth Participation in Agricultural Livelihood Income Generating Activities and Income Generated. Results from Table 1 shows the various activities from which the respondents derived their agricultural livelihood.

It indicates that 30.1% of the respondents were involved in crop farming, with an average income of ₦420,093.02 in a year and 14.3% of them were into poultry production and earned an average income of ₦216,000.00 while only 3.5% and 4.5% were engaged in crop product processing and poultry product marketing and earned ₦29,250.74 and ₦14,166.67 in a day respectively. Crop farming and poultry production have traditionally been the dominant agricultural activities engaged by farmers even in areas surrounded by urban cities. Perhaps this is so because there is always a ready market for such ventures as a result of consistent food demand throughout the year, thus considered as a very potential income-generating activity that people can be more interested. This result is in conformity with findings of Osabohien et al., (2020) and Abiala and Ojo (2019), who reported that crop farming and processing are the major agricultural livelihood generating activities engaged by female farmers in rural communities in Osun State.

Poultry product marketing (meat or egg) offers moderate but substantial income that could be used as copping strategies needed to cushion the effects of social and economic and shocks (Dutse, et al., 2024). Poultry marketing is a source of income diversification within the poultry sector, which can contribute to overall financial stability. This result is in line with FAOSTAT (2019) who stated that livestock poultry business is a lucrative business amongst young women in developing community.

However, only a few (6.8%) of the respondents were brokers or marketing agents but realized an average income of ₦4,550,500.51 in a year. This activity stands out with an exceptional high income earnings, because of high cost of livestock in the peri-urban areas which is associated with low supply to meet increased demand. This results highlight the potentials of women in moving agriculture to its adjudged position to move most developing countries economy to higher ground, Nigeria in particular (Kadzamira, et al., 2024)

Table 1: Extent of participation in agricultural livelihood income generating activities and income generated by respondents

Variable	Frequency*	Percentage	Average income (₦)
Crop farming	40	30.1	420,093.02(per yr)
Poultry production	19	14.3	216,000.00(per yr)
Livestock rearing	11	8.3	420,000.00(per yr)
Poultry marketing- meat or egg	6	4.5	14,166.67(per day)
Farm product processing	4	3.0	29,250.74(per day)
Meat marketing	11	8.3	145,050.12(per wk)
Marketing of products	9	6.8	294,444.45(per wk)
Farm labour	8	6.0	20,000.00(per season)
Food vendors/restaurants	7	5.3	22,909.09(per day)
Brokers/market agents	9	6.8	4,550,500.51(per yr)
Fruit juice making	14	10.6	116,020.43(quarterly)
Frying of eatables	16	12.0	296,486.13(per yr)

*Multiple responses allowed.
Source: Field Survey, 2023

Extent of Female youth self-care responsibilities

Table 4 showed that a lot of female youth shouldered the responsibilities of taking care of themselves, indicating a level of self-independence in meeting their own needs. A significant number (47.4) of female youth have 3-4 self-care responsibilities which they spent money, with others having up to 5 and above (29.3) self-care responsibilities. This implies that almost all the female youth are either partially or completely independent of themselves with little or no support from others. This can be established as a measure of female economic resilience to survive even at the sudden economic upheaval. The result further showed that majority (45.1%) of them spent an average amount of ₦130,078.95 for food per day and only few (15.0%) of them spent an average of ₦183,033.15 for residential/shops accommodation a month and a very decima (3.8% and 3.0%) of them spent an average of ₦14,065.38 per term and ₦40,000.15 on books and other items from their livelihood earnings respectively. Other responsibilities include spending on clothing/shoes (15%) and make-up (18.0%) as well as for transport (6.0%) expenses respectively, for beautification or personal grooming and for good appearance and for easy movement to their places of livelihood to and fro and personal visits. Also 30% and 9% of the female were responsible for Airtime/data and cellphone expenses. Thus, stresses the importance of staying connected and accessing information, because access to airtime and data is crucial for communication and accessing online information sources or digital marketing, particularly among farmers or students and also for livelihood businesses. The results provides critical insights on the quest to engage the youth in agricultural economic activities so that they can potential provide for some of their needs rather than indulging in behavior that is inimical to societal development. The results is in consonance with findings of Akinpelu (2020) who reported that majority of female youth gender shouldered the various responsibilities of catering and caring for themselves with little or no support from families or relatives and also meets up with other responsibilities. Similarly, Salisu et al.,(2017) expressed that livelihood activities are income pathways through which women make use of it to take care of their needs.

Table 2: Self-care responsibilities by female youth

Variables	Frequency	Percent	Amount spent (₦)
Levels of self-care responsibility			
1-2	31	23.3	
3-4	63	47.4	
5 and above	39	29.3	
Total	133	100.0	
Female youth self-care responsibilities			
Food	60	45.1	130,078.95/a day
Cell phone	12	9.0	81,081.02/6month
Shelter	20	15.0	183,033.15/month
Airtime/data	40	30.0	5,250.00/a day
Clothing	20	15.0	30,000.24/month
Make-up	24	18.0	15,004.36/a week
School fees	13	9.8	121,928.57/a term
Transportation	8	6.0	10,000.00/a day
Books	5	3.8	14,065.38/a term
Others	4	3.0	40,000.15/a month
Total	206*		630,441.82

Multiple responses allowed.
Source: Field Survey, 2023

Perceived contribution of participation in agricultural livelihood activities on female youth wellbeing

Table 4.3 showed that, of the nine (9) perceived contribution statements of participation in agricultural livelihood activities on female youth wellbeing, 8 perceived statements were agreed by the female youth that participating in agricultural livelihood activities has contributed in their lives and only 1 one statement was not perceived or disagreed. It indicates that female youth agreed that participation in livelihood has contributed in increased sources of income (3.0), enhances social networking and good relationship (2.9), reduces relegation of women in decision making (2.8), and improve level of and general standard of living. Only statement on the contribution of participation in livelihood create and opens good opportunities was disagreed with a weighted mean of 1.9. The results reveals a good expression of satisfaction by the female youth engaging in agricultural livelihood activities and are filled with a sense of fulfillment and pride of what they are doing to assist themselves and perhaps others in order to live a more descent and responsible life.

This also points to the potentials that abounds in agriculture which have the capacity to provide women with various empowerment schemes/activities for both adult and younger women to achieve their aspirations and dreams, thus, contributing their quarter in national development. This results concord the findings of Dutse et al (2024) and Lachaud et al. (2018) among female youth in Kaduna State who reported that a very significant number of female youth were engaged in agribusiness strongly agreed of the positive impact in participating in agricultural livelihood

Table 3: perceived contribution of agricultural livelihood activities on female youth wellbeing

Perceived impact statement	AG	N	DS	WTS	Mean	MTH
Increased my sources of income	396	0	1	397	3.0	
Improved my level of and general standard of living	294	26	22	342	2.6	
Reduces my dependency on parents and relations	282	14	32	328	2.5	
Enhances self-reliance on my ability, capacity and skills	252	36	31	319	2.4	
Create equity and open opportunities	177	16	66	259	1.9	2.0
Reduces relegation of female in decision making	348	6	14	368	2.8	
Enhances my chances of accessing medical needs	261	18	37	316	2.4	
Increases my livelihood diversification	249	24	38	311	2.3	
Enhances my social networking and relationship	384	6	2	392	2.9	
Total						

*Multiple responses
Source: Field Survey, 2023

Factors Influencing Female Youth Participation in Agricultural Livelihood Generating Activities

The result of Logit regression analysis in Table 2 revealed the Chi-square value (P<0.01) to be highly significant

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at 1 % level of probability, indicating that the parameters included in the model taken jointly are significantly different from zero and predict participation in agricultural livelihood generating activities. Six variables, out of the ten explanatory variables hypothesized to influence participation in agricultural livelihood generating activities, were found to be statistically significant at different levels of probability. These variables include age, income, household size, primary occupation and distance.

Age had a positive and significant effect on participation in agricultural livelihood generating activities. As age increases by one year, the odds in favor of participating in agricultural livelihood generating activities increases by a factor of 1.106 (equivalent to an increase of about 10.6%). This is because age is can serve as a proxy for experience and evidence of human capital acquisition. Thus, as age increases farmers accumulate experience and become more willing to participate in agricultural livelihood generating activities. This result agrees with the findings of Daudu et al. (2023) and Etim et al. (2018) for Nigeria and Ketema et al. (2021) for Eastern Ethiopia, who reported a positive and significant relationship of farmers' age on participation in agricultural activities.

The results show that education status had positive and significant effect on t participation in agricultural livelihood generating activities. Relative to illiterates, educated female youths had 52% higher odds of participation. This result is in line with that of Daudu et al. (2023) who reported that average education positively affected participation in agricultural activities. This is because of the fact that education enables farmers to obtain and analyze relevant farm information from different sources for engaging in agricultural livelihood activities. This implies that educating farmers would improve participation and increase crop productivity and thereby improve food security situation.

The result of this study also revealed that engaging in farming as a primary occupation had a negative and significant influence on participating in agricultural livelihood generating activities. The odds-ratio in favour of participating in agricultural livelihood generating activities indicates that, with other factors being kept constant, the odds of female youth whose primary occupation is farming participating in agricultural livelihood generating activities is lesser by a factor of 0.88 relative to female youth who have other primary occupations. Primary occupation is the potential source of a starting and supportive capital for other livelihood generating activities to thrive and sustained and when it is lost it affects the entire livelihood chain.

Household size had a positive and significant influence participation in agricultural livelihood generating activities. This suggests that, relative to smaller households, having a larger household increases participation in agricultural livelihood generating activities. As the household size increases by one person, the odds of participating in agricultural livelihood generating activities increases by about 15.9%. Thus, there is the tendency of female youth with larger household size to have a higher likelihood of participating in agricultural livelihood generating activities than smaller household

size because of increased responsibilities. Increase in household size may also increase labour availability and quality, which will make it easier for the female youth to participate in agricultural livelihood generating activities. This result is in consonance with the findings of Samuel and Sylvia (2019) who reported that relatively larger household size enhances the availability of labor for increased efficiency in production among farmers. This result also corroborates the argument that many farmers give birth to more children in order to augment their labour force (Agyeman-Boaten et al., 2022).

Income had a positive and significant relation with participation in agricultural livelihood generating activities. This implies that participation is likely to increase as income increases. The odds-ratio suggests that participation in agricultural livelihood generating activities is likely to increase by 26.3% if income increase. Increased income is a crucial factor when deciding to engage in a livelihood activity. A possible explanation for these results may be that increased income may help to alleviate the problem of low access to credit. Thus, it can provide the necessary input and can allow the adoption of improved technologies to enhance productivity (Fasakin et al., 2022). Rationally, as income increases, the chances of increasing agricultural investments becomes eminent and through which individuals are able to acquire basic necessity of life and build assets, for future investment, acquire livelihood asset on their own (Tesfaye, 2022). This finding is in line with those obtained by Twumasi et al. (2019) and Magagula and Tsvakirai (2020) for Ghana and South Africa, respectively.

Similarly, location and distance had a negative and significant relationship with the probability of participation in agricultural livelihood generating activities. The result revealed that for each additional distance from the area of participation in livelihood generating activities, the odds of participation decrease by 93%. This implies that the further the location of residence to the area of activities, the more it discourages participation in agricultural livelihood activities. This result is in consonance with findings of Beriso et al. (2023) which reported that women living closer to the place of their livelihood activities were more likely to be empowered and participate than those living farther away. Similar findings were reported by Ketema et al. (2021).

Table 4: Logit model estimate of the factors influencing female youth participation in Agricultural livelihood generating activities

Variables		Standard error	P>|z|	Odds ratio
Age	0.101***	0.025	0.000	1.106
Sex	0.053	0.475	0.907	1.054
Marital status	0.277	0.470	0.437	1.319
Education	0.419*	0.382	0.096	1.520
Household size	0.148*	0.097	0.078	1.159
Income	0.233***	0.077	0.000	1.263
Primary occupation	-0.129***	0.023	0.000	0.879
Location/Distance	-0.073***	0.025	0.007	0.930
Access to credit	-0.057	0.042	0.209	0.945
Years of cooperative	0.010	0.035	0.760	1.010
Constant	-5.521***	0.008	0.002	0.004
Observations	133			

LR Chi2 (10)	104.660
Prob>Chi2	0.000
Log likelihood	-76.477
Pseudo R²	0.406

Note: *** and * significant at 1 percent and 10 percent levels of probability

Source: Field Survey, 2023

CONCLUSIONS AND RECOMMENDATIONS

The findings revealed that female youths in Gwagwalada are actively engaged in more than one agricultural activities, particularly engaged in crop and poultry production, which contributes to their income. The income generated is useful in taken care of their needs and female youth were perceiving the contribution of livelihood activities to their wellbeing. The Logit regression analysis highlights that factors such as age, education, household size, income, occupation, and location significantly influence participation levels. The study, therefore, recommends the implementation of policies that facilitate easier access to land for female youths. This could involve land reform initiatives that prioritize youth ownership and leasing arrangements, ensuring that young women can secure land for agricultural activities or shop space for agribusinesses. Also, strategies to reduce the high cost of production through subsidies for inputs, partnerships with agricultural suppliers, and the promotion of community-based resource-sharing initiatives could be explored. Also, engaging youth as brokers or marketing agents should be encouraged through institutional support by establishing, for instance, modern marketing facilities such as the animal stalls and slaughter houses should be private by government and private organizations, to attract more female youth in the venture for further exploration and also provide training in agribusiness to make them more efficient in their ventures.

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THE ROLE AND IMPACT OF DIGITAL TRANSFORMATION ON THE DEVELOPMENT OF SMALL AND MEDIUM-SIZED ENTERPRISES IN HAJDÚ-BIHAR COUNTY

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Abstract: *In our survey-based research, assessed the opinions of 39 small and medium-sized enterprise (SME) leaders in Hajdú-Bihar County on digitalization, how they evaluate their employees' digital skills, what digital best practices they apply, and how familiar they are with current trends in digital best practices. In the literature review, we touch on the concepts and significance of digitalization and digital transformation, the characteristics and types of best practices, benchmarking as a tool for identifying them, and the steps involved in their implementation. We introduced four currently popular digital best practices: optical character recognition, homomorphic encryption, robotic process automation, intelligent process automation. The advantages and impact of these practices on corporate efficiency are highlighted. Based on the results, we reached the following conclusions:*
The findings show that most Hungarian companies view digitalization as an opportunity, but there are deficiencies in strategic planning and commitment. Although leaders theoretically support technological progress, 93% of companies do not have a developed digital strategy, and leaders also rate employee engagement as low. The resources allocated for digitalization investments are also low, with most companies spending only between 0-10 million HUF. The application of artificial intelligence (AI) technologies is still in its early stages, though there are positive examples. Dissatisfaction is evident regarding employees' digital competencies, particularly in problem-solving and data security. The lack of knowledge of modern digital technologies also hinders innovation. Companies' digital maturity is low, with most having only taken initial steps in this area. Often, the perceived digital intensity of the industry does not reflect reality, which can hinder development.

Keywords: *best practices; digital best practices; digitalization; artificial intelligence; efficiency*
(JEL code: O33)

INTRODUCTION

In this research, we surveyed the opinions of companies handled by an accounting firm in Hajdú-Bihar County about digitalization, how leaders evaluate their employees' digital skills, what digital best practices they use in their workflows, and whether they are familiar with current trends in digital best practices. The literature review will cover digitalization and its importance, and we will present the literature on best practices, where in addition to introducing definitions, we will discuss the steps for introducing best practices and benchmarking as one of the most suitable methods for identifying them. We also consider it important to mention change management literature, as the introduction of a best practice in a company will bring about some changes. Many digital best practices are used in business, and in our publication, we will present four practices in detail, highlighting the positive effects of their application on corporate efficiency. A separate section will be devoted to presenting the economic role of do-

mestic small and medium-sized enterprises (SMEs) to emphasize and draw attention to the fact that these businesses play a key role in Hungary's economy. We will then present the results of our research, from which we will draw conclusions.

Digitalization

Digitalization refers to the partial or full conversion of processes, objects, or content that previously existed in physical or analog form into digital form. This process can help increase the efficiency and customization of processes (Fichman et al., 2014). It is worth clarifying the difference between digitization and digitalization. The former refers to converting analog data into electronic form, while the latter involves performing operations with already digitized data and utilizing them (Éltető, 2021). Most domestic SMEs are still in the digitization phase and are mostly compelled to take advantage of digitalization opportunities due to some government measure. A similar situation occurred with the introduction of the e-invoicing system. It is also important to mention digital transformation as a key concept. This primarily refers to exploit-

ing digital technologies and integrating them into corporate processes, often affecting the entire company and requiring strategic decisions to implement (Brávecz and Krebsz, 2021). According to Matt et al. (2015), any organizational change that alters a company's products, processes, structure, or business model using digital technologies is considered digital transformation.

Digitalization can offer numerous benefits for a company, such as increasing sales volume, improving productivity, fostering innovation in value creation, and introducing new forms of interaction with customers and other business partners. In some cases, digital transformation can lead to a complete overhaul of a company's business model. These organizational changes pose continuous challenges for businesses (Brávecz and Krebsz, 2021). The Fourth Industrial Revolution, also known as digital transformation, is described by Szalavetz and Somosi (2019) as a set of rapidly spreading new applications and foundational technologies. These technologies, such as robotic business process automation, AI-based decision support systems, simulation, virtualization, cloud-based solutions, autonomous vehicles, and smart infrastructures, are deeply embedded in various segments of the economy and daily life. We are currently in the midst of a digital revolution that is fundamentally reshaping economic processes. The advancement of digitalization enables companies to organize and execute their activities electronically. Thus, businesses can trade without physical presence in any part of the world (Pajor, 2019). The concept of the digital economy is closely linked to digitalization, which refers more narrowly to a subfield of the information and communication technology sector and more broadly to all activities related to digital data. In modern economies, it may encompass an entire country's economy (IMF, 2018). The expansion of the digital economy brings numerous new economic and social opportunities, encouraging innovative activities and increasing productivity. The key players in economic development are the government, businesses, and the population, who together determine the level and pace of digitalization. These actors collectively determine the level and pace of digitalization within a given country (Brávecz and Krebsz, 2021).

In our opinion, successful digitalization requires the organization to have a comprehensive digital strategy, strong leadership support, and adequate digital competencies among employees.

Digital Strategy

A commonly mentioned requirement in the literature during digital transformation is the existence of a digital strategy, which is considered the starting point for digital transformation efforts (Hess et al., 2016). A documented strategy aligns IT and business strategies and extends across the entire organization. Furthermore, it plans organizational changes and defines those integrated business capabilities and value streams that are driven by new technologies and are able to adapt to rapidly changing market conditions (Berghaus & Back, 2016; Hirte & Roth, 2018). The digital strategy outlines and defines

the vision and roadmap that the company aims to follow. Key elements in developing the vision include setting specific and measurable digitalization goals and developing the related actions (Wade & Shan, 2020). The action plan details how to reach the desired future state, who the participants are, what steps are needed, and how much time is required for implementation (Patel et al., 2018). According to some studies, communicating the digital vision is essential (Ivancic et al., 2019). It is necessary to align the vision with the corporate strategy so that both internal and external stakeholders understand the critical role they play in the transformation. Moreover, it is crucial to communicate why IT tools are needed and what gaps they are intended to fill (Kadir & Broberg, 2020). Companies must recognize that a digital strategy needs to be continuously reassessed. It requires ongoing adaptation to the dynamically changing technological environment, new opportunities, markets, and customer needs (Matt et al., 2015; Kääräinen & Teppola, 2017).

According to Kissflow (2025), 70% of companies worldwide already have a digital transformation strategy or are currently working on one. In addition, digital transformation is considered a top priority for 74% of organizations. Furthermore, 89% of companies have already adopted a so-called "digital-first" business strategy or plan to implement one (Kissflow, 2025). "Digital First" is a business strategy that places digital technology at the center of corporate operations and customer relations. This means the company prioritizes digital channels, operates a flexible and data-driven business model, and fosters a corporate culture with a digital mindset (Savciuc, 2023). As emphasized by the literature, global trends also indicate that digital transformation holds increasing strategic importance for a growing number of companies.

Leadership Support and Role Modeling

Top management support and commitment are critical success factors in digital transformation (Fischer et al., 2020). A lack of leadership engagement can become a major obstacle during the transformation, often manifesting as resistance (Brock and von Wangenheim, 2019). Many companies establish a Chief Digital Officer (CDO) position responsible for coordinating digital initiatives. The CDO operates at the intersection of business and IT, and their role is to develop, communicate, and align the entire digital strategy across the organization (Singh & Hess, 2017). In addition to communicating the vision, leaders must also serve as role models for employees (Diener and Špaček, 2021). This is especially important when facing resistance or reluctance to adopt new methods (Bach et al., 2018). A proven method is for leaders to raise awareness of the benefits of digitalization projects (Silverio-Fernández et al., 2021). The literature recommends proactive leadership, where leaders support, motivate, and inspire teams while also listening to and incorporating employee insights (Ebert and Duarte, 2018).

Digital Skills

Technological changes compel people and businesses to

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acquire new digital skills and competencies. The EU's goal is that by 2030, at least 80% of adults should possess basic digital skills. To have at least basic digital skills, a person must be able to perform at least one activity in five different competency areas: 1. information and data literacy (e.g., searching the internet), 2. communication, 3. digital content creation (e.g., writing code), 4. security and data protection (e.g., protecting personal and company data), 5. problem-solving (e.g., installing software). According to EU research, nearly half of EU citizens lack basic digital skills, while close to 90% use the internet at least once a week. A 2021 survey revealed that only 54% of residents had basic or higher digital skills. Among EU countries, in 2021, Finland and the Netherlands had the highest proportion of people with basic or higher digital skills (both 79%), followed by Ireland (70%) and Denmark (69%) (Eurostat, 2023).

Best Practices

First, let's look at some definitions of best practices. According to Bretschneider et al. (2005), the term "best practice" implies that a particular practice is superior to other alternatives and is aimed at achieving a specific goal. Andrews (2012) defines "best practices" as those practices that certain groups believe produce better results more effectively than other practices, and these more effective practices are used as examples to follow. In our opinion, one of the most comprehensive definitions was created by Hayes (2022). Best practices are a set of guidelines, ethical standards, or ideas that represent the most effective or preferable course of action in a given business situation. These practices can be developed by authorities (e.g., regulatory bodies), governing bodies, or even companies themselves (Hayes, 2022). Best practices vary widely by industry and sector but also differ by area (human resources, finance, etc.) and the nature of the problem being addressed. A best practice has the following characteristics: it has been tried and tested, delivers the best results according to benchmarking criteria, is recognized and rated as excellent by others (customers, suppliers, experts, etc.), and its outputs can be offered for sale and are valuable to others (Németh, 2015). Best practices generally come about in two ways. Organic best practices typically develop naturally after years of trial-and-error show that certain procedures are better than others. "Designed" best practices are created by an organization or manufacturing company based on research and serve as guidelines or benchmarks for other companies. Organic best practices emerge naturally as employees carry out their tasks and discover that some working methods produce better results than others. These may originate from an individual or a group as employees exchange ideas and experiences. "Designed" best practices are created by a governing organization after research is conducted on the best way to perform a task. The governing organization could be governmental, an industry group, an original equipment manufacturer (OEM), or a software company, or a company could develop a best practice for internal use. These are often similar to standards but following them is optional. They can serve as benchmarks by which an organization compares itself to another company

(Wright, 2022).

Steps for Identifying and Applying Best Practices

First, it's necessary to research what best practices are being used by companies in the given industry, particularly in the area that needs improvement. Once these practices have been successfully identified, communication with key individuals in the company is essential. It's important to define different metrics to track progress and increase accountability. Introducing a best practice will bring about changes in certain workflows, so it's crucial to prepare for employee resistance and develop a strategy to manage it. It is important to involve the relevant individuals and ensure that all necessary information is available. To fine-tune best practices, it's worth seeking help from other companies or getting feedback from your own customers. Periodically reviewing best practices is also recommended to ensure they still align with organizational changes (Hayes, 2022).

Change Management

Change is often confused with adjustment, but the two do not mean the same thing. Adjustment occurs at a specific moment and results in a new state, whereas change is a process that leads to new alternatives in the structure, behavior, culture, or perspective of the organization (Gál, 2020). Based on the extent of the change, two major categories can be distinguished: incremental and radical change. Incremental change involves changes in one or a few essential organizational characteristics. The degree of change is small, and these changes are noticeable at only a few levels within the organization. It is important to emphasize that this is a gradual, step-by-step change process, making it less dramatic and, consequently, relatively slow. Radical change, on the other hand, is the complete opposite of incremental change (Farkas, 2014). Organizations are constantly affected by internal and external environmental factors. Internal elements include human resources and processes, while external factors involve market demand or national culture, which forms the basis of organizational culture (Berde and Pierog, 2018; Bogdán and Popovics, 2023). Lewin's classic model is an essential reference in change management. Lewin divided the change process into three stages. The first is unfreezing, where detachment from the previous practice takes place. The second is changing, during which the necessary modifications are made, representing an unstable transitional state. Finally, refreezing occurs, where the focus is on solidifying the new practices (Kiss, 2021).

Based on everyday life experiences and psychological and sociological research, we can state that people naturally avoid change. Resistance can be of two types: personal or organizational. Personal reasons can be traced back to behavioral, cultural, or psychological factors. Among the psychological factors, the most significant is uncertainty avoidance, or the fear of the unknown. Transitioning to a new process requires more mental effort than performing already known, practiced operations. Among the behavioral factors, the "outsider" effect is primary. Here, the employee thinks, "You came up with this, so you deal with it alone." This completely hinders the work of external experts (Bakacsi, 2015).

According to Hofstede's national culture model, Hungarians have a significantly higher Uncertainty Avoidance Index (UAI) than Anglo-Saxon countries. In a study conducted in 2005, Hungary scored 82 points in this dimension, which is considered exceptionally high. Such countries maintain rigid codes of belief and behavior, are less liberal in their thinking, and require rules. The research examined 74 countries (Falkné Bánó, 2014).

The GLOBE study reveals that Hungarians have a lower Uncertainty Avoidance Index than the countries studied in the research. According to the survey, our Uncertainty Avoidance Index is 3.12, but it should be 4.66. The survey examined 61 countries (Bakacsi, 2014; Falkné Bánó, 2014). It can be said that the GLOBE study also confirms Hofstede's typology regarding Hungary.

However, Bogdán and Popovics (2022) observed the opposite in their research conducted in the HR department of a multinational company based in the United States but operating in Hungary. They found that the employees had so fully identified with the parent company's national and organizational culture that they did not exhibit a high degree of uncertainty avoidance.

In the following section, we will introduce four digital best practices that are gaining increasing popularity in the business world.

Digital Best Practices

Homomorphic Encryption

The goal of homomorphic encryption is to enable operations to be performed on encrypted data, allowing the data to remain encrypted while being processed. This allows tasks to be executed in an environment that cannot be fully trusted. An increasing amount of data is outsourced to cloud storage, often unencrypted, requiring significant trust in cloud storage providers. Traditional encryption avoids this issue, but the user cannot perform operations on the data unless it is downloaded to a local machine for computation (Armknecht et al., 2015). There are three types of homomorphic encryption: Partially homomorphic encryption allows only one type of operation, which can be performed an unlimited number of times. "Somewhat homomorphic" encryption allows a few types of operations but only a limited number of times. Fully homomorphic encryption allows an unlimited number of operations to be performed any number of times (Acar et al., 2018). How does the encryption process work? First, the data owner encrypts the data with a public key and sends it to the other party. The other party receives the encrypted data, performs operations on it, and sends the encrypted result back to the data owner. The owner then decrypts the data with a private key and obtains the result of the mathematical operation, which is identical to the result that would have been obtained with unencrypted data (Dilmegani, 2024).

Optical Character Recognition (OCR)

Optical Character Recognition (OCR) is an electronic or mechanical process that converts typed, handwritten, or printed text images into machine-readable text, whether from a scanned document, a photo of a document, or a "scene photo." OCR systems typically consist of two modules: text detection and text recognition. The goal of the first module is to identify all text in the image. The second module aims to interpret the text's visual content and transcribe the visual symbols into a natural language format (Li et al., 2023). An OCR system primarily relies on extracting features and distinguishing/classifying them based on patterns (Memon et al., 2020). Applying OCR software significantly reduces the need for manual data entry and retyping. Manually copying a typical document containing 300-500 words takes about 10 minutes, while OCR completes the task in 10 seconds, reducing paperwork time by 75%. The accuracy rate of OCR can reach up to 99.8%, which is much higher than that of humans. Physical documents are more prone to being lost, stolen, or damaged, while digitized documents can be stored more securely. These solutions ensure accurate data collection and efficient digitization, reducing the risk of costly human errors that can disrupt or halt processes and lead to financial penalties (Hristova, 2024).

Intelligent Document Processing (IDP)

Intelligent Document Processing (IDP) is a technology that enables the automated, direct processing of documents by capturing, extracting, and processing the data embedded in business documents. IDP uses the previously mentioned optical character recognition (OCR) to convert printed or handwritten text into machine-readable formats. It employs artificial intelligence and machine learning techniques to read, understand, and process structured, semi-structured, and unstructured data in documents like invoices or contracts, just like a human would. The use of IDP offers numerous advantages for employees and customers alike. It enhances efficiency, saving significant time, especially in industries with high volumes of paperwork, such as financial services, healthcare, logistics, and legal sectors. The processing time of invoices can be reduced by up to 90%, resulting in a 400% increase in employee productivity. This was the case at the Metro wholesale store, where the ABBYY intelligent document processing software reduced the turnaround time from 1-2 days to just a few hours. Data management becomes more accurate, processing time decreases, and customer inquiries can be responded to more quickly, resulting in an enhanced customer experience. The fast processing of documents and extraction of information allows for quicker decision-making. This is especially beneficial in industries where timely decisions are crucial, such as finance and customer service. Its scalability is another key advantage, as IDP solutions can handle a larger volume of documents without proportionally increasing labor costs as the company grows (Hristova, 2024).

Robotic Process Automation (RPA)

Robotic Process Automation (RPA) is a technology that mimics how humans interact with software to perform large-scale, repetitive tasks. RPA technology creates software

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programs or bots that can log into applications, enter data, perform calculations, execute tasks, and copy data between applications or workflows. Software robots access enterprise systems and perform tasks similar to how humans do. For example, a software robot might open a new Microsoft Excel sheet, navigate to a specific worksheet, change certain cell values, save the worksheet, and close the application (Gillis and Lawton, 2024). RPA tools can be combined with artificial intelligence to extract more context from the worksheet being worked on. Using optical character recognition (OCR), it reads text or handwriting, and natural language processing (NLP) extracts entities such as names, invoice terms, or addresses, or even creates an automatic estimate of a damage claim's value based on a picture.

RPA technology can help companies in their digital transformation processes in several ways. It enables better customer service processes, increases task accuracy as bots perform repetitive tasks, reduces costs due to fewer manual and repetitive tasks, and dramatically decreases processing time. Overall, significant efficiency gains can be achieved by digitizing and auditing process data (Gillis and Lawton, 2024).

Intelligent Process Automation (IPA)

Intelligent Process Automation (IPA) is a combination of technologies used to manage and automate digital processes. IPA is designed to assist employees in completing the manual, repetitive, and routine tasks they previously performed. The technologies combined in IPA include Robotic Process Automation (RPA), Artificial Intelligence (AI), Machine Learning (ML), and Digital Process Automation (DPA). With these technologies, particularly through AI, IPA can learn how to adjust and improve process flows, creating an intelligent process capable of learning and improving over time.

IPA plays an important role in automating a significant portion of corporate tasks and processes. The goal of IPA is to increase operational efficiency, enhance employee performance, and improve the responsiveness of customer interactions (Gillis, 2023).

In our opinion, the aforementioned best practices have highlighted the importance of artificial intelligence, as most of the tools mentioned are already connected to AI in some way. Furthermore, we believe that those who do not leverage the advantages of AI will soon suffer significant competitive disadvantages. After discussing digital best practices, we will explain the role of small and medium-sized enterprises (SMEs) in the Hungarian economy, emphasizing why it is crucial to support these companies and why it is so important for them to develop, especially in terms of digitalization.

MATERIALS AND METHODS

In the course of the research, we used a self-designed questionnaire based on knowledge found in the academic literature. The questionnaire consists of two parts: the first includes questions related to digitalization, while the second focuses on digital best practices. We used a five-point Likert scale, multiple-choice questions, and mostly simple yes/no questions. In cases where we believed a term might be unfamiliar to respondents, we provided a brief, one-sentence explanation to avoid misunderstandings. Additionally, we aimed to include as many examples of digital tools as possible to make it easier for respondents to complete the questionnaire. We created the questionnaire using Google Forms, which was sent out to companies handled by an accounting firm via their mailing system. The accounting firm exclusively deals with small and medium-sized enterprises, specifically 100 in total. During the available time for completion, 39 responses were received, representing a 39% response rate. It is important to note that the results of the questionnaire cannot be considered representative!

Company Information

Firstly, we will present the general information of the companies, which we asked about at the beginning of the questionnaire. The vast majority (82%) of respondents hold executive and/or ownership roles within the company. Most of the companies were founded in the early 2000s, with a dominance of those registered in 2003, but there were also newer companies, including one established in 2022. In terms of company type, most responses came from micro-enterprises, specifically thirty. Additionally, six small enterprises and three medium-sized enterprises participated in the research. In terms of company structure, the majority operate as limited liability companies, with the number matching the count of micro-enterprises. The majority of companies are active in the trade and construction industries, with eleven from the former and six from the latter sector represented.

RESULTS AND DISCUSSION

The first question concerned their perspective on digitalization. Nearly 75% of the responses view this process as an opportunity. 21% of companies considered themselves neutral, while 5% perceived it as a threat. Despite the majority of companies viewing digitalization as an opportunity, they do not have a corresponding strategy in place. 93% of organizations do not have a detailed digital strategy. In the absence of a digital strategy, there is no defined vision for the future, which leads to digital developments being implemented on an ad-hoc basis. This lack of consistency can easily result in fragmented operations. Without a strategy, it becomes difficult to recognize the potential of digital technologies, which in turn hinders innovation activities. The lack of innovation can quickly lead to a competitive disadvantage. Based on the responses, more than half of the company leaders consider themselves fully committed to digitalization. However, 30% were more critical, considering themselves neutral, and 18% did not consider themselves committed at all. The majority of leaders were more critical of their employees, with nearly 50% considering their workers neutral and 25% believing their employees are not committed to digitalization at all. Only 28% of leaders felt that their subordinates were fully committed. In our opinion, there is a slight contradiction in the fact that while the majority lack a digital strategy, most

leaders are committed to digitalization processes. However, this supports our view that digital developments are carried out on an ad-hoc basis. We believe that employee engagement is influenced by which generation is in the majority within a company. Most members of Generation Y and Z tend to be more open to adopting new technologies.

We also asked how much companies spend on digitalization. Based on the responses, it can be said that they spend relatively little on this process. 97% of the responses indicated spending between 0 and 10 million forints, and only 3% reported spending between 10 and 50 million forints. No responses were received for the 50-90 million and over 100 million categories. We received similar results when asking how much they had spent on digitalization since the outbreak of the coronavirus pandemic. 95% of companies remained in the 0-10 million forint range. One standout company spent over 100 million forints on digitalization since the onset of the pandemic. Only one company from the respondents won a state grant supporting digitalization, and that was fifteen years ago. The coronavirus pandemic triggered a form of "forced digitalization," where quick and efficient solutions had to be found in a short amount of time and at the lowest possible cost. Examples include enabling remote work, conducting sales through digital platforms, and managing customer relationships digitally.

Only 13% of companies use some form of artificial intelligence-based software or service. In this regard, there is no significant lag compared to European SMEs, as only 7% of companies use AI-based technology. According to the EU survey, 3% of Hungarian SMEs use such technology, placing Hungary at the bottom alongside Greece, Cyprus, Estonia, and Poland, just ahead of Romania, where only 1% of companies use AI-based technology. Among those companies that use such technology, nearly all use Chat GPT, and there is one company that uses multiple AI software for work purposes, including Claude AI and GitHub Copilot for coding assistance. We asked the leaders how satisfied they were with their employees' digital competencies, which the EU has designated as target areas for development by 2030. Based on the responses, 51% of leaders are completely satisfied with their employees' skills in information and data literacy, which includes internet searching, while 23% expressed dissatisfaction. A similar result was observed in online communication, with 46% satisfied and only 25% dissatisfied. The least satisfaction was expressed regarding digital content creation, with only 15% satisfied. As for security, including measures for protecting corporate and personal data, 41% of leaders were not very satisfied, while nearly 30% were completely satisfied. The last area was problem-solving, where leaders were the least satisfied. More than half (51%) expressed dissatisfaction with this skill, while only 23% were satisfied with their employees' digital problem-solving abilities. Overall, the responses indicate that leaders are generally dissatisfied with their employees' digital skills.

The questionnaire also included a question asking whether leaders had heard of any of the above-mentioned digital best practices. Respondents were provided with a brief definition for each method. Only 5% of respondents had heard of ho-momorphic encryption, and the same proportion was familiar with intelligent process optimization. A larger percentage knew about robotic process automation with 9%. The most well-known techniques were optical character recognition (46%) and intelligent document processing (44%). We also asked if they would consider using these methods if they learned about their practical benefits. The majority of respondents (54%) were undecided, while 31% clearly stated they would consider it, and 15% expressed opposition to these procedures. We asked the leaders which tools they considered indispensable for the company in terms of digitalization. We will list the top five tools in ascending order. In fifth place, tied, were the use of a custom domain name and office software suite (46%). This was followed by antivirus software (49%), then the possibility of electronic payment with 54%. The top two were having a company website and issuing online invoices, which is not surprising, as the majority of the respondents were from the trade sector. We also asked how frequently they use these digital tools. Daily used tools included the company email address, some office software suite, messaging platforms, and the electronic invoicing system. Despite having their own company website being one of the most indispensable tools, a significant portion of companies use it less frequently than monthly, as is the case with digital knowledge bases, intranet portals, enterprise resource planning software, online advertising, online sales, VPNs, custom applications, and any artificial intelligence-based software. Social media platforms are used daily by 33% of companies, while 51% use them less frequently. A similar ratio was observed for cloud-based services, with 48% using them daily and 35% occasionally. A similar situation exists with online/electronic payments, where 35% use this option daily, and 35% use it much less frequently. During the research, we asked which internal barrier they considered the most significant in hindering the use of information and communication technologies.

The use of information and communication technologies is hindered by both internal and external factors. In their publication, Tarute and Gatautis (2014) identified the barriers that SMEs may face. Internal obstacles include the characteristics of the owner/manager, the attributes of the company, the cost of implementation and application, and the return on investment. External factors mentioned include infrastructure, social and cultural limitations, as well as political, legal, and regulatory constraints. According to the majority of leaders (38%), the implementation and application costs are the biggest barriers to using these technologies. 31% mentioned company characteristics, and 18% saw the return on investment as the most significant barrier. We also asked which external barriers they considered most significant. According to the responses, leaders see infrastructure as the most critical external factor, with 31% expressing this view. The second most important external factor was social barriers (23%), followed by political, legal, and regulatory barriers (18%). In our opinion, among the internal barriers, employee resistance to change is particularly significant. In addition, a lack of knowledge regarding technologies among employees can also present challenges. This implies that the human factor is unavoidable when it comes to the adoption of digital technologies. External barriers are

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mostly determined by the macro-environment, to which companies can adapt, unlike internal factors, which can be more easily changed.

We were interested in how the company leaders viewed their own company's digital maturity. Respondents could choose from five categories, which were based on the framework by Sándor and Gubán (2021): Entry-level: Start-ups or companies that have not paid attention to digital development to the expected level. Pathfinder: Digital development needs are recognized, and initial steps have been taken, but there is no clear concept for implementation. Advanced: Companies are at an acceptable level of digital maturity but still lag behind well-performing competitors. Leader: Companies have an acceptable level of digital maturity, though several competitors outperform them. They are aware of their shortcomings and are working to address them. Optimizer and Feedback: This is the highest level, where companies monitor environmental changes to ensure they do not regress to a lower maturity level.

Most leaders (44%) believed their company was still in the pathfinder phase. 26% classified their company as entry-level, while 23% ranked themselves in the advanced category. Only 8% considered their company to be at the leader maturity level, and no leader selected the highest level of digital maturity. Based on the information presented earlier, we also believe that companies are still in the exploratory phase.

We also aimed to assess how digitally intensive leaders consider the industry in which their company operates. Leaders could choose from five categories: low, moderately low, medium, moderately high, and high. The majority of respondents (39%) believed their company operates in a medium-intensity industry. 26% ranked themselves in the low category, which is surprising given that most companies were from the trade sector, which We believe belongs more to the moderately high or high digital intensity industries. Both the moderately high and high categories received 13%, and the moderately low category barely reached 10%.

CONCLUSION

Based on the responses, most companies view digitalization as an opportunity (75%), yet the majority do not have a developed digital strategy (93%). This indicates a lack of strategic planning, despite leaders' theoretically positive stance toward technological advancement.

While more than half of the leaders are committed to digitalization, they remain skeptical of their employees' attitudes. According to the responses, half of the leaders feel their workers are indifferent or uninterested in this regard. This could indicate a lack of internal motivation among employees and/or insufficient training, as well as a lack of integration of digital transformation into the organizational culture.

The vast majority of companies (97%) spend between 0 and 10 million forints on digitalization, which is relatively low. Even with the forced digitalization caused by the COVID-19 pandemic, this amount remains modest. This suggests that resources directed towards digitalization are limited, or

increasing the level of digitalization does not hold a high priority in the budget.

The use of artificial intelligence technologies is low among SMEs in both Hungary and the EU. However, there are positive examples of the use of Chat GPT and other AI-based tools. That said, the implementation of AI is still in its early stages, and Hungarian SMEs rank near the bottom within the EU in this regard.

Leaders are generally dissatisfied with their employees' digital competencies, particularly in problem-solving, digital content creation, and security. This dissatisfaction highlights the lack of education and training available to employees within companies, or perhaps employees are uninterested in training, or the training provided is not effective. It seems that there is a general dissatisfaction among leaders regarding their employees' digital skills, leading to the conclusion that they are far from implementing any of the currently popular digital practices. First, they need to familiarize themselves with basic technologies and learn how to apply them properly.

The vast majority of leaders still view their companies as being at the "pathfinder" or "entry-level" stages of digital maturity. This means that many companies have only taken initial steps on the path to digitalization, implying that significant developments still need to be made, which will likely require considerable time and effort.

Most respondents believe that the digital intensity of their industry is medium or low. This is interesting, as the trade sector, where most respondents operate, is much more digitally intensive. This suggests that companies do not fully recognize the potential of digitalization within their own industries.

Recommendations

First and foremost, it is essential to develop a digital strategy. While a company can create this strategy internally, it may be beneficial to involve a professional consulting firm.

To increase the use of artificial intelligence-based tools, it is important that leaders communicate their benefits to employees—particularly how these tools support daily work processes. This requires leaders to take on a proactive role. They should ensure employee involvement in the implementation process, which can increase interest in the technology. Organizing practical training sessions is also advisable, along with recognizing those employees who actively use these tools. A similar approach should be taken when developing digital competencies.

To develop employees' digital skills, the current knowledge level should first be assessed, followed by the provision of level-appropriate, hands-on training. It is useful to involve internal mentors, establish an incentive system, and integrate learning into daily work routines.

It is also recommended to consider introducing underutilized or currently unused tools, as all of them could support the company's operations. A digital knowledge base can ease the onboarding process, enterprise resource planning (ERP) software can support data-driven operations, and the use of VPNs can enhance cybersecurity.

Summary

In our research, we surveyed 39 leaders of small and medium-sized enterprises in Hajdú-Bihar County to gauge their views on digitalization, how they evaluate their employees' digital skills, what digital best practices they apply, and how familiar they are with current trends in digital best practices. In the literature review, we discussed the concept of digitalization, digital transformation, and its significance. We introduced the literature on best practices, explaining the definitions and the steps for implementing them. We also considered the literature on change management, which we believe is closely related to the application of best practices. We presented four popular digital best practices and their benefits, particularly focusing on their positive impact on business efficiency.

In summary, the research results indicate that while companies have a positive attitude toward digitalization, they lack strategic planning, resources, and adequate digital competencies. To fully leverage the opportunities offered by digitalization, companies need stronger commitment, increased financial investment, and training programs, as well as better understanding and application of modern technologies.

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WHAT DRIVES FEMALE FARMERS' PARTICIPATION IN OFF-FARM ACTIVITIES? THE CASE OF RURAL NIGERIA

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Abstract: *Women often lack access to productive resources such as land and capital in most developing countries. This forces them to take part in off-farm activities to augment their little farm income. This study investigated factors that affect the involvement of women farmers in different types of off-farm entrepreneurial livelihood activities in rural Bauchi state, Nigeria. A purposive sampling method was used in selecting three local government areas in the western agricultural zone of the state and a random sampling method was used in selecting ten wards. 5% registered women farmers in each selected ward, making 134 respondents. Semi-structured questionnaires were administered to women farmers in 2017. The results revealed that food processing, farm product sales, trading and tailoring are the major off-farm livelihood activities engaged in by rural female farmers. Logit regression results revealed, as expected, that different factors affect their involvement in various types of off-farm activities. Food processing and tailoring required relatively high start-up capital and access to electricity as an investment and the use of machines was needed. Thus, access to credit or remittances and to electricity increases the probability of being involved in these activities. The requirements of trading being lower and access to market increases the probability of being involved. Provision of extension services, rural credit facilitation programmes, rural electrification, road and market structure development are instruments*

INTRODUCTION

Reliance on agricultural growth and agricultural strategies alone as the primary vehicle for poverty reduction in rural areas in developing countries seems not to be sustainable (FAO 2019a). Factors such as very small landholdings, risks due to drought, floods, crop loss due to pest and/or disease, poor road infrastructure and gaps in market access in rural areas decreases the ability of agriculture to entirely safeguard the livelihood of the rural population. Farmers' engagement in off-farm activities can help to overcome these problems and increase smallholder households' incomes (Alabi et al., 2022).

Off-farm income refers to all income-generating activities except crop and livestock production (Ahmadzai, 2020; Barette et al., 2001; Lanjouw and Lanjouw, 2001) such as tailoring, food processing, sale of farm products, petty trading etc. The rural poor often lack access to insurance services; so many individuals prefer to engage in a wide range of income generating activities to avoid risk (Tucker et al. 2010).

The present study is devoted to understanding the patterns of off-farm activity involvement of women farmers. Women have relatively lower influence in household decisions in most developing countries compared to males (Achandi et al., 2018; Ragsdale et al., 2018; Sell and Minot, 2018). Studies reveal that women have inadequate access to and control over productive resources such as land, capital, agricultural inputs and technology, such as improved crop varieties, training, information as well as marketing services (Fletschner and Kenney, 2014, SDG, 2018). Evidence also suggests that women have an unmanageable workload, they lack access to credit or have no decision-making power over credit and are poorly represented in agricultural groups and organizations (Alkire et al., 2013; Akter et al., 2016).

Off-farm employment gives a wife more influence in

household decision making (Braun et al., 2019; Nyabaro et al., 2019). It reduces dependence of the household on forest resources (Hussain et al., 2019) and improves the level of household forest conservation management (Xie et al., 2019a). Off-farm employment increases household income and reduces poverty-vulnerability among farmers (Isshaku and Abdul-Rahaman, 2019). An off-farm income reduces child malnutrition and household food insecurity (Broeck and Kilic, 2019; Dzanku, 2019). Thus, women's off-farm activities contribute to the achievement of several Sustainable Development Goals (SDGs), particularly to the goals "No poverty", "Zero hunger", "Gender equity" and "Life on land".

African women farmers participate in off-farm activities mainly to augment their small agricultural income to ensure they meet their household livelihood responsibilities and needs (AfDB, 2015). They tend to be entrepreneurs of necessity, rather than opportunity, driven into small business by the lack of alternatives. Women in Africa are more likely to be running microenterprises in the informal sector, engaging in low-value-added activities that reap marginal returns (AfDB, 2015).

This study builds upon previous literature that estimated the determinants of off-farm participation among farmers regardless of the gender (Lanjouw and Lanjouw, 2001; Xia and Simmons, 2004; Isgut, 2004; Dary & Kuunibe 2012; Akaakohol & Aye 2014; Iqbal et al., 2015; Rizwan et al., 2017; Nazir et al., 2018) (see Chapter 2.3.). Despite the growing importance of off-farm activities, very little is known about their drivers in developing economies like Nigeria (Ibekwe et al., 2010). This is in particular true for the off-farm activities of women farmers.

To close this gap, the paper analysed the determinants of women's participation in selected off-farm livelihood activities. This study shed light on underdeveloped rural areas in northern Nigeria where information about the off-farm activities of women is very scarce but needed to derive appropriate policy recommendations. It provides evidence that female farmers without access to resources tend to engage in easy-to-enter entrepreneurial activities, such as sales, rather than in activities that require higher starting costs, electricity access and knowledge and skills, such as food processing and tailoring.

The paper has four sections: the first section contains the introduction; the second part provides literature review; the third part describes the methodology; the fourth part presents the results and discussion and the last part provides conclusions and policy recommendations.

LITERATURE REVIEW

The literature review of studies on off-farm entrepreneurial activities of farmers was conducted to develop a conceptual framework for the study. In the following, factors were identified that potentially affect the involvement of off-farm activities.

Regarding age, young farmers are more likely to participate in off-farm livelihood activities and to migrate to augment their agricultural income (Rizwan et al., 2017; Yusuf et al., 2016; Eshetu and Mekonne, 2016 and Apind et al., 2015). Age influences participation, reaching some point then declin-

ing (Beyene, 2008, Corsi and Salvioni, 2012; Bouchakour and Saad, 2019). Beyene (2008) found a positive effect of age on the off-farm participation decisions of farm households among male household heads in Ethiopia and the same model found a negative effect of age squared which implies that effect of age on off-farm participation is not linear but hump-shaped. Corsi and Salvioni, (2012) arrived at a similar hump-shaped result as they reported a positive effect of age and a negative effect of age squared in the assessment of determinants of off-farm participation of Italian farm households for workers, spouses and their eldest children of working age, using a five equation multivariate probit. This is quite similar to Bouchakour and Saad (2019), who hypothesized that age would have a positive effect on young farmer participation and a negative effect on old farmer participation in off-farm participation in Algeria by making a quadratic equation of age and testing same.

Education is expected to have a positive effect on off-farm work decisions for female farmers if the effects of human capital on off-farm wages outweigh the increase in the shadow value of labour on the farm, (Lass et al., 1991). Increases in education have a significant positive effect on self-employment and public service off-farm livelihood activities (Iqbal et al., 2015, Akaakohol and Aye, 2014, Akhtar et al., 2019).

Land ownership can affect the participation in off-farm livelihood activities as it may be used as collateral when borrowing capital for business initiation and development (Taverner et al., 1997; Woldehanna et al., 2000; Kousar and Abdulai, 2016).

The unitary model predicts that farm size affects participation in off-farm livelihood activities in a positive way when it does not compete with farming for productive resources, especially labour and capital but only serves to augment and complement it (Dedehouanou et al., 2018; Akhtar et al., 2019). In the profit maximisation model, the use of farming inputs and resources are tailed always to more profitable or less risky activities which may affect participation in off-farm activities negatively (Matse and Young 2004; Serra et al., 2005). Several previous studies reported the significant negative effect of farm size on participation in off-farm livelihood activities. This is the case in particular in areas with non-favourable climate conditions where agriculture is less profitable and farmers are pushed to allocate their resources to off-farm activities for the sake of profit maximization and risk aversion (Akhtar et al., 2019; Rizwan et al., 2017; Corsi and Salvioni, 2012; Beyene, 2008). Differently, Rizwan et al. (2017) reported a significant positive effect of land size on participating in self-employment off-farm livelihood activities. This can be explained by the fact that the owner of a large farm may benefit from economies of scale and this provides him with higher income and the opportunity to hire labour for the farming activities

Most of the off-farm livelihood activities require capital and investment. If a female farmer has access to credit or to microfinance then the probability of engagement in off-farm activities increase (Hitayezu et al., 2014, Akaakohol and Aye, 2014; Beyene, 2008).

Lack of market access or a long distance from the production point to the nearest market reduces the probability of n

participation in off-farm livelihood activities (Beyene, 2008; Akaakohol and Aye, 2014).

Access and distance to a road can affect participation in off-farm livelihood activities as this facilitates the movement of inputs and products from the producer/provider to the consumer. Rizwan et al. (2017), for example, reported a significant positive effect of access to a road on participating in off-farm self-employment livelihood activities among rice farmers of the Punjab in Pakistan.

Access to electricity creates an opportunity for female farmers participation in off-farm activities as it provides a chance of using electronic machines and facilities (Hitayezu et al., 2014; Chowdhury 2010; Gibson & Olivia, 2010).

MATERIALS AND METHODS

Study Area

Nigeria is the 7th most populated country in the world and it is projected that the population of the country will reach 401 million by the 2050, which will make it the 3rd most populated country in the world after China and India (NBS, 2018). The GDP of the country was 375.745 billion US dollars in 2016, with an annual growth rate of 2.4% dominated by the oil industry; while agriculture, forestry, and fisheries contributed 20.8%, industry (including construction) constituted 22.3% and goods and services contributed 13.2%. The population of working age was 115 million while only 69.5 million were fully employed. Rural population in Nigeria continues to decline (from 59% in 2008 to 48% in 2018) (World Bank, 2020). School enrolment for primary school reached 84.7% and for secondary school this was 42.0% in 2016 (NBS, 2018).

The study was carried out in Bauchi state in north east Nigeria (Figure 1) with a total land area of 49,119km2 which constitutes 5.3% of the total Nigerian land mass (BASG, 2018). The state has a population of 6 million inhabitants with 46.73% of the age group of 4-9 years. Adult literacy among female reaches 85.92%. The state has 55 different tribal groups with different occupational patterns and beliefs, Hausawa and Fulani are the most prominent tribes and Hausa language is the common language used in the area (NBS, 2018).

Figure 1: Map of Nigeria showing Bauchi state
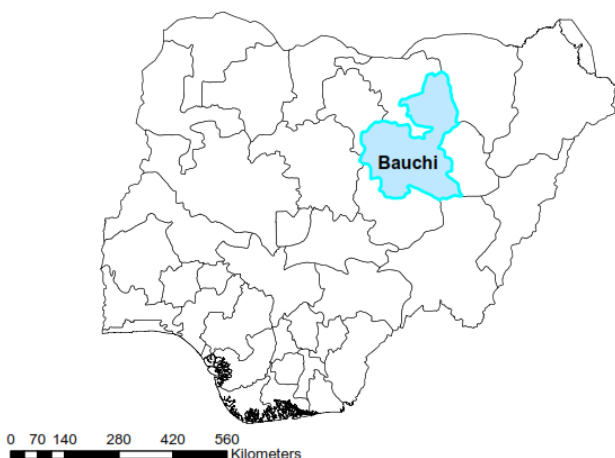
Status of rural women

In rural Nigeria, a patriarchal structure of society is prevalent. Men's role is generally more highly valued and rewarded than women's roles. Women bear the primary responsibility for childcare and domestic work, while men are responsible for providing the family livelihood that makes them the head of the household, thus woman can only be a household head when they become a widow or are divorced (Ufuoma et al., 2010). Female participation in political activities and public governance is limited in most rural areas. Women are among the poorest groups in rural Nigeria with limited access to land, capital, including credit (due to lack of collateral) and education. About 10% of registered farmers are women and only 7% of them own land, 30% of them have access to agricultural loans, and 15% have a bank account (FAO, 2018). Even though women have access to land in northern rural Nigeria, men receive double the share compared to a woman during inheritance (FAO, 2018). In the southern part, access is determined by the influence of the husband in the rural community and the position of the wife in polygamous household settings (e.g. first wife, second wife, etc. or mother of the first male child) (Ufuoma et al., 2010). Average land size owned by women in north eastern Nigeria is 0.8 ha compared to 7.5 ha by men (FAO, 2018).

Women make up 60% of the labour force in the informal sector and 70% of agricultural farm labour (Ufuoma et al., 2010; Kanpmann, 1999; Kwesiga, 1998). Mining, hunting, and black smithery are occupations predominantly occupied by men while gathering of non-timber forest products, weaving, tailoring traditional clothes, trading of cosmetics and jewelry as well as craft making are occupations predominantly occupied by women. Women are also involved in the marketing of agricultural products, and in decision-making for the pricing of goods, while men dominate in most activities involving hard work, such as land preparation, transport and wholesale selling (FAO, 2018). Merely 6% of extension staff are female (FAO, 2018).

Both sexes participate in agriculture with some crops attached to gender and some level of division of farming operations. For example, staple food and cash crops such as maize, rice, sorghum, millet, groundnut, sesame, cowpea and cotton are predominantly produced by men while spices and vegetables such as peppers, ginger, cloves, onion, amaranths, sorrel etc. are produced by women. Men are responsible for ploughing, planting, weeding, rearing of large ruminants, and women are responsible mostly for harvesting, threshing, processing, rearing of small ruminants and poultry production (FAO, 2018; Ufuoma et al., 2010).

Policies supporting rural women and achievement of SDG

Despite their significant contribution to agricultural labour that promotes national food security, women did not get any formal recognition by way of a policy pronouncement to encourage, protect and facilitate their access to inputs and services until 1986. In 1986, a government policy directive was

developed to establish the Women in Agriculture (WIA) component of Agricultural Development Programmes (ADPs) that were responsible for grassroots extension and advisory services in all states of Nigeria (FAO, 2018). The overall objective of the policy was to integrate women into national agricultural development, through the mainstreaming of women into the ADPs system, to enable them equal access to agricultural inputs, credit, loans and extension services (FAO, 2018). This broad objective was intended to achieve the following specific goals: i. to develop innovative gender specific programmes for women farmers in close collaboration with national agricultural research institutions; ii. to promote the development and use of appropriate agricultural technologies which reduce drudgery and meet the needs of women in poverty alleviation; iii. to assist in linking women farmers to sources of credit; iv. to increase the agricultural productivity and income of women farmers; v. to improve the skills of women in food processing, utilization and marketing to enhance income; vi. to organize women into cooperative groups for effective group action; and vii. to encourage women farmers to keep livestock to improve their nutritional status (FAO, 2018). The instruments used to achieve the stated objectives were provision of input subsidies (provision of livestock to women, simple processing machines for farm produce) provision of extension services (using women extension agents to reach women farmers as the solution to the gender segregation of the area and organizing and mobilizing women into cooperatives to achieve economies of scale in production, resource sourcing and marketing). The programmes under the policy helped in creating awareness of the importance of women in agricultural production and promoted capacity-building for women to adopt new production and processing technologies, and also fostered collaboration with research institutes to promote labour saving devices for women. However, it was observed and confirmed by ADP WIA officials that the WIA programme never achieved the stated objectives, even with World Bank support for the ADPs. Basically because the targeted number of female extension agents (EA) was never achieved in most states; the critically needed commitment to funding and the political will to back the policy with appropriate legislation were never provided, especially after the termination of World Bank support to the ADPs; no prominent policy existed to provide for women's access to land and production inputs (FAO, 2018).

In 1990, women's development strategies were implemented under the National Fadama development project with the partnership of the World Bank that aimed to sustainably increase the incomes of participating rural community dwellers. Target groups included the rural poor engaged in economic activities (farmers, pastoralists, fishers, nomads, traders, processors, hunters and gatherers); disadvantaged groups (widows, the handicapped, the sick and other vulnerable groups, including people living with HIV/AIDS and unemployed youth) (World Bank 2008). The impact assessment of Fadama I and II revealed that women, the poor and other disadvantaged groups were given a voice through the project (FAO, 2018). The project pro-actively supported women's organizations participating in project-related activities. Women were trained to be useful economic agents, thus making meaningful contributions to the quality of

life of their beneficiaries and the local economy (World Bank, 2008). The instruments used were input subsidies (provision of low-cost improved irrigation technology) and extension service provision (training women in different farm and off-farm activities, most especially processing of farm produce into different byproducts) However, the programme was later replaced by the National Programme for Food Security (NPFS). Another gender empowerment programme was USAID MARKETS II that aimed to improve the performance, income, nutrition, and food security of poor rural farmers in an environmentally friendly manner in Nigeria. The key objectives included ensuring smallholder farmer's access to increased income, ready markets, better inputs (improved seeds and optimal use of fertilizer), adequate finance, better water and pesticide management, appropriate technologies and extension services. The programme also included the goal of ensuring gender equality in food security, so that both men and women have significant influence on household spending (USAID, 2017). The instruments used to achieve the policy objectives were: credit support (liaison between farmers and lending institutions and using cooperative farms as collateral) input subsidies (provision of improved seed, fertilizer and raw-materials for aquaculture and fish feed); extension services (teaching women soy bean farmers to uptake close planting, which ensures quick canopy closure and controls weeds, and linking them to processing companies to get more competitive prices by eliminating the intervening of middlemen) (USAID, 2017).

After the acceptance of Sustainable Development Goals (SDGs) by member states of the United Nations, Nigeria conducted a SDGs Data Mapping Exercise, conducting baseline surveys in collaboration with the UNDP whose results have been useful in developing indicators for SDG implementation, monitoring and reporting in the country. In addition, the UNDP conducted various advocacy and awareness activities with several government ministries, departments, and agencies, to support initiatives aimed at promoting strategic engagement around the SDGs. For example, the UNDP supported the government-developed private sector engagement strategy which provided for and recommended the establishment of the first-ever private sector advisory group on SDGs, providing both technical and financial support towards ongoing efforts aimed at integrating the SDGs, particularly "No poverty", "Zero hunger", "Gender equity" and "Life on land", into national and state-level policies, plans and budgets (UNDP, 2017).

Rural infrastructure

The level of road connectivity, accessibility and transport services are generally poor and inadequate in rural Nigeria (Usman, 2014, Aderamo and Magaji 2010). 87% of rural roads are in poor condition (World Bank, 2019). Only 30.95% of rural households in Nigeria had access to electricity in 2018 (World Bank, 2018a).

Rural markets, generally, do not have infrastructure to tackle any produce that requires specialized handling and waste management. Rural market usually takes place once in a week, but some retailing is commonly practiced by women within or in front of their house. The small and medium-size

enterprises (SMEs) that operate in rural markets, many of which are owned by women, usually do not have access to credit and are not aware of modern business practices (World Bank, 2019).

Data Collection

A multi-stage sampling technique was used in purposively selecting the western agricultural zone from the three agricultural zones of the state. Further, three out of seven local government areas in the western agricultural zone of Bauchi State were purposively selected, based on the dominance of women farmers in those areas; these were: Bauchi, Alkaleri and Dass local government areas. Ten wards were selected using a simple random sampling technique from the three local government areas and 5% of registered women farmers were randomly selected across the wards, based on the list of farmer's groups provided by the Bauchi State Agricultural Development Programme (BSADP), making a total of 134 respondents as the sample size of the study. The semi-structured questionnaire was pre-tested and adapted accordingly. One of the co-authors with the help of 3 enumerators collected the data using face-to-face interviews with women farmers in 2017. The questionnaire included socio-economic characteristics of the respondents (e.g. age, years of formal education, family size), types of off-farm activities, and available infrastructure in their villages such as electricity, roads, and markets.

Data analysis

Descriptive statistics and a chi-square test were used to summarize, group, and describe the data collected. Logistic regression models were used in determining the factors that influence women's participation in different off-farm livelihood activities.

Logistic regression modell

The participation in off-farm livelihood activities has two options, either to participate or not. As the dependent variables were binary in nature, this makes the Logistic regression model appropriate for the analysis (Iqbal et al., 2015; Rizwan et al., 2017; Nazir et al., 2018).

Mathematical expression of the relationship in its non-linear form (sigmoid curve) is:

$$\frac{Pi}{1-Pi} = \frac{1+\exp(Zi)}{1+\exp(-Zi)} \quad ...(1)$$

When transformed into linear, this is:

$$Li = \ln\left[\frac{Zi}{(1-Pi)}\right]Zi \quad ...(2)$$

In this case, $Pi/(1-Pi)$ is the probability ratio that the female farmer will participate in off-farm livelihood activity. If a woman farmer engaged in off-farm activity, then the value of the dependent variable is 1, and 0 for the woman farmer who did not engage in off-farm activity. The data were analysed using STATA statistical software version 13.

ogistic regression model estimates:

$$y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \ldots \beta 11X11 + \varepsilon \quad \ldots (3)$$

Where;

y= dependent variable (participating in off-farm=1 otherwise=0)

β0 = constant

β1– β11 = logistic regression coefficients

X1– X11 = independent variables as described in table 1

The models were tested for multicollinearity and homogeneity using correlation, Variation Inflation Factor (VIF) and normality of the residuals, no signs for homogeneity and multicollinearity were found.

Table 1: Description of the variables imported into the models

Variable	Item	Frequency (Percentage) *	Mean and SD **
Tailoring	Yes	20 (14.93)	
	No	114 (85.07)	
Trading (non-food)	Yes	31 (23.13)	
	No	103 (76.87)	
Food processing	Yes	29 (21.36)	
	No	105 (78.64)	
Food product sell	Yes	33 (24.63)	
	No	101 (75.37)	
Age			38.03 (10.00)
Married	Single	32 (23.88)	
	Married	102 (76.12)	
Level of education	No formal	10 (7.46)	
	Primary	42 (31.34)	
	Secondary	53 (39.55)	
	Tertiary	29 (21.64)	
Number of dependents			3.28 (2.96)
Remittance	Yes	33 (24.63)	
	No	101 (75.37)	
Land ownerships	Yes	78 (58.21)	
	No	56 (41.79)	
Farm size			1.88 (2.73)
Extension contact/year			1.73 (1.31)
Access to credit	Yes	78 (58.21)	
	No	56 (41.79)	
Access to road	Yes	49 (36.56)	
	No	85 (63.43)	
Access to electricity	Yes	73 (54.48)	
	No	61 (45.52)	
Access to market	Yes	38 (28.36)	
	No	96 (71.64)	

* categorical variables; ** continuous variables

Data analysis

The dependent variables in the four logistic models indicate the participation or not participation of women farmers in the following off-farm activities: i. tailoring, ii. trading of cosmetics, clothes, and food additives; iii. food processing and iv. food products sales. Other off-farm activities engaged by rural women farmers in the study area that were not included in the models because of low number of participants were hair dressing (7.5%) and bead and soap making (4.0%).

i. Tailoring: producing garments and clothes by using small manual equipment and electronic machines such as scissors,

zigzag and sewing machines. The businesses operated mostly in the home or in a shop very close to the women's house. This is common off-farm activity in rural Nigeria, Willebrands et al. (2012) reported 7% worked as tailors in his study in Nigeria. Ogunrinola et al. (2005) found that, in five rural communities of Nigeria, a woman tailor averagely saves ₦4,886 ($14) monthly as informal personal savings.

ii. Trading of non-food products such as cosmetics and clothes: retailing businesses where a trader serves as a middleman between the wholesaler and final consumer and the business usually operated in the residential environment mostly very close to potential customers. This is a common off-farm livelihood activity in rural Nigeria and is dominated by females (Fabusoro, 2010). Willebrands et al. (2012) reported that traders of clothes and food stuffs constituted 44% of small enterprises in Lagos, Nigeria. In the study by Ogunrinola (2011), traders saved averagely ₦3,390 ($9.41) as monthly informal savings.

iii. Food processing: a process of transforming raw food stuffs to ready to eat foods mostly at home and selling it at strategic places or prepared and sold at the same place outside the home. This is a common off-farm livelihood activity dominated by women in rural Nigeria (Dutse et. al., 2024; and Ogunrinola, 2011, Fabusoro, 2010). Willebrands et al. (2012) found that a rural woman that engage in food processing averagely saves ₦5,712 ($16) as monthly informal personal savings in Nigeria.

iv. Food product sales: retailing of food, when a trader serves as a middleman between food wholesalers and final consumers. This is a common off-farm livelihood activity in rural Nigeria dominated by females (Fabusoro, 2010). Ogunrinola et al. (2005) reported that a rural woman saves ₦3,330 ($9) informal monthly personal savings from food product sells.

Independent variables (socio-economic, farm and institutional factors)

Independent variables were explored from the literature on off-farm livelihood activities in studies that mostly did not distinguish between genders (see Chapter 2).

RESULTS AND DISCUSSION

Women characteristics

Table 2 depicts characteristics of the women farmers which includes age, family size, marital status, level of education, farming experience, farm size and monthly off-farm income. About 47.8% of the women farmers are younger than 39 years, in their economically active and reproductive age.

Table 2: Characteristics of the women famers (N=134)

Variable	Item	Frequency	Percentage	Mean (SD)
Age (years)	<29	24	17.9	38
	30-39	40	29.9	
	40-49	54	40.3	
	≥50	16	11.9	
Marital status	Single	32	23.9	
	Married	102	76.1	
Highest level of education	No formal	10	7.46	
	Primary	42	31.34	
		53	39.55	
	Tertiary	29	21.64	
Number of dependent				3 (2)
Household size	1-5	62	46.3	6
	6-9	58	43.3	
	≥10	14	10.6	
Farming experience (years)	1-5	40	29.9	10
	6-10	36	26.9	
	11-15	20	14.9	
	>15	38	28.3	
Land ownership	Yes	78	58.21	
	No	56	41.79	
Farm size (ha)	<1	58	43.3	1.5
	1-2	29	21.7	
	2.1-4	24	17.9	
	>4	23	17.2	
Off-farm income ($/ month)[1]	<27.8	48	35.8	39.9
	27.8-55.5	66	49.3	
	>55.5	20	14.9	

[1]the original categories were in Nigerian currency (<10,000, 10,000-20,000 and >20,000), 1$=360 Naira in December, 2019.

Factors influencing women farmers' participation in off-farm livelihood activities

The results of regression analysis (table 3) show the socio-economic, farm and institutional factors that are influencing women farmers to participate in different type of off-farm livelihood activities in our case study in rural Bauchi state, Nigeria.

Table 3: Logistic regression results of factors influencing women's off-farm participation

Variable	Tailoring	Trading	Food processing	Food product sales
Age	0.0263 (0.309)	-0.0016 (0.198)	0.0124 (0.188)	-0.0673 (0.207) *
Married	-0.1342 (0.749) **	0.1881 (0.877) **	0.0889 (0.652)	0.2919 (0.963) **
Level of education	0.0063 (0.438)	0.0183 (0.359)	0.0577 (0.331) *	0.1125 (0.369)
Number of dependents	-0.0046 (0.124)	-0.0195 (0.111)	0.0269 (0.130) **	-0.0219 (0.136)

Remittance	0.1826 (1.241) *	0.0302 (0.866)	0.0776 (1.056)	0.2143 (0.421)
Land ownerships	0.0209 (0.973)	0.1854 (0.769) **	-0.1187 (0.705) *	-0.1017 (0.785) *
Farm size	-0.0145 (0.255)	-0.4167 (0.199) *	0.0031 (0.114)	-0.5969 (0.158) **
Extension contact	0.0294 (0.279) **	-0.0239 (0.223)	0.0368 (0.247)	-0.0441 (0.282)
Access to credit	-0.1127 (0.289)	0.0159 (0.218)	0.0749 (0.326) **	0.0097 (0.229)
Access to road	0.1363 (0.409) **	-0.2116 (0.189)	0.1430 (0.177) **	-0.0763 (0.307)
Access to electricity	0.0634 (0.714) *	0.0012 (0.531)	0.1450 (0.595) **	0.1019 (0.587)
Access to market	0.0245 (0.781)	0.1790 (0.607) **	-0.0312 (0.659)	0.0693 (0.689)
Number of	**134**	**134**	**134**	**134**
Prob>Chi²	**0.0084**	**0.0099**	**0.0029**	**0.0036**
Pseudo R²	**0.3259**	**0.2500**	**0.2971**	**0.2884**

Marginal effect and standard error are reported (figures in parenthesis are standard error)

**significant at 0.05 and *significant at 0.10

The results of regression analysis revealed that age has a statistically significant negative effect on women farmers' participation in food product sales with a marginal effect of -0.0673. This implies that an increase of one year in age leads to decreased chances of a woman farmer's participating in food product sales of 6%. This finding supports the expectation provided by Beyene (2008) that, because of the different marginal value of free time, at a younger age the probability of working off-farm increases. Similarly, Rizwan et al. (2017) found that increases in age significantly decrease the likelihood chances of participating in self-employment, migration, and other off-farm livelihood activities among rice farmers in the Punjab, Pakistan. Also, Shehu et al. (2024a) revealed that younger males and females participate more in marketing of cowpea Nigeria. Several other studies support the finding that young farmers are more likely to be self-employed to augment their agricultural income (Yusuf et al., 2016; Eshetu and Mekonne, 2016 and Apind et al., 2015; Dary and Kuunibe, 2012).

On the one hand, married women farmers participated in trading and food product selling statistically significantly more than single women with marginal effects of 0.1881 and 0.2919. On the other hand, married women participated less than single women farmers in tailoring with a marginal effect of -0.1342. The positive influence of being married on trading and food product sales may be explained by the financial need of her family which is in line with the results of Xie et al. (2019b) for rural Sichuan, China. The result that married women farmers are less likely to participate in tailoring than single woman farmers by 13% may be attributed to the fact that a woman farmer must attend some level of training before she can participate in it, and household responsibilities might not give her a chance to do that training. Further, the tailoring business is time-consuming, which competes with the hours needed for household duties.

An increase in educational level increases the likelihood of women farmers' participation in food processing off-farm livelihood activities by 5.7% in our model. Education is needed as any food processing business operation requires formal registration with government agencies in the study area, such as with the Corporate Affairs Commission (CAC) and the National Agency for Food and Drugs Administration and Control (NAFDAC) and every package of processed foods and drugs should have an operational permit and registration number after meeting the stipulated standards. The result is in line with several studies that found that increases in education have a significant positive effect on self-employment and public service off-farm livelihood activities (Mapfumo & Mushunje, 2022; Dary and Kuunibe, 2012; Iqbal et al., 2017; Akaakohol and Aye 2014; Akhtar et al., 2019).

Increases in the number of dependents increase the likelihood of a woman farmer participating in food processing off-farm livelihood activities by 2.6%. More dependents imply a higher cost of living as the average number of dependent members is 3 persons in the area. Low farm income may be insufficient to cater for the whole household. This agreed with the results of previous studies that found a positive effect of the dependency ratio on business off-farm participation (Iqbal et al., 2015; Rizwan et al., 2017; Xia and Simon, 2004).

The results further revealed that a woman farmer that is receiving remittances is more likely to participate in tailoring by 18%. The possible reason is that the remittances can serve as starting capital.

The result shows that a woman farmer that owned land is more likely to participate in trading by 18% than a landless woman farmer and is less likely to participate in food processing (by 12%) and food product sales (by 10%). The finding partly agrees with studies of Taverner et al. (1997); Woldehanna et al. (2000); Kousar and Abdulai (2016) that reported positive effect of land ownership and land tenure security on off-farm livelihood activities in the U.S, Germany and Pakistan respectively.

Increasing farm size statistically significantly decreases the likelihood of participating in trading by 41%. This can be explained by lesser economic necessity to participate in off-farm activities as the economies of scale of larger farm size allow families to produce more food and to achieve higher incomes. Other studies also reported this significant negative effect of increasing land size on participation in off-farm livelihood activities (Akhtar et al., 2019; Rizwan et al., 2017; Corsi and Salvioni, 2012; Beyene, 2008).

Increases in frequency of extension contact increases the likelihood of participation in tailoring by 2.9%. This shows the importance of the Women in Agriculture (WIA) programme that provides women farmers with training in farm and off-farm innovations to improve their living standards (FAO, 2018) and distributes sewing machines after the training in some cases. This is in line with Shehu et al. (2024b) who found some traditional information channels increases commercialization of cowpea.

Woman farmers with access to credit are more likely to participate in food processing by 7.4% compared to woman farmers without access to credit. Credit may serve as the necessary starting capital to establish and engage in a new busi-

ness in food processing. Similarly, the studies by Hitayezu et al. (2014); Akaakohol and Aye (2014); Beyene (2008) revealed that access to credit or microfinance institutions has a statistical positive effect on participating in off-farm livelihood activities.

Women farmers with access to a road are more likely to participate in trading and food processing by 13.6 and 14.3% than the women without access to it. The reason is that access and distance to a road can affect or facilitate the movement of inputs and products from the producer/provider to the consumer. Rizwan et al. (2017) reported a significant positive effect of access to roads on participation in off-farm livelihood activities among rice farmers of the Punjab, Pakistan.

Further results show that woman farmers with access to electricity are more likely to participate in tailoring and food processing by 6.3 and 14.5% respectively than a woman farmer without access to it. The possible reason for that is that the availability of electricity creates the opportunity for women farmers to use small electronic equipment such as zigzag sewing machines, mixers and grinding machines that are used in both tailoring and food processing off-fam livelihood activities. Chowdhury (2010) found a significant positive effect of access to electricity on participation in rural self-employment off-farm livelihood activities among rural women in Bangladesh as electronic machines may be used in tailoring and food processing, which is a similar finding to that of Gibson & Olivia (2010), also, in line with the study of Isgut (2004), who recorded that households with electricity have more rural nonfarm income and self-employment than households without electricity in rural Honduras.

A woman farmer with access to a market is by 17.9% more likely to participate in trading than a woman farmer without access to a market. Markets create opportunities to meet a large number of potential customers that creates demand for goods and services. This finding agreed with that of Akaakohol and Aye (2014) and Beyene (2008) who found that distance to market has a significant negative effect on participation in off-farm livelihood activities.

Further results (appendix 1) on distribution of rural women farmers' participation in different types of off-farm activities in respect to rural infrastructure accessibility revealed a statistically significant difference between those that participated in tailoring and food processing off-farm livelihood activities and those who did not so participate in regarding to participants having better access to credit, to roads and higher access to electricity.

CONCLUSIONS

The study revealed, as expected, that different factors affect the involvement in various types of the off-farm entrepreneurial activities investigated such as tailoring, food processing and trading. Factors such as access to extension services, to roads, electricity and markets have significant effects on women farmers' participation in different off-farm livelihood activities in our model. Food processing and tailoring required higher starting capital (and thus access to credit or remittances increased the probability of being involved) and access to

electricity as use of machines is needed. The requirements of trading are lower and, in particular, access to a market increases the probability of being involved. Based on these results, provision of extension services, rural credit facilitation programmes, rural electrification, and road and market structure development are instruments that would support women farmers' involvement in off-farm activities.

To improve access to credit, in particular landless women farmers need to be considered, as most of the time land is used as collateral. One alternative is disbursement of credits among cooperatives. Credit scheme programmes are important as they can serve as start-up and investment capital for off-farm livelihood activities. Further, it gives them purchasing power to expand the land under their cultivation as the majority of them cultivate less than one hectare.

Only about one third of rural households have access to electricity in Nigeria (World Bank, 2019), provision of electricity is imperative to the promotion of off-farm livelihood activities. Further, 87% of rural roads are in poor condition in rural Nigeria. Rural markets, generally, do not have the infrastructure to tackle any produce that requires specialized handling and waste management. Therefore, investment in rural roads, rural electrification and rural market infrastructures which were not included specially in the previous and current gender equality promoting policies may be needed to be incorporated. The improvement of rural infrastructure will promote women's involvement in off-farm livelihoods which will result in complementing the objective of Women in Agriculture and Fadama programmes.

Further results show that more educated women farmers are more involved in food processing than those with a low level of education. Food processing is very important as a large portion of farm products go to waste during harvest and post-harvest as a result of poor processing, storage facilities and transport networks in most developing countries. The need of education of female children is often neglected in rural Nigeria. The result of this study regarding food processing provides evidence of the positive effect of female education on involvement in household livelihood activities.

This study cannot be generalized to all categories of women as the data represent only women farmers in the rural areas. Further studies that focus on the effect of the participation in various off-farm activities on women farmers' income and the livelihood of the household as well as on behavioural drivers could bring interesting results.

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APPENDICES

Off-farm		Access to credit			Access to road			Access to electricity			Access to market		
		Yes	No	Sig[1]	Yes	No	Sig[1]	Yes	No	Sig[1]	Yes	No	Sig[1]
Tailoring	**Yes**	19 *(95%)*	1 *(5%)*	**0.034**	18 *(90.0%)*	2 *(10.0%)*	**0.041**	19 *(95.0%)*	1 *(5.0%)*	**0.036**	14 *(70.0%)*	6 *(30.0%)*	0.190
	No	59 *(51.8%)*	55		31 *(27.2%)*	83 *(72.8%)*		54 *(47.4%)*	60 *(52.6%)*		24 *(21.1%)*	90 *(78.9%)*	
Trading (non-food)	**Yes**	20 *(64.5%)*	11	0.124	17 *(54.8%)*	14 *(45.2%)*	0.180	18 *(58.1%)*	13 *(41.9%)*	0.291	30	1 *(3.2%)*	**0.002**
	No	58 *(56.3%)*	45		32 *(31.1%)*	71 *(68.9%)*		55 *(53.0%)*	48 *(46.6%)*		8 *(7.8%)*	95 *(92.2%)*	
Food processing	**Yes**	27 *(93.1%)*	2	**0.022**	25 *(86.2%)*	4 *(13.8%)*	**0.008**	28 *(96.5%)*	1 *(3.5%)*	**0.005**	20 *(69.0%)*	9 *(31.0%)*	0.265
	No	51 *(48.6)*	54		24 *(22.9%)*	81 *(77.1%)*		45 *(42.9%)*	60 *(57.1%)*		18 *(17.1%)*	87 *(82.9%)*	
Food product sell	**Yes**	14 *(42.4%)*	19	0.465	21 *(63.6%)*	12 *(36.4%)*	0.256	19 *(57.6%)*	14 *(42.4%)*	0.209	25 *(75.8%)*	8 *(24.2%)*	0.011
	No	64 *(63.4%)*	37		28 *(27.7%)*	73 *(72.8%)*		54 *(53.5%)*	47 *(46.5%)*		13 *(12.9%)*	88 *(87.1%)*	

CHANGE LEADERSHIP IN PROFESSIONAL SPORT – BASED ON INTERNATIONAL AND NATIONAL EXAMPLES

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Abstract: *Accelerated and turbulent changes – partly driven by external operating environment – are determining day-to-day operations and operational decisions of organizations. They need to be able to respond appropriately, in line with their strategy, yet proactively, in order to maintain competitiveness and future prospects. This is also the case in the world of sport. Our focus is on professional sport – on a domestic sport federation and on one of the most successful clubs in Hungary. The study attempts to adapt the change management theory to professional sport to make it strategic and proactive by creating adapted basis for change management rather than change. Primary and secondary sources were processed using qualitative methods. We investigated three areas of change management / leadership: financial strategy, organization of international sport events and facility management. We conclude that change leadership can be identified in practices of the sports organizations studied, and the theoretical framework can be adapted and applied.*

INTRODUCTION

Our environment is changing at an ever-increasing scale and ever-faster pace. For leaders, the aim is to prepare for changes and make informed decisions and leadership responses. However, a key feature of changes is that it is unexpected. Change is now part of our everyday lives. You could say that without change there is no progress. Changes can be both negative and positive, and in both cases it needs to be led and managed. Organizations that are able to adapt their operations to their environment are the ones that can survive (BURNS & STALKER, 1961, LAWRENCE & LORSCH, 1967, TEECE, 2007, cited in CSEDŐ & ZAVARKÓ, 2019, p. 17). The nature of the changes focused on in this research and identified in professional sport are the decisive economic events of 2022, the roots of which can already be found in 2020 and 2021, and which have caused decisive changes in both the international and domestic sport worlds.

In our study, we provide a theoretical foundation for change management in Hungarian professional sport. We do so in a practice-oriented way and through concrete examples, thus putting into perspective all the events that the world of professional sport has experienced in recent years. We are convinced that the approach followed in this study is very important and innovative in this field, but that it can also con-tribute to both increasing the theoretical knowledge of those interested in the subject and to provide appropriate responses to the changes taking place around us. It can thus become an important tool for future research and for management training in sport management.

The often-cited context is that the challenges of the 21st century require a different solution than the ones offered by past practice and experience. At the same time, however, to-day many emphasise the importance of a complex approach in which, for example, we are aware of historical contexts and can discover recurring patterns, so-called fractals, over larger horizons. In our research, therefore, we aim at a complex approach on the one hand, and the distinction between changes and changing is our theoretical pillar on the other, so that the grouping of underlying drivers and the identification of the different models that are related to them can add novelty to our study. Our focus is always on the effects of external factors.

The correctness of managerial decisions can be affected and adversely affected if the period for which future decisions are based is chosen inappropriately, and even if history is overlooked that has a serious impact on it and even forms the picture of the present and future decisions. This may explain why the payback period as a criterion for the economic viability of an investment/investment cannot be the recom-

mended and followed methodology in the financial decisions of companies, because it introduces a subject into the decisions that may even influence the right decision (BREALEY & MYERS, 1994, p. 73).

Our research is on change management / change leadership in professional sport. In a review of research in sport economics and management, this topic is still considered to be a niche, it does not appear in the research reviewed by András et al. (2019). In our work, we investigate how change leadership (implementation of concepts, identification of knowledge and contexts) can be understood (practical examples) and applied (practical examples) in professional sport.

Literature Review

The aim of this chapter is to provide an overview of some of the literature on change management and change leadership that is applicable to the management of professional sport.

In this subsection, we briefly present the theoretical foundations that are dominant in the international and domestic literature on the topic, and we seek to highlight the main interrelationships. First, the conceptual approach of change vs. change is discussed, followed by theories of change, such as evolutionary motor theory and Lewin's force field motor theory. The literature review concludes with an interpretation of change leadership.

Changes vs. changing. Bennis (1966) made a distinction between the theoretical framework of what we call changes and changing. He sees the difference in that theories of changes tend to answer why and how changes occur, whereas theories of changing seek answers to questions such as how changes can be generated and how changes can be successfully managed. Changes are by all accounts a dynamic phenomenon, a differentiated approach refined by Porras and Robertson (1992). Changes are a continuous adaptation to environmental conditions. Changes are an objective process with a defined and interpretable direction. It exists independently of our will and is present both in the surrounding systems and within those systems. Modification in environmental conditions force changes in order for organisations to adapt to new conditions (CSATH, 1999).

"Changes are a process that results in new or novel alter-

Table 1: Interpretation of changes and changing in the national and international literature

Changes	Changing	Literature
Why and how do changes happen?	How to generate change and how to lead changing successfully?	Bennis, W. G. 1966
Changes are dynamic phenomena.	Differentiated approach	Porras és Robertson, 1992
Changes exist independently of our will and are present both in the surrounding systems and within those.	Modification in environmental conditions force changing to enable organisations to adapt to new circumstances.	Csath, 1999
Changes are a process whereby new or novel alternatives are introduced into an organisation's structure, behaviour, culture and approach.	Organisational changing should always be understood as leaded changing, since the very term 'organisational changing' implies the active involvement of leadership".	Gál, 2020, p. 259
Strategic decision making is not a seamless process in which changes do not occur at a steady pace.	Many dynamic factors can occur that interrupt or delay the process (interruption, delay and acceleration, cycles).	Zoltayné, 2002, p. 114
The open systems approach of organisations implies that they need to adapt to changes in their external environment.	In a dynamic environment, an organisation is only effective if it is constantly renewing and changing. The way in which the environment-organisation fits together is determined by the conscious choice of the organisation's leaders. We can distinguish between reactive, preactive and proactive leadership choices.	Bakacsi, 1996, p. 284 Dobák, 2006

Source: Own editing based on, Bennis, W. G. (1966), Porras és Robertson, 1992, Csath, 1999, Gál, 2020, p. 259, Zoltayné, 2002, p. 114, Bakacsi, 1996, p. 284, Dobák, 2006

natives being introduced into the structure, behaviour, culture and approach of an organisation. Organizational changing should always be understood as leaded changing, beacause the term organizational changing refers to the active involvement of leadership" (GÁL, 2020, p. 259). And changing is a consciously shaped process (intervention) with a direction towards the future. Its aim is to achieve a new (more advanced) equilibrium state compared to the current one (NÉMETH, 1997). To summarise, changes are autonomous processes; changing is a volitional process (Table 1).

Managing changes is a managerial activity while leading change (changing) is an organisational process. According to Gál (2020), organisations are constantly affected by events that generate changes. It is necessary to react effectively to these events, and this reaction is a prerequisite for the survival of the organisation. In all cases, it is true that changes create uncertainty and therefore tension (GÁL, 2020, p. 257). Change management is a managerial activity that aims to identify, prepare, plan, implement and sustain the changes necessary for environmental adaptation and organisational renewal (CSEDŐ & ZAVARKÓ, 2019, p. 14). According to Dobák (2006), many and diverse changes can occur in organisations at the same time, but in the present interpretation, change management refers to the management of organisational changes for environmental adaptation and organisational renewal (CSEDŐ & ZAVARKÓ, 2019, p. 17)

Theories of change. Two theories are closely related to the discussion of this topic and are briefly described below. First, the so-called evolutioner motor theory and then the Lewin force field model will be presented.

Evolutionary engine theory. Van de Ven and Poole (1995), through a review of 200 articles on change management, concluded that theories of emergent changes can be classified into four major groups. Their distinction is based on what drives (facilitates, energises, motivates) changes. On this basis, four distinct groups have been distinguished: 1) the teleological motor, 2) the life cycle motor, 3) the dialectical motor and 4) the evolutioner motor. Related to the topic at hand, the evolutioner motor postulates a continuous cycle in the triad of versions-selection-maintain and the main focus of changes is on the organisational responses generated by the pressure of environmental conditions. Underlying this is the assumption that someone notices the changes in the environment, which – if there is capacity and capability in the organisation to changes – will then initiate organisational changing.

In professional sport, the focus is on the organisational reactions and changes generated by the pressure of environmental conditions, i.e. the changing are brought about by the modification of environmental conditions, then this is the so-called evolutionary engine theory (GÁL, 2020, p. 259). Possible grouping of the theory: the need for change leadership can be given by 1) changes in external factors, 2) internal factors can also generate changes (CSEDŐ & ZAVARKÓ, 2019, p. 18) – hence change leadership is defined as: environmental adaptation and organisational renewal. In the evolutionary theory approach, every organization acts in its own self-interest for its own survival and success – all processes should

point in this direction (monitoring the environment, detecting environmental changes, forming reactions to changes, implementing the reactions, and continuously repeating this process) (POÓR, 2017).

Organizations are understood as open systems – they are in constant contact with the external environment (DOBÁK, 2006, cited in CSEDŐ & ZAVARKÓ, 2019, p. 25). External factors that require changes can be identified using strategic management tools such as Porter's five forces model or PESTEL analysis. Adapting to a changing environment is not easy – all organisations strive for a degree of stability, so change management must be able to manage against organisational inertia (DOBÁK, 2006, cited in CSEDŐ & ZAVARKÓ, 2019, p. 18).

Lewin's Force Field Model. According to Gál (2020), Lewin's Force Field model of 1972 is used to describe changes (GÁL, 2020, p. 258). According to Gál (2020), in the Lewin's force field model approach, changes can be interpreted as changes in the characteristics of a system, i.e. "as we move forward in time, along some of its parameters, they show different patterns than before". According to Gál (2020), Lewin's basic theory suggests that the balance of factors that impede and generate changes that affect a stable, equilibrium state is upset, whereby the previous stable state is broken and the organism becomes unstable. Referring to this, Gál (2020) identifies adaptation, i.e. changing the previous state, as a need for the organism to be able to survive in the new situation (GÁL, 2020, p. 258).

Changing – change leadership and change management. Today's changes and their turbulence have accelerated, which means that organisations have less time to create and implement responses to changes. Changes can be both negative and positive, with consequences in both cases. However, according to Gál (2020), this process does not necessarily ensure that this stable, final state can be achieved. For these reasons, Gál (2020) argues that it is not always the case that a state of completion is reached. Organizations are thus in a process of constant adaptation, in addition to permanent changes, and we can hardly speak of a stable state. According to Gál (2020), „organisations are characterised by permanent instability and a conscious and controlled managerial response to changes becomes essential, the framework for which is provided by change management" (GÁL, 2020, p. 258-259).

Today, learning and leadership are becoming increasingly important. Organisations that are able to adapt to changes are those that are able to learn from changes, manage and develop the knowledge they have already acquired. The fundamental link is that changes are generated by external-internal processes, but can only be managed by the leaders of organisations. Basic premise: for sustainable competitive advantage, environmental changes and organisational changes must fit together, organisational changes must be conscious, and the conscious management of these changes is change management, which aims at organisational renewal, adaptation to the changing environment - changes - novelty - innovation (CSEDŐ & ZAVARKÓ, 2019, p. 13).

Adaptation paradox: the more an organization adapts to

current external factors, the more its ability to adapt to the future decreases (BURGELMAN, 1991, cited in CSEDŐ & ZAVARKÓ, 2019, p. 26) – a high degree of adaptation to the current environment may even be detrimental if the environment changes again.

Change management: change management is about tackling complex, often messy problems where cause and effect relationships are far from clear. Thus, the order of factors to be considered may be interchangeable, depending on the research and practice objectives or priorities (FARKAS, 2006, p. 12).

Based on the review of international and domestic literature, the following interpretations of change management can be distinguished (FARKAS, 2006, p. 12): 1) change management as resource development, 2) change management as the art of balancing, 3) change management as the practice of dealing with turbulent situations, 4) change process as problem identification and resolution. Each of these distinctions works with different interpretations of changes. In the case of interpretation 4), changes as a "why" emerges, then: 'changes are always about starting from one state and arriving at another, and on the way to that state, tasks are solved, giving way to something entirely new' (FARKAS, 2006, p. 15).

"All this is being done in line with pre-defined objectives, with milestones set and with careful planning and stakeholder engagement. The range of terms used to replace the word "problem" in change management terminology is wide, such as: opportunity, challenge, crossroads, controversy, issue, phenomenon" (FARKAS, 2006, p. 15).

The way in which the environment and the organisation fit together and the success of the adaptation, the results of the organisational changes that occur, are determined by the conscious choice of the organisation's leaders. We can distinguish between reactive (adapting to environmental changes), preactive (anticipating expected environmental changes) and proactive (seeking to change environmental conditions) managerial choices (DOBÁK, 2006). Based on Nadler et al. (1998), the four basic types of change are depicted as follows (Figure 1).

Figure 1: Four basic types of changing

Source: Nadler, D. A. & Nadler, M. B.: Champions of Change: How CEOs and Their Companies are Mastering the Skills of Radical Change. Jossey-Bass, San Francisco, 1998

Nadler et al (1998) interpret the four basic types of changing along two dimensions. It considers both the rate of changing and its timing. He speaks of adaptation when the rate of changing is a quantitative changes in state and its timing is a post hoc reaction. In the case of a reactive, ex-post reaction, he refers to the basic type of changing as recovery, when the degree of changing is already qualitative and can therefore be described as a revolutionary change of state. He speaks of fine-tuning when the rate of changing is a quantitative changes of state and the timing is characterised by anticipation, i.e. proactivity. According to Nadler et al. (1998), a change of direction is said to occur when the timing of the changing is proactive and the degree of changing is qualitative, i.e. a revolutional state change.

According to Bartlett & Ghoshal, 2002 (cited in CSEDŐ & ZAVARKÓ, 2019, p. 34), adaptation to environmental changing is ensured by three main factors: 1) highly specialised organisational units called "centres of excellence", 2) rapid and efficient sharing and global management of local knowledge, and 3) the context of integration and cohesion (culture, systems).

Dynamic capabilities is a resource-based strategic approach, in the framework of which adaptation-innovation and changes are linked and connected in the sense of understanding (TEECE et al., 1997, TEECE, 2007, 2016, cited in CSEDŐ & ZAVARKÓ, 2019, p. 37). According to this approach, in turbulent environments, it is a more reliable decision to base the strategy not on industry positioning, but on organisational resources and their development. Furthermore, innovation created as a combination of organisational resources also feeds back to the market environment as an output, and it is not only the environment that affects the organisation.

The DC framework is based on the premise that in order to keep pace with rapid environmental changes, companies need the capabilities to sense new business opportunities, develop business models capable of seizing opportunities, mobilise the necessary resources (seizing) and transform their operations accordingly (CSEDŐ & ZAVARKÓ, 2019, p. 37). The environment is changing very rapidly, with competitive challenges allowing shorter time than ever to adapt.

MATERIALS AND METHODS

The subject of our primary research is the Budapest Honvéd Sports Association and the Hungarian Canoe Federation, and to identify practical examples we will examine the practices of these two organisations as a case study, through interviews with their leaders. In evaluating and analysing the management interviews, we identified the change leadership practices in the three areas.

The Budapest Honvéd Sports Association has 14 divisions (athletics, wrestling, judo, kayak-kenu, karate, handball, basketball, pentathlon, shooting, recreational sports, gymnastics, swimming, fencing, water polo) and 9 sections (B33, e-sport, football, laser run, diving, boxing, synchronised swimming, taekwondo, wave riding) (honved. hu, 2023). It is Hungary's most successful club in terms of Olympic results. The aim of
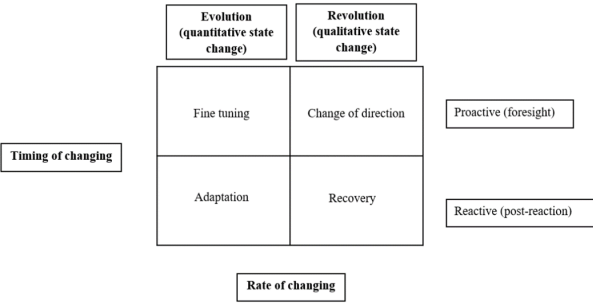
the sports club is to be the number one sports club in Budapest and in the country and to offer everyone the possibility of leisure sport and a healthy lifestyle.

The Hungarian Canoe Federation can look back on 81 years of history, currently counting 191 member organisations and 5076 athletes. It has 28 Olympic gold medals, one Paralympic gold medal, 280 World Championship gold medals and 217 European Championship gold medals. The Maty-ér in Szeged has hosted four World Championships and several World Cups, World Youth Championships to date and again in 2027. Its current disciplines are speed kayak, kayak polo, marathon, parakenu, water touring, rafting, SUP, kayak polo, slalom (kajakkenusport.hu, 2023).

The association is a public benefit organisation, so its main objective is not to make a profit, but rather to create social value, to serve the community, to create opportunities for sport and to support the operation of kayak canoeing sports clubs to the highest possible level. The Hungarian Canoe Federation is also a holding company (mainly for its asset management activities) and owns three other companies which carry out various activities (Sportrendszer Fejlesztő és Tanácsadó Nonprofit Kft., Canoe Üzemeltető és Szolgáltató Nonprofit Kft., BJMOKK Sportüzemeltetési Nonprofit Kft.).

In our research, we examined the management of change/changing in international and domestic professional sport from several perspectives. In our methodology, we used qualitative methods to analyse primary and secondary sources. Our aim in using qualitative methods was to focus on understanding from the perspective of the respondent (the changing leader).

Qualitative research can be used to explore a person's experience or behaviour, or to understand a phenomenon (GHAURI, 2004). It also provides an opportunity to gain a deeper understanding of the phenomena under study and to gain insights into the experiences and opinions of participants. This method places less emphasis on quantifiable data, but is more fundamentally suited to exploring and revealing certain characteristics and contexts. Qualitative methods: literature analysis, documentary second analysis, primary expert interviews. The different tools complement each other and help to develop a broader understanding of the topic through national and international examples. In the secondary research, we reviewed the international literature and identified theoretical frameworks in international practice cases. Our primary research involved interviews with experts.

In our primary research, we had expert interviews with Gábor Schmidt, Social President of the Hungarian Canoe Federation, Deputy State Secretary for Sport Administration and Development, State Secretariat for Sport, and István Gergely, Executive President of the Budapest Honvéd Sports Club. The interviews took place on MSTeams in spring 2023. The two organisations differ in organisational form, but are comparable in terms of the research question. Main common characteristics: mainly publicly funded organisation, performance pressures, exposure to external environmental factors both in terms of facilities management, financial strategy (opportunity for business revenues).

The research was built on two pillars. First, we identified the changes that are shaping the professional sporting life.

Then we examined the practice of change in three areas of change management in international and domestic professional sport. Our aim is to present and second-analyse practical examples that help us to interpret our theoretical framework for sport.

The three practice areas are interrelated. Financial strategy and the organisation of international sporting events have an impact on facilities management.

Our research question: How to understand (theoretical framework) and apply (practical examples) changes, and even more so change leadership in professional sport. Our question: How is change leadership as a leadership activity implemented in professional sport? How is it practised in professional sport?

Research limitations. As a research limitation, it can be identified that no general management responses can be derived from inhomogeneous sample items, therefore one of the aims of the study is to identify good practices in the context of changing leadership in domestic sports organisations. A future development opportunity is to increase the number of organisations studied according to the different organisational forms.

RESULTS AND DISCUSSION

Situation analysis – Identifying macro-level environmental changes.

In professional sport, the nature of changes will be determined by the decisive economic events of 2022, the roots of which can already be found in 2020 and 2021, and it is worth taking a step back and placing the events of the 21st century in a broader historical perspective, because this will allow us to identify patterns that show the historical events in their context and draw attention to recurring phenomena and interrelationships. All these changes in the general environment have brought about changes in both the international and domestic sporting world. An analytical presentation of environmental changes has been made by examining secondary and primary sources.

It is also useful to have a kind of grouping between environmental changes, which helps to create a professional order between the changes. Such a grouping could be the temporality mentioned above, but the following also give the possibility to distinguish between several dimensions: 1) sport or non-sport, 2) international or domestic, and 3) chronological effects.

Global trends include digitalisation, which is emerging as a tool to transform operational processes and management activities. The need for digitalisation as a successful development policy tool (see Estonia's success). It is also necessary when structural, temporal and spatial boundaries are loosened and processes are and have become decentralised, multi-actor, networked. According to Davensport-Westerman (2018), digital transformation is not only about developing and implementing new technologies, but also about continuous changes in the organisation, investing in new capabilities and recombining people, tools and business processes (DAVENSPORT & WESTERMAN, 2018, cited in CSEDŐ & ZAVARKÓ,

2019, p. 26).

Digitalisation as an external trend leads to organisational changes in the field of facility management, operation and development (transformational and transactional variables, according to which the primary driver of organisational changes is environmental adaptation (BURKE & LITWIN, 1989, cited in CSEDŐ & ZAVARKÓ, 2019, p. 26).

It is characterised by a competition for innovation and a broad, cross-cutting drive for sustainability. Csath (2023) argues that in the current rapidly changing economic environment, with its new technological breakpoints, the conditions for competitiveness and its improvement are also changing (CSATH, 2023, p. 126). He states that "a high rate of investment in intellectual capital and a high level of intellectual wealth are prerequisites for a country to move from competing on the basis of "cheapness" to competing on the basis of knowledge and innovation, i.e. to move up a level and become a knowledge economy" (CSATH, 2023, p. 126). It can be concluded that today, in order to maintain and improve competitiveness, it is necessary to quickly match problems with solutions (market needs and technologies) and to develop technological infrastructure.

International consultancy firms (Deloitte, Nielsen) report and forecast on sport economic and marketing trends on a regular basis, with technological focus on data analytics, digitalisation, social media, facilities, wearables, web3.0 (DELOITTE, 2017). The future of globalisation is an important phenomenon, with Halmai (2023) suggesting that the competition between the US and China, the impact of certain trade policy restrictions and the consequences of the coronavirus epidemic threatening global production chains could spell the end of globalisation. In his view, the globalised world economy is undergoing a fundamental transformation, in which identifying the main directions of changes is an inescapable task of economics and a prerequisite for far-sighted economic policy action (HALMAI, 2023, p. 5). This also has implications for Hungarian economic policy, which has used sport as a strategic sectoral instrument over several cycles.

In the case of environmental changes on a global scale, pandemics were the first and most frequently mentioned in the online expert interviews, and have had a profound impact on the international and domestic sporting world, its operations, its competitive system and its supply chain, which is considered global. In second place and also mentioned in all interviews was the changes in energy prices, which interviewees linked to the war conflict in our neighbourhood and the related inflation as adverse changes in energy prices in their operations. Either these were not immediate, because longerterm and pre-contracted agreements either delayed the impact somewhat, or the immediate and rapid response (closing plants, reducing the indoor temparatures to a level that match the legal requirement, starting up a smart home-like system and related education) helped to blunt the impact. A difference could be in the third mentioned external environmental changes, which could be linked to the fact that a sport specific association tends to focus on sport specific factors, thus the mention of climate changes in the case of kayak canoeing, while the need for IT system improvement was mentioned in

the case of a multi-sport association.

Table 2 provides a summary of the three main external environmental variables identified by the primary research findings, i.e. the interviews, and the secondary sources.

Table 2: Main external environmental changes identified through secondary sources and primary interviews

Secondary sources	MKKSZ, Schmidt Gábor	BHSE, István Gergely
Digital transformation	Covid-19	Covid-19
Innovation competition	War inflation	Energy price changes in 2022
The future of globalisation: De- or reglobalisation	Climate changes	Need for IT system development

Source: Interviews with experts by Schmidt, Gergely, 2023

Changes in Hungarian sport

The year 2022 brought changes to the state governance system of Hungarian sport. The former ministerial structure was replaced by the Ministry of Defence (hereinafter: MoD), changing the person of the State Secretary and linking the previously established National Sports Agency Nonprofit Limited Liability Company (hereinafter: NSC) as an important back-up organisation. In a government decree, the tasks of the, which is under the ownership of the Ministry of Defence, were defined, as well as the transfer of tasks and the creation of financing conditions for the performance of certain tasks, with regard to the reorganisation of tasks resulting from the restructuring of the central sports governance system (kormany.hu, 2023). A new head was appointed to both the State Secretariat for Sport of the Ministry of Defence and the NSC, as well as to the Hungarian Olympic Committee. The former is headed by Dr Ádám Schmidt, State Secretary for Sport, Péter Bíró, CEO of the National Sports Agency Nonprofit Limited Liability Company, while the National Olympic Committee (MOB) is headed by President Zsolt Gyulay.

The management of Hungarian sport has been challenged by the pandemic and the energy crisis that, as well as by the price increases caused by inflation. In addition, the regulation of TAO (Corporation tax) resources has evolved continuously.

The communicated objectives were to increase the efficiency of the newly established sports governance and to reduce bureaucracy, the latter also applying to the use of TAO funds, whereby the aim is for TAO to support and develop sport and the profession, and for this funding system to have a future.

The above analysis of the situation in professional sport identifies changes in environmental conditions at both macro and micro levels, which will force sporting organisations to changing in order to adapt to the new circumstances. The

question is how to lead changing successfully? How is change management as a leadership activity implemented in professional sport?

International and national examples of change leadership (changing)

Practical examples (Table 3) of change leadership in three key areas of professional sport have been identified and analysed by examining secondary and primary sources. The three areas are interlinked, with financial strategy and the organisation of international sporting events having an impact on facilities management, and this is reflected in reverse.

Financial strategy. The financial strategy is built around three pillars. The first is the investment strategy. The owner of capital invests his money in the business or sports company because he hopes to increase his wealth and the value of the company. Changing environmental factors, changes in the economic situation of market players and the state (uncertainty, increased risk) change the propensity and willingness to invest. In uncertain economic times, investors seek stability and predictability. Sport (sports teams, championships, events) is not immune to economic shocks. The demand for sport as entertainment also depends on the general economic conditions. And the economic situation influences who is able to invest in sport. The subject area can be understood in an international context. In this area, the world of sport has undergone constant change over the last 10-15 years. One of the main trends is the significant increase in the involvement of Asia and the Arab world. Qatar has invested $200 billion in sport through the organisation of the football world cup in order to use its impact to achieve its goals.

A good example of the impact of geopolitical changes is that in 2022, when the Russian-Ukrainian war broke out, Chelsea owner Roman Abramovich was sanctioned for his links to Russian President Vladimir Putin. The club was therefore put up for auction in 2022. The £4.25bn takeover (theguardian.com, 2022), the largest ever in the history of the sporting giants, required the approval of the Premier League and the UK. The buyer was a consortium led by US businessman Todd Boehly.

In the case of the Olympics, obtaining the right to host the event requires a large financial investment. In recent years, the number of bidding countries has steadily decreased and the bidding system has changed. The International Olympic Committee (IOC), the owner of the hosting rights, is in preliminary negotiations with countries with hosting ambitions. The process is changing, making it more attractive for new countries to organise and invest in sport.

In October 2021, the Premier League authorised the acquisition of Newcastle United by the Saudi-based Public Investment Fund, becoming the flagship Saudi Arabia project with sporting ambitions and sports business objectives. And the football project, which will run from 2023-2024, aims to triple the market value of the Saudi series ($2.1 billion target) by placing it among the top ten leagues in the world (MONCZ, 2023).

The second element of the financial strategy is financing. In this case, we use three practical examples from Hungary to illustrate how the funding and financing of Hungarian sport is being implemented and has been transformed.

Changing public sport funding system. Between June and November 2022, the new sports governance leadership reviewed the previous programme and, instead of the previous 16 sports, all Olympic sports were included in the National Competitive Sports Development Programme, grouped into five different categories in the spirit of the five rings (SCHMIDT, 2022).

In the National Programme for the Development of Competitive Sport, the basis for classification, and therefore the amount of funding, is "the expected performance in future cycles in addition to past performance" (SCHMIDT, 2022). Furthermore, the new system is much more dynamic than the previous one, in which sports are treated not only on the basis of past performance but also on the basis of expected future performance. "From a sporting point of view, a category 1 sport, which is expected to win medals at the Olympics and World Cups, is approached in a very different way than a category 3, 4 or 5 sport (Table 4). The latter cannot be expected to be judged at the same level as swimmers or wrestlers, based on the organisation and strength of the competitors. There is a constant concerted effort to categorise the sports so that they

Table 3: Causes and effects of financial changes

Country	Reason for changes	Changing and its impact
Qatar	Building soft power, strengthening international economic and political position	Investing $200 billion in sport, organising the football World Cup.
United Kingdom	Russian-Ukrainian conflict	The Russian owner has been replaced by an American investment group.
India, Egypt, Indonesia	Reduction in the number of bidders – the Olympic bidding system has been restructured – based on preliminary negotiations	The new countries will be attracted to organise the Olympics, to invest in sport.
China	Leadership ambition, political objective Xi Jinping's programme	Increasing participation in recreational sports. Chinese professional athletes' performance has increased, China hosts major international sporting events.
Saudi Arabia	Sports ambition, sports economy objectives, improving national image	2021: Acquisition of Newcastle United, 2022: Signing of Cristiano Ronaldo, 2023: signing of Karim Benzema and other star footballers

Source: own editing, 2023

are ranked as high as possible on the basis of their performance" (BAJI, 2022). Some sports have moved up, such as cycling or sailing, while others have slipped back, such as gymnastics.

Table 4: Five categories of the National Competitive Sport Development Programme

Category 1	"Due to their structure, professionalism and highly developed talent management system, they have a good chance of winning medals at the next two Olympics."
Category 2	"There is a good chance that the next two Olympic Games will feature high-scoring sports."
Category 3	"In some cases", scoring at the next two Olympics is expected."
Category 4	"In the six-year period starting with the 2028 Olympics (two Summer and two Winter Games), there is a possibility of quota and possibly points scoring."
Category 5	"Based on their current situation and potential, Olympic qualification is neither expected nor achievable."

Source: Schmidt G., 2022

Funding and financial planning for domestic sports organisations

In the case of Budapest Honvéd Sports Club, 95 percent of its revenue comes from state subsidies, according to the interview. The 5 percent comes from event management, a pillar that is profit-driven and expected to generate a profit. A future goal is to increase the share of own income in the funding, and the association would like to open up to day admission services. This concept was already formulated before 2020, but changes over the last three years have confirmed the need for this new approach. Developments have therefore been made which offer the possibility of generating own income, such as the construction of a kitchen with a capacity of 600 people and thus the provision of catering, and the rental of facilities. In the case of COVID-19, independent income has been reduced, operating costs have fallen, but new costs have arisen: decontamination, masks. As a changing, the club has introduced new protocols to ensure that sporting facilities can

be provided under these rules as soon as possible.

The Hungarian Canoe Federation, is characterised by a multi-legged approach to funding, and the "holding-like" operation of the organisation has been a conscious strategic goal of the organisation in recent years. This allows for the generation of business revenues alongside state support. The Federation has a specific recreational sports strategy aimed at providing high quality services to consumers (athletes). The investments have enabled the member organisations to carry out these activities. From a financial point of view, the Federation acts as an intermediary for the redistribution of public subsidies. Therefore, the funding objective of the Federation is to enable its member organisations to generate their own income and to reduce as far as possible their dependence on public subsidies.

The third element of the financial strategy is the analysis and planning of the financial system (Table 5). Changing environmental factors determine cost management. In this ever-changing environment, a major challenge is whether and how to manage costs effectively. In times of changes and uncertainty in terms of investment and financing, the role of financial planning becomes paramount.

At the Budapest Honvéd Sports Club, financial planning is done on a departmental basis, with the financial manager, professional manager and department chairman jointly preparing the plan, which is sent to the head office. The consultation phase is part of the process, the prepared plans are reacted to by the managers and the final version is created through a process of consultation. The aim is to have a zero balance between the income and expenditure side; it is not the responsibility of the departments to make a profit, as we are talking about a non-profit organisation. Centralisation, avoiding duplication and rational financial management are important objectives. 'Not everyone has a physiotherapist, a psychologist or a bus of its own' (GERGELY, 2023). The changes of the last three years have highlighted the need for centralisation and responsible financial planning. Centralised resources – facilities, gym, equipment, buses, health centre – are used by departments on a time-schedule basis. "It is no longer the case that the swimming pool is only for the swimmers – they have priority and choose the first appointment – but then the other disciplines and recreational sports are also accommodated in the pool" (GERGELY, 2023). In the situation created by the changes, the association was helped by the fact that it "had financial reserves, had a vision for survival, and proactively sought the most efficient ways of operating" (GERGELY, 2023). After several years of preparation, by 2022 BHSE's facilities had an energy system in place that allowed energy consumption to be accurately measured and planned. In the sports facilities, "the temperature required for sports purposes was ensured, with drastic reductions and the introduction of a home office in the other premises" (GERGELY, 2023). In financial planning, the primary objective is to "ensure that the association's operations are in order in terms of sports at the end of the day (i.e. every four years, at the end of the Olympic cycle)" (GERGELY, 2023).

In the case of the Hungarian Canoe Federation, financial planning will start in the autumn of the previous year and will

be voted on by the General Assembly in October. The budget planning is based on the objectives set out in the strategy. In the current situation, the priorities are (1) support for member organisations, salary increases for coaches – this is now justified by the rise in energy prices, (2) Olympic qualification tasks – especially in the years prior to Olympic Games (3) continued operation of the regional system – increasing the number of member organisations. In financial planning, the obligation to set aside reserves is a priority, without which the budget cannot be adopted (SCHMIDT, 2023). This conscious planning has been well tested in the case of COVID-19 and wartime inflation. In the case of COVID-19, the federation's goal was to emerge as a winner as an outdoor sport, and to do this, it needed the support of the clubs. In 2020, there was "an unprecedented increase in numbers; in 2021 there was no increase, but no decrease in numbers" (SCHMIDT, 2023). This increased consumer demand, mainly from recreational athletes, needed to be met by the member associations, and the goal was achieved: they were able to manage this increased demand. In professional sport, the Federation did not abandon the clubs, cutting back on membership fees and reducing competition fees, with a rapid budget reallocation in 2020. Even in the case of wartime inflation, the Federation's stable financial position and conscious financial planning enabled it to provide immediate extra funding for the 20 largest clubs in August 2022.

Table 5: Changes and changing in the organisations surveyed

	Covid-19	**Energy crisis/ wartime inflation**	**Changing financing situation**
Hungarian Canoe Federation	Support for clubs. Cut back on membership fees and competition fees. A rapid budget reallocation to impact 2020.	Provide immediate additional resources to the top 20 clubs.	Conscious budgeting, holding-like operations, business continuity, multi-legged operations.
Budapest Honvéd Sports Club	Introduction of new protocols, providing sporting opportunities under these rules.	A remotely controlled energy system that provides the necessary environment for athletes, but also brings significant savings.	Departmental financial planning, centralisation.

Source: own editing based on interviews with experts, 2023

Sport events

The three areas chosen interact with each other: (1) who can and who will be the organising city? – the transformation of the landscape of financial invesments (discussed in the first part) determine and transform the list of countries that will

be able and willing to organise international sport events in the short term; (2) COVID-19, (3) the war situation [in the neighborhood] and the energy crisis are forcing further changing (Table 6). In our approach, the changing in the field of international sport events can be divided into two parts. When a changing is needed in the concept, in the way the event is organised; in the organisation, in the factors, and when the organising city itself the venue changing.

The changing in the organisational concept was mostly due to the COVID-19 effect. The issue of safety has long been included in sport economic trends, "but since 2020 this area has been reinterpreted and health safety has become the main issue, with the health situation affecting (international) sporting events that attract crowds and consumers who attend them in person on site" (MÁTÉ & ANDRÁS, 2022, p. 46). The "Watch Games. See More." was a complex strategy of the 2022 Handball European Championship that, through conscious planning, would have ensured that the international sporting event would achieve the desired positive effects, not only in sport but also in other related areas (MÁTÉ, 2022a). The programme was intended to showcase the culture, gastronomy and diverse programme offerings of the organising country (see more, taste more, feel more, chill more, spot more, do more). However, these could not be achieved in that health situation. During the event, the number of illnesses among the players was high, the level of performance of the Hungarian team was below expectations.

Another example of a changes in organisational concept is the World Cup in Qatar, in which adapting to environmental conditions has created ever-changing factors. Stakeholder consensus created different changes, to which management responded with changes. The decision by the International Football Federation in 2010 meant to hold the World Cup in an Arab country for the first time and the first to be held in Asia since 2002. The adaptation to environmental factors to avoid the summer heat generated a sporting change, with the World Cup being held in the winter, in the middle of the national championships, in an unusual move. Another important environmental factor is the adaptation to the culture of the organising country, Qatar, as a conservative Muslim state, has strict regulations on the sale of alcohol. The host country and FIFA negotiated this so-called "beer issue" until the last minute, which created a new situation for Budweiser. Budweiser paid out $75 million to be the exclusive beverage sponsor, but it was decided before the event that there would be no alcoholic beer in the stadiums despite the preliminary agreement (bloomberg.com, 2023).

The other major changing, when the host city is changed, is the venue. There may be several reasons for cancellation, backtracking, re-planning. Each sporting organisation has a different approach when a country or city withdraws from hosting a major sporting event. No two cancellations are the same, every case is different and therefore the consequences and sanctions are different. Table 6 collects ten cases where the changes have brought about a changing. The Norwegians pulled out of the 2020 Women's Handball European Championship half a month before it was due to start, leaving the hosting to the Danes alone. The Dutch, who had returned the

Table 6: Causes and solutions for changes in international sporting events

Sport event	Organiser	Reasons	Solution
Winter Olympics, 1976	Denver	[The originally planned budget would have been triplicated – mainly due to the rise of the costs of clean up and of adversing the unforeseen environmental impacts.]	Innsbruck
World Kayak Canoe Championships, 2011	Vichy, France	Weather forecasts predicted bad weather conditions.	Szeged, Hungary
European Women's Handball Championship, 2012	Netherlands	Financial reasons	Serbia
Africa Cup of Nations, Football 2015	Morocco	Ebola outbreak in West Africa.	Equatorial Guinea
FINA World Aquatics Championships, 2017	Mexico, Guadalajara	The funds needed to run the event were not available.	Budapest
European Women's Handball Championship 2020	Norway, Denmark	COVID-19	Denmark
Billie Jean King Cup (formerly known as the Fed Cup), 2011	Budapest, Hungary	COVID-19, financial reasons	Prague, Czech Republic
FINA World Aquatics Championships, 2022	Fukuoka	COVID-19	Budapest, Debrecen, Szeged
U18 Girls' Handball World Championships, 2022	Georgia	War	Skopje, Northern Macedonia
World Wrestling Championships, 2022	Russia	War	Belgrade, Serbia

Source: Own editing, 2023

hosting rights to EHF the 2012 European Women's Handball Championhip shortly before the start, had to pay a hefty fine and were excluded from that tournament.

For the 2022 FINA World Aquatics Championships, Hungary was the back-up country again after 2017. Originally, the FINA World Championships, postponed from 2021 to 2022, were due to take place in Fukuoka in the second half of May 2022, but the Japanese organisers, citing the pandemic, have indicated that they will only be able to hold the event in July 2023. With thousands of athletes starting their preparations to compete at the 2022 World Championships, the International Swimming Federation did its best to offer a suitable alternative – and the Budapest World Championships were agreed. The Hungarian Swimming Federation took on the task and challenge only by leading changing. Instead of six sports, five were organised, and this time the programme did not include the giant steeplechase. It was a novelty to start the event with the swimming competition along with the diving and open water swimming events and the group matches of the water polo tournament in the first week, followed by the diving and open water swimming events and the straight knockout stage of the polo tournament in the second week. Using only existing facilities, the World Championships venues included cities in the countryside, with Debrecen, Sopron and Szeged among the organising cities, making use of the available sports facilities. The event was organised with a reduced capacity, and the 10,000 capacity required by FINA for the World Championships was not guaranteed for the swimming competitions in the Duna Arena.

The U18 Girls' Handball World Championship was originally scheduled to be held in Georgia in 2022, but after the outbreak of war, the event was moved to a new venue (Skopje, North Macedonia) for security reasons.

The venue for the 2022 World Championships was changed by the International Wrestling Federation (UWW) due to sanctions against Russia, and the new venue was Serbia and its capital Belgrade.

Hungary "has already repeatedly demonstrated its ability to host major international and domestic sporting events at world-class level and to exploit their tourism potential" (MÁTÉ, 2022a, p. 65). However, in 2022, it initiated the withdrawal from the 2024 European Women's Handball Championship, which will be partly hosted by Hungary. When this bid was awarded, there was no war, no energy crisis and no resulting financial difficulties. 'One of the keys to the successful organisation of an international sporting event is a supportive social environment', something that could not be achieved in the current economic climate (MÁTÉ, 2022b, p. 474). Constructive re-planning resulted in the rights holder reducing Hungary's original commitments in view of the changed situation. Debrecen will host one group and one main-round group instead of the originally planned two groups, one main-round group and Final Weekend in Budapest and Debrecen.

Facilities Management

The financial strategy and the possibility of organising international sporting events have an impact on facilities management. In professional sport, a significant proportion of expenditure is incurred in the operation and maintenance of facilities. The organisation of sporting events contributes to the capacity utilisation of facilities. The renting of sports facilities is a source of income for sports organisations. COVID-19 was the first of the changes identified in the first part of the study to place facility owners in a new situation. The main challenge was the closure of facilities and the loss of rental income. In the case of the Budapest Honvéd, revenues were practically nil, rentals were not possible, summer camps could not be realised. At the same time, although operating costs were reduced, new expenses were incurred, such as disinfection, masks, introduction of new protocols (GERGELY, 2023). As an outdoor sport, kayak canoeing could be a "winner" of sorts from the restrictions. Because of the restrictions imposed on indoor facilities, people who wanted to play sport sought outdoor activities. By implementing appropriate protocols, they were able to operate outdoor facilities safely and serve the increased demand (SCHMIDT, 2023)

Subsequently, the energy crisis has reinforced the old-new sustainability drive. Facilities that are energy efficient through conscious design are the winners in the current situation. In the field of facilities management, the new situation has again called for innovation. One such example is the smart facility development of the Budapest Honvéd, which is a major solution for saving energy in the context of the energy price crisis. The essence of this energy system is that everything can be measured accurately and the settings can be monitored and controlled remotely, bringing conscious savings to the management, complemented by education of colleagues. In the case of the Hungarian Canoe Federation, all facilities, including the headquarters, were reviewed as a result of the rise in the electricity bill, and there were some facilities that were closed. In terms of facility upgrades over the past ten years, there has been a strong emphasis on supporting rural affiliates where energy efficiency of facilities has been improved through solar panels, replacement of windows, insulation (SCHMIDT, 2023). These measures have considerably strenghtened small and medium sized clubs.

Change leadership can also be identified in the management of swimming pools needed to maintain the viability of wet sports. Thanks to the cooperation of the stakeholders, the Hungarian Swimming Federation, the State Secretariat for Sport, swimming pool operators, managers and clubs, changing have been made to ensure the operation of the sports. In July 2022, at the first signs of the energy crisis, the Federation started to assess the situation of the swimming pools and to collect data. In addition to cost optimisation and forced pool closures, the aim was to ensure that the successful programmes already in place (Future Champions, Swimming Nation Programme) were not compromised and that those who wanted to play the sport would not have to travel more than 30 kilometres. In addition to financial support, the swimming pools that remained open also received operational advice, which led to significant energy savings. The optimisation of the facilities required sacrifices from all concerned, both in terms of training numbers, training times and use of the courts.

CONCLUSION

In this study, we examined the issue of changes and changing professional sport. According to Bennis' interpretation of changes and alteration, why and how changes occur, we identified the changes that affect professional sport (BENNIS, 1966). Changes are objective process that has a defined and interpretable direction. Thus, we identified the biggest changes that have affected professional sport in the last three years as: the Covid-19 epidemic, digital transformation, the innovation race, wartime inflation and the energy price change in 2022.

In order to bring together theory and practical examples to analyse changing, we categorised the changing that leaders of organisations made to ensure that environmental adaptation was successful and that the organisation could innovate into the four basic types of changing distinguished by Nadler and mtsa (1998). Nadler et. all (1998) interpret the four basic types of changing along two dimensions – the rate of changing and its timing (Table 7).

Adaptation occurs when the extent of the changing is a quantitative change of state and the timing is an ex-post reaction, examples include budget reallocation, additional resources (MKKSZ), the 2022 European Men's Handball Championship's "Watch Games. See More" concept change, Qatar World Cup winter organisation and the beer issue, implementing new protocols in facilities (BHSE) and catering for the increased demand for outdoor sports (MKKSZ).

In the case of recovery, ex-post reaction, they refer to the basic type of changing as recovery, where the degree of changing is qualitative and can be described as a revolutionary change of state. Examples include the changing of ownership of Chelsea, the hosting of the FINA World Aquatics Championships 2017 and 2022, the changing of venue for the U18 Handball World Championship 2022 and the World Wrestling Championships 2022.

Fine-tuning can be said to occur when the degree of changing is a quantitative change of state and the timing is characterised by foresight, i.e. proactivity, such as conscious financial planning (MKKSZ), centralisation (BHSE), constructive re-planning of the organisation of the 2024 European Women's Handball Championship, rethinking of the operational solutions for swimming pools.

A change of direction is proactive in terms of timing and qualitative in terms of scale, i.e. a revolutionary change of state. Examples include: the significant increase in the involvement of Asia and the Arab world, Qatar's investment in sport: the organisation of the Football World Cup, Hungary's new sports financing system, event management as a revenue generator (BHSE), holding company-like operations (MKKSZ), energy system innovation, smart facility development (BHSE) and the implementation of energy efficient facilities (MKKSZ).

Table 7: Categorisation of changing according to Nadler's (1998) basic types

Fine tuning	Change of direction
▪ Financial planning (MKKSZ) ▪ Centralisation (BHSE) ▪ Constructive re-planning of the organisation of the 2024 European Women's Handball Championship ▪ Rethinking swimming pool management solutions	▪ Significant increase in the engagement of Asia and the Arab world ▪ Qatar's investment in sport: hosting the Football World Cup ▪ New sports funding system in Hungary ▪ Event management as a source of revenue (BHSE) ▪ Holding-like operation (MKKSZ) ▪ Energy system innovation, smart facility development (BHSE) ▪ Energy efficient installations (MKKSZ)
Adaptation	*Recovery*
▪ Budget reallocation, additional resources (MKKSZ) ▪ 2022 European Men's Handball Championship - Watch Games. See More concept change ▪ Qatar World Cup winter organisation, beer issue ▪ Implementing new protocols in facilities (BHSE) Serving the growing demand for Iranian outdoor sports (MKKSZ)	▪ Chelsea change of ownership ▪ FINA World Aquatics Championships 2017 and 2022 ▪ U18 Girls' Handball World Championships, 2022 ▪ World Wrestling Championships, 2022

Source: Based on Nadler (1998) own ed.

In the examples we studied, the need for change management was driven by changes in external factors. Validating the evolutionary theory approach, the organisations acted for their own survival and success, and the direction of changing points in this direction. In answering our research question, change, and even more so change leadership in professional sport, can be understood and applied in both quantitative and qualitative terms. Based on practical examples in all three areas, we were able to identify processes that required changing. Change leadership as a leadership activity is a crucial part of the management of professional sport. Our research also confirmed Gál's (2020) finding that changes is a process in the life of (sport) organisations, resulting in the introduction of new alternatives, solutions and approaches.

For the financial strategy of sports organisations, the changes – in our practical examples, the negative changes – have forced them to adopt a new approach and to re-design their capacities and capabilities.

There has been a shift in the organisers of international sporting events, a change of direction, and the question is obvious: who is willing and able to organise major international sporting events in the future?

Proactivity in facilities management is a necessity. Investing in sustainable operations, developing smart facilities is a long-standing expectation, yet changing environmental factors are forcing change and a breakthrough, a change of direction in this area. In all three areas of professional sport, proactivity and qualitative change leadership are key. A common feature is conscious planning and flexibility, which at first sight seems contradictory, but is nevertheless what we expect in order to be successful. It should be stressed that ineffective responses to a rapidly changing environment do not necessarily affect survival, but rather performance in a dual sense, i.e. sporting and/or economic performance.

A limitation of the research is that there is limited scope for drawing consistent and coherent change management conclusions from the inhomogeneous sample elements under investigation, and these need to be differentiated from a managerial perspective depending on the organisation to which they are applied.

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THE ANALYSIS OF FACTORS ON STUDENTS' SATISFACTION: THE CASE OF MONGOLIA

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Abstract: *Our study aims to examine the correlation between professors' communication, professors' knowledge, professors' skills, teaching method and campus environment and how students' issues are assessed with their satisfaction.*
We attempt to evaluated and provided valuable insights into factors influencing student satisfaction across both public and private universities in Mongolia, highlighting key areas for enhancing the higher education experience. Our study was conducted via online channel from total 326 respondents, who study at university bachelor degree in Mongolian public university as Mongolian State University of Education and private university as Royal International University, Mongolia. We used SMART PLS-3.0 and SPSS-27.0 software as a qualitative research program, Cronbach's alpha (α coefficient), (T statistic) and (P values) were used to measure the data in our study. We describe and compared between relationships of hypothesized and significance of the hypothesis tested by Path analysis in our study such as the analysis of hypotheses reveals differing impacts of professors' communication, knowledge, skills, teaching method, and campus environment on student satisfaction across the two universities. In Royal International University, Mongolia, only teaching method and campus environment significantly influence student satisfaction. Conversely, at Mongolian State University of Education, professors' knowledge and campus environment positively affect student satisfaction.

INTRODUCTION

Higher education institutions are encountering increased competition to implement market-driven strategies that distinguish them from rivals and draw in as many students as possible, all while fulfilling the needs and expectations of current students.

In our study, we need to begin the discussion logically of factors and impacts beginning with a definition of students' satisfaction. In education field, our study has a significant impact of students' satisfaction. Ashari Ismail, Muhammed Hariri Bakri, Mohd Norazmi Nordin (2021), studied that satisfaction is a complex concept with multiple meanings and application as it finds expression and widespread application in disciplines such as sociology, economics, religion, law, psychology, urban

and regional planning, marketing, music, and entertainment among. There are many definitions of satisfaction that were mention in the literatured of satisfaction. "Longman Dictionary of Contemporary English (1981) defines satisfaction as contentment (leisure); something that pleases, the fulfilment of need or desire, payment of a claim or money owned, condition of being fully persuaded (certainty), and the chance to defend one's honor in a duel. (Ashari Ismail, 2021).

However, there are main concepts related to the relationship between professors' attributes, teaching methods, campus environment, and student satisfaction. When we need to focus on their factors that research questions in our study as below:

RQ 1. What communication between professors and students impact student satisfaction?

RQ 2. What role do professors' knowledge play in influenc-

ing student satisfaction?

RQ 3. What skills do professors' play in influencing student satisfaction?

RQ 4. What different teaching method affect students' assessment of their issues and overall satisfaction?

RQ 5. What ways does the campus environment contribute to student satisfaction?

MATERIALS AND METHODS

Our study was conducted via online channel from total 326 respondents, who study at university bachelor degree in Mongolian public university as Mongolian State University of Education and private university as Royal International University, Mongolia.

Our study used information obtained from the responses to a questionnaire applied to undergraduate students of the between one to four course in Mongolian State University of Educational and Royal International University, Mongolia. Our model of study was based on a questionnaire about perceptions of professors' communication, professors' skills, professors' teaching method and campus environment and students' satisfaction in an undergraduate course of art, architure, graphic art, business administration and law.

The questionnaire was separated into two parts, one was general information each university, another was for the analysis of professors' impacts and another. Each had a five-point Likert scale (33 items) and an open question at the end. The answers had five options, from the least to the most favorable. In questions about frequency, the options were 1 – never; 2 – rarely; 3 – sometimes; 4 – often; and 5 – always, and in questions about agreement, 1 - strongly disagree; 2 – disagree; 3 – neither agree nor disagree; 4 – agree; 5 – strongly agree in our study.

THEORETICAL BACKGROUND IN OUR STUDY

Satisfaction

According to Guolla (1999) satisfaction is an evaluation which takes place at the end of the process of consumer psychology after the use of a product or service (Suarman, 2015).

Solomon et al. (2002) posits that satisfaction is largely determined by the feelings or attitudes about a product or service generated post purchase or consumption. Rai (2013) defined satisfaction as "a buyer's emotional or cognitive response post subjective assessment and comparison of prepurchase expectations and actual performance subsequent to the consumption of the product or service, meanwhile evaluating the costs incurred and benefits reaped in a specific purchase even or over time in course of transacting with an organization" (Medha Srivastava, 2013)

Herzberg et al. (1959) defined the best known popular "theory of job satisfaction." According to the two-factor theory of job satisfaction factors that affect job satisfaction are divided into two categories, hygiene and motivation. Hygiene factors surround the doing of the job. They include supervision, interpersonal relations, physical working conditions,

salary, company policy and administration, benefits, and job security. Motivation factors lead to positive job attitudes because they satisfy the need for self-actualization. Motivation factors are achievement, recognition, the work itself, responsibility, and advancement (Bayasgalan, 2015).

Anita Kanwar, Meghana Sanjeeva (2022), argued that students are the most important stakeholders of any educational institution. Along with students' progression and placements one of the main indicators of a college's progress is the students' level of satisfaction (Anita Kanwar, 2022).

Professors' communication and students' satisfaction

Carlos Estrela, Marcela Gimenes B Oshita (2024) studied that Communication takes place in a context of great importance in learning, as it directly affects factors that are relevant for clarity, safety, confidence, and the logic of the contents taught. Success in a career as a professor depends on a high communicative potential. Teaching requires the incorporation of communication skills, and these potentials may affect the outcomes of the learning process (Carlos Estrela, 2024).

Udhanshu Bhushan (2021), said that Students are important stakeholders in the higher education system. Policy, planning, financing and governance all revolve around maximizing the learning and satisfaction of students. If with enhanced communication skills, learners are likely to develop greater self-confidence and improve their self-image (Bhushan, 2021).

Elisa Monterrubio Cabrera, Liliana de Jesús Gordillo Benavente, Carmen Guadalupe Juárez Rivera (2024) argued that the audiences and audiences of each institution become more and more dynamic in their communication processes in media spaces, becoming present and visible (Elisa Monterrubio Cabrera, 2024).

Communication is seen as social interaction of people while exchanging scientific, industrial or any other experience; interpersonal or group communication among people exchanging their experience with the help of verbal and nonverbal signals. Communication competence was indicated as the second most important competence in the educational process. This competence consists of a bigger range of subcategories compared to personal competence. It is necessary to note that the subcategory "sender's personality" is attributed to communicative competence because it characterizes the sender's personality as a universal participant in the process of communication: "charismatic", "admirable personality" and exceptional personality" (Vida NAVICKIENĖ, 2019). Considering the literature review, we hypothesize that professors' communication and students' satisfaction as below:

Hypothesis 1. Professors' communication will have a positive impact on students' satisfaction.

Professors' knowledge and students' satisfaction

Knowledge is a collaborative and integrated approach to creation, capture, access and use of an enterprise's intellectual assets (Grey, 1996). Knowledge management is the concept

under which information is turned into actionable knowledge and made available effortlessly in a usable form to the people who can apply it (Tsogtsuren Bayasgalan, 2017).

Shulman, L.S. (1987) indicated that besides subject-matter expertise the pedagogical content knowledge is required for effective teaching and the satisfaction of students. Many of the effective teaching skills come under the umbrella of Pedagogical skills, Classroom management skills, Knowledge of Curriculum, Quality teaching, Differentiated instruction, Instructional Assessment, Use of appropriate and effective teaching strategies. The curriculum can be defined as the road-map or framework for teachers to accomplish desired learning objectives. Therefore, curriculum thinking and its knowledge needs to be undertaken for the teachers to start to think about how to represent and structure a topic (Lambert, D. (2014a) (Muhammad Mujtaba Asad, 2020).

Nurul Hidayah Binti Md Noor (2021), studied that lecturer in higher education institutions have the responsibility of delivering quality education through finding the better ways of delivering knowledge, researches, reviewing and updating their knowledge as well as improving the curriculum to satisfy the students as the students is the customers of the institutions (NOOR, 2021). Considering the literature review, we hypothesize that professors' knowledge and students' satisfaction as below:

Hypothesis 2. Professors' knowledge will have a positive impact on students' satisfaction.

Professors' skills and students' satisfaction

Baigalmaa Danzan, Gerelkhu Tugsuu (2018), studied that Learning and teaching skills are a complex construct that is difficult to define. Most definitions of learning describe it as a relatively permanent change in behavior or ability in response to practice or experience (Shuell, 1986). Learning outcomes show a significant relationship with success in the initial phase of gradates' careers (Vermeulen & Schmidt, 2008). Student feedback is increasingly being considered as an important indicator of the quality of education (Harvey, 2001). Student feedback such as performance, including academic performance and student satisfaction, is important in understanding the students' perspective on their learning experiences (Baigalmaa Danzan, 2018).

Learning motivation involves an individual's desire to master new knowledge and skills. Motivation to learn is influenced by internal factors such as self-confidence, expectations and personal satisfaction, as well as external factors such as the support of teachers, family and peers. Learning motivation is a psychological drive that encourages individuals to start, continue, and direct their learning actions (Ely Ibrahim, 2023). Considering the literature review, we hypothesize that professors' skills and students' satisfaction as below:

Hypothesis 3. Professors' skill will have a positive impact on students' satisfaction.

STUDY RESULTS

Mushroom cultivation is a non-traditional farming enterprise that is being promoted in Ghana due to its proven economic, medicinal, and nutritional value. The increased demand for oyster mushrooms in Ghana, particularly in the Greater Accra region, justifies the need for commercialisation. Commercialising mushrooms provides a means of generating income and reducing poverty while also improving food security. The mushroom commercialisation index showed that during the 2020 production season, all producers sold 75% of oyster mushrooms. This indicates that oyster mushroom is grown as a cash crop in the region, although the intensity of commercialisation (GHC 10202.29) was low. In terms of farmer characterization, the study found that the majority (94%) of the mushroom producers in the region were highly commercialised. Age, educational level, land ownership, and volume of output were significant determinants of the intensity of mushroom commercialisation. We recommend that stakeholders such as the Food Research Institute and the Ministry of Food and Agriculture of Ghana increase their efforts to improve oyster mushroom production to enhance the intensity of commercialisation. We also recommend that stakeholders in the mushroom industry launch programmes to attract young, educated people, especially recent graduates who are not formally unemployed, into oyster mushroom production. This will increase the supply and maximise producers' profits.

Professors' teaching method and students' satisfaction

Teaching quantity and quality of students during interaction in teaching and learning should be the major concerns of educators. Quantity refers to the frequency of students' interaction to discuss their learning subject; whereas quality refers to the learning aspects discussed by students. Interaction among students is considered as social relationships in the classroom. According to Mohammad Ashori (2007) interaction is a natural social relationship between individuals, in which individuals mutually influence each other simultaneously (Suarman, 2015).

Pedagogical skills are essential for every teacher to promote the process of teaching and learning and to make it more effective. Many researchers have mentioned that students are capable enough to reflect on the teacher's method of teaching, instructional assessment, and classroom management skills. Thus, students are eligible to express whether they are satisfied with the teaching methods of their instructor or not. Keeping this in view, one of the key aspects that require students' satisfaction in claiming the provision of quality teaching is the teacher's pedagogical skills. As such, the influence of teachers' pedagogical skills on students' academic achievement and participation in classroom activities has always been regarded as an important factor in imparting quality education. But as a matter of fact, students' satisfaction towards teacher's pedagogical skills and teaching methods had never been taken in to account as a matter of importance and usually never paid

attention by the educational authorities (M. Nauman et. al, 2010) (Muhammad Mujtaba Asad, 2020). Considering the literature review, we hypothesize that professors' teaching method and students' satisfaction as below:

Hypothesis 4. Professors' teaching method will have a positive impact on students' satisfaction.

Campus environment and students' satisfaction

According to Guolla (1999) said that students' satisfaction on their learning program is considered as a cumulative satisfaction of the entire program of their study. Students are clients who interests and satisfaction need to be prioritized as a dependent variable. The students are clients and their satisfaction on certain educational products or services, resulted through interaction between lecturers and students during their teaching and learning process (Suarman, 2015).

Muhammad Hilmy Muslim, , Hafazah Abdul Karim, Ishak Che Abdullah (2012) studied that Student housing presents a unique opportunity for student affairs administrators to contribute to and support the educational experience of the university student. Research on the impact of on-campus living satisfaction on student development has consistently shown that students' chances of persisting to graduation are greatly improved by living on campus and having a positive living and learning experience. Students that have a positive experi-ence are more likely to see their program through to completion and have increased satisfaction with their overall university experience. The following studies demonstrate that while on-campus living may look and feel the same in many places, the way the program is viewed and experienced by the students is not (Muhammad Hilmy Muslim, 2012).

Ely Ibrahim, Karlina Napu, Darman (2023), identified the influence of environment and satisfaction on student learning motivation at Bina Mandiri University, Gorontalo. They argued that a good educational environment can include aspects such as adequate campus facilities, a complete library, good laboratories, and adequate academic support from faculty and teaching staff. Also, they argued that the learning environment includes all factors that influence the learning process, such as the social context, culture, facilities and infrastructure, as well as the learning approach used escribes the learning environment as the physical, social, and psychological conditions in which individuals are located, including factors such as the classroom atmosphere, social interaction, and the existence of learning support resources (Ely Ibrahim, 2023). Considering the literature review, we hypothesize that campus environment and students' satisfaction as below:

Hypothesis 5. Campus environment will have a positive impact on students' satisfaction.

The proposed framework provides a structured method for

Figure 1. Conceptual model on students' satisfaction
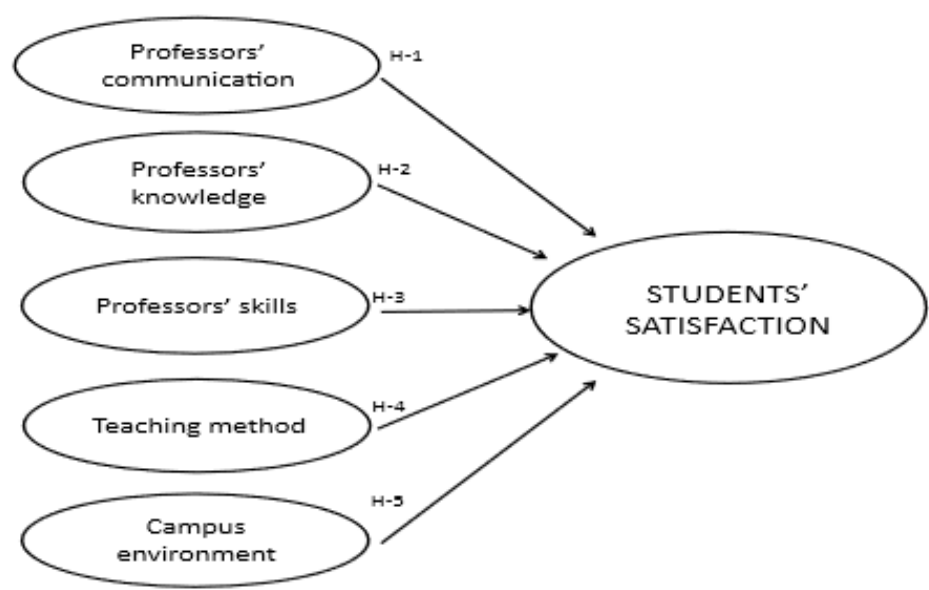
RESULTS

Table 1. The general information in statistical data

№	Name of Universities	number	Percent
1	Mongolian State University of Education	180	55.21%
2	Royal International University, Mongolia	146	44.79%
	Total	326	100.00%

Noted by: The results of our study.

understanding our research problem and key variable relationships in line with our conceptual model in Figure 1.

Our survey was rolled out and were kept open for a month between October and November, 2024-2025 in Academic year. We are analyzed that four important dimensions such as professors' communication, professors' knowledge, professors' skills, teaching method and campus environment and

how students' issues are assessed with their satisfaction were fnalized. The survey was conducted online, allowing students to participate without revealing their personal identities, thereby minimizing the risk of biased responses or any pressure on them to provide skewed answers. The statistical analysis of Mongolian State University of Education has a majority with 180 participants, representing 55.21% of the total. Royal International University, Mongolia has 146 participants, making

Figure 2. The results of the proposed model (RIUM)
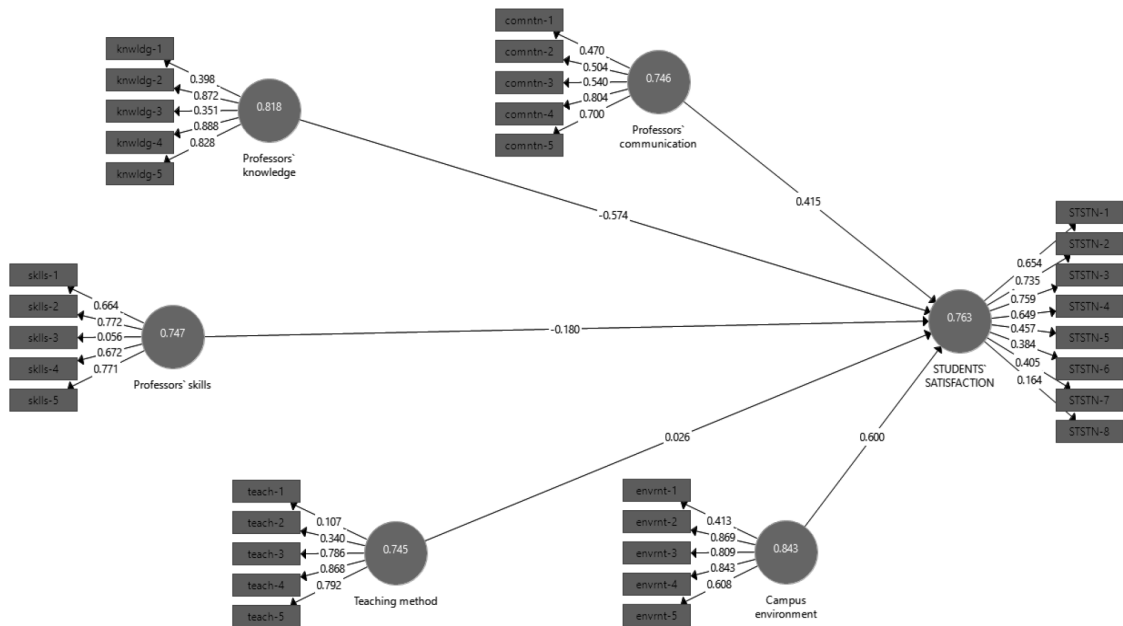
Noted by: The results of our study PC-professors' communication, PK-professors' knowledge, PS-professors' skills, TM-teaching method, CE-campus environment, Sndt SAT-students' satisfaction.

Figure 3. The results of the proposed model (MSUE)
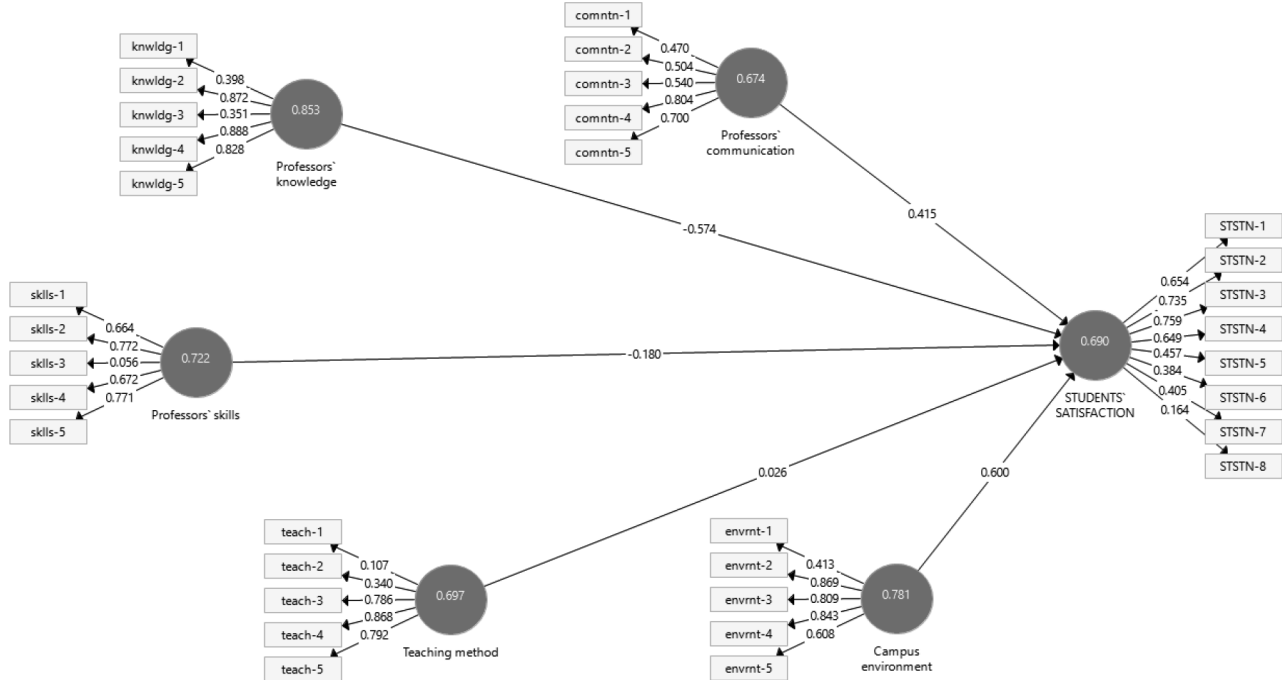
Noted by: The results of our study PC-professors' communication, PK-professors' knowledge, PS-professors' skills, TM-teaching method, CE-campus environment, Sndt SAT-students' satisfaction.

Table 2. The consistency reliability and convergent validity (RIUM)

The factors	Codes	Items	outer	Cronbach's alpha	CR	AVE
professors' communication	comntn-1	greeting	0.730	0.880	0.913	0.677
	comntn-2	clarify	0.824			
	comntn-3	speech	0.847			
	comntn-4	support	0.894			
	comntn-5	respect	0.812			
professors' knowledge	knwldg-1	professional knowledge	0.843	0.919	0.938	0.753
	knwldg-2	research methodology	0.878			
	knwldg-3	preparation	0.811			
	knwldg-4	foreign language	0.932			
	knwldg-5	knowledge resources	0.869			
professors' skill	sklls-1	critical thinking	0.796	0.928	0.946	0.777
	sklls-2	adaptability	0.917			
	sklls-3	decision-making	0.917			
	sklls-4	soft skills	*0.033*			
	sklls-5	hard skills	0.837			
teaching method	teach-1	active learning	0.869	0.938	0.953	0.801
	teach-2	differentiation	0.897			
	teach-3	assessments	0.919			
	teach-4	training based learning	0.891			
	teach-5	case based learning	0.898			
campus environment	envrnt-1	green area	0.882	0.933	0.949	0.789
	envrnt-2	car parking	0.889			
	envrnt-3	cleaning	0.909			
	envrnt-4	Inclusivity	0.895			
	envrnt-5	safety	0.866			
STUDENTS'	STSTN-1	teaching quality	*0.624*	0.874	0.901	0.635
	STSTN-2	campus facilities	0.772			
	STSTN-3	student support services	0.794			
	STSTN-4	student-teacher relationship	0.790			
	STSTN-5	learning environment	0.770			
	STSTN-6	motivation	*0.614*			
	STSTN-7	academic advising	0.733			
	STSTN-8	personal improvement	0.729			

Noted by: The results of our study, CE-campus environment, PC-professors' communication, PK-professors' knowledge, PS-professors' skills, TM-teaching method, Sndt SAT-students' satisfaction.

up 44.79% in our study below data gives the following result at table 1. Hair et al. (2017) recommended that indicators with weaker outer loadings can be retained if other indicators with high loadings explain at least 50 percent of the variance (AVE = 0.50) (Hair, Hollingsworth, Randolph, & Chong, 2017) .

Werts C E, Linn R L (1974), defined that composite reliability (CR) is also used to measure internal consistency and must not be lower than 0.7 (Werts, Linn, & Jöreskog, 1974).

In the table 2 and 4, we analyzed measurement analysis such as outer loadings, Cronbach's alpha, CR (composite reliability) and AVE (average variance extracted) in our study. The measurement analysis evaluated the outer loadings of various items associated with different factors influencing students' satisfaction in our study.

In table 2, Royal International University, Mongolia, the outer loadings of 5 items measuring professors' communication ranged from 0.730 to 0.894, Cronbach's alpha of 0.880, Composite reliability (CR) was 0.913 and Average Variance Extracted (AVE) was 0.677. The outer loadings of 5 items measuring professors' knowledge ranged from 0.811 to 0.932, Cronbach's alpha of 0.919 (CR) was 0.938 and (AVE) was 0.753. The outer loadings of 5 items measuring professors' skills ranged from 0.033 to 0.917, Cronbach's alpha of 0.928,

(CR) was 0.946 and (AVE) was 0.777. The outer loadings of 5 items measuring teaching method ranged from 0.869 to 0.919, Cronbach's alpha of 0.938, (CR) was 0.953 and (AVE) was 0.801. The outer loadings of 5 items campus environment method ranged from 0.866 to 0.909, Cronbach's alpha of 0.933, (CR) was 0.949 and (AVE) was 0.789. The outer loadings of 8 items campus environment method ranged from 0.614 and 0.794, Cronbach's alpha of 0.874, (CR) was 0.901 and (AVE) was 0.635.

The measurement model from Royal International University, Mongolia demonstrated strong reliability and validity for most constructs, with high outer loadings, Cronbach's alpha, composite reliability, and AVE values across professors' communication, knowledge, teaching method, and campus environment. However, the professors' skills construct included one item with a very low outer loading, suggesting a need for item revision to further strengthen the measurement quality.

In table 3, Mongolian State University of Education, the outer loadings of 5 items measuring professors' communication ranged from 0.470 to 0.804, Cronbach's alpha of 0.674, Composite reliability (CR) was 0.746 and Average Variance Extracted (AVE) was 0.381. The outer loadings of 5 items measuring professors' knowledge ranged from 0.351 to 0.888,

Table 3. The consistency reliability and convergent validity (MSUE

The factors	Codes	Items	outer	Cronbach's alpha	CR	AVE
professors' communication	comntn-1	greeting	*0.470*	*0.674*	0.746	*0.381*
	comntn-2	clarify	*0.504*			
	comntn-3	speech	*0.540*			
	comntn-4	support	0.804			
	comntn-5	respect	0.700			
professors' knowledge	knwldg-1	professional knowledge	*0.398*	0.853	0.818	0.503
	knwldg-2	research methodology	0.872			
	knwldg-3	preparation	*0.351*			
	knwldg-4	foreign language	0.888			
	knwldg-5	knowledge resources	0.828			
professors' skill	sklls-1	critical thinking	*0.664*	0.722	0.747	*0.417*
	sklls-2	adaptability	0.772			
	sklls-3	decision-making	0.056			
	sklls-4	soft skills	*0.672*			
	sklls-5	hard skills	0.771			
teaching method	teach-1	active learning	*0.107*	*0.697*	0.745	*0.426*
	teach-2	differentiation	*0.340*			
	teach-3	assessments	0.786			
	teach-4	training based learning	0.868			
	teach-5	case based learning	0.792			
campus environment	envrnt-1	green area	*0.413*	0.781	0.843	0.532
	envrnt-2	car parking	0.869			
	envrnt-3	cleaning	0.809			
	envrnt-4	Inclusivity	0.843			
	envrnt-5	safety	*0.608*			
STUDENTS'	STSTN-1	teaching quality	*0.654*	*0.690*	0.763	*0.314*
	STSTN-2	campus facilities	0.735			
	STSTN-3	student support services	0.759			
	STSTN-4	student-teacher relationship	*0.649*			
	STSTN-5	learning environment	*0.457*			
	STSTN-6	motivation	*0.384*			
	STSTN-7	academic advising	*0.405*			
	STSTN-8	personal improvement	*0.164*			

Noted by: The results of our study, CE-campus environment, PC-professors' communication, PK-professors' knowledge, PS-professors' skills, TM-teaching method, Sndt SAT-students' satisfaction.

Cronbach's alpha of 0.853 (CR) was 0.818 and (AVE) was 0.503. The outer loadings of 5 items measuring professors' skills ranged from 0.664 to 0.772, Cronbach's alpha of 0.722, (CR) was 0.747 and (AVE) was 0.417. The outer loadings of 5 items measuring teaching method ranged from 0.107 to 0.868, Cronbach's alpha of 0.697, (CR) was 0.745 and (AVE) was 0.426. The outer loadings of 5 items campus environment method ranged from 0.413 to 0.869, Cronbach's alpha of 0.781, (CR) was 0.843 and (AVE) was 0.532. The outer loadings of 8 items campus environment method ranged from 0.164 and 0.759, Cronbach's alpha of 0.690, (CR) was 0.763 and (AVE) was 0.314.

The measurement results from Mongolian State University of Education indicate generally moderate reliability and validity across the constructs, with professors' knowledge and campus environment showing relatively stronger metrics, while professors' communication, skills, teaching method, and students' satisfaction exhibited lower Cronbach's alpha, composite reliability, and AVE values. These results suggest that particularly professors' communication and students' satisfaction, require improvement through item revision or removal to enhance the overall measurement quality.

Table 4. The discriminant validity (RIUM)

factors	[1]	[2]	[3]	[4]	[5]	[6]
campus environment [1]	0.888					
professors' communication [2]	0.781	0.823				
professors; knowledge [3]	0.655	0.700	0.867			
professors' skills [4]	0.747	0.791	0.685	0.882		
STUDENTS' SATISFACTION [5]	0.481	0.553	0.365	0.423	0.731	
teaching method [6]	0.853	0.809	0.693	0.751	0.470	0.895

Noted by: The results of our study.

We used SmartPLS software in our study. The SmartPLS is one of the prominent software applications for Partial Least Squares Structural (PLS-SEM). PLS-SEM has been deployed in many fields, such as behavioral sciences (BassAvolio, B., Jung, D., & Berson YB.,, 2003), marketing (HenselerJ.,, 2009) organization (Sosik J JKahai, 2009), management information system (ChinW., 2003).

In table 4, professors' communication showed strong correlations with professors' skills 0.791 and teaching method 0.809, indicating its key role in both skill demonstration and instructional approach. Professors' knowledge was moderately correlated with communication 0.700, skills 0.685, and teaching method 0.693, reflecting its interconnectedness with teaching dynamics. Student satisfaction had moderate correlations with all factors, highest with professors' communication 0.553, suggesting it is influenced by but distinct from these constructs. Teaching method was highly correlated with campus environment 0.853, professors' communication 0.809, and professors' skills 0.751, underscoring its central importance. The strongest relationships were between teaching method and campus environment 0.853, and between professors' communication and professors' skills 0.791. Enhancing campus environment, teaching methods, and faculty capabilities is likely to improve student satisfaction significantly in Royal International University, Mongolia (table 4).

In our study, we proposed the structural model and table 5, Campus environment correlated moderately with students' satisfaction (0.495), teaching method 0.450, professors' skills 0.446, and professors' communication 0.436. professors' communication correlated moderately with teaching method 0.518 and professors' knowledge 0.425. Professors' knowledge shows a moderate correlation with professors' communication 0.425 but low correlations with professors' skills 0.263 and teaching method 0.221.

Table 5. The discriminant validity (MSUE)

factors	[1]	[2]	[3]	[4]	[5]	[6]
campus	0.729					
	0.436	0.617				
	0.379	0.425	0.710			
professors' skills [4]	0.446	0.391	0.263	0.646		
Students' Satisfaction [5]	0.495	0.376	-0.211	0.112	0.560	
teaching method [6]	0.450	0.518	0.221	0.483	0.298	0.652

Noted by: The results of our study.

Students satisfaction had a moderate positive correlation with campus environment 0.495 and a weak positive correlation with professors' communication 0.376, but a negative correlation with professors' knowledge -0.211 and weak with professors' skills 0.112. Teaching method correlated moderately with professors' communication 0.518 and professors' skills 0.483. Finally, the results highlighted the importance of campus environment and communication in shaping student satisfaction and teaching effectiveness but also suggest that other factors may contribute in Mongolian State University of Education (table 5).

Table 6. The Path analysis (RIUM)

hypothesis	relationship	sample meanings	standard deviation	T statistics	P values	results
H1	PC--> Sndt SAT	0.041	0.089	0.337	*0.736*	Not supported
H2	PK--> Sndt SAT	-0.046	0.086	0.509	*0.611*	Not supported
H3	PS--> Sndt SAT	0.020	0.172	0.164	*0.870*	Not supported
H4	TM--> Sndt SAT	0.395	0.142	2.584	0.010	Supported
H5	CE --> Sndt SAT	0.544	0.127	4.481	0.000	Supported

Noted by: PC-professors' communication, PK-professors' knowledge, PS-professors' skills, TM-teaching method, CE-campus environment, Sndt SAT-students' satisfaction.

We describe relationships of hypothesized and significance of the hypothesis tested by Path analysis in our study. In table 6, Hypothesis H1 such as professors' communication have no supported on students' satisfaction for sample meanings 0.041 standard deviation 0.089, T statistic 0.337 and p value 0.736. Hypothesis H2 such as professors' knowledge have no supported on students' satisfaction for sample meanings -0.046 standard deviation 0.086, T statistic 0.509 and p value 0.611. Hypothesis H3 such as professors' skills have no supported on students' satisfaction for sample meanings 0.020 standard de- viation 0.172, T statistic 0.164 and p value 0.870. Hypothesis H4 such as teaching method have supported on students' satisfaction for sample meanings 0.395 standard deviation 0.142, T statistic 2.584 and p value 0.010. Hypothesis H5 such as campus environment have supported on students' satisfaction for sample meanings 0.544 standard deviation 0.127, T statistic 4.481 and p value 0.000 in Royal International University, Mongolia.

Table 7. The Path analysis (MSUE)

hypothesis	relationship	sample meanings	standard deviation	T statistics	P values	results
H1	PC--> Sndt SAT	0.080	0.072	1.286	*0.199*	Not supported
H2	PK--> Sndt SAT	0.694	0.094	7.335	0.000	Supported
H3	PS--> Sndt SAT	0.056	0.092	0.541	*0.589*	Not supported
H4	TM--> Sndt SAT	-0.094	0.100	0.365	*0.715*	Not supported
H5	CE --> Sndt SAT	0.253	0.107	2.020	0.044	Supported

Noted by: PC-professors' communication, PK-professors' knowledge, PS-professors' skills, TM-teaching method, CE-campus environment, Sndt SAT-students' satisfaction.

In table 7, Hypothesis H1 such as professors' communication have no supported on students' satisfaction for sample meanings 0.080 standard deviation 0.072, T statistic 1.286 and p value 0.199. Hypothesis H2 such as professors' knowledge have supported on students' satisfaction for sample meanings 0.694 standard deviation 0.094, T statistic 7.335 and p value 0.000. Hypothesis H3 such as professors' skills have no supported on students' satisfaction for sample meanings 0.056 standard deviation 0.092, T statistic 0.541 and p value 0.589. Hypothesis H4 such as teaching method have supported on students' satisfaction for sample meanings -0.094 standard deviation 0.100, T statistic 0.365 and p value 0.715. Hypothesis H5 such as campus environment have supported on students' satisfaction for sample meanings 0.253 standard deviation 0.107, T statistic 2.020 and p value 0.044 in Mongolian State University of Education.

DISCUSSION

The analysis of hypotheses reveals differing impacts of professors' communication, knowledge, skills, teaching method, and campus environment on student satisfaction across the two universities.

The measurement model for Royal International University, Mongolia, only teaching method and campus environment significantly influence student satisfaction, while professors' communication, knowledge, and skills show no significant effect.

The measurement model for Mongolian State University of Education demonstrated moderate reliability and validity, with professors' knowledge and campus environment constructs showing relatively stronger psychometric properties compared to others. Constructs such as professors' communication, skills, teaching method, and students' satisfaction exhibited lower Cronbach's alpha, composite reliability, and AVE values, indicating less consistent and valid measurement.

The results of our study highlighted the need for revising or removing weaker items, particularly in professors' communication and students' satisfaction constructs, to improve the overall quality and robustness of the measurement model.Also, the results suggested that the determinants of student satisfaction vary between institutions, highlighting the importance of contextual factors in shaping educational experiences.

CONCLUSION

We concluded and comapred our study as discriminant validity and path analysis. Firstly, the analysis using SmartPLS revealed that at Royal International University, Mongolia, professors' communication, skills, and teaching methods are strongly interrelated and closely linked to student satisfaction, emphasizing the importance of faculty capabilities and instructional approaches in enhancing educational outcomes. In contrast, Mongolian State University of Education showed more moderate and varied correlations, with campus environment and professors' communication playing a significant role in student satisfaction, while professors' knowledge and skills exhibited weaker or even negative relationships. The differences suggest that while teaching methods and campus environment are central to student satisfaction in both universities, the strength and nature of relationships among faculty-related factors vary, possibly reflecting institutional or contextual distinctions.

Secondly, the results of our study highlighted the need for tailored strategies at each university, focusing on strengthening key factors such as communication and campus environment to improve student satisfaction and teaching effectiveness.

Finally, the path analysis results indicate that at Royal International University, Mongolia, teaching method and campus environment significantly influence student satisfaction, while professors' communication, knowledge, and skills do not show significant effects. Conversely, at Mongolian State University of Education, professors' knowledge and campus environment are significant predictors of student satisfaction, whereas teaching method, communication, and skills lack significant impact. The all findings highlighted that the key drivers of student satisfaction differ between the two institutions, emphasizing the need for context-specific strategies focusing on enhancing campus environment and either teaching methods or faculty knowledge accordingly.

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DIVESTITURE POST MERGERS AND ACQUISITIONS IN INDIA – REASONS AND MODEL TO PREDICT

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Abstract: *Divestitures post-acquisition are a common occurrence yet the jury is still out on whether they represent correction of prior mistakes or are a restructuring tool to improve performance in the hands of managers evaluating overall portfolio of assets. We take a sample of 1,344 deals buy Indian public listed buyers from 2000 to 2020 of which 13% were followed by a divestiture to create models to predict if an acquisition is likely to be followed by a divestiture or not using logistic regression and discriminant analysis. Our model is more than 75% accurate in its prediction even when tested on unselected data (new data for the model). We find support for portfolio theory and reject the correction of prior mistakes theory to explain post-acquisition divestitures. We support the theory that financial constraints leads to post acquisition divestiture. We also support the theory on indigestion that post acquisition divestitures are due to cookie-jar problem where buyers are finding it difficult to integrate. Increased volatility and poor mean stock price returns both contribute to conditions leading to such divestitures. The model constructed is useful for shareholders and other stakeholders to predict whether a divestiture will follow an acquisition or not. Managers can also use the model to predict eventual outcome of their acquisition decisions.*

Keywords: *Divestiture, merger and acquisition, predicting divestiture, acquisition failure, restructuring.*
(JEL code: G34)

INTRODUCTION

Divestitures around acquisitions are more common than one may imagine. Right from early 1980s, studies have reported that 30 to 45 percent M&As were divestitures of previously-acquired units (Weston, 1989). Porter (1987), Kaplan and Weishbach (1992) and Ravenscraft and Scherer (1987) also find evidence of a high occurrence of divestitures after M&A. The scenario is no different today. Aktas et al. (2022) report that 13% of acquisitions in their large 6,845 sample were associated with at least one divestiture representing on an average about 33% of the original acquisition value. Further, studies have also claimed a 'cause and consequence' relation between these acquisitions and divestitures (Ma & Wang, 2018).

Much of the traditional literature on this topic considers divestitures post M&A evidence of failure of prior M&A. It is so because it is believed that few unsuccessful M&A are retained and few successful M&A are divested (Hamilton & Chow, 1993; Ravenscraft & Scherer, 1987; Taylor, 1988). Porter (1987) and Berger and Ofek (1995) subscribed to the idea that divestitures post M&A were correction of prior mistakes. They accompanied problems like issue of change management, financial and reputational loss (Donaldson, 1990; Kaplan & Weisbach, 1992; Taylor, 1988).

Recent literature, on the other hand, is beginning to explore this topic in a little more nuanced way than to simply classify them as evidence of failure with a broad brush stroke. Divestitures have a positive side to them (Aktas et al., 2022; Amiri et al., 2021), one that improves efficiency (Berry, 2010; Cummins & Xie, 2009), reduces overdiversification (Berger & Ofek, 1995; Curi & Murgia, 2018; Kumar, 2005), eliminates underperforming units (Shimizu, 2007; Wang & Jensen, 2018) and so on.

Much of the research in M&A had earlier either ignored the topic of divestiture or considered it as the other side of M&A. Divestitures are only beginning to get some atten-

tion in the field of M&A research. While some studies have attempted to study the reasons of divestitures post M&A in developed economies like USA, there is not even one study that comprehensively attempted to understand reasons behind such divestitures and create a model to predict them in Indian context, to the best of our knowledge. It is a topic of great significance because such divestitures have significant implications on shareholder's value (Aktas et al., 2022), organizational performance (Helfat & Eisenhardt, 2004; Helfat, et al., 2007; Moliterno & Wiersema, 2007), organizational learning (Shimizu & Hitt, 2005), future strategy (Meschi & Metais, 2015) and so on. Further, a global study also doesn't help one understand India specific nuances. USA's market capitalization as share of global market capitalization is more than 50%. When one adds other developed countries it increases to approximately 80% (Lu, 2024a). Share of Indian markets in global market capitalization is less than 10% of USA (Lu, 2024b). Essentially, even though India is fifth largest economy in the world, a study based on listed M&A buyers which is the case for most existing research–for example, Aktas et al. (2022) and Amiri et al. (2021)–will only have Indian nuances as rounding off errors. It shows a clear, valuable gap in the field of research on divestitures post M&A.

MATERIALS AND METHODS

TWe explored several different factors that potentially contribute to a divestiture around an M&A.

Financial constraints

Divestitures can bring in much needed cash for a struggling organization. Poor performance prior to divestiture (Bergh, 1997; Berry, 2013; Duhaime & Grant, 1984) is topic which has been explored by researchers in the past as one of the explanations of such divestitures in different forms. Thus, we predict that:

Hypothesis # 1a: Financial constraints of buyer increases the likelihood of divestitures post M&A.

We have combined several variables which have been studied in the past to analyze impact of financial constraints on divestitures post M&A in studies such as Aktas et al. (2022), Denis and Sibilkov (2010), and Hadlock and Pierce (2010):
- (Low) Cash:
    - Cash holding - Cash_Holding_N_Binned
    - Free Cash Flows – Levered_FCF_Divestiture_N and Levered_FCF_N_Change
- (Low) Profitability:
    - Return on Assets – ROA
    - Profit (EBITDA) Margin – Buyer_Profitability_Change
- Debt capital and leverage:
    - (High) Leverage –Buyer_Leverage_Divestiture_N and Buyer_Leverage_N_Change_Binned
    - Debt issue (no) – Debt_Issue_B - as increase in debt, at least in the near term, will signify increase

in availability of capital, and thus, easing of constraints.
- (Low) Valuation – TobinsQ_Binned
- Size, age and strength:
    - (Small) Size (by assets) – Small_Organisation_B and Size_Log
    - (Low) Age – Young_Organisation_B
    - (Weak) Strength (by revenue) – Strong_Organisation_B
- Dividend Payer (Yes) – Dividend_Payer_B – as per signaling hypothesis (Baker, 2009), a reduction in dividend payment rate for a regular payer signals trouble which will also likely impact management's compensation, and therefore, acts as an obligation.

Deal complexity

Deal complexity is a double-edged sword. While larger and cross border deals means more opportunities for learning and synergies (e.g., cross border opens up new geographies as markets and larger deals allows more bargaining power with suppliers), it can also lead to cookie-jar problem or indigestion (Gaddis, 1987; Kaplan & Weisbach, 1992; Schipper & Smith, 1983). Thus, we predict that divestitures post M&A could be due to indigestion i.e.,

Hypothesis # 2a: Deal complexity (relative size and/ or cross border deals) increases the likelihood of divestitures post M&A.

The independent variables studied here are Relative_Size and Cross_Border_B.

Instability in performance

Combination of two assets which are less than perfectly correlated should result in reduced volatility which could have been one of the motivations to focal M&A (Lubatkin & Chatterjee, 1994; Lubatkin & O'Neill, 1987; Sanders, 2001). When this expectation is not met or when volatility increases post M&A, it can lead to divestiture (Chatterjee, 1986; Seth, 1990; Singh & Montgomery, 1987). Thus, we predict that:

Hypothesis # 3a: Stock volatility (pre divestiture and increase in volatility when compared to pre-acquisition) increases the likelihood of divestitures post M&A.

The independent variables studied here are Stock_Volatility_Divestiture and Stock_Volatility_Change_Binned.

Mean stock performance

Divestitures are complex decisions with their own share of risks, issues and complexities (Amiri et al., 2020). A manager motivated to minimize volatility, would be equally motivated to maximize mean stock performance. Hence, when mean stock performance is going well, manager would be unlikely to divest (Berry, 2010; Brauer, 2006; Kolev, 2016). Further extending the same argument, mean stock performance would negatively moderate the relationship between volatility and post M&A divestiture likelihood (Amiri et al., 2021). Thus, we predict that:

Hypothesis # 4a: Strong mean stock performance (pre divestiture and increase in performance when compared to pre-acquisition) reduces the likelihood of divestitures post M&A.

Hypothesis # 4b: Strong mean stock performance (pre divestiture and increase in performance when compared to pre-acquisition) negatively moderates the relationship between stock volatility and post M&A divestiture likelihood.

The independent variables studied here are Mean_Stock_Performance_Divestiture, Mean_Stock_Performance_Change, Stock_Volatility_Divestiture, Stock_Volatility_Change_Binned and their respective interactions.

Related vs. unrelated M&A

A related deal provides economies of scale (Berger & Ofek, 1995; Chatterjee & Lubatkin, 1990; Helfat & Eisenhardt, 2004), better strategic fit with buyer (Eisenmann, 2002; Haspeslagh & Jemison, 1991), stronger capabilities, easier integration and thus, lesser challenges. Unrelated deals are known to be associated with higher failure rate (Meschi & Metais, 2015), poor performance (Bergh, 1997; Kaplan & Weisbach, 1992; Porter, 1987) and more risks, challenges and complexities in integration (Bergh, 1995; 1997; Mahoney & Pandian, 1992). Thus, we predict that:

Hypothesis # 5a: Related M&A deals are less likely to be followed by divestitures or unrelated deals are more likely to be followed by divestitures.

The independent variable studied here is Relatedness_C.

Anticipation of regulatory concern

When two big organizations who are market leaders are getting into a deal, regulators can often be raise concerns. One of the ways to allay those concerns is to divest parts of the organization which can be done in anticipation of regulatory concern. Such divestitures are effective tools to check increasing market power following M&A between market leaders (Vasconcelos, 2010; Vergé, 2010). Thus, we predict that:

Hypothesis # 6a: Anticipation of regulatory concern increases the likelihood of divestitures post M&A.

However, divestiture in anticipation of regulatory concern requires robust M&A market which may be available to buyers in developed countries but may be a luxury that Indian managers cannot afford. For example, the deal volume in USA from 2000 to 2010 has been in the range of 8,000 to 14,000 deals (count) and $500b to $2 trillion. In India during the same period it has been between 700 and 1,500 deals valued at $5-60 billion (Institute of Mergers, Acquisitions and Alliances, 2025). In other words, the deal market in India is a fraction of the deal market in USA. Therefore, divesting post an M&A to alleviate potential regulatory concern may neither be feasible nor financially viable. If anything, since other market participants would be well aware of a potential risk of regulatory action, any attempt to sell around a focal M&A in an illiquid market like India is likely to be from a weak bargaining power position leading to fire-sale like situation. Therefore, managers would be motivated to avoid having to divest post such an M&A. It thus presents with the following

alternative hypothesis:

Hypothesis # 6b: Anticipation of regulatory concern reduces the likelihood of divestitures post M&A.

The independent variable studied here is High_Reg_Risk_Combined.

Correction of prior mistake

Correction of prior mistake is often the explanation for divestitures following an M&A (Kaplan & Weisbach, 1992; Porter, 1987)), and poor acquisition cumulative abnormal returns (CAR) are often a proxy of such mistakes (Allen et al., 1995). Thus, we predict that:

Hypothesis # 7a: Poor acquisition CAR increases the likelihood of divestitures post M&A or acquisition CAR is negatively associated with likelihood of divestiture post M&A.

The independent variable studied here is Acquisition_CAR.

Experience

Organizations learn from past experiences in the relevant field. For divestitures post M&A, two important variables which would add to organizational learning would be past acquisition experience (Barkema & Schijven, 2008a; Hayward, 2002; Zollo, 2009) and past divestiture experience (Doan et al., 2018) gained over a 5 year period prior to the focal M&A.

If divestitures following an M&A signal correction of prior mistakes where prior mistakes are poor M&A, a more experienced buyer should have fewer mistakes, and therefore, lesser need to divest post M&A. Thus, we predict that:

Hypothesis # 8a: Experience (acquisition and divestiture experience) reduces the likelihood of divestitures post M&A.

However, if divestitures, like acquisition, are a tool in arsenal of managers to improve performance of overall portfolio as propagated by portfolio theory (Barkema & Schijven, 2008a; Dranikoff, Koller, & Schneider, 2002; Lubatkin & Chatterjee, 1994)), such experience should not reduce the likelihood of divestitures post M&A. In fact, for savvy and experienced buyer, such a divestiture could very well have been part of the plan – acquire, learn, integrate and divest once deal value is fully extracted (Capron et al., 2001). It therefore presents with the following alternative hypothesis:

Hypothesis # 8b: Experience (acquisition and divestiture experience) increases the likelihood of divestitures post M&A. The independent variables studied here are Past_Acquisition_5_Log_Binned and Past_Divestment_5_Log.

Methodology

We used S&P CapitalIQ to extract data of deals by Indian buyers from 2000 to 2020 which was our main dataset for analysis and it covers the period since when the M&A market picked up in India from 2000s. Additionally, we captured data from 1995 to see past deals for calculating prior acquisition and divestiture experience. Similarly, we extracted deals data till end of 2023 to ensure that we follow every deal for three years to ascertain whether it was followed by divestiture or

not. The three year period is in line with prior research–for example, Maksimovic et al. (2011) and in line with findings of Amiri et al. (2020) that average divestiture period was 2.5 years and supported by observations of Ingham et al. (1992), Lubatkin et al. (2001) that integration is completed within three years. It is also more than the one year period taken in studies like Aktas et al. (2022) and it is not too large like five or seven years during which period the buyer would have done many more acquisitions and thus, the findings will be biased with those corporate events. For example, in our sample, the buyers were doing 0.3 acquisition per year on an average. Thus, increasing the period to five or six years would have likely included at least one more acquisition. S&P CapitalIQ was used for extracting financial and share price data of buyers. Deals were filtered and retained based on the following criteria – public listed buyer (as private buyers had a lot of data availability issues), deal should closed or completed, acquisition should have led to change in control, buyer should not have been later bankrupt or been acquired itself, buyer's assets should be positive, the deal should have been closed within three years and if a divestiture happened post deal it should have also led to change in control. Deals with missing data were also removed and we were left with 1,344 deals of which 176 or 13% were followed by a divestiture which is same as the 13% number in the study by Aktas et al. (2022) based on global sample.

Dependent variable was coded as a binary categorical variable which took value 1 if there was no divestiture following an acquisition and 2 if the acquisition was followed by a divestiture. We included relevant control variables which were Capex_N, Equity_Issue_B, RD_N, Listed_Target_B, We also controlled for industry and year fixed effects (Industry_FE and Year_FE). Independent variables have been along with hypothesis above. We used logistic regression as the dependent variable was dichotomous similar to Bergh (1997), Doan et al. (2018), and Nguyen and Rahman (2015). Additionally, we created another predictive model using discriminant analysis similar to Bergh (1997). Further, we compared means and distribution of variables across two groups (acquisitions which were followed by a divestiture and those that weren't) using independent samples t-test for scale variables and chi-square test of independence for categorical variables. We ensured that conditions necessary to run these tests were checked.

RESULTS AND DISCUSSION

Conditions necessary for running Logistic regression were checked and ensured. Linearity of logit was tested using Box-Tidwell test and six continuous variables were found to be breaching the assumption, and therefore, were transformed into categorical variables and their names were suffixed with "_Binned". Multi-collinearity was tested through VIF and correlation matrix and buyer profitability pre divestiture was dropped due to high VIF score. VIF scores can be made available upon request. VIF scores of all the other variables were below the prescribed threshold of 5-10 (Sheather, 2009; Tabachnick & Fidell, 2012). The sample size was sufficiently large and none of the variables ensured perfect separation. Cooks's distance and standardized residuals were used to check for outliers and influential points and were found to be acceptable i.e., all absolute values were below 1 and 3 respectively. For discriminant analysis also, most of the conditions were met and anyway discriminant analysis is quite robust to breaches to these assumptions and is good first choice for a classifier development (Hallinan, 2012). Additionally, we only used 80% of the data to create the model and remaining 20% of observations were used to cross validate the model. The cross validated results of unselected cases were also satisfactory proving the robustness and predictive power of the model.

Table 1 reports comparison of means tests. Significance values have been taken from t-test for scale variables and Chi-square test of independence for categorical variables. Buyers who had acquisitions followed by divestitures had the following characteristics (when compared to buyers who didn't divest post-acquisition) – less cash holding, bigger in size, stronger (by revenue), lower valuation (TobinsQ), more experienced M&A players (more acquisitions and divestitures), lesser increase in leverage, more increase in volatility. More of these buyers were dividend payers. Overall, the profile is clear – larger, more established (size, revenue, dividend payers) and more experienced M&A players were divesting more often. Further, deals which were followed by increase in volatility were also followed by divestitures more often. Further, domestic deals and deals with lower regulatory action risk were being followed by divestitures more than those which were cross border or had higher regulatory action risk.

Table 1. Comparison of means

Acquisition_With_Or_Without_Divestiture	1 (without divestiture)			2 (with divestiture)		
	Mean	N	Std error mean	Mean	N	Std error mean
Capex_N	0.1026	1,278	0.0174	0.0758	188	0.0050
Cash_Holding_N	0.0825**	1,278	0.0031	0.0651**	188	0.0072
Equity_Issue_B	0.6776	1,278	0.0131	0.633	188	0.0352
Debt_Issue_B	1.9405	1,278	0.0066	1.9415	188	0.0172
Dividend_Payer_B	0.7363***	1,278	0.0123	0.8617***	188	0.0252
RD_N	0.0011*	1,278	0.0002	0.0021*	188	0.0008
ROA	0.1447***	1,278	0.0091	0.1182***	188	0.0048
Size_Log	1.9706***	1,278	0.0245	2.7806***	188	0.0639

TobinsQ	2.4892**	1,278	0.0994	1.8156**	188	0.1010
Past_Acquisition_5_Log	0.2723***	1,278	0.0084	0.3744***	188	0.0228
Past_Divestment_5_Log	0.0317***	1,278	0.0030	0.1096***	188	0.0141
Relative_Size	0.1742	1,278	0.0206	0.1202	188	0.0475
Cross_Border_B	0.2872*	1,278	0.0127	0.2234*	188	0.0305
Relatedness_C	2.4812	1,278	0.0403	2.3032	188	0.1047
Listed_Target_B	0.1025	1,278	0.0085	0.1277	188	0.0244
Acquisition_CAR	0.0109	1,278	0.0018	0.0055	188	0.0044
Young_Organisation_B	1.0571	1,278	0.0065	1.0319	188	0.0129
Small_Organisation_B	1.1103	1,278	0.0088	1.1277	188	0.0244
Strong_Organisation_B	1.4609***	1,278	0.0139	1.6968***	188	0.0336
Buyer_Profitability_Change	-1.5876	1,278	1.0801	-0.005	187	0.0062
Buyer_Leverage_Divestiture_N	0.2934	1,274	0.0058	0.3044	186	0.0146
Buyer_Leverage_N_Change	0.0337***	1,274	0.0044	0.0032***	186	0.0059
Levered_FCF_Divestiture_N	-0.041	1,274	0.0046	-0.0556	186	0.0106
Levered_FCF_N_Change	0.0231*	1,274	0.0152	-0.0072*	186	0.0091
Stock_Volatility_Divestiture	48.233	1,272	0.5977	45.9303	188	1.6945
Stock_Volatility_Change	-2.3057	1,272	1.0769	2.2913	188	1.7142
Mean_Stock_Performance_Divestiture	0.0809	1,249	0.0196	0.153	186	0.0818
Mean_Stock_Performance_Change	-0.4226***	1,172	0.0770	-0.0299***	177	0.1007
High_Reg_Risk_Combined	5.6291	1,278	0.0278	5.883	188	0.0411

Note: *, **, *** represents statistical significance at 10%, 5% and 1% levels respectively. Source: created by authors based on analysis of data.

Source: own elaboration.

Discriminant model using hierarchical insertion was created (see table 2 for details). Final model retained size, equity issue, past divestiture experience, change in leverage, free cash flows pre-divestiture and stock volatility pre divestiture as variables. Equity issue and increase in leverage, which represent increased financing availability for the organization, were found to reduce likelihood of divestiture which supports theory on financial constraints and portfolio theory. Larger (by size) and more experienced players (divestiture experience) are more likely to divest following an acquisition. Increase in volatility and poor free cash flows post-acquisition (pre-divestiture) both increase the likelihood of divestiture.

Table 2. Discriminant analysis model

Details	Model
Standardized Canonical Discriminant Function Coefficients	
Equity_Issue_B	-.228
Size_Log	.896
Past_Divestment_5_Log	.369
Buyer_Leverage_N_Change	-.176
Levered_FCF_Divestiture_N	-.197
Stock_Volatility_Divestiture	.351
% Correct –	
Original Total	76.80%
Cross Validated Selected	76.70%
Cross Validated Unselected	71.20%
Canonical Correlation	.378
Eigenvalue of Model	.167
N - Selected (used for model constructed)	1079
N - Unselected (used for cross validation)	265

Source: own elaboration.

The discriminant model was built using 80% of observations selected randomly and it correctly classified 76.8% of those cases correctly.

This model fairs very well when compared to models created by previous studies on this topic. For example, (Bergh, 1997) created two models based on acquisitions done in 1977 and 1987 which had an accuracy of 63.29% and 75.51%. In our model, of the remaining 20% observations not used for creating the model, the model was able to correctly predict post-acquisition outcome for 71.2% cases.

Column 1 of table 3 reports the values of control model whose adjusted R square (Nagelkerke R Square) is .109. Other columns of table 3 report other models which have been continued to table 4. Final column of table 4 combines all models and has an adjusted R square of .345 which is a marked improvement on control model. It shows that the selected independent variables have good explanatory power and are adding to the model. Results of individual factors are discussed below.

Table 3. Discriminant analysis model

	Control model 1	Cash 2	Profitability 3	Leverage 4	Valuation 5	Size, strong, age 6	Dividend 7	Relative size 8
Constant								
Capex_N	-1.7109 [1.1238]	-2.0337* [1.1976]	-1.6602 [1.1269]	-1.8705 [1.1726]	-1.7247 [1.1266]	-1.502 [1.3001]	-2.2818* [1.1991]	-1.7407 [1.1256]
RD_N	16.0273* [8.5577]	15.5944* [8.797]	15.9492* [8.5332]	18.9624** [8.9019]	15.8166* [8.6108]	12.1127 [8.795]	14.6893* [8.5978]	15.7974* [8.5673]
Listed_Target_B(1)	-0.2789 [0.2499]	-0.2989 [0.2516]	-0.2681 [0.2514]	-0.3192 [0.2538]	-0.2819 [0.2502]	0.023 [0.2674]	-0.2525 [0.2527]	-0.3107 [0.2534]
Equity_Issue_B(1)	0.1256 [0.1803]	0.0915 [0.1827]	0.1086 [0.1817]	0.085 [0.1861]	0.1278 [0.1806]	0.3494* [0.1964]	0.14 [0.1821]	0.1216 [0.1804]
Cash_Holding_N_Binned(1)		0.3782* [0.2291]						
Levered_FCF_Divestiture_N		-0.4681 [0.6288]						
Levered_FCF_N_Change		-0.1443 [0.4709]						
ROA			-0.5468 [0.6229]					
Buyer_Profitability_Change			0.0009 [0.0024]					
Buyer_Leverage_Divestiture_N				0.9986* [0.5136]				
Buyer_Leverage_N_Change_Binned(1)				0.8701*** [0.186]				
Debt_Issue_B(1)				0.0477 [0.3672]				
TobinsQ_Binned(1)					-0.0374 [0.1726]			
Small_Organisation_B(1)						-0.4875 [0.3603]		
Size_Log								
Young_Organisation_B(1)						0.2116 [0.4823]		
Strong_Organisation_B(1)						-0.1752 [0.2344]		
Dividend_Payer_B(1)								

	Control model 1	Cash 2	Profitability 3	Leverage 4	Valuation 5	Size, strong, age 6	Dividend 7	Relative size 8
Relative_Size								-0.1426 [0.1781]
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nagelkerke R Square	.109	.116	.112	.138	.109	.241	.135	.110
Hosmer and Lemeshow Test	.402	.523	.306	.173	.264	.059	.081	.266
% Correct	86.6	87.0	86.7	87.4	86.6	88.1	86.9	86.6
Omnibus Tests of Model Coefficients	.001	.001	.001	.000	.002	.000	.000	.001
N (observations)	1,466	1,460	1,465	1,460	1,466	1,466	1,466	1,466

Note: Values outside brackets are B coefficient. *, **, *** represents statistical significance at 10%, 5% and 1% levels respectively. Terms in square brackets are standard errors. Source: created by authors based on analysis of data.

Table 4. Logistic regression: remaining models and combined model

	Cross border 9	Volatility 10	Performance 11	Related 12	Regulatory risk 13	Acqui CAR 14	Past 15	Combined model 16
Constant			-63.13* [37.3712]		-92.3923*** [35.1792]		-47.6911	37.8235 [47.9622]
Capex_N	-1.6947	-1.8999 [1.1564]	-1.9925 [1.2339]	-1.7407 [1.1291]	-1.7585 [1.1334]	-1.7105 [1.127]	-1.7924 [1.1868]	-1.4442 [1.6312]
RD_N		14.4435* [8.5636]	11.6894 [8.6033]	17.0492** [8.6252]	14.8795* [8.7603]	16.2499* [8.5565]		10.0505 [9.7315]
Listed_Target_B(1)	-0.2654	-0.2551 [0.2517]	-0.2935 [0.2543]	-0.3484 [0.2536]	-0.4987* [0.2588]	-0.2777 [0.2498]	-0.2623 [0.2558]	-0.1395 [0.3025]
Equity_Issue_B(1)	0.1239	0.1412 [0.1813]	0.0712 [0.1882]	0.1157 [0.1809]	0.1565 [0.1819]	0.124 [0.1804]	0.2235 [0.186]	0.3399 [0.2218]
Cash_Holding_ N_Binned(1)								0.7929*** [0.2824]
Levered_FCF_ Divestiture_N								-1.6098 [1.0318]
Levered_FCF_ N_Change								-0.4945 [0.8167]
ROA								-2.1335** [0.8933]
Buyer_Profitability _Change								0.2211 [0.2307]

	Cross border 9	Volatility 10	Performance 11	Related 12	Regulatory risk 13	Acqui CAR 14	Past 15	Combined model 16
Buyer_Leverage_Divestiture_N								-0.4029 [0.7108]
Buyer_Leverage_N_Change_Binned(1)								0.6449*** [0.2164]
Debt_Issue_B(1)								0.1425 [0.4295]
TobinsQ_Binned(1)								-0.3894* [0.2302]
Small_Organisation_B(1)								-0.6567 [0.4081]
Size_Log								1.3732*** [0.1992]
Young_Organisation_B(1)								-0.0718 [0.5123]
Strong_Organisation_B(1)								-0.0767 [0.2696]
Dividend_Payer_B(1)								-0.7116** [0.3294]
Relative_Size								0.3326** [0.1695]
Cross_Border_B(1)	0.1427 [0.208]							0.3868 [0.2537]
Stock_Volatility_Divestiture			-0.0098* [0.0052]					0.0137** [0.0064]
Stock_Volatility_Change_Binned(1)			-0.5264*** [0.1877]					-0.3022 [0.2169]
Mean_Stock_Performance_Divestiture			-0.7797* [0.4348]					-0.8801* [0.4943]
Mean_Stock_Performance_Change			0.1527 [0.1469]					0.1429 [0.1741]
Mean_Stock_Performance_Divestiture by Stock_Volatility_Divestiture			0.0104* [0.0062]					0.0142** [0.0073]
Mean_Stock_Performance_Change by Stock_Volatility_Change_Binned(1)			0.0225 [0.1716]					-0.1051 [0.1937]

	Cross border 9	Volatility 10	Performance 11	Related 12	Regulatory risk 13	Acqui CAR 14	Past 15	Combined model 16
Relatedness_C				0 [0]				0 [0]
Relatedness_C(1)				0.3644** [0.1811]				0.251 [0.2174]
Relatedness_C(2)				0.2295 [0.3816]				0.2027 [0.4346]
Relatedness_C(3)				-0.0849 [0.5146]				-0.4674 [0.5817]
High_Reg_Risk _Combined					0 *** [0]			0 [0]
High_Reg_Risk _Combined(1)					-1.6268** [0.7385]			-1.0832 [0.8728]
High_Reg_Risk _Combined(2)					-1.5513 [1.0371]			-18.7583
High_Reg_Risk _Combined(3)					-0.8974* [0.4869]			0.0065 [0.577]
High_Reg_Risk _Combined(4)					-1.9675* [1.0252]			-2.588 [1.7267]
Acquisition_CAR						-1.0187 [1.3669]		0.5642 [1.8172]
Past_Divestment_5_Log								1.2249** [0.6233]
Past_Acquisition_5 _Log_Binned(1)								0.1491 [0.239]
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nagelkerke R Square	.110	.122	.131	.114	.133	.110	.162	.345
Hosmer and Lemeshow Test	.366	.251	.448	.374	.227	.623	.087	.155
% Correct	86.6	87.1	86.7	86.8	86.6	86.6	87.3	88.9
Omnibus Tests of Model Coefficients	.002	.000	.000	.001	.000	.002	.000	.000
N (observations)	1,466	1,460	1,349	1,466	1,466	1,466	1,466	1,344

Note: Values outside brackets are B coefficient. *, **, *** represents statistical significance at 10%, 5% and 1% levels respectively. Terms in square brackets are standard errors. Source: created by authors based on analysis of data.

Other key notes:

1) For categorical variables, sign of coefficients in the output table are against the reference category which is the highest category by default in SPSS. For ease of interpretation, in the text, the signs have been changed to reflect the true nature of variable i.e., if higher category implies more of the variable and original sign was negative for lower category (implying if variable is less the likelihood of divestiture is more) the sign

has been changed to positive (as we are studying the higher category).

2) While Levered_FCF_Divestiture_N (free cash flow pre-divestiture) and Relative_Size were not statistically significant in the individual model, when analyzed with other factors in the combined model, it gained statistical significance. The text reports coefficients and statistical significance from the combined model.

3) Stock_Volatility_Divestiture was significant in both individual model and combined model, however, the sign changed. We report coefficient based on combined model.

CONCLUSION

Financial constraints

Several factors have been found to statistically significant and supporting hypothesis # 1a that presence of financial constraints is associated with increased likelihood of divestitures of prior acquisitions. These factors are low cash (cash holding and free cash flows before divestiture), high leverage prior to divestiture and regular dividend payer. Of these, free cash flow prior to divestiture is also included in the discriminant model with negative coefficient. Overall, it provides strong support to the assertion that financial constraints lead to problems which ultimately requires buyers to divest post an acquisition. Further, issues pertaining to strength of balance sheet have been found to be statistically significant and not profitability. Change in leverage has a statistically significant negative coefficient implying that if the leverage increases post-acquisition then it reduces the likelihood of divestiture of prior acquisition. An increase in leverage, at least in the short term means that organization has been able to secure debt financing and its immediate financial constraints i.e., need for cash have been alleviated. It is also in-line with previous research that when larger financial resources are available the buyer has more runway and take more risks (Finkelstein & Haleblian, 2002; Haleblian & Finkelstein, 1999; Shimizu, 2007). Therefore, this also supports the theory on financial constraints. Overall, our findings are in-line with prior research in the area, for example, Bergh (1997), Berry (2013), Borisova & Brown (2013).

Deal complexity

As the coefficient for Relative_Size is positive (.143) statistically significant at 10% level, we find support the argument that larger relative size deals are complex, and therefore, often lead to cookie jar problem i.e., the buyer finds it difficult to manage integration complexities. The resultant divestiture that often follows is an outcome of indigestion similar to the assertion of Gaddis (1987) and Kaplan and Weisbach (1992). When a buyer has acquired something that it is finding difficult to integrate and manage (indigestion), divestiture may seem like the only feasible option to reduce size, scope and complexity of the organization (Schipper & Smith, 1983). While the coefficient for cross border deals was also positive it wasn't statistically significant implying that we cannot support the argument that cross border deals are more likely to be divested.

Instability in performance

Similar to the findings Amiri et al. (2021), we find support for the theory that any instability in performance, as shown by high volatility prior to divestiture or an increase in volatility when compared to pre-acquisition period, leads to increase likelihood of divestiture of prior acquisition. The coefficients for Stock_Volatility_Divestiture and Stock_Volatility_Change_Binned were .013 (p: <.001) and .560 (p: <.001) respectively. Volatility is an important factor because it is a measure of risk. Increased risk hampers an organization's ability to raise debt financing (Correia et al., 2018; Kim et al., 2001; Merton, 1974) and also increases cost of capital Barth et al. (2013)). Further, since managers are responsible and rewarded for increasing shareholder's wealth, high volatility or reduced predictability of returns harms management's earning potential. Combination of assets should have reduced volatility, assuming the assets were not perfectly correlated. When this fair expectation is not met, managers respond by divesting. This finding supports portfolio theory that managers evaluate their entire portfolio of assets and volatility of combined assets is an important factor.

Mean stock performance

As managers are motivated to ensure predictability of returns, they are equally if not more motivated to ensure that the absolute returns are good, or the corollary is that poor performance triggers divestiture of prior acquisitions. In support of hypothesis # 4a based on previous assertions on this topic we find that strong mean stock performance reduces the need for divestiture post-acquisition (Berry, 2010; Brauer, 2006; Kolev, 2016). The coefficient for Mean_Stock_Performance_Divestiture is -.780 (p: <.100). These findings are also in line with the recent USA based study of Amiri et al. (2021) and support the portfolio theory. However, when it comes to moderating impact of mean stock performance on relationship between volatility and divestiture likelihood, the results are not as hypothesized and we do not find support for hypothesis # 4b as the coefficient for interaction between Mean_Stock_Performance_Divestiture and Stock_Volatility_Divestiture is positive (.010; p: <.100).

Related vs. unrelated M&A

We find support for hypothesis # 5a that unrelated deals are more likely to be followed by a divestiture than a related deal which is similar to prior research, for example the study by Meschi and Metais (2015). This relationship has statistical significance when comparing completely unrelated deals where not even two SIC digits match with completely related deals where all four SIC digits match (coefficient is .364 p:<.050). However, it is not statistically significant when two or three SIC digits match. Overall, the support for hypothesis that related (unrelated) deals are less (more) likely to be followed by divestiture is in-line with theories that unrelated deals are more risky, complex, have poorer performance and higher failure rate when compared to related deals which provide more economies of scale and better strategic fit.

Anticipation of regulatory concern

Anticipation of regulatory concern is a factor where Indian M&A industry behaves completely differently with their developed economies' counterparts. We find support for hypothesis # 6b for three relative size categories - 10-20%, 33-100%, 100%+ (coefficients are -1.627 p:<.050; -.897 p:<.100; -1.967 p:<.100 respectively). When regulatory action is a concern, Indian deals are less likely to be followed by a divestiture. It makes sense because Indian M&A markets are less vibrant, and it would therefore not be easy for a buyer to find suitable buyers for its assets to be divested and/ or the price will not be as per expectations.

Correction of prior mistake

When prior mistake is proxied by poor CAR around acquisition returns, we do not find support for hypothesis # 7a that divestitures post-acquisition represent correction of prior mistakes as the coefficient is not statistically significant. These findings are almost identical to the findings of Amiri et al. (2021) on the USA sample. Similar to them, we have a negative coefficient for Acquisition CAR which is statistically insignificant.

Experience

We find support for hypothesis # 8b that experience increases the likelihood of divestiture. These findings further reject the argument that divestitures post-acquisition are correction of prior mistakes. If it was the case, more experienced buyers would ideally be making fewer mistakes, and therefore, reducing the likelihood of divestitures post-acquisition. It instead supports portfolio theory that divestitures, like acquisitions, are tools in the arsenal of managers who evaluate entire portfolio and use additions and subtractions in their portfolio to drive shareholder value. Divestitures could very well have been part of the plan all along – to acquire, integrate, assimilate know-how, extract synergies and divest slack resources.

We conclude that it is possible to predict whether an acquisition in India will be followed by a divestiture or not with reasonable accuracy. Several factors are used for this prediction many of them are similar to the findings of global studies and selected variables vary in their behavior. We find that financial constraints in terms of cash, leverage and obligation to pay dividends are important factors that put pressure on managers to divest post an acquisition. Indigestion caused by high relative size leads to increased integration complexity which forces managers to divest to reduce organization's size, scope and complexity. Shareholder's returns and thereby stock price is also an important predictor whereby increased volatility (predictability of shareholders' returns) and/ or decreased mean stock performance (absolute shareholders' returns) both increase the likelihood of such divestitures. This provides strong support to portfolio theory. Experience of buyers translates into more divestitures post M&A which also provides support to portfolio theory and rejects the argument that such divestitures are correction of prior mistakes. While unrelated deals are more likely to be divested, anticipation of regulatory concern has the opposite impact.

This study makes significant contributions to the field of research around divestitures post-acquisition in India. We identify factors where Indian M&A markets are similar to their developed economies' counterparts and where they are not. Importantly, we developed a robust model to predict whether an acquisition will be followed by a divestiture or will be retained. This model is more than 75% accurate in its predictions which is more than what was achieved by earlier studies for example the study by Bergh (1997). We have also identified factors that increase and decrease the likelihood of such divestitures.

Findings of this study provide a clear framework for market participants including shareholder's and analysts to predict outcome of acquisitions. It is also useful for managers to understand factors that cause one to ultimately divest a prior acquisition. Further, it establishes that such divestitures are not evidence of correction of prior mistakes but instead can be a tool in the hands of experienced buyers to restructure and manage overall portfolio. We have studied several factors and this research, to the best of our knowledge, is the most comprehensive study on predicting divestitures of prior acquisitions done by Indian buyers. Future research work can leverage this work to gain understanding and undertake other research questions as detailed in the limitations of this study.

Like any research, there are certain limitations to this study that represent opportunities for future research. First, we have studied factors pertaining to the buyer and have not investigated factors pertaining to the target. Second, our sample was restricted to publicly listed buyers leaving transactions by privately held buyers out of scope. Third, we have not distinguished between partial and full divestitures as well as between divestiture of same unit and other units by the buyer. Fourth, we have not investigated parallel yet important research questions, which can be covered by future research, such as impact of such divestitures on shareholders' returns and impact of such divestitures on profitability of the organization. Fifth, we have not evaluated the interaction effect between variables for example, impact of high volatility on post-acquisition divestiture likelihood of cross border deals. Sixth, we have defined factors in a certain manner e.g., we calculated acquisition CAR using standard market model. Future research can evaluate impact of different definitions and calculation methodologies.

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APPENDICES

Variable definitions

Organization variables:

•Capex (Capex_N): Capital expenditures normalized on a base of total assets.

•Cash holding (Cash_Holding_N): Cash and cash equivalents normalized on a base of total assets.

•Equity Issue (Equity_Issue_B): taken as a binary variable with value of 1 if organization issued equity during the focal deal, 0 otherwise.

•Debt Issue (Debt_Issue_B): taken as a binary variable with value of 2 if organization issued debt during the focal deal, 1 otherwise

•Buyer's Leverage: Total debt normalized on a base of total.

oLeverage pre divestiture (Buyer_Leverage_Divestiture_N): Calculated one year before divestiture announcement.

oChange in leverage (Buyer_Leverage_N_Change): Calculated as difference between value one year before acquisition announcement and one year before divestiture announcement.

•Normalized Levered Free Cash Flow (FCF): Levered free cash flow which is EBITDA adjusted for net working capital changes, Capex and mandatory debt payments was taken and normalized on the base of total assets.

oLevered FCF pre divestiture (Levered_FCF_Divestiture_N): Calculated one year before divestiture announcement.

oLevered FCF change (Levered_FCF_N_Change): Calculated as difference between value one year before acquisition announcement and one year before divestiture announcement.

•Stock Volatility: Stock volatility is standard deviation of returns or variability of returns which is a measure of risk.

oStock volatility pre divestiture (Stock_Volatility_Divestiture): Calculated for a period of one year before divestiture.

oStock volatility change (Stock_Volatility_Change): Calculated as difference between value for the period one year before acquisition announcement and for the period one year before divestiture announcement.

•Stock performance: Stock performance was the abnormal return calculated as the difference between observed return and expected return. It was calculated using standard market model: $AR_{j,t} = R_{j,t} - (\alpha + \beta \times R_{mt})$. Where $AR_{j,t}$ is abnormal returns, $R_{j,t}$, is organization's observed returns, and R_{mt} is observed returns for the market, and α and β are constant and systematic risk respectively of organization j. α and β shall be calculated over approximately 230 trading days (i.e., approximately 320 days) ending 45 days before announcement date of the event.

Country specific appropriate index was used as market portfolio (i.e., Brazil: Bovespa Index (Ibovespa); Russia: MOEX Russia Index, India: Nifty 50 Index, China: Shanghai Composite Index and South Africa: FTSE/JSE Top 40 Index).

oStock performance pre divestiture (Mean_Stock_Performance_Divestiture): Calculated for a period of one year before divestiture.

oStock performance change (Mean_Stock_Performance_Change): Calculated as difference between value for the period one year before acquisition announcement and for the period one year before divestiture announcement.

•Dividend Payer (Dividend_Payer_B): taken as a binary variable with value of 1 if organization, before the focal deal, paid cash dividends, 0 otherwise.

•R&D (RD_N): is the expenses on research and development normalized on a base of total assets.

•EBITDA ROA (ROA): EBITDA or earnings before special items, interest, tax, depreciation and amortization normalized on a base of total assets.

•Size (Size_Log): taken as the log of total assets in USD million in the year prior to acquisition announcement.

•Tobin's Q (TobinsQ): Calculated as sum of total debt and equity market value normalized on a base of total assets.

•Acquisition experience (Past_Acquisition_5_Log): measured as the log transformation of count of deals completed by the buyer (excluding subsidiaries and affiliates) five years prior to the focal deal. Since the count observations contained several 0 values, a small positive constant was added before log transformation as the log of 0 is undefined.

•Divestment experience (Past_Divestment_5_Log): measured as the log transformation of count of divestments completed by the buyer's entity (excluding subsidiaries and affiliates) in five years prior to focal deal. Since the count observations contained several 0 values, a small positive constant was added before log transformation as the log of 0 is undefined.

•Small organization (Small_Organisation_B): taken as a binary variable with value of 2 if the organization is in the bottom tercile using total assets as the normalization variable, 1 otherwise. The cut-off was calculated for each industry and country combination.

•Young organization (Young_Organisation_B): similar to small firm variable, it is taken as a binary variable with value of 2 if the organization is in the bottom tercile using firm age as the normalization variable, 0 otherwise. The cut-off was calculated for each industry and country combination.

•Strong organization (Strong_Organisation_B): taken as a binary variable with value of 2 if the organization is above the four-firm concentration ratio (CR4), 1 otherwise. CR4 is calculated as the average share of revenue/ shipments by top four organization. The cut-off was calculated for each industry and country combination.

•Change in profitability (Buyer_Profitability_Change): profitability was measured as the industry adjusted net margin (return on sales). The industry average was calculated for each industry and country combination. The variable was calculated as a difference between profitability one year before acquisition announcement and profitability one year before divestiture announcement.

Deal characteristics:

•Binary variable for divestiture (Acquisition_With_Or_Without_Divestiture) which takes the value 2 if the focal deal was accompanied with an acquisition in the focal period, 1 otherwise.

•Acquisition Cumulative abnormal return (Acquisition_CAR) over a three-day window (-1, +1) around the acquisition announcement date i.e., one day before and one day after the announcement date. Abnormal return is observed return less expected return using standard market model as defined above in calculation of stock performance variable.

•Relative size (Relative_Size): refers to the greater of ratio of book value of total assets of target to that of the buyer prior to the acquisition and ratio of total transaction value to market capitalization of the buyer.

•Cross Border (Cross_Border_B): taken as a binary variable with value of 1 if the target organization is from a different country than the buyer, 0 otherwise.

•Cross Industry (Relatedness_C): similarly, cross border shall be taken as a category variable with value of 1, 2, 3,4,if the buyer and target had no, two, three and all four digits of SIC same.

•Public Target (Listed_Target_B): taken as a binary variable with value of 1 if the target organization is a publicly listed company, 0 otherwise.

•High regulatory risk (High_Reg_Risk_Combined): Proxy for high risk taken to be when a market leader is either the buyer or the target and the deal's relative size is significant. The variable takes the value of 2, 3, 4, 5 when the relative size is 10-20%, 20-33%, 33-100%, 100%+ respectively or 6 when there is no regulatory risk.

Other control/ fixed effect variables:

•Industry (Industry_FE): defined as first two digit of primary SIC code of the buyer to control for time-invariant industry characteristics.

•Time fixed effects (Year_FE): unique identifier given to year to control for year of acquisition.

Other definitions

•Acquisition or mergers and acquisitions (M&A): Acquisition is defined as a corporate transaction where a buyer has bought assets or shares of another organization fully or partially. Merger is where two entities combine to form a new entity. In this work, acquisition and M&A are both considered and used interchangeably. Several filters were applied on M&A deals – deals with missing data were removed and in line with most of the researches on this topic, for example, Aktas et al. (2022) and Amiri et al. (2021). Only deals by public listed buyers were included as data for private buyers was not available. The deal should have closed within three years and the status should be closed or completed i.e., not just announced or cancelled. The deal should have resulted in change in control. The buyer should be solvent with positive assets. The buyer should have been from one of the BRICS countries and deals should have been announced between 1st January 2000 and 31st December 2023 (both inclusive) to be included in the work.

•Focal deal is defined as the acquisition/ M&A deal around which divestitures are being studied. Divestitures are associated to a focal deal if such a divestiture took place during the focal period.

•Divestiture: divestiture is defined as sale of a business unit by a parent organization. Direct investment (even 100%) in parent organization is not considered i.e., the seller has to be an organization and not an individual. Similarly, a private equity owner selling an organization is not included, the seller should be a corporate organization and not a financial investor. For being considered in the study, only divestitures which were done by a buyer of the focal M&A were considered, the deal should not have been completed and should have led to change in ownership. The divestiture could have been of the same unit that was acquired or any part of the combined business of the buyer (Aktas, Baros, & Croci, 2022). If such a divestiture was done during the focal window, it was tagged to the focal M&A deal and the deal was said to be with divestiture (Acquisition_With_Or_Without_Divestiture took the value 2). If it was done up to five years before the focal window, it was counted in Past_Divestment_5_Log.

•Focal window: Focal window taken as the period starting one year before acquisition announcement to three years post-acquisition closure.

•All pre divestiture variables: For acquisitions with accompanying divestitures, these were calculated one year before divestiture announcement. For remaining observations, it was calculated one year before end of focal window which was three years from acquisition announcement.

•All post divestiture variables: For acquisitions with accompanying divestitures, these were calculated one year after divestiture announcement. For remaining observations, it was calculated one year after end of focal window which was three years from acquisition announcement.

•All change variables: All change variables were calculated as a difference between variable's value one year before acquisition announcement and variable's value one year before divestiture announcement. Where an acquisition was not accompanied by divestiture instead of one year before divestiture announcement one year before focal window end (which was three years from acquisition announcement) was taken.

THE DECLINE OF TRADITIONAL PASTORALISM IN EUROPE: UNDERSTANDING THE DYNAMICS THROUGH DISCUSSION GROUPS WITH SPANISH SHEPHERDS

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Abstract: *Extensive livestock farming, a traditional practice in Europe, has emerged as a potential sustainable development strategy, particularly in regions experiencing rural depopulation. This approach is expected to generate multiple positive externalities. Notwithstanding the recent emphasis on its significance within the framework of novel European policies, the sector persists in its decline. The present research utilizes focus group methodology to examine the underlying causes of this decline from the perspective of shepherds. Two discussion groups were convened with farmers from the regions of Castilla y León and Castilla-La Mancha in Spain, thereby enabling a comparison of the practitioners' testimonies with the extant literature. The methodological approach employed herein underscores the significance of focus groups in elucidating the intricate socioeconomic dynamics that characterize traditional livestock communities.*
The findings reveal multiple interconnected challenges, including but not limited to: low profitability derived from legal requirements and concentration of demand; increasingly complex access to pastures due to local and state regulations; significant barriers to entry, including economic requirements and bureaucracy; difficulties in work-life balance; bureaucratic obstacles to positive externalities; conflictive relations with the tourism sector; weak associationism; and limited technology adoption. This study makes a significant contribution to the methodological literature by demonstrating the efficacy of focus groups in unveiling latent dynamics within declining traditional sectors.

Keywords: *Extensive livestock farming, Rural depopulation, Socioeconomic dynamics, Focus group methodology*
(JEL code: Q12, Q18)

INTRODUCTION

Conventional extensive livestock farming has undergone a persistent decline in recent decades, with a shift towards intensification or abandonment (Berriet, 2018; Godde, 2018; Portús, 2020; Pinto, 2023). The correlation between the decline of conventional livestock farming, rural depopulation, and natural disasters has been extensively documented in academic literature (Durán, 2020; Mastronardi, 2021; Morales, 2020). The aforementioned livestock farming model has been demonstrated to engender several noteworthy benefits, including but not limited to reduced energy consumption (Bossis, 2012), enhanced resilience to climate change (Barron, 2021; Deleglise, 2019; Teague, 2015), and augmented biodiversity (Garde, 2014; Pinho, 2012; Tampaki, 2022).

It is paradoxical that, despite the growing recognition of the value of traditional livestock farming, its deterioration continues. According to data provided by the European Commis-sion, the Common Agricultural Policy of the European Union allocated €104 billion to measures against climate change in the 2014-2020 period, with a particular emphasis on measures to reduce greenhouse gases, the consumption of inputs, and the commitment to resilient livestock. Consequently, he has placed greater emphasis on organic livestock as a pivotal element in the pursuit of sustainable development. The ongoing trend of intensification or abandonment underscores a substantial discrepancy between the objectives of implemented policies and their tangible outcomes on the ground. This discrepancy gives rise to fundamental inquiries regarding the efficacy of contemporary strategies for revitalizing the sector and the necessity of reevaluating intervention methodologies.

A number of studies have previously examined the friction between public policies and the traditional sector (Aubron, 2014; Gardin, 2013; Morsel, 2022). However, to the best of our knowledge, no research has been conducted that addresses the global causes of the decline of traditional livestock farm-

ing. This lacuna in existing knowledge may be attributable to the lack of concern that prevailed for conventional livestock farming until recently. This sector has undergone a transformation, shifting from a position of disrepute to its current status as a proponent of sustainable development, as asserted by the European Commission. However, despite the intentions of public intervention, we observe that the trend continues to decline. Therefore, it is worthwhile to investigate the dynamics within the sector that perpetuate this trend, despite the efforts of the administration. The exploration of the underlying causes of this decline is imperative to address the existing contradictions in public policies, identify and resolve the issues inherent in livestock farming, and ensure the long-term viability of this sector for the pursuit of balanced and environmentally sustainable economic growth.

The present research utilizes focus group methodology to examine the causes of this decline, using Spain as an analogous example to the European context, drawing upon the direct experiences and perspectives of farmers. The present research is situated within the scope focused on sheep and goat farmers residing in two distinct Spanish regions. The "autonomous communities" of Castilla y León (CYL) and Castilla-La Mancha (CLM) are notable for their distinctive cultural characteristics. The objective of the research is to utilize focus groups to address the following challenges: (i) to understand the dynamics that drive intensification or abandonment; (ii) to contrast academic perspectives against practical realities; and (iii) to understand the discrepancy between the objectives of current policy interventions and their results.

The decision to utilize focus groups as the primary research method is of particular importance in light of the intricate social and economic dynamics that are in play. This methodological approach enables the capture of collective narratives and shared experiences, the identification of points of consensus and conflict within the community (Kitzinger, 1994), and, when applied to the context of traditional livestock farming, the comprehension of policy and intervention perceptions and experiences at the local level. It also facilitates the identification of unexpected themes and interactions that might be obscured in individual interviews. The results obtained will facilitate the fulfillment of the existing knowledge gap, thereby enabling the development of an approach to the general problems of traditional livestock farming and providing the basis for future research.

The significance of these findings lies in their practical ramifications. A comprehensive understanding of the dynamics underlying the decline of traditional livestock farming is imperative for the formulation of public policies that impact the sector. The findings of this research provide a rationale for the observed decline and, from the perspective of livestock farmers, offer potential solutions to long-standing problems. This contribution is not only pertinent to the livestock sector; it is also germane to the broader set of environmental policies and the pursuit of the Sustainable Development Goals in Europe.

The article's structure is as follows: the theoretical framework addresses the literature that has been reviewed in relation to extensive livestock farming, presents the analogy between the Spanish and European contexts, in addition to providing data on the structure of livestock farms in Spain and in the two regions studied; the methodology delineates the design of the focus group; the results section presents the positions of the farmers obtained through the focus groups; the discussion section contrasts these results with the literature; and finally, the conclusions section presents the most relevant findings, the main recommendations arising from the results, the limitations contemplated, and the future lines of research.

THEORETICAL FRAMEWORK

Literature Review

A review of the extant literature indicates a general consensus on the economic and ecological unsustainability of intensive livestock farming (Díaz Gaona, 2021; Mena, 2017) and the dependence of extensive livestock farming on public funds (Lienard, 2014). Non-market benefits, defined as externalities, are typically not subject to analysis, particularly in regions experiencing economic decline (Scoones, 2023).

The product's appeal is further enhanced by the inclusion of additional features. It is more independent of livestock feed markets (Franco, 2012; Leithold, 2011), lower energy consumption (Bossis, 2012), the resilience of extensive livestock farming in the face of climate change (Barron, 2021; Deleglisse, 2019; Teague, 2015), and drought (Nettier, 2010), reduction of dependence on subsidies (Gaspar, 2009; Lasanta, 2019), in addition to a greater benefit to biodiversity (Garde, 2014; Pinho, 2012; Tampaki, 2022). Consequently, it is not surprising that sustainability is linked to extensivity, as indicated by the perspective of future farmers (Damico, 2022).

In Europe, widespread rural depopulation has led to the revegetation of abandoned land (Harkoma, 2020; Mastronardi, 2021; Vlami, 2019). These areas can be recovered by traditional livestock sectors (Álvarez, 2016; Celaya, 2022; Díaz Gaona, 2019; Lasanta, 2019; 2022). This is a highly desirable outcome, as livestock farming helps to prevent natural disasters related to such abandonment (Pateiro, 2020).

However, despite its many advantages, the observed trend is toward greater intensification and unsustainability (Godde, 2018). The extant literature identifies a number of factors that contribute to this phenomenon. According to Czajkowski (2021) and Santiago (2022), psychological barriers are defined as the absence of psychological incentives for farmers to opt for extensivity. Legal restrictions, such as the Common Agricultural Policy in Europe (Vicente, 2019), as well as food and meat industry requirements (Aubron, 2014; Gardin, 2013; Morsel, 2022), are also relevant factors in this context. Problems with social representation, such as social cohesion, lack of voice in regional governments, and weak cooperation among livestock farmers (Fernández, 2012), have been identified. Operational difficulties, including access to pastures and common land (Galán, 2022; Schils, 2019), the lack of generational and labor replacement (Ruiz, 2020; Sendyka, 2018), and competition from other sectors, where the proliferation of tourism has led to a decline in livestock farming (Jiménez, 2019), have also been identified. In Spain, there has been an

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observed gradual disappearance of a sector, as well as of traditional livestock practices such as transhumance (Portús, 2020; Ríos, 2013; 2015). Extensive traditional livestock farming has only been able to remain, fundamentally, in ignored and marginal areas (Bertaglia, 2007).

Confronted with this challenging circumstance, novel prospects have emerged, presenting potential solutions: Recent technological advancements have led to the development of innovative "virtual fence" systems, which have been shown to enhance grazing practices within designated territories (Anderson, 2014). Additionally, recent studies have identified methods for detecting calving in wild animals (González Sánchez, 2021) and have incorporated the Internet of Things to facilitate the study of crucial livestock parameters (Mishra, 2023). The evolution of the legal framework has given rise to novel opportunities, such as the transition from conventional livestock farming to organic livestock farming, which is subject to more stringent regulations (Horrillo, 2020; López i Gelats, 2020). The increasing demand for quality products, which is concomitant with consumption, enables the provision of superior quality products that are associated with animal welfare and that are increasingly supported by the growing population (Resano, 2018; Stampa, 2022).

Spain as glimpse of Europe

Spain was among the Western European countries that later initiated the process of industrialization. It was not until the latter half of the 20th century that Spain could be considered as transitioning from an agrarian society to an industrial one. However, during the final decades of the previous century, significant political efforts were made to assimilate Spain into both the European Economic Community and, subsequently, the European Union. These endeavors aimed to mitigate the disparities between the Spanish and European contexts. Consequently, the reality in Spain can be indicative of the general trend in the European Union. The recent structural transformation of the economy, the demographic and territorial weight of the country (as it represents more than 10% of both), and the fact that it belongs to the "Mediterranean countries" make it an example of a bridge between the most developed and the least developed countries within the European Union. Consequently, the Spanish reality can be regarded from a regional perspective. The concerns surrounding the decline of traditional sectors, such as extensive livestock farming, can be extrapolated to the European Union as a whole, and perhaps even to the entire continent.

Depopulation in rural areas.

While the population began to concentrate in cities from the mid-20th century onward, Spain has experienced a decline in its rural population since 2000 (Fig. 1). The municipalities most adversely affected by this phenomenon are predominantly villages, defined as those with a population of less than 1,000 inhabitants. The growth exhibited by small towns (10,000–50,000) and large towns (>50,000) is more consistent, with medium-sized towns demonstrating popula-

tion growth in comparison to other larger municipalities. A comparison with the dynamics in the European Union reveals significant analogies (Fig. 2). A comparative analysis of the definition of "city" across different national contexts reveals emergent trends. Notably, the rate of rural population loss exhibited an initial surge at the onset of the observed period. However, this dynamic has since stabilized, resulting in a demographic profile that closely mirrors that of the European Union.

Figure 1. Variation in municipalities of Spain
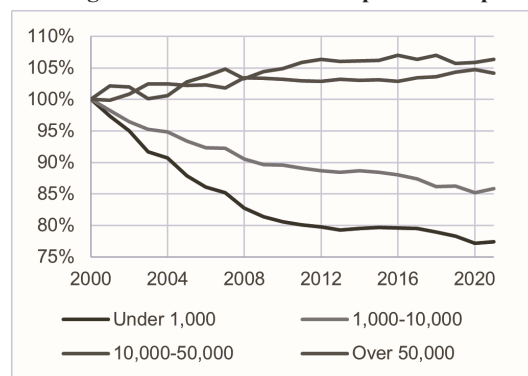
Source: Own elaboration. SOURCE: INE (Spanish National Institute of Statistics) and World Bank.

Figure 2. Variation of rural and urbal population in Spain and EU.
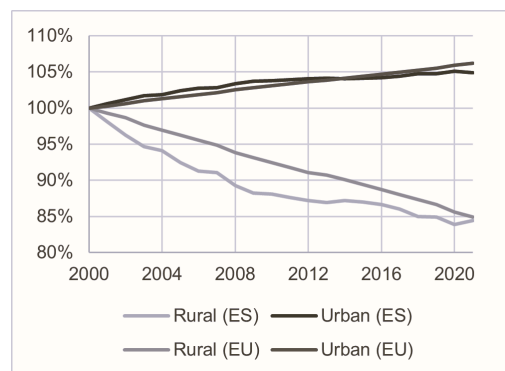
Source: Own elaboration. SOURCE: INE (Spanish National Institute of Statistics) and World Bank.

Aging of livestock farmers.

The average age of heads of livestock farms in Spain is advanced. Disaggregating the data by age range, we find that the largest group of livestock farmers is between 55 and 65 years of age (Fig. 3). This data contrasts with the dynamics of the labor market, which shows its highest values between 35 and 55 years of age. This labor market shows few differences with that of the EU, except for a later entry and an earlier exit. The dynamics with respect to the aging of farm managers, however, are more drastic in the case of the EU. The majority age group is above 65 years of age. The differences in the dynamics between Spain and the EU are not many, although we observe that in Spain there are more young farmers.

Figure 3. Comparative between employees and livestock farmers in Spain and EU, by age rank
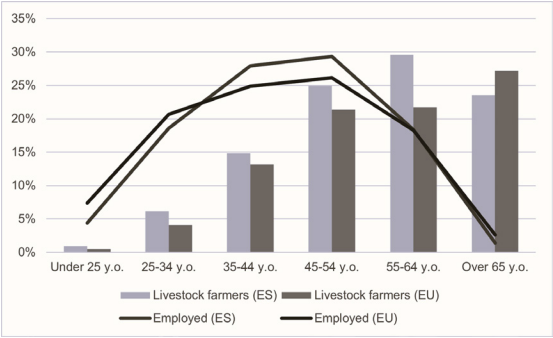
Source: Own elaboration. SOURCE: Eurostat

## Traditional and extensive livestock: a statistical approach

Agricultural statistics do not yet collect data in a standardized way that would allow the characterization of the sectors as extensive or intensive. However, the size of the farm in TLUs allows us to make a first approach to the problem. TLUs is a unity that compares different species of livestock, creating a unitary standard to measure the size of livestock managed by a farm. TLU for dairy cows is 1, for goat and sheep is 0.1 and for pig is 0.3. We have selected the value of 100 TLUs to find out which sectors have larger farm sizes. This value of TLUs greater than 100 means that holdings have more than 100 cows, 1000 goats or sheep, or 333 pigs. We record the results for Spain (Fig. 4).

According to the number of holdings the most intensified sector is the pig, followed by the cow, sheep and goat. According to the number of heads, we see that almost all the pig sector is intensive, in cow it is over 60%, in sheep it is around 50% and in goat it represent 30% of the total goat livestock.

**Figure 4. Percentagee of holdings >100 TLUs and livestock heads, by animal**
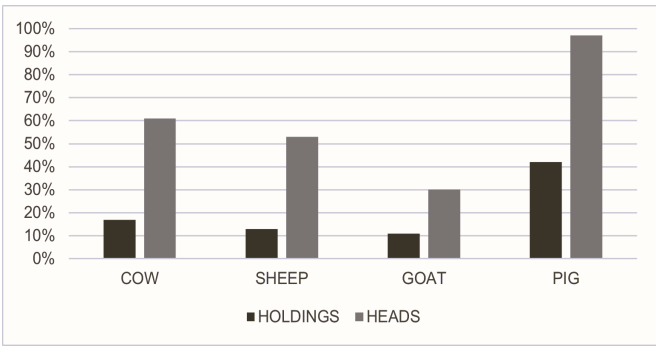
Source: Own elaboration. SOURCE: INE

Decline in livestock activity in the sheep and goat sector

The decline in livestock activity can be approached from the perspective of the loss in the number of livestock heads. In the case of sheep and goats in Spain, we observe a plunge from 2017, when the number of sheep and goats was 19 million, to values close to 18 million, which means a loss of almost one million (Fig. 5). With respect to the European Union, the drop has been from nearly 76 million to 73.5, which is two and a

half million. These cattle are not equally important for all EU countries, but are particularly relevant in southern Europe (Fig. 6).

Figure 5. Evolution in number of sheep and goat heads (millions) in Spain and EU
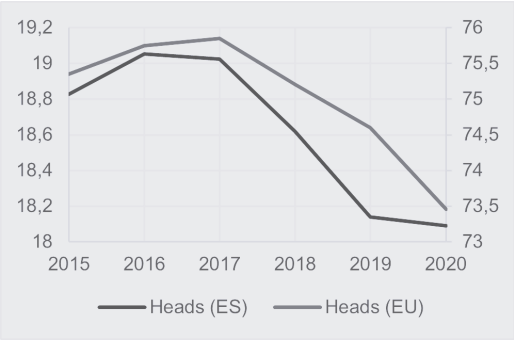
Source: Own elaboration. SOURCE: Eurostat

Figure 6. Distribution of livestock sectors in EU members
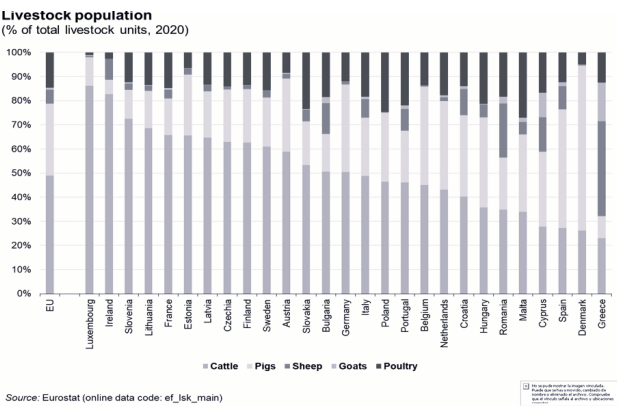
Source: Own elaboration. SOURCE: Eurostat

Regional distribution of livestock

In Spain, the territorial distribution of the sheep and goat sector is heterogeneous for historical, cultural, economic and climatological reasons. The following graphs show the regional distribution of sheep (Fig. 7) and goats (Fig. 8). For sheep, only three regions account for 57%: Andalusia, Castilla y León and Extremadura. For goats, Andalusia and Castilla-La Mancha together account for 55% of the total. We show the location and extension of these regions on a map of the country (Fig. 9).

Figure 7. Territorial distribution of sheep.

Source: Own elaboration, SOURCE: INE

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Figure 8. Territorial distribution of goats
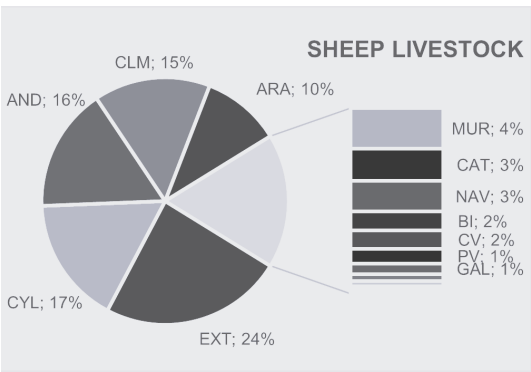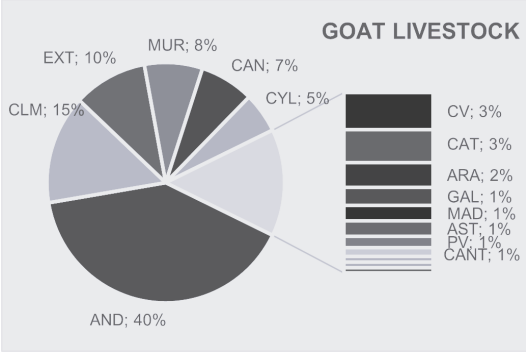
Source: Own elaboration. SOURCE: INE

Figure 9. Regions of Spain

Source: IA generated map.

Characterization of sheep and goat farming in Castilla-La Mancha and Castilla y León

To facilitate the analysis of the sector's dynamics, a group of livestock farmers from Castilla-La Mancha and Castilla y León was convened. These regions were selected due to their significance at the national level. The configuration of agricultural establishments exhibits disparities across these regions, with a divergence observed between the two sectors (Fig. 10). In accordance with the findings presented in Figure 4, a heightened intensity is observed within the sheep sector, wherein the predominant segment consists of farms with a population exceeding 1,000 head (>100 TLUs). The goat sector is characterized by the predominance of small (CYL) and medium (CLM) sized farms in terms of production. The regional dynamics indicate a lower concentration of livestock in CYL compared to the national average, while CLM exhibits larger farms.
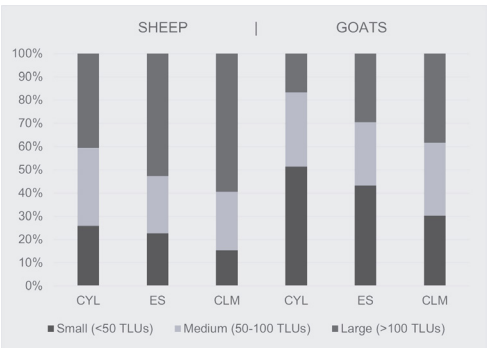
Figure 10. Distribution of holdings by size

Source: Own elaboration

The following graphs illustrate the productive structure of the farms. In this study, we have combined both species (sheep and goats) to provide the average economic results for each livestock unit and for each farm. As illustrated in Figure 11, the product sold in CLM has a higher price. Nevertheless, the production costs of these products are marginally higher than those of CYL. The elevated price level enables higher profits and reduced subsidies. This phenomenon appears to be attributable to the consolidation of farms into larger entities (Fig. 12). This consolidation facilitates returns to scale and potentially grants greater bargaining power in price determination, given the economies of scale associated with larger operating scales.

Figure 11. Average results, in euros, by TLU
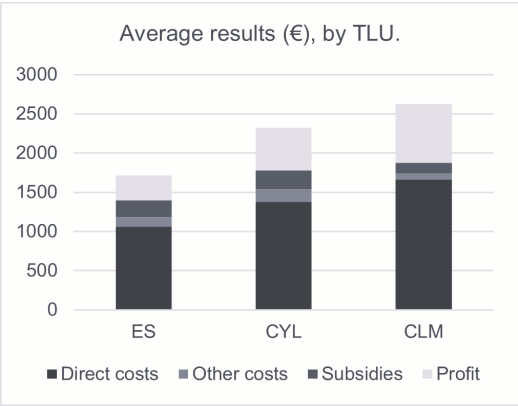
Source: Own elaboration

Figure 12. Average results, in thousands of euros, by holding
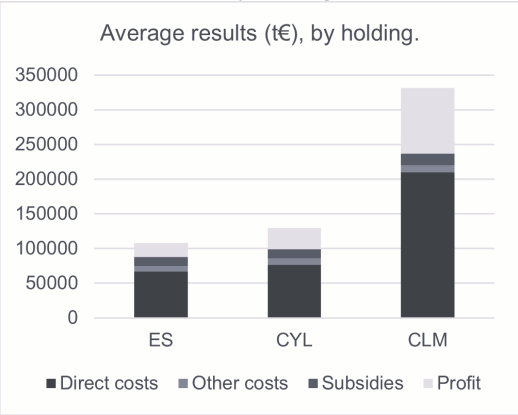
Source: Own elaboration

MATERIALS AND METHODS

The focus group

The present study utilizes focus groups as the primary research method, aligning with Wilkinson's (1998) approach to qualitative research in the social sciences. The selection of this methodology was made on the basis of its capacity to engender collective narratives, unveil group dynamics, accentuate shared challenges and divergent perspectives, identify patterns in language and action, and characterize group dynamics

through discussion analysis (Kitzinger, 1994).

Participant selection procedure

The population under discussion is composed of traditional sheep and goat farmers, specifically those residing in the regions of Castilla y León and Castilla-La Mancha. The recruitment procedure has been executed through prior contacts and associations in the sector.

Two focus groups were convened for the purpose of data collection:
• Castilla y León (n = 11).
• Castilla-La Mancha (n = 6)

The sessions were conducted in May and July of 2023, employing a combination of remote and in-person formats. The participants represented a wide range of age groups, varied experiences with livestock, and geographic locations within their respective regions.

Data collection protocol

The data recorded for the participants included region, profession, age, sex, and breeds. The sessions were recorded with the express authorization of the participants, with the aim of transcribing and analyzing them later. The storage of this data has occurred in secure corporate spaces of the University of Castilla-La Mancha, with access exclusively restricted to the research team.

All participants have been anonymized through the implementation of pseudonymization, whereby each participant is assigned a code consisting of the Autonomous Community followed by a random ordinal.

Structure of the focus group

The focus groups were structured around six thematic blocks.

• Introduction: where the reasons for the meeting and the research project are exposed: analysis of the socioeconomic sustainability of traditional livestock farming. The methodology used is also exposed.
• BLOCK I: Traditional livestock farming as a business.
o Problems of the sector.
o Benefits of the permanence of the sector.
o Strengths.
• BLOCK II: Circular economy.
o Environmental sustainability.
o Organic livestock.
• BLOCK III: Social economy as philosophy.
o Participation of society in traditional livestock farming, and vice versa.
o Networks and associationism.
• BLOCK IV: Integration of tourism.
o Potential extra income from tourism.
o Viability.
• BLOCK V: New technologies.
o Internet commerce.
o Use of online platforms that favour associationism.
• BLOCK VI: Perception of traditional livestock farming.
o Pastoralism in society.
o Pastoralism in the rural world.
o Self-perception.
o Perspectives of the activity itself.
o Social recognition.
• Closing: thanks to the participants, also with a view to subsequent discussions to continue the research.

Ethical considerations

The study was conducted in accordance with the ethical principles that govern research in this field. These principles include the voluntary participation of study participants, the provision of informed consent for the recording of sessions,

Table 1. Data from interviewed farmers

CASTILLA Y LEÓN				CASTILLA-LA MANCHA			
CODE	SEX	AGE	LIVESTOCK	CODE	SEX	AGE	LIVESTOCK
CYL#1	H	50-60	SHEEP	CLM#1	H	30-40	GOAT
CYL#2	H	50-60	SHEEP	CLM#2	H	30-40	GOAT
CYL#3	H	50-60	SHEEP	CLM#3	H	60-70	GOAT
CYL#4	H	40-50	SHEEP	CLM#4	H	50-60	SHEEP AND GOAT
CYL#5	H	50-60	SHEEP	CLM#5	M	40-50	GOAT
CYL#6	H	60-70	SHEEP	CLM#6	H	50-60	SHEEP AND GOAT
CYL#7	M	-	SHEEP				
CYL#8	M	20-30	SHEEP				
CYL#9	H	-	SHEEP				
CYL#10	H	50-60	SHEEP				
CYL#11	H	50-60	GOAT				

Source: Own elaboration

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the anonymization of data, the minimization of power differences among study participants, the use of open-ended question formats, and the promotion of internal debate among study participants.

The methodological approach that has been developed emphasizes rigorous documentation through the use of session recordings and simultaneous note-taking. This ensures comprehensive data capture while maintaining participant confidentiality.

RESULTS

Livestock farmers' narrative

The analysis of the focus groups yielded several key issues regarding the challenges and the current state of extensive livestock farming in Spain. The results of the study are organized into seven main categories that emerged from the participants' speeches.

Business viability and administration challenges

A predominant concern that was expressed by participants from both regions pertained to the substantial administrative obligations imposed on farmers. Participants from both Castilla y León (CYL) and Castilla-La Mancha (CLM) underscored the substantial impact of bureaucratic requirements on their capacity to prioritize livestock-related activities. As several CYL participants have noted: "I think the biggest problem we're facing right now is bureaucracy." "They take more time away from paperwork when it could be fixed with much less paperwork."

Administrative complexity poses significant challenges for new entrants to the sector. The implementation of new measures for product traceability is viewed by CLM participants as a potential source of additional, unnecessary impediments. Despite the provision of subsidies, participants indicated that they are inadequate given the initial investment required. CLM expressed its concurrence with the measures for accessing the sector. However, at a certain juncture, one of the participants underscored the imperative of universal rights, asserting that "everyone should have the same rights." Additionally, subsidies are contingent on variables such as the Pasture Eligibility Coefficient, which introduces uncertainty among farmers regarding their eligibility for these benefits. As one CLM participant noted: "I have 1000 hectares, just 20 have been taken into account, and the subsidy is charged according to the pastures."

Market structure and price formation

The research revealed significant concerns about the concentration of market power in the meat industry. According to the participants' descriptions, a monopsony structure is in effect, wherein slaughterhouses and meat processors effectively control prices. This phenomenon stands in stark contrast to the past, when a more balanced market environment was the norm, characterized by the presence of multiple buyers and sellers. A CLM farmer elucidated: "The one who sets the price is the

trafficker. The price is set by the same person who is going to buy it from you."

Furthermore, participants noted the absence of price differentiation between intensive and extensive livestock products, despite evident differences in quality. Similarly, the surplus of calves on dairy sheep farms exerts a substantial influence on market prices, as these animals are regarded as a by-product that must be disposed of in order to reduce feed expenditures. Consequently, the absence of market recognition for conventional livestock farming methodologies adversely impacts the financial viability of the industry.

Generation succession and labor problems

The findings indicate a severe crisis in generational succession. The majority of participants expressed a negative outlook regarding the future of their children in the family business. Their concerns primarily stem from the perceived inadequacies of the working environment and the perceived lack of financial stability. Consequently, professionals recognize that their chosen field is not perceived as attractive to individuals outside the sector. A CLM participant has noted: "I have joined by vocation. I'm finishing the year and efforts haven't given me anything, well, to eat all year. But that's it."

The implementation of a hiring initiative has the potential to mitigate these conditions. However, the challenge of securing sufficient labor exacerbates this predicament. One CYL participant noted: "Don't look for what you're not going to find—nor expensive, nor cheap, nor good, nor bad." Another CLM said: "People to help you, there is no one." The underlying factors contributing to this phenomenon are the conditions of the trade, which are subject to the needs of the livestock. This aspect is difficult to reconcile with labor legislation. Additionally, the costs associated with the trade are a contributing factor: "1200 euros per month, plus social insurance... you give it to the sheep and you will see how they will produce more than with the shepherd." "It is unadvisable to seek that which is not to be found—that which is neither expensive nor cheap, nor good nor bad". In the context of CYL, it is noteworthy that immigrants who self-identify as shepherds primarily do so as a means to acquire the necessary documentation that facilitates their residency status.

According to the CYL participants, other measures that facilitate conciliation are identified, including public fences. These are expansive, clearly delineated, and publicly owned spaces where cattle can be left for extended periods. One of the participants made the following observation: "We had to request (...) that the administration helps us to maintain clearing and to maintain public fences in the municipalities where there is livestock".

Environmental management and sustainability

The participants exhibited a profound comprehension of their role in environmental management, particularly in the context of fire prevention and biodiversity maintenance. However, they noted an increasing restriction by the administration on access to specific pastures, which, paradoxically, can

be detrimental to environmental conservation. The emergence of these novel impediments, unobserved in previous eras, has rendered the utilization of these pastures more costly or directly obstructed it, a phenomenon that has adversely impacted the capacity to engender positive externalities. A CYL participant noted: "You didn't have to apply for anything, in the past. Burns were made and the sites and the forest were kept clean and there were never fires."

Social economy and gender equality

The research revealed limited development of social economy initiatives. Despite the existence of certain forms of partnership, such as quality seals and agricultural chambers, cooperative endeavors have historically proven unsuccessful in both regions. The participants attributed these failures to management issues and a lack of trust. "Cooperatives (...) they are worthless," said one CYL participant, and another from CLM asserted: "(The cooperative I was in) did not work." Some recognized their potential value if they are properly managed, however, one CLM participant noted: "You need an administrator, and we are farmers. We do nothing but produce (...). You would have to hire someone else." In both regions, they concluded that perhaps the problem lay specifically in the sheep sector.

With respect to gender, the findings suggest a conventional participation of women in the sector, albeit frequently unobserved in official records. Recent administrative initiatives have been implemented with the objective of enhancing the visibility and formal participation of women in the sector.

Tourism integration and technological adaptation

The integration of tourism activities was met with general opposition from the participants, who regarded it as a potentially disruptive element to their primary activity. While some respondents lacked experience in the field, the prevailing opinion was that tourism offers more challenges than opportunities for diversification.

With regard to technological adoption, participants exhibited a paucity of knowledge concerning potential applications beyond rudimentary communication tools. While acknowledging the merits of certain existing technologies, such as vehicles, mobile phones, and feeders, they voiced reservations about more sophisticated solutions, citing concerns regarding cost and the challenges of practical implementation.

Self perception of traditional livestock farmers

The perception of livestock farmers regarding their work, as well as their belief in society's perception of their trade, varies significantly between regions. In the context of CLM, both factors exhibited a positive trend, as this region is predominantly characterized by the aforementioned activity. Conversely, in CYL, they exhibited a negative attitude. One of the participants offered the following observation: "Young people think that pastors are stupid and don't know anything", while another pointed out categorically: "What they want (from the

Administration) is to put an end to the sector (...). We have been persecuted for years and years."

Dynamics of the sector and implications of current policies

A review of the extant literature on the subject reveals that there are two factors that influence the dynamics of the traditional livestock sector. The internal factors intrinsic to the sector are related to the very nature of the activity. In contrast, external factors have a significant impact on the overall trend of traditional livestock farming.

Among the internal factors that influence abandonment are high initial investment, relatively low economic profitability, the inability to compete economically with intensive production farms, the implications of working with live cattle for vacations and rest periods, a shortage of skilled workers, and a limited capacity for technological adaptation. However, the survival of this sector may be facilitated by several factors, including the availability of low-cost resources, the scarcity of alternative employment opportunities in rural areas, and the preference for a certain lifestyle among livestock farmers. Social status, which can be classified as either positive or negative depending on the idiosyncrasies of the society in which it operates, can also play an important role. However, livestock farmers consider external factors to be more relevant to the sector's survival. Among these factors, the actions of the public administration emerge as a salient element, exhibiting a direct correlation with the profitability and business viability of these entities. Among the government actions that encourage abandonment, we find uncertainty regarding changes in bureaucratic requirements, such as food traceability, the granting of subsidies, or access to and management of public natural resources. Concurrently, it is evident that extensive livestock farming is contingent on substantial public sector support, with the allocation of various subsidies being a pivotal factor in its continued viability. These concessions include the participation of women in the livestock farming sector, the incorporation of young people into the sector, the recovery of abandoned land, and recognition of the environmental role of extensive livestock farming.

A variety of external factors must be considered, including the role of intermediaries, the presence of competing companies within the industry, the perspectives of end consumers, and the broader societal implications of the industry's actions. Among the factors that have a deleterious effect on extensive livestock farming are the existence of intensive farms that produce less expensively, the lack of product differentiation, the market power of intermediaries, and competition with tourism for land use. Among the factors that have the potential to exert a positive influence on this matter are the enhancement of public awareness regarding environmental and animal welfare issues, the increased demand for natural products, and advancements in technology. Despite the initial reluctance of livestock farmers to adopt new technologies due to their cost, mobile phones have become a common tool for navigating administrative procedures and facilitating transactions. Ultimately, we ascertain cooperative organization as a neutral factor. Despite

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the theoretical usefulness of cooperatives, failed experiences have engendered a climate of distrust among livestock farmers.

DISCUSSION

The results of this study indicate significant discrepancies between academic perspectives and the daily realities of extensive livestock farming in Spain. Despite the preponderance of academic literature that accentuates the potential of this sector to address various territorial challenges, such as depopulation and the prevention of natural disasters (see Álvarez, 2016; Lasanta, 2019, 2022; Díaz Gaona, 2019; Celaya, 2022), our findings indicate that ranchers encounter substantial impediments that jeopardize the fundamental viability of their activity. The potential of extensive livestock farming has not been effectively addressed by public policies. The present interventions are chiefly confined to the allocation of direct grants, while the underlying structural deficiencies persist in remaining unaddressed. The following problems have been identified:

•The market structure in question is one in which a single entity, referred to as a "monopsony," exerts control over a specific market sector. A fundamental discovery of our study is the economic paradox of the sector. Contrary to the prevailing

Figure 13. External and internal factors affecting viability of traditional livestock farming
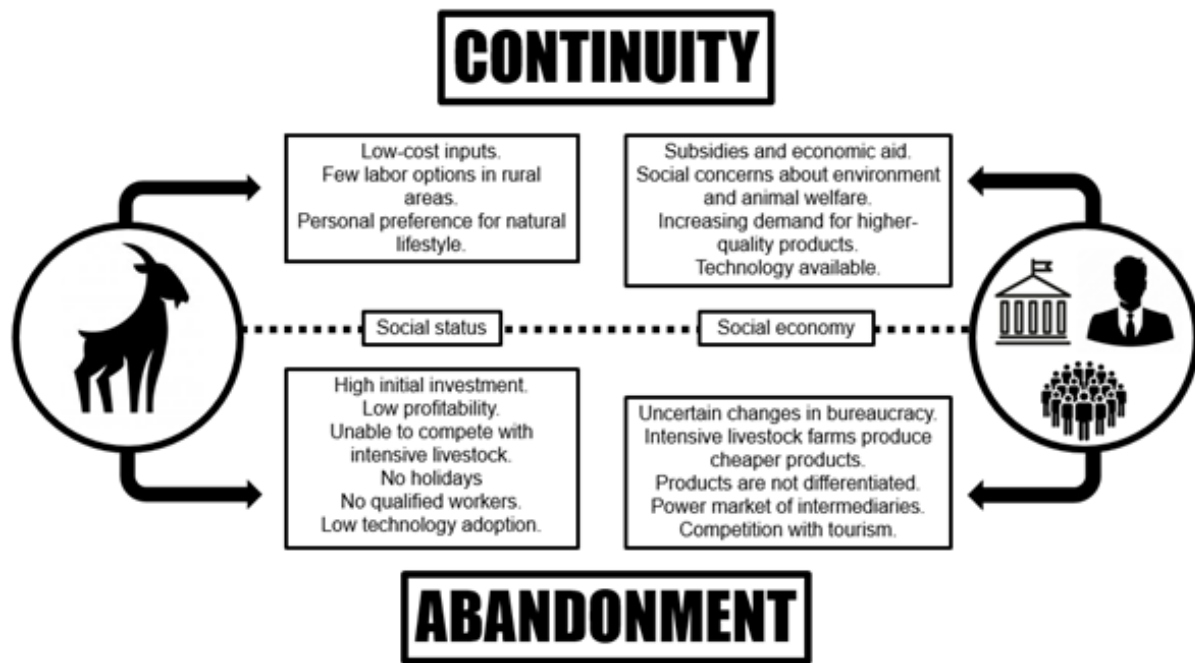
Source: Own elaboration

view that suggests the inevitable dependence on public subsidies (Lienard, 2014), our results indicate that the low profitability of the sector is not inherent in its nature, but rather the result of specific market failures. This phenomenon is particularly evident in the concentration of demand within a select group of meat industries.

• Administrative restrictions of various kinds have been identified as a contributing factor to the phenomenon under investigation. These restrictions include, but are not limited to, bureaucracy and barriers to the use of public goods. It is paradoxical that, while the extant literature highlights the value of the ecosystem services provided by extensive livestock farming (Álvarez, 2016; Lasanta, 2019, 2022; Díaz Gaona, 2019; Celaya, 2022), current policies frequently hinder these same functions. Farmers have expressed frustration with restrictions on access to areas that could benefit from their activity, especially in terms of fire prevention and landscape maintenance.

• Disagreements with the tourism industry The present findings call into question certain widely held academic proposals for the revitalization of the sector (Tulla, 2019; Montra-

sio, 2020; Potthoff, 2020; Belliggiano, 2021). Rural tourism, frequently referenced as a strategy for diversification, is perceived by farmers as a source of conflict rather than opportunity.

• The process of technology adoption is a multifaceted phenomenon that can be examined from various perspectives. As was the case with the previous point, the recommendations put forth by academic institutions (Keates, 2019; Mishra, 2023) encounter substantial practical impediments, including cost and utility concerns. This underscores the necessity for solutions that are more tailored to the distinct circumstances of the sector.

• Inadequate collaboration among agricultural producers. The study indicates a conspicuous absence of cohesion within the sector. This atomization has the effect of limiting the sector's ability to defend its collective interests, and it may partially explain its vulnerability to pressures from both the market and the public administration.

In summary, the literature has demonstrated a paucity of joint vision regarding the challenges associated with con-

ventional livestock farming. Consequently, a paucity of exhaustive scrutiny has prevailed, resulting in an absence of a comprehensive analysis of the particular predicament. It is the objective of this project to facilitate the dissemination of the experience of livestock farmers on a global scale, with the aim of resolving the problems that have been occurring in the sector.

CONCLUSION

This research provides a critical perspective on the current challenges of extensive livestock farming in Spain, as an example of the trends observed in Europe. To this end, we have extracted pertinent information from traditional farmers in two of the primary economic regions for livestock activity. Traditional farmers are considered key agents in understanding the trend in the sector. According to their testimony, it can be posited that factors are in play that exert pressure between the poles of continuity and abandonment. The aforementioned factors are associated with the activity itself or with the actions of other social agents, including the public administration, economic sectors in competition (e.g., tourism), intermediaries, consumers, and society as a whole. For farmers, the primary cause of this decline is economic viability, which is threatened by market distortions and administrative barriers (objective 1). In consideration of extant literature on the subject, it has been determined that the sector is not imperiled by inherent inefficiencies. Moreover, the solutions proposed by academia—namely, rural tourism and digitalization—have been repudiated. These findings reveal a significant discrepancy between literature and practical reality (objective 2). Finally, it is important to emphasize the role played by the policies implemented in the extensive livestock sector. The findings indicate a necessity for a reorientation of public policies towards more pragmatic measures that could exert a substantial impact on the viability of the sector. It is evident that public sector interventions appear to be, at a minimum, amenable to improvement in order to achieve the objectives established by the administration itself (objective 3).

The findings indicate that the trend of abandonment or intensification does not constitute a random phenomenon; rather, it is a response to the dynamic inherent within the traditional livestock sector itself. The underlying causes of this phenomenon remain to be fully elucidated. The actions of the public authorities, despite claims to the contrary, are often imprecise and counterproductive. The participants of the focus groups have expressed their discontent with the prevailing policies, articulating concerns regarding the proliferation of bureaucracy and the ambiguity of the legal framework. While acknowledging the positive public initiatives undertaken by certain local or regional governments, the farmers contend with the recent changes in administration processes, including those pertaining to subsidies and novel food traceability requirements. Concurrently, the conventional approach engenders a series of disadvantages, including less appealing laboral conditions (e.g., scarcity of time and physical exertion), which culminate in inadequate generational replacement. The measures that livestock farmers identify as having the greatest

potential are administrative simplification, the establishment of public fences, the facilitation of access to pastures, and the effective differentiation of their product. Conversely, they consider other measures, such as tourism and digitalization, to be ineffective. Furthermore, a paucity of sectoral cohesion has been observed among livestock farmers. These testimonies indicate that the factors enabling the departure from the sector are associated with a vulnerable market position and the challenges posed by prevailing policies. These issues are further compounded by the farmers' own limited capacity to establish a robust and unified network to address these challenges. The survival of extensive livestock farming hinges on an approach that prioritizes the removal of structural barriers.

Specifically, the recommendations that our results seem to suggest are the following:

1. Improvement of the communication channels of the public administration with livestock farmers and increase transparency, in order to reduce uncertainty.

2. Facilitating compliance with food, health and environmental requirements through more intuitive and user-friendly tools, either by electronic means or by working closely with municipalities and other local authorities.

3. Legal regulation that establishes differentiation standards for better consumer information, so that the type of livestock farming each product comes from can be differentiated.

4. Facilitation of traditional livestock farming networks to put farmers in contact with each other and with other sectors of society, in order to increase the cohesion of the sector and improve the flow of knowledge and experience.

The conclusions drawn in this study are pertinent for three primary reasons. A preliminary investigation revealed an absence of studies addressing the decline of extensive livestock farming, with a focus on the perspectives of its primary proponents. Secondly, the results yielded recommendations with practical applications for the Academy. These recommendations include the discussion of previous literature, theoretical implications that lay the foundations for future studies, and the opening of new research niches. They also include the application of business strategies, such as publicizing the functioning of the sector, and the implementation of public policies, such as addressing conflicts and mechanisms not valued by the administration. In summation, the significance of this study is predicated on its generalizability, which transcends national boundaries and can be extrapolated to the context of traditional livestock farming throughout Europe, particularly within the confines of the European Union.

Consequently, future research endeavors should prioritize the evaluation of the particular impact of the identified administrative and market barriers. This would facilitate the quantification of the damage caused to the sector or to the ecosystem services provided by livestock farmers. Consequently, it would allow for the comparison of the social and environmental impact and the proposal of solutions. In terms of market barriers, the impact of the meat industry's monopsony could be analyzed, along with its effect on producer surplus and the quality of the product received by the final consumer. These analyses could facilitate the adoption of public policies that

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address these obstacles in an effective and economically efficient way.

It is imperative to reiterate the significance of the ecosystem services furnished by extensive and traditional livestock farming. This underscores the necessity to implement public policies that are oriented towards their preservation. It is imperative to redirect the production model towards a more economically and environmentally sustainable model, in accordance with the Sustainable Development Goals. Consequently, the effective design of policies that genuinely align with established objectives is of paramount importance in our society.

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THE IMPACT OF REDUCED LOADING DENSITY ON SLAUGHTER CHICKEN TRANSPORT: A HUNGARIAN CASE STUDY

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Abstract: *The European Food Safety Authority (EFSA) has issued a new recommendation regarding the regulation of animal transport, which includes providing more space for animals during transportation. Complying with this recommendation has various economic, environmental, and animal welfare implications. A case study was conducted in cooperation with two slaughterhouses in Hungary to assess the animal welfare, economic, and environmental consequences of reducing bird density during broiler transport. For both companies, data from two consecutive transport trips were analysed: one trip followed the current regulation and practice regarding stocking density, while the other used the lower density recommended by EFSA. Although the two companies used different types of crates and loading methods, the mode of transport, weather conditions, personnel involved in loading and unloading, and measurement procedures were the same. Worse animal welfare indicators (e.g., dead-on-arrival birds, confiscations, limb injuries, bruises) were observed in both cases when loading density was reduced in line with EFSA's recommendation. Therefore, no clear benefits from an animal welfare perspective could be identified. From an economic standpoint, the implementation of this recommendation would require significant investment, result in higher per-unit transportation costs, and ultimately lead to an increase in poultry meat prices. Furthermore, the environmental impact would also be negative: more transport trips would be needed, leading to increased greenhouse gas emissions and greater water usage for washing vehicles and containers.*

Keywords: transport; broiler chicken; animal welfare; economics; environmental impacts
(JEL code: D24, M11, Q10)

INTRODUCTION

The rapid growth of the global population, coupled with the rising demand for animal-based protein sources, has placed increasing pressure on livestock production systems to satisfy these nutritional needs. Concurrently, animal welfare has emerged as a critical area of concern, attracting growing attention from both the scientific community and the general public. This heightened interest is particularly evident within the European Union and numerous other countries, where societal expectations, regulatory frameworks, and sustainability objectives are increasingly aligned with the promotion of animal welfare (Koknaroglu and Akunal, 2013).

In contemporary discourse, animal welfare is recognized not only as an ethical imperative but also as a factor with significant legal, economic, and trade-related implications. It has become an essential consideration in policy-making, international agreements, and the development of sustainable agricultural practices (Algers, 2011; Koknaroglu and Akunal, 2013). Animal welfare is a complex and multifaceted issue that encompasses scientific, ethical, economic, and political dimensions. Consequently, research in this field requires an interdisciplinary approach that integrates the expertise of specialists from various domains. Biologists, ethologists, veterinarians, economists, legal experts, and policymakers all play a vital role in deepening our understanding and developing effective strategies. Improving animal welfare is not only a moral responsibility but also brings significant societal and economic benefits in the long run (Carenzi and Verga, 2009).

While simplistic definitions may equate animal welfare with the animal's immediate state of comfort or distress (Hemsworth et al., 2014), modern conceptualizations are considerably more comprehensive. Current scientific understanding emphasizes the importance of providing animals with an environment that enables the expression of species-specific natural behaviours. Enhancing welfare standards in intensive production systems is not only a means of reducing suffering but also contributes to improved productivity, product quality, disease resistance, and consumer trust. Thus, animal welfare should be viewed not merely as a moral concern but as a foundational element of sustainable and socially responsible animal agriculture (Koknaroglu and Akunal, 2013).

Transportation represents a critical factor influencing animal welfare within livestock production systems and therefore

warrants particular attention. During the process of animal transport, multiple stressors may interact simultaneously, each potentially compromising the welfare of the animals involved (Marahrens et al., 2011).

In May 2020, the European Commission announced in the "Farm to Fork" strategy (EC, 2020) that it would review animal welfare legislation by the end of 2023 to align it with the latest scientific findings. This included Council Regulation 2005/1/EC, which addresses the protection of animals during transport. Currently, Regulation 2005/1/EC defines the responsibilities of all actors involved in the transport chain of live animals entering or leaving the EU. This encompasses monitoring tools, inspections, and transport equipment. On 7 December 2023, the Commission adopted a new regulatory proposal for the Council and the European Parliament (EC, 2023a) concerning the protection of animals during transport, which would replace Regulation 2005/1/EC.

The main objectives of the proposal:
- Reducing animal welfare issues associated with long journeys and multiple loading and unloading operations;
- Providing animals with more transport space;
- Improving transport conditions for vulnerable animals;
- Preventing animals from being exposed to extreme temperatures;
- Facilitating compliance with EU animal welfare rules, including through digitalization;
- Enhancing the protection of animals exported outside the EU (EC, 2023b).

The legislative proposal is based on the opinions of the European Food Safety Authority (EFSA) (EFSA et al., 2022) and the Commission's assessment of the proposed changes' impact on animal welfare, economics, the environment, and society. The legislative process is well advanced, with the deadline for submitting amendments set for the second quarter of 2025, and the European Commission's vote expected in the fourth quarter of 2025.

One of the most significant proposed changes affecting slaughter chicken transport is that space requirements for animal species and transport equipment shall at least comply with the figures laid down in Chapter VII of the draft regulation.

Animals occupy space in three dimensions, but measuring their volume is challenging. Therefore, live weight is used as a proxy measurement, as it closely correlates with the space animals occupy. Based on this, the general allometric equation is applied to calculate the minimum floor area required during transport (EFSA et al., 2022):

Space requirement (cm²) = 290 × live weight (kg)$^{2/3}$ (1)

Under the current regulations, birds up to 3 kg live weight require 160 cm² per kg in transport containers (Table 1). According to the EFSA recommendation, birds weighing 2.5 kg require 214 cm² per kg, while birds weighing 3 kg require 201 cm² per kg. This represents a 26-34% increase in space requirements, leading to a proportional reduction in live animal transport capacity per vehicle.

Table 1. Characteristics of the current and proposed regulations on stocking density for poultry transport in containers

Category: Other poultry (excluding day-old chicks), weight (kg/bird)	Minimum space requirement (cm²/kg)
Current regulation (Regulation 1/2005/EC), Annex I, Chapter VII, Section E: Poultry	
< 1.6	180 – 200
1.6 – 3	160
3 – 5	115
5 <	105
Marel's proposal for compliance with the current regulation	
1.6 – 3	170
EFSA recommendation, 2022	
1	290
1.5	253
2	230
2.5	214
3	201
3.5	191
4	183
4.5	176
5	170

Source: Regulation 2005/1/EC; EC, 2023a

The aim of the survey was to determine, based on practical experience, the animal welfare consequences of reducing bird density during slaughter chicken transport. We hypothesized – contrary to the intended objectives of animal welfare legislation – that the increased free space during transport would lead to a higher number and proportion of injuries, as well as a similar trend in the rate of dead-on-arrival birds. In addition to animal welfare issues, the study also aimed to explore the economic and environmental impacts.

MATERIALS AND METHODS

A case study was conducted with the involvement and cooperation of two slaughterhouses in Hungary. The study (loading and transport) took place at the end of January 2025. The transport distance was 72 km for the first company and 150 km for the second company. The study was conducted on heavyweight broilers (2.84 and 3.18 kg per bird), which came from the same barn for each company. For both companies, data from two consecutive transport trips were analysed. One trip ("Truck A") followed the current regulation and practice regarding animal density, while the other ("Truck B") was filled with the animal density according to the EFSA recommendation, which requires more space. The two companies used different types of crates, and as a result, the loading method also differed. Efforts were made to ensure that the internal conditions within each company were consistent for both transport trips ("A" and "B"). The loading and unloading of the birds were performed by the same crew. Both trucks followed the same route, at the same speed, and with similar driving styles. The consignments involved in the study were handled separately at the processing plant. The qualification

was carried out according to the generally applied practice at each company and was performed by the same individuals.

The main data and characteristics of the 1st company's animal transport are summarized in Table 2. The crate type used by Company 1 was a traditional plastic poultry transport crate (85×66×33 cm). The average weight of the transported flock was 2.84 and 2.9 kg. According to the current regulation, 10 birds can be loaded in such a crate with this average weight. In contrast, according to the EFSA recommendation, only 7 birds can be placed in the crate, which is 30% fewer. The dif-

ference is clearly visible in Figures 1 and 2. Table 3 summarizes the key data and characteristics of poultry transport for Company 2. The container type used by the company was the Stork Marel Atlas container. The average weight of the transported flock was 3.18 kg. According to the current regulation, the upper crates of the applied containers can hold 52 chickens of this weight. In contrast, the EFSA recommendation allows for 23% fewer birds, meaning only 40 chickens can be placed in each upper crate. This difference is visually illustrated in Figures 3 and 4, showing the lower crates of the containers.

Table 2. Details of the animal transport – Company 1

Denomination	Truck "A" (according to the current regulations)	Truck "B" (according to the EFSA recommendation)
Distance of transport (km)	72 km	
Start (date, hours, min)	28/01/2025 21:30	28/01/2025 23:25
Arrive (date, hours, min)	28/01/2025 23:01	29/01/2025 0:55
Type of loading vehicle used	Manual loading and forklift	
Type of truck used	Trailer-based livestock transport vehicle	
Used container details	plastic poultry transport crate, 85×66×33 cm, useful floor area 76×57 cm (4,332 cm^2)	
Loading method, loading brigade	by hand, 16 person	
Loading time of truck (hours, min)	1 h 30 min	1 h 20 min
Average weight on farm (kg/bird)	2.84	2.90
Procedure and main features of processing plant qualification	Dedicated personnel (quality inspectors) examined the rate and type of limb injuries on the evisceration line. A full count was applied instead of sampling. The suspension method and line speed were the same for both transport truck.	
Number of birds per containers	10	7
Total number of chicken per truck	5,040	3,528
Total quantity at slaughterhouse (chicken live weight kg per truck)	14,300	10,240

Source: Own elaboration.

Figure 1. Plastic crate filled according to the current regulation (10 chickens per crate)

Source: Own elaboration

Figure 2. Plastic crate filled according to the EFSA recommendation (7 chickens per crate).

Source: Own elaboration

Table 3. Details of the animal transport – Company

Denomination	Truck "A" (according to the current regulations)	Truck "B" (according to the EFSA recommendation)
Distance of transport (km)	150 km	
Start (date, hours, min)	31/01/2025 4:35	31/01/2025 5:20
Arrive (date, hours, min)	31/01/2025 6:45	31/01/2025 7:35
Type of loading vehicle used	Manitou MLT 625-75 H	
Type of truck used	Volvo + Schwazmüller RH125	
Used container details	Stork Marell Atlas container: 5-tier containers, lower crate: 233×100 cm (23,300 cm²), 4 additional crates: 233×110 cm (25,630 cm²) each, crate height: 28.3 cm. Each crate is separated in the middle.	
Loading method, loading brigade	5 persons (2-person packing teams) Both trucks were loaded using the one-leg catching technique.	
Loading time of truck (hours, min)	45 min	45 min
Average weight on farm (kg/bird)	3.18	3.18
Procedure and main features of processing plant qualification	Examining the carcasses on the line for one minute. The line operated at a speed of 16,650 birds per hour, which corresponds to an average of 277 birds per minute.	
Number of birds per containers	47/52 47 birds in the lower crates 52 birds in the other crates.	37/40 37 birds in the lower crates 40 birds in the other crates.
Total number of chicken per truck	5,610	4,334
Total quantity at slaughterhouse (chicken live weight kg per truck)	17,840	13,782

Source: Own elaboration.

Figure 3. Stork Marel Atlas container filled according to the current regulation (lower crate: 47 chickens per crate)

Source: Own elaboration

Figure 4. Stork Marel Atlas container filled according to the EFSA recommendation (lower crate: 37 chickens per crate)

Source: Own elaboration

At the two companies, not only were there differences in the available space and loading quantity for the crates used, but also a significant variation in the loading time. Despite the fact that the transport vehicle capacity of Company 2 was 11% and 22% higher than that of Company 1, the loading time was half as long for Company 2, which used the larger crate type.

It is well-known that the handling and loading of animals into transport crates, as well as the transportation itself, can cause stress for the animals. The number of animals that die during transport (dead-on-arrival birds) serves as a direct indicator of pre-slaughter welfare issues (Gickel et al., 2024). During the study, in addition to the amount of dead-on-arrival birds at the processing plant, further data related to objective animal welfare conditions linked to transportation were collected, such

as confiscation, the number of birds with limb injuries, and the number of birds with bruised body parts. From these quantitative data, we calculated ratios relative to the number of birds transported per truck.

RESULTS AND DISCUSSION

The results of the study are presented separately for each company due to the different types of crates used. For Company 1 (Table 4), the number of birds that can be transported per truck decreased by 30%, from 5,040 to 3,528 birds. The rate of dead-on-arrival birds increased from 0.16% to 0.31%, while the confiscation rate increased from 0.95% to 1.47%. The number of limb injuries rose by 1.64 percentage points, and the number of birds with bruised body parts increased by 0.61 percentage points. In the case of Company 2 (Table 5), the number of birds that can be transported per truck decreased by 22.7%, from 5,610 to 4,334 chickens. The rate of died-on-arrival increased from 0.12% to 0.32%, while the confiscation rate increased from 0.45% to 1.5%. The number of limb injuries increased by 0.14 percentage points, and the number of birds with bruised body parts increased by 0.28 percentage points.

When comparing the data from both companies, a significant difference is observed in the proportion of birds with limb injuries and birds with bruised body parts in both transport cases. This difference is likely related to the varying crate types, loading crews, and processing plant qualifications, which suggests the need for further investigation.

By averaging the data of the two slaughterhouses, it can be concluded that, depending on the type of crate and the average weight of transported birds, the capacity of the transport vehicle and the number of birds that can be transported is reduced by 22-30%. The dead-on-arrival bird and confiscation rate has roughly doubled at the loading density recommended by EFSA.

Animal welfare considerations

Although our results cannot be considered statistically representative, they clearly highlight that the EFSA recommendation regarding increased space for poultry during transport do not have a positive impact on the development of the most important animal welfare indicators. The Poultry Veterinary Study Group Europe (PVSGE), in its comments on the Commission's draft regulation (PVSGE, 2024), draws attention to two recent studies on the transportation of large numbers of broiler chickens in the United Kingdom (Allen et al., 2023)

Table 4. Changes in objective animal welfare indicators related to broiler transport –Company 1 (plastic poultry transport crate)

Denomination	Truck "A" (according to the current regulations)		Truck "B" (according to the EFSA recommendation)		Difference ("B" – "A")		Difference (Ratio ("B" – "A") / Ratio "A") (%)
	Value	Ratio* (%)	Value	Ratio* (%)	Value	Ratio* (%)	
Dead-on-arrival birds (pcs/truck)	8	0.16	11	0.31	3	0.15	96
Dead-on-arrival birds (kg/truck)	22.7	0.16	31.9	0.31	9.2	0.15	96
Confiscated birds (pcs/truck)	48	0.95	52	1.47	4	0.52	55
Confiscated birds (kg/truck)	117.2	0.82	129.7	1.27	12.5	0.45	55
Number of birds with limb injuries (pcs/truck)	179	3.55	183	5.19	4	1.64	46
from this							
freshly bruised wing (pcs)	32	0.63	39	1.11	7	0.47	74
freshly bruised thigh (pcs)	9	0.18	14	0.40	5	0.22	122
previously bruised wing (pcs)	5	0.10	5	0.14	0	0.04	43
previously bruised thigh (pcs)	5	0.10	4	0.11	-1	0.01	14
fracture of the wing (pcs)	31	0.62	36	1.02	5	0.41	66
fracture of the thigh (pcs)	8	0.16	12	0.34	4	0.18	114
open fracture of the wing (pcs)	80	1.59	91	2.58	11	0.99	63
open fracture of the thigh (pcs)	2	0.04	3	0.09	1	0.05	114
Number of birds with bruised body parts (pcs/truck)	68	1.35	69	1.96	1	0.61	45

*Ratio to the number of birds transported per truck (%)

Source: Own elaboration.

Table 5. Changes in objective animal welfare indicators related to broiler transport –Company 2 (Stork Marell Atlas container)

Denomination	Truck "A" (according to the current regulations)		Truck "B" (according to the EFSA recommendation)		Difference ("B" – "A")		Difference (Ratio ("B" – "A") / Ratio "A") (%)
	Value	Ratio* (%)	Value	Ratio* (%)	Value	Ratio* (%)	
Dead-on-arrival birds (pcs/truck)	7	0.12	14	0.32	7	0.20	159
Dead-on-arrival birds (kg/truck)	22.3	0.13	44.5	0.32	22.2	0.20	158
Confiscated birds (pcs/truck)	25	0.45	65	1.50	40	1.05	237
Confiscated birds (kg/truck)	79.5	0.45	206.7	1.50	127.2	1.05	237
Number of birds with limb injuries (pcs/truck)	14	0.25	17	0.39	3	0.14	57
from this wing injury (pcs)	11	0.20	15	0.35	4	0.15	77
thigh injury (pcs)	3	0.05	2	0.05	-1	-0.01	-14
Number of birds with bruised body parts (pcs/truck)	18	0.32	26	0.60	8	0.28	87

*Ratio to the number of birds transported per truck (%)

Source: Own elaboration.

and Germany (Gickel et al., 2024). These studies reveal that the stocking density during transport had no significant effect on the rate of dead-on-arrival birds. These studies also emphasize that the dead-on-arrival rate is one of the most important welfare indicators for animal transport. We agree with the PVSGE's view that reducing stocking density does not lead to significant improvements in key welfare indicators. On the contrary, we anticipate an increase in injuries during transport due to slipping, wing flapping, and excessive trampling if the birds' space in the transport crates is increased. These factors negatively affect the birds' welfare and also increase the proportion of confiscated and injured birds in the processing plant, ultimately leading to a decrease in the quantity of products leaving the processing plant.

In warmer conditions, the transporter may choose to reduce the number of birds placed in the transport crates, but in our opinion, it should not be mandated that the space per bird must be increased on every transport. This is supported by the results of a Canadian study (Caffrey et al., 2017), which showed that higher stocking densities were beneficial during exposure to cold weather, as in colder conditions, a statistically significant higher rate of dead-on-arrival birds was observed with lower stocking densities.

A previous Hungarian survey (Kopecsnik, 2008) found that the evaluation of increasing space per bird was not conclusive. In this survey, with a stocking density of less than 207 cm²/kg, the rate of dead-on-arrival birds was 0.6%, while for densities above this, it was 0.49%. However, the author high-lights that injuries during transport occurred more frequently with greater space per bird (0.31% for less than 207 cm²/kg; 0.51% for more than 207 cm²/kg), presumably due to impacts and skidding during braking and turning. With more space, the animals have more opportunity for wing flapping and shifting, which also increases the likelihood of liver ruptures, wing and leg fractures, and bruising. Similar findings were observed in a Portuguese slaughterhouse survey (Saraiva et al., 2020), which examined 64 short-distance transports of broiler chickens with an average weight of 1.85 kg. The study found a correlation between increased space during transport and the frequency of bruising: the likelihood of bruising exceeding 4% increased linearly, from about 20% (for 180 cm²/kg space) to 60% (for 230 cm²/kg space). Based on this, the study suggested that transport containers providing less space per individual could be more effective in preventing bruising, as the birds support each other's bodies, reducing the risk of falling, and minimizing the need for spreading wings and legs to maintain balance.

Economic consequences

In addition to the welfare considerations mentioned, the planned increase in space requirements has significant economic impacts. A direct loss is represented by the increasing rate of dead-on-arrival birds and confiscation.

Assuming a farm-gate cost of 425 HUF/kg (with an exchange rate of 410 HUF/EUR, equivalent to 1.04 EUR/kg), the value of live animals per transport load, calculated per 100

Table 6. Changes in the specific value of processable chickens calculated at the farm-gate and the specific transport costs

Denomination	Company 1		Company 2	
	Truck "A" (according to the current regulations)	Truck "B" (according to the EFSA recommendation)	Truck "A" (according to the current regulations)	Truck "B" (according to the EFSA recommendation)
Total quantity at slaughterhouse (chicken kg/truck)	14,300	10,240	17,840	13,782
Value of chickens calculated at the farm-gate (EUR/truck)	14,823	10,615	18,493	14,286
Processable quantity after deduction of mortality and condemnation (chicken kg/truck)	14,160	10,078	17,738	13,531
Farm-gate value per kilogram of processable chicken (EUR/100kg)	104.68	105.32	104.25	105.58
Transport cost (EUR/truck)	293	293	611	611
Transport cost per kilogram of processable chicken (EUR/100kg)	2.07	2.91	3.44	4.52

Source: Own elaboration.

kilograms of processable live weight, which appears as a specific raw material cost in the processing plant, increased by 0.64 and 1.33 EUR (0.6% and 1.28%, respectively) based on the examined sample (Table 6). This could translate into an additional cost of 5.1 million EUR on an industry-wide level, considering the domestic broiler purchasing volume in 2024 (521,000 tons).

A lower bird density allows for the transport of fewer birds, which increases the transport costs per unit of live weight. The transport cost depends on the type of transport vehicle and the distance travelled. Assuming a transportation cost of 2.04 EUR per kilometre, the cost per 100 kilogram of processed chicken increased by 0.84 EUR and 1.07 EUR (40.5% and 31.1%, respectively) for both companies. This also results in a significant additional cost at the industry level, but we will not quantify it here since the distances of the transports in our study are not considered average at the national level.

Due to the lower loading density, not only do the transport costs per unit of live weight increase, but the capacity of the transport vehicles needs to be increased by 30-40%, which comes with significant investment requirements. In addition, the amount of water and chemicals (detergents, disinfectants) used to wash the transport vehicles and containers between transports, as well as the associated costs, increases proportionally.

Beyond the economic implications discussed, it is also important to address the impacts on the efficiency of the slaughter line. In a well-organized, highly automated facility, the speed of the slaughter line and the hanging of birds on hooks from the transport crates are optimized in terms of logistics and labor force organization. Under normal conditions, the second slaughterhouse (Company 2) operates with a capacity of 16,600 birds per hour, requiring at least 50 birds per crate. When processing the birds from the "B" truck (loaded according to the EFSA recommendation), it was observed that

every 5th hook remained empty, and the slaughter line operated at a capacity of 13,002 birds per hour. This resulted in a 21.7% decrease in efficiency, which, due to relatively high fixed costs (depreciation of expensive machinery and equipment, a significant portion of labour costs, energy costs, etc.), clearly increases the cost of chicken meat leaving the facility. According to expert estimates, the cost response coefficient of processing plant costs, including raw material costs, is around 0.8. With such a cost structure (20% fixed and 80% variable costs), a 21.7% reduction in capacity would lead to an approximately 5% increase in chicken meat production costs.

Environmental consequences

The 30-40% increase in the number of trips is reflected not only in fuel consumption but also in greenhouse gas emissions and the ecological footprint of the activity to the same extent. The amount of water used for washing vehicles and containers also increases proportionally. In the case of Company 2, we were able to gather information on the carbon dioxide emissions of the transport vehicles, which is 814 grams per kilometre. With the current regulation's loading, the carbon dioxide emissions per kilogram of live weight delivered was 0.014 kilograms for the 150-kilometer round trip. Due to the lower loading density, the carbon dioxide emissions per kilogram of live weight increased to 0.018 kilograms (a 22.2% rise).

CONCLUSION

One of the main measures of the European Green Deal is the "Farm to Fork" strategy, which aims to move the current EU food system towards a more sustainable model. We believe that the measures introduced under this strategy, particularly regarding animal welfare in the context of this article,

should contribute to all three fundamental pillars of sustainability (environmental, social, and economic), or at least positively affect one pillar without negatively impacting the other two. The results of the case study presented highlight that the European Commission's new draft regulation negatively impacts the sector's stakeholders from both an economic and environmental perspective, and there is no evidence to suggest that there would be any benefits from an animal welfare standpoint.

Worse animal welfare indicators (e.g., dead-on-arrival birds, confiscations, limb injuries, bruises) were observed when loading density was reduced in line with EFSA's recommendation. Based on these results our hypothesis is accepted: Contrary to the intended objectives of animal welfare legislation the increased free space during transport would lead to a higher number and proportion of injuries, as well as a similar trend in the rate of dead-on-arrival birds. From an economic standpoint, the implementation of this recommendation would require significant investment, result in higher per-unit transportation costs, and ultimately lead to an increase in poultry meat prices. Furthermore, the environmental impact would also be negative: more transport trips would be needed, leading to increased greenhouse gas emissions and greater water usage for washing vehicles and containers.

Our study was exploratory and cannot be considered statistically representative. Therefore, similar studies are recommended to conduct not only at the Hungarian level but also internationally. We also suggest repeating the study in Hungary under warmer weather conditions and over varying transport distances. Unfortunately, during the test, we were unable to measure the weight loss (at the farm and slaughterhouse scales), which could indirectly indicate increased movement of the transported birds associated with more space (e.g., wing flapping). More movement may be associated with greater stress on the animals, which should be avoided from an animal welfare perspective.

ACKNOWLEDMENTS

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THE CLUSTERS OF TELEMEDICINE (THE SCOPE AND MAIN ECONOMIC ISSUES OF TELEMEDICINE)

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Abstract: *The introduction of telemedicine tools was motivated by the need to reduce the risk of infection. This paper deals with the main areas of telemedicine. It presents a definition of telemedicine and its most typical manifestations. It discusses the role of health in economic growth. It also discusses the legislative background to telemedicine. It analyses the two major clusters of telemedicine, primary health care and VR-based care. Primary care includes online rounds, remote examinations, remote diagnostics, remote intervention, remote monitoring and surveillance. The second cluster, based on virtual reality, already includes elements such as surgical interventions, pain relief, attitude modelling, rehabilitation, anxiety and phobia management, eating disorders management, relaxation, medical care in disaster situations. A separate chapter of the study deals with the economic indicators and revenues of telemedicine.*

Keywords: *Remote diagnostics, remote intervention, VR-based care, Rehabilitation*
(JEL code: I1, I3)

INTRODUCTION

There are marked differences in internet usage patterns, even in search methodology, between different social strata, genders, and age groups. Those who use the Internet more for information are primarily women, those with higher education, young people, and young adults. Many factors influence behavior in the virtual space, be it place of residence, profession practiced, or current studies and interests.

A typical attitude in our country is that some users are not looking for information for themselves. However, for a relative, family member, or friend, and in these cases, health content is the most prevalent. In many cases, the patient or his/her family member will seek information from internet sources before the first medical treatment, as the search for a quicker home solution is a primary idea for minor problems, and this has become a natural habit in the country. Of course, prior information can significantly shorten the visit if it is professional and increases efficiency since, in most cases, the vast majority of medical activity involves providing information and education. (Miller, E. A. 2003)

The dangers of obtaining information online from the wrong source demonstrate the justification for efficient and professional telemedicine systems, as a vast amount of information is still available to the user when browsing. Soon enough, the article seems quite technical; there needs to be regulation on publishing the subject.

In the context of pandemics, the term 'infodemic' has become a frequently used term, in parallel with 'pandemic,' to describe the rapid and widespread spread of misinformation. In a closed living environment, the need for patients to actively learn online has become a major challenge, which continues to place a heavy burden on medicine today. The emergence of misleading, pseudo-scientific articles negatively impacts the development of the doctor-patient relationship of trust. Preformed opinions with medical consultation make communication between doctor and patient easier, thus making it easier to make a diagnosis quickly and, in many cases, to treat patients effectively.

During the epidemic, moreover, the vast majority of general practitioners encountered patients who had already read an Internet resource before the telephone consultation and had adopted a negative attitude towards the definition of therapy. In such cases, using high-quality and professionally appropriate telemedicine strictly regulated by law would be important. Recording the anamnesis is extremely important in most cases, and in emergency care, it is paramount.

Decision-making in non-contact therapy is a matter of increased pressure for professionals; it is impossible in some medical specialties. The current advantage of using online interfaces is their popularity and professionalism. With appropriate professional control, they are a time—and cost-ef-

fective tool in the hands of healthcare professionals, and thus also an economic issue.

Quality online information (provided exclusively by an accredited telemedicine provider) supports the patient and the doctor in decision-making. It can also reduce the anxiety associated with morbus by creating a sense of control. It moves the healing process in the desired direction, and using the right resources also supports maintaining professional standards. It should be stressed that treatment in virtual space requires the same professional competencies as traditional treatment and thus guarantees the same professional standards.

Web content is a double-edged weapon in telemedicine since, in addition to authenticity, it is important to make it accessible to the public, mainly for the reasons mentioned above. Ethics is also a recurring problem, as the chances of the searcher encountering services of an economic nature, often for profit, increase with the severity of the illness in most of the results found on the Internet. In this respect, there is still a complete lack of legal background and a system of sanctions in our country.

Usability is a constant issue, as are the age and educational characteristics of the user groups. Our country has a high degree of ambivalence about health issues, creating a crisis of confidence in virtual health services. The only way to alleviate this is to develop professional and systematic telemedicine systems. (Győrffy Zs. szerk. 2021)

MATERIALS AND METHODS

This study is based on a qualitative analysis of legislative frameworks, technological developments, and economic impacts related to telemedicine in Hungary and broader European contexts. Secondary data were collected from existing literature, legislative documents, and official health economic indicators. The clustering of telemedicine services was performed using bibliometric analysis with VOSviewer software (2024), enabling the identification of major thematic groups in the field: primary health care and VR-based care. A descriptive approach was applied to present the medical, technological, and economic implications of these clusters.

RESULT AND DISCUSSION

DEFINITION OF TELEMEDICINE AND ITS MOST COMMON MANIFESTATIONS

Telemedicine is a health service with an appropriate professional structure but without direct contact between the provider and the recipient. Communication and activity between the two people occurs exclusively through a data transmission system.

In order to define telemedicine, it is worth distinguishing between medical activities according to the purpose of the relationship, its direction, and its professional quality, as follows:

- Teleconsultation: The doctor providing care can be involved in the process of diagnosis, prescription of therapy and treatment online, and maintaining one-way or two-way communication with the patient as required.

- Telemedicine: The examiner and the patient are spatially separated, and the diagnosis is made via a data communication system

- Remote monitoring: During the treatment of the patient, the current status is recorded by the transmitting systems and transmitted to the specialist care provider, who has the possibility of continuous monitoring but does not need to be physically present.

- Remote manipulation: To perform the examination, the healthcare professional uses remote sensors to examine an interactive space, which can be optical, robotic, or other remote-controlled devices (AAS, I.H.M.,2007).

The pandemic has given the development of healthcare in this area a huge boost, and the spread of telemedicine has been a forced process in managing the health situation, forcing the authorities to provide legal backing for its introduction and operation. The first legal amendments were made to two regulations, namely Decree 60/2003 (20.X.) of the ECSCM1 on minimum conditions for practices and Decree 9/2012 (28. II.) of the NEFMI2 on health services accounting (9/2012.(II. 28.) NEFMI Decree on the definition of outpatient specialized care activities eligible for financing from the Health Insurance Fund, the eligibility criteria and rules applicable to the use of such activities, and the settlement of claims).

Based on these legal amendments, the possibility of using telemedicine in a specific situation was created within the framework of public funding in cases where it did not conflict with medical-professional contraindications. Patient care was provided via the Internet or telecommunication devices in real time but separated in space. The following activities were developed and implemented in the context of the roll-out:

Diagnosis and follow-up

- Remote consultation during triage (professional pre-screening) to determine the need for care and, if necessary, remote consultation for further medical intervention and medication.

- Set up diagnosis and therapy using teleconsultation, applying remote diagnostics, and, depending on this, remote monitoring and, if necessary, teleconsultation.

- Specialist advice, consultation, and therapeutic advice by telephone

- Follow-up after diagnosis using telemonitoring and infocommunication tools and data-based assessment and implementation.

The introduction of telemedicine tools was motivated by the need to reduce the risk of infection, and the establishment of a professional and regulatory framework has made it effective to introduce and expand this form of care at the national level. The expansion has been ongoing ever since, as has the revision of the legal and regulatory framework, as bridging distance and physical presence have significantly increased the effectiveness of diagnosis and therapy under the pressure of specific legislation.

The time management provided by telemedicine optimally increases the number of care spectrums, and using fewer human resources and equipment also increases the provider's profits. In any case, it is cost-effective to introduce this method for primary care prescribing, and time management is significantly

facilitated. This will also allow for an increase in the number of services available and introducing new services. Of course, using more complex diagnostic and therapeutic procedures has its risks, and providers need time for experience-based analysis before stable implementation. (Bán A.,2013, 2014)

THE ROLE OF HEALTH STATUS IN ECONOMIC GROWTH

In the general public mind, the importance of an individual's health status needs to be sufficiently linked to the scale of the public health challenge and its impact on the economy, and people are most aware of its everyday role. Quality of life and the long-term preservation of an individual's longevity and working capacity is also an economic issue, whether we look at labor market characteristics or the burden and cost-effectiveness of the public care system.

1. For all economic actors, it is optimal for the worker to live as long as possible, to be able to work as long as possible, and to cost the employer and the public sector as little as possible, so the impact on the national economy is two-way. The role of health in the national economy is nevertheless a subject that is treated with caution, even in the case of professional decisions. It would be necessary for more sections of society to recognize that health is not only an individual interest and priority but also a key pillar of economic competitiveness. (Breen G.M., Matusitz J. 2010)

1. Introducing telemedicine can significantly raise awareness and increase cost-effectiveness. However, the upfront investment appears to be costly, and the return on investment will only be reflected in long-term economic indicators. Nevertheless, efforts continue, and investment in this area has tripled in the last three years (The role of health in economic growth, in IME- The journal of health leaders, Volume XVIII, Issue 7, September 2019).

From the population's point of view, telemedicine solutions are likely to positively influence health improvement, triggering a two-way process, ideally in terms of population and earning power. In addition, humanity's constant vulnerability to epidemics also underlines the justification for interactive care systems, as maintaining the ability to work in these situations is a critical element of economic performance. The development of telemedicine is constantly raising questions and generating problematic issues of both utility and medical and economic efficiency.

The critical prerequisite for a service system is strict adherence to technical standards

and compliance with strict technical standards by providing qualified medical equipment, which requires a significant investment by the provider. The above diagram illustrates the key issues in the operation of European telemedicine service delivery systems. With evolving technology, there is a growing number of similar healthcare services and mobile applications, the actual qualifier of which is the user community.

LEGISLATIVE BACKGROUND

The first official definition of telemedicine is described in the Decree of the Ministry of Health No. 28/2010 (12 May 2010), which states that"...telemedicine is a health service that allows communication between the provider and the recipient of care via a remote data transmission system, without the parties meeting in person." (Decree No 28/2010 (12 May 2010) of the Ministry of Health on the professional criteria and policy priorities to be applied in the procedure for the inclusion of health technologies used in preventive health care procedures in health insurance financing, and on the administrative service fees to be paid for certain procedures related to their inclusion). However, the legislation needs to provide detailed information on the specific services, and the professional conditions will be defined later in the Decree 60/2003 (20.X.2003) of the ECMR by setting the minimum conditions for the services (Decree No 60/2003 (20.X.) on the minimum professional requirements for the provision of health services).

The regulation allows medical specialists, paramedical staff, and clinical psychologists of various specialties to send health data using information communication tools and make diagnoses, therapeutic recommendations, and consultations without the patient being present if the care parameters and the medical judgment allow it. It is important that the conditions laid down in the regulation are met for the performance of the specified activity and that the legal requirements concerning the processing and protection of health and personal data are fully respected. (Fejes Zs., Mihók S., Matusz M. 2019)

In addition to the above, the legislation describes the possibilities for using teleconsultation, telediagnosis, and teleconsultation, as well as the minimum conditions for using teleradiology. Teleradiology is a telemedical activity in which the results of diagnostic imaging examinations are transmitted electronically between sites so that they can be evaluated and form the basis for diagnosis.

The scope of teleradiology includes the following services:

- Telediagnostics: The image evaluation following the examination is performed away from the examination site; this may be the first or second opinion with the opinion of one or both participating physicians.

- Teleconsultation: evaluation of the findings during or even after the imaging examination, if the result influences the course of treatment, or if the anamnesis includes an evaluated examination, the re-evaluation of which will provide new criteria.

Although many of the precise parameters are defined and regulated above, the domestic legal framework needs to catch up to the much more complex system of Western European regulations. It is worth noting here that the social security system in Western countries is tied, limiting and expanding the number, quality, and availability of benefits according to levels and even priority. Secondarily, the reason for this lies in the speed of legislation, not only in technical and infrastructural conditions, which implies the speed of technological development and the emergence of innovations.

In telemedicine, the pandemic emergency and the subsequent introduction of a specific legal framework have brought about a major change in our country, as the focus has shifted to virtual healthcare. The basic legal principles of teleconsultation were first published in April 2020 in Government Decree

157/2020 (29.4.2020) and then in the supplementary EMMI Decree 33/2020 (16.9.2020). 1. (33/2020.(IX.16) EMMI Decree amending Decree No. 60/2003 (X. 20.) of the Ministry of Social Affairs and Health on the minimum professional conditions for the provision of health services and Decree No. 9/2012 (II. 28.) of the Ministry of Social Affairs and Health on the definition of outpatient specialized care activities eligible for financing from the Health Insurance Fund, on the eligibility criteria and rules applicable to the use of such activities and on the accounting of services). The second wave of the pandemic has made it clear that telemedicine is indispensable and that its daily practice is essential for both public and private health services.

The content of the previously mentioned legislation is summarized in paragraph 37 of Act LVIII of 2020 on the application of telemedicine, with a precise definition of the term: telemedicine is an activity aimed at the provision of telemedicine in the absence of the patient:
- detailed assessment of the condition
- identification of diseases and risk factors

- accurate diagnosis, ordering detailed tests, and initiating treatment to assess the patient's condition better
- Assess the treatment outcome by remote consultation, monitor the patient's condition, and make a diagnosis by remote monitoring (Act LVIII of 2020 on transitional rules and epidemic preparedness in connection with the end of an emergency).

THE HEALTH CLUSTER SYSTEM ABOUT TELEMEDICINE

Clustering is a complex concept in itself; it involves clustering based on professional parameters. Their composition can be extremely diverse and, based on practice, constantly changing regarding the number of participants and their specialties. In our country, the number of clusters in the health sector has increased considerably in recent years, and experience with them has been a constant topic of discussion at medical conferences and in economic forums.

Figure 1. Cluster analyzis
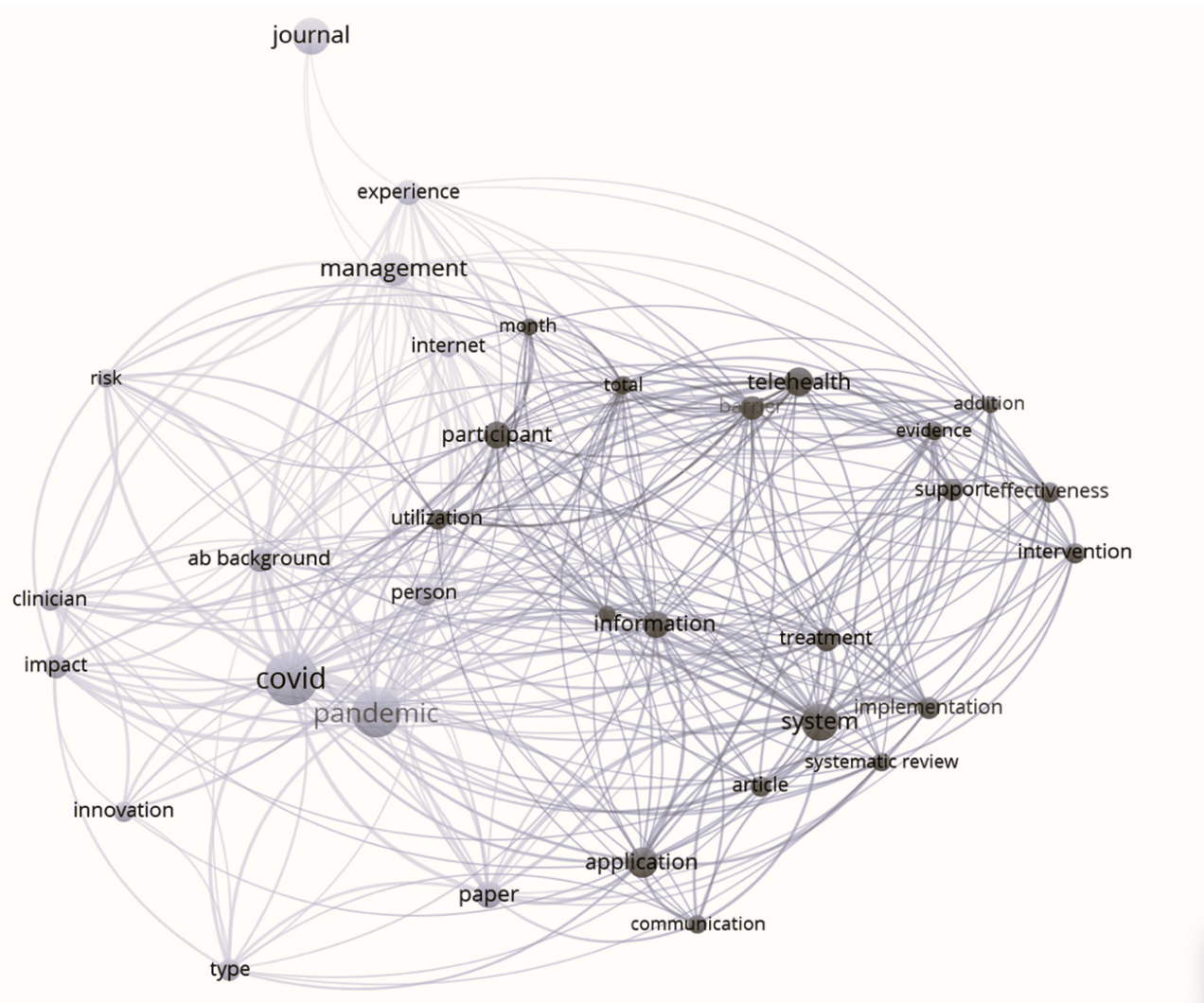
Source: Own elaboration by VOSviewer (2024)

Cluster 1: Primary health care

The online visit is the encounter between doctor and patient, in our case, using telecommunication. The visit is not face-to-face, the submission of necessary and other medical documentation is done through data upload and transfer. The doctor diagnoses, provides information, and sends referrals, if necessary, based on the data uploaded by the patient. After the referral, there is also a data-based follow-up, consultation after the examination, and, if possible, therapy ordering. This is of particular importance in Hungary, as the hierarchy of the medical profession and the care competencies are closely interlinked. In the case of state funding, the regional provision of care should be noticed.

At present, the use of eHealth in Hungary is implemented at the state level using the unified EESZT (Electronic Health Service Space). The possibility of teleconsultation using the EESZT system is made possible by a state legal and regulatory system in such a way that only specific healthcare providers are entitled to use the system, and the basis for identification is the unique identification number used for social security purposes, i.e., the social security number. Patient data's electronic storage and transmission is linked exclusively to the social security number.

Tests, remote diagnostics

The term 'telemedicine' refers to the process whereby the doctor making the diagnosis is in contact with the patient exclusively in virtual space during the diagnosis. It can be very diverse in terms of its specialization, and the following areas can be differentiated according to the professional parameters of diagnosis:

- Imaging diagnostics: most radiological examinations, CT, MR, UH, CBCT, etc., where the findings are analyzed via an info-communication channel, and the results are made available to the specialist requesting the examination in the patient's medical records.

- ECG remote diagnostics: This form of care was first introduced in our country by the OMSZ. It consists of sending the ECG results obtained at the point of care to the specialist using mobile technology, who uses them to determine the most optimal place of care or even the parameters of the on-site care. The technical background is provided by a TTEKG device, which transmits the patient's findings to the cardiac center, where a cardiologist is in charge of the monitoring 24 hours a day. The findings can be immediately assessed, and the care facility to which the ambulance unit will transport the patient will be determined.

In the case of remote diagnostics, communication with the patient is necessary, since the exact formulation of the complaint is necessary to record the anamnesis, the doctor can also question the patient, and the results of the examination and the recordings are available in the virtual space, on the basis of which, in non-emergency cases, the specialist can respond within a few days, possibly suggesting therapy or referring the patient. If the online visit is insufficient to diagnose accurately, the doctor can also invite the patient for a personal visit.

Currently, telemedicine services are included in the repertoire of major private providers in our country, reducing the time needed for treatment and increasing the number of treatments.

Remote intervention

Remote intervention, or remote manipulation, is a complex process that relies on remote sensing systems. These systems enable practitioners to conduct examinations or interventions from a distance. A notable example of this is the practice of endoscopic examinations. The use of robotic devices, in conjunction with video guidance, is gaining traction in this field.

The notion of telesurgery may seem bizarre in the current public consciousness. However, its development is becoming increasingly necessary, as the differentiated nature of surgical science means that, in some cases, no specialist surgeon is available. This also means that there is a great need for development worldwide. The chances of a patient's recovery in extreme cases are greatly enhanced by how quickly specialist care arrives, a specialism that would also be needed in trauma and emergency care. The specialty of telesurgery can also extend to other specialist medical activities, such as gynecology, orthopedics, neurology, cardiology, and specialist pediatric care. Currently, the best-known and most widely used robotic surgery system is the DaVinci system, which is used by more than eight hundred institutions worldwide. (Marescaux, J., Leroy, J., Rubino, F., et al. 2002)

Surveillance and Monitoring

Remote monitoring is required when a specialist is needed to care for and monitor the patient. However, sensors and signal transmitters trigger his presence and competence during the monitoring. Examples include using devices for measuring vital parameters, such as sphygmomanometers, pulse oximeters, blood glucose meters, or the ECG mentioned earlier. The system's operation requires the activity of the two sides of the signal-receiving system. This is the area where telecommunication devices and mobile applications have the most significant potential.

There are currently several working examples of remote monitoring in our country. Treating patients based on data recorded by a smartwatch or other device, either online or during a face-to-face visit, is good practice. Continuous monitoring is essential for some conditions and is becoming more convenient and faster with the development of smart devices.

During the data capture process, pre-screening is possible, whereby the device's AI-based software will flag extreme anomalies, alert the specialist care provider immediately if necessary, or even call for help. Some of the analytics can be analyzed using AI, but differentiation of rare pathologies is impossible. For the health professional, continuous control is essential in many cases. However, personal presence can also be a risk factor for the patient, as the COVID epidemic has shown very well. Maintaining continuous control is practical, and personal intervention is only necessary when necessary or immediately required.

An excellent example of necessity is in chronic care and

elderly care, where therapy is prolonged and requires minimal or infrequent but continuous supervision. (Á, Móré M, Zombory J.,2020): Other specialties also involve long-term patient care, and the method may be relevant in the case of antenatal care, psychiatry, or even oncology care, as these specialties require significant human resources.

Monitoring is also becoming increasingly valuable for health promotion. To strengthen the culture of health, individuals must have a rational view of their health status and be able to identify their vital parameters or deviations from them.

Telemonitoring has several advantages over classical methods, some examples of which are:

- negative changes in the patient's condition can be detected quickly, with a faster reaction

- rapid, professional, and cost-effective care, which determines the outcome of therapy

- Improved contact with professional staff (long-term harmful reduction in morbidity and mortality)

The basic system of telemonitoring:

- Biological sensors worn by the patient (ECG, blood pressure monitor, pulse oximeter, blood glucose meter, etc.)

- Smart IT devices (e.g., smartphones with apps, IT software)

- Additional devices that power the sensors (Bluetooth, wifi, ant+)

- Connectivity devices (Internet, GSM, private networks, VPN) with telecom solution

- Host-side systems (central servers, data storage, cloud and specialist systems)

- Healthcare providers and their staff (doctors, specialists, nurses, assistants, IT specialists)

- A Clinical Decision Support System (CDSS) is an interactive application that assists in diagnosis.

With the massive development of telemedicine and its integration into daily care, frontline healthcare professionals and the general public have been exposed to the concept of online rounds. Private and public care have used online rounds effectively during the pandemic, with several providers introducing it as a new feature in primary and specialist care. (Breen G.M., Matusitz J., 2010)

Cluster 2: VR-based care

VR technology can be applied in many specialized areas within the healthcare sector. It is still difficult to define the importance of technology at this stage, but we can see that it is proving to be professional in new areas in the short term. VR technology is not necessarily a therapeutic activity or a therapeutic tool only. In order to use it in the field of medicine in a controlled and regulated way, it is essential that its user is a medical professional and uses the virtual device responsibly. The technology is not inherently harmless, as there is a high risk of addiction.

It must always be made clear that VR technology is merely a virtual reality that provides a deceptively realistic experience but is not a substitute for real human contact. Particular care must be taken when dealing with minors; as for young people, the real and virtual worlds overlap easily, which can

disrupt their development and socialization processes.

Surgical interventions

VR technology can be applied in several areas of surgery. Today, it is useful to model and perform surgeries in real life, support the patient's recovery, and provide medical education. Surgical training, surgical planning and modeling, integrated anatomy education, and telesurgery can all benefit from VR technology. 3D visualization of a limb or organ system allows all the details to be planned accurately before the operation. Also, it allows medical students to see the details of the entire operation.

On YouTube and IndaVideo, several educational short films are recorded with a 360-degree camera, which, when viewed through VR glasses, gives the user the illusion of being part of the operation in the flesh, close up, at the surgery site. Artificial simulation during examinations and surgical procedures allows surgeons to acquire outstanding and practical skills in specialized fields (neurology, cardiology) since learning during actual operations is a risk for the patient. VR offers infinite practical opportunities in a much safer environment than the core program of traditional surgical training.

Pain relief

VR applications, most notably fully immersive devices, can remove the user from one environment and transport them to another reality. In this way, making stressful and occasionally painful experiences for the patient more tolerable and pleasant can be supported. This could be relaxing music to help the patient relax in a harmonious virtual space or a soothing but static environment with neutral sound effects.

Attitude shaping

VR offers an opportunity to change attitudes toward problem patients over the long term through the use of real-world experience. Textbooks and theoretical knowledge alone are often insufficient to provide higher-quality care to patients, and in many cases, face-to-face contact with patients does not ensure that the health professional has an empathic attitude toward problem patients.

For example, some research has shown that medical professionals in the fields of addiction and geriatrics have a markedly negative attitude. Institutional education cannot fully prepare them for these experiences; VR technology can help. There is, for example, a virtual program where the user can experience the role of a person with dementia, with all its limitations. This helps to develop the necessary empathy.

Rehabilitation

There is growing potential in rehabilitation, and perhaps the most significant demand for telemedicine tools is being expressed in this field. Non-evasive technologies have already been effective in this field, but with the introduction of fully-evasive technology, real-world experiences can be created for

the rehabilitated.

Currently, the most researched area is related to rehabilitation methods for diseases associated with mental decline, such as Parkinson's, Alzheimer's, and other dementing diseases. The use of VR in this field is based on research showing that these patients can be developed using their traditional pedagogical tools, using their childlike instincts (competitive ability, ability to play), which are essential not only for maintaining mental health but also for maintaining physical fitness, dynamism, and muscle strength through linked exercises. The overall aim is to improve quality of life in the long term, and VR can be used to model a range of playful movement forms linked to daily routines, such as the popular virtual hand program.

Managing anxiety and phobias

The primary and most researched application of VR applications within the field of psychiatry is the treatment of anxiety, phobias, and mixed personality disorders. Software developments are becoming more and more common, which provide patients with the possibility to effectively and long-term get rid of their fears and phobias by using ever-changing methods. The basic principle of these interventions is a gradual and cautious approach, in which the VR experience helps the patient to face the phobia factor in an experiential but step-by-step way. This may occasionally require several years of therapeutic practice.

Another area of particular interest is the rehabilitation of people with post-traumatic stress syndrome. Life-like visualization is a great help in processing traumatic experiences, for example, in the care of disaster or war survivors, which requires a long period of therapy and gradual caution. Equally important and exciting is the pathology of social anxiety, where the fear factor can be a person, place, or even an object, which can be visualized and corrected by VR technology to correct abnormal behavior. Creating a realistic experience is also crucial in dealing with difficulties in social interaction. For example, in the case of vertigo, many VR programs are in use today, where the user can control the virtual situation.

Treatment of eating disorders

VR has also become an accepted technology for eating disorders, where visual motivation is an essential factor for people suffering from this disorder and where previously only video and images were available to professionals. VR is used in the treatment of eating disorders in several areas. In the treatment of anorexia nervosa, two of the most important areas are body image correction and overcoming food aversion. The virtual mirror is the most commonly used VR application to correct body image distortion.

Relaxation

VR applications can excellently enhance the positive effect of satisfying relaxation. Within a short period, the user finds himself in a relaxing environment, be it a forest, a river, a meadow with flowers, or even a room. In all cases, the experience is lived and reacted to in a safe environment where the sense of fear is reduced,

According to the medical indication, appropriate relaxation in recovery distinguishes two to three levels.

Medical care in disaster situations

Some specific medical situations cannot be reproduced artificially to a great extent or only partially, yet a high level of skill is required for the professional to carry out medical work in such situations. Disaster situations and the emergency medical care required in such situations are prime examples. Natural disasters cannot be prepared for under simulated or artificial conditions, but the professional needs to know exactly how and what type of tasks medical practitioners should perform in such circumstances and how to carry out procedures according to protocol.

Economic indicators and revenues of telemedicine

The economic indicators for telemedicine in the field of health services in Hungary have changed significantly and continue to develop dynamically. Some key economic indicators related to telemedicine in Hungary:

- Cost reduction: Telemedicine offers an opportunity for health systems to reduce administrative costs and the cost of patient care. For example, by reducing the number of outpatient visits or repeat tests.

- Improving accessibility: Telemedicine allows doctors and patients to connect remotely, improving access to healthcare, especially in areas where shortages of specialists or distances make healthcare challenging.

- Increasing efficiency: Telemedicine allows healthcare providers to manage time and resources more efficiently, as patient communication is done remotely and health data is available electronically.

- New business models: Telemedicine enables healthcare providers to develop new business models, such as subscription-based healthcare services or specialized healthcare applications.

- Technological development: Telemedicine constantly evolves with information and communication technologies that enable secure and efficient health data management and communication between patients and doctors.

These economic indicators also play a key role in improving the development and efficiency of healthcare services in Hungary. Technology and healthcare practices are constantly changing and adapting to new challenges and opportunities. (Daragó, L., Engi, Cs., Pesti, I., et al. 2010)

Calculating the economic efficiency of telemedicine is complex, and many factors need to be considered. Some important aspects to consider when assessing the economic efficiency of telemedicine are:

- Cost savings: It is essential to consider how telemedicine contributes to cost savings in the health system. For example, it can reduce the number of repeat medical visits, the length of hospital admissions and stays, and travel costs for patients

and health professionals.

- Increasing efficiency: It is also essential to consider how telemedicine contributes to increasing the efficiency of the health system. For example, remote consultations allow doctors to treat more patients in less time or allow health data to be shared more quickly and efficiently.

- Patient satisfaction: The introduction of telemedicine also can potentially improve patient satisfaction with healthcare. Benefits such as faster access to doctors, convenient home consultations, and reduced waiting times can increase patient satisfaction.

- Investment in technology: It is also essential to consider the technological investments needed to implement telemedicine. These include improving IT infrastructure, protecting health data, and educating and training healthcare professionals and patients.

In European countries, the cost of renting telemedicine equipment varies depending on the type of equipment, the duration of the rental, the needs of the renter, and the service providers' prices. In general, prices can vary between countries and regions. Here are some examples of prices for telemedicine equipment rental in European countries:

- Telemedicine equipment: The rental fees for telemedicine equipment can vary depending on the type of equipment, e.g., ECG, blood pressure monitor, digital otoscope, etc. Rental fees can be charged monthly or annually and usually range from several euros to several hundred euros.

- Video communication equipment: The rental of video communication equipment allows doctors and patients to carry out remote consultations. Rental fees are usually charged monthly or annually and vary depending on the service provider.

- Mobile health units: These devices allow healthcare providers to offer mobile health services like health screenings or examinations. The rental fees for mobile health units can usually be higher, including equipment and vehicle rental.

Prices may also include other variables such as the number and quality of equipment, services, maintenance and support, etc. Renters must obtain detailed information on prices and services and discuss the rental conditions with the chosen provider to find the optimal solution. (Dózsa Cs., Ruzsovics Á. 2019)

Discussion

The pandemic accelerated the adoption of telemedicine, revealing its transformative potential across the health care sector. This study confirms that telemedicine can be divided into two main functional clusters: primary health care and VR-based care.

Primary care applications—such as remote diagnostics, teleconsultation, and remote monitoring—demonstrate the feasibility of integrating digital solutions into public health systems. They offer measurable benefits in terms of cost-efficiency, time management, and access to care, particularly in rural or underserved regions. Hungary's implementation of EESZT exemplifies a centralized, regulated model of eHealth deployment, showing both the potential and limitations of top-

down digital health policy.

In contrast, VR-based care represents an emerging and experimental domain. While currently limited in widespread adoption, its utility is growing in fields such as rehabilitation, psychiatry, surgical training, and phobia management. However, its ethical implications—especially regarding minors and the blurred boundary between virtual and real environments—necessitate stringent guidelines and professional oversight.

From an economic perspective, the study illustrates that telemedicine is not merely a cost-cutting measure but a long-term investment. Telemedicine reduces administrative burdens, hospital visits, and unnecessary procedures while improving health service accessibility and efficiency. Nevertheless, high initial infrastructure costs and a lack of harmonized regulation across Europe remain barriers to full-scale implementation.

Legislation in Hungary has evolved rapidly since 2020, responding to emergency needs with legal frameworks for teleconsultation and teleradiology. However, gaps persist in comparison to Western European standards, particularly in data protection, service definitions, and financing mechanisms.

CONCLUSION

Telemedicine is often referred to as a phenomenon of constructive or disruptive innovation. However, innovation is divisive, with numerous challenges and features affecting social responsibility and ethical issues. It poses a problem for the global health community, professional actors in the global innovation process, and funding companies and governments. A coordinated and robust approach to innovation management would be needed, together with professionals from health and other disciplines (IT, economics, technology). Over the last decade, telemedicine has begun to bridge the gap between innovations used at the extremes and integrated developments used by the majority. (McCue, M., Fairman, A. D., Pramuka, M. 2010)

In all European countries, telemedicine methods and, in the process of integration, even the patient care process itself, are increasingly being pushed outside the institutional framework and are slowly finding a place for themselves in virtual space. In personalized care and nursing, these methods are becoming more widespread in small and medium-sized countries. With telemedicine, patient care is increasingly shifting from hospitals to home care and monitoring by mobile devices. Convenience and cost-effectiveness are the main drivers. Receiving care at home instead of in a hospital is an improvement even for the patient.

This is also the trend in our country, where, in addition to regional specificities, different areas of the country are developing specificities in line with demographic conditions. However, telemedicine is also justified by the fact that, as the burden on regional care systems increases, there is a growing willingness to seek alternatives and, thus, to be open to telemedicine methods. (Daragó L., Jung Zs. 2019). Telemedicine has emerged as a critical innovation in modern healthcare, driven by the need for safe, efficient, and accessible medi-

cal services. This paper analyzed the dual-cluster structure of telemedicine—primary care and VR-based care—and assessed its legislative, medical, and economic dimensions. The findings indicate that telemedicine can significantly enhance healthcare delivery by improving accessibility, reducing costs, and promoting patient-centered care. However, successful integration depends on sustained investments in infrastructure, robust legal frameworks, and interdisciplinary collaboration.

LIMITATIONS OF THE RESEARCH

Reliance on Secondary Data: The study is predominantly based on literature review and legal documents, lacking empirical validation through surveys, interviews, or patient/provider-level data. Geographical Limitation: The focus is largely on Hungary and similar Central European systems, which may limit the generalizability of findings to countries with different healthcare financing models. Rapidly Changing Technological Landscape Given the fast evolution of telemedicine and VR-based healthcare, some insights may become outdated without continuous data monitoring and updates. Incomplete Economic Metrics: The analysis does not provide a full cost-benefit model or quantitative assessment of telemedicine's return on investment, which would strengthen conclusions about efficiency and sustainability. Regulatory Variability: The fragmented nature of telemedicine regulation across European countries makes it difficult to propose universally applicable policy recommendations.

POSSIBLE RESEARCH DIRECTIONS

Introducing telemedicine can optimize costs by reducing the need to admit patients to hospitals and travel and transport costs. It can also increase productivity and access to the labor market. Telemedicine requires much new investments. I envisage possible further research questions in the following areas:

1. Cost-Effectiveness in Public Healthcare Systems: Assessing how telemedicine optimizes expenditures in publicly funded systems (e.g., V4 countries) by reducing hospital admissions, travel needs, and time to treatment.

2. Comparative International Analysis: Benchmarking Hungary's telemedicine development against countries with more mature digital health systems to extract best practices in regulation, financing, and implementation.

3. Technology Adoption and User Behavior: Analyzing demographic, social, and educational factors influencing the acceptance and usability of telemedicine tools, especially in marginalized or elderly populations.

4. Long-Term Economic Returns on Investment: Evaluating how initial infrastructure and technological investments contribute to long-term improvements in population health, workforce participation, and economic productivity.

ACKNOWLEDGMENTS

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THE ECONOMIC IMPORTANCE OF TRADITIONAL AND REGIONAL FOOD IN THE NORTHERN GREAT PLAIN REGION

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Abstract: *For a given region, competitiveness and sustainability play a vital role, as they are critical determinants of residents' quality of life and economic situation. The intensive implementation of rural development also offers opportunities for economic growth. Traditional and regional food products obviously give opportunities for the development of rural areas. Also, their production is significant for the local and Hungarian economies and society. Increasing the production of these food products and expanding and increasing their market outlets can contribute to maintaining the population in certain areas of the region and, among other things, protecting and preserving the tangible and intangible heritage of rural areas. Urban areas are also of particular importance for traditional and regional food: local events, such as themed festivals, and catering operators can also help to promote food products through a conscious, well-thought-out sales and marketing strategy. My research aims to characterize the economic position of traditional and regional food and products among local consumers in the Northern Great Plains region. During the survey, 1.349 people completed the questionnaire, and all of them gave valid responses. I focused on local specificities, gauging the opinions of residents in the region in relation to traditional food consumption in order to assess their willingness to pay more for traditional and regional food.*

INTRODUCTION

Food consumption is an integral part of everyday life in a society. I agree with POPOVICS (2009) that food is essential in people's lives. By the consumers, the highest share of expenditure is spent on food, and the most time on average per year is spent on buying food. Food consumption is both a compulsion and a source of pleasure; it also determines the lifestyle and rhythm of consumers and their social relations and can be traced back to the traditions of each culture. Nowadays, we are facing a shift in values: consumers are increasingly moving away from over-consumption, and when choosing between products, they focus on high-quality brands and brand and image benefits. Also, value orientation is becoming more critical in consumer behavior (TÖRŐCSIK, 2007). Hungarian traditional and regional food has a unique value in the food market; they are known for their high quality, distinctive flavor, and health benefits, which make them attractive to consumers.

Food economy and food consumption

The level of industrial development determines the level of economic development of a country and its regions. The level of development of other economic sectors, including agriculture, also depends on the level of industrial development. However, non-industrial sectors such as agriculture reflect the level of industrial development and the economy as a whole (BURGER, 1985). According to SZABÓ (1998), agricultural activity is defined as crop and livestock production activities that produce crop and livestock products for food consumption, animal feed, and industrial processing. The essential characteristic of the activity is that it is closely and inextricably linked to the agricultural land, especially in the case of crop production that is significantly exposed to climatic and weather conditions.

Agriculture can contribute to the economic growth of a region through:
- the labor provided by industry and other sectors,
- the food supply of a growing urban population and the supply of raw materials to industry,
- the capital and funds made available for industrial development,
- foreign exchange earnings, partly by substituting agricultural exports and partly by imports of raw materials from food and agriculture,
- a market for the absorption of industrial products,
- by promoting industrialization and the development of

other sectors of the economy (BURGERNÉ, 1980).

Agriculture and the food industry, which process raw materials into consumable products, together form the food economy, providing healthy food for the population. It is also essential for employment and contributes to a region's economic performance. The connection between agriculture and the food industry is established through procurement. Farmers are free to sell their agricultural products to anyone, and they produce to order, for self-sufficiency, or sale on the open market. In this way, agricultural products are sold through several channels, and producers are free to choose between these channels, in virtually all cases, on the basis of economic considerations. The most essential form of sale of agricultural products is the sale of goods based on a contractual relationship between producers and buyers, mainly food producers. Producers can also sell their products directly to farmers' markets, various outlets - open shops, market stalls, etc. - and retail, wholesale, catering, foreign trade businesses, public institutions, and foreign buyers. Extra-contractual production is primarily adjusted to expected solvent demand based on tradition, influenced by expected sales prices and the specific characteristics of economies (CSIZMAZIA et al. 2007).

Food consumption can be seen as a specific area important for both the individual and the economy. However, food consumption is motivated by general, everyday physiological needs, and food cannot be dematerialized or substituted by other products. It is essential that food consumption also reflects lifestyle and values (LEHOTA, 2004). According to VETŐNÉ (2013), food production and consumption are also connected and interlinked in many ways; therefore, food consumption and production and the technological developments supporting them can only be effectively understood together.

Food consumption is directly influenced by biological, psychological, sociological, anthropological, demographic, economic, and political factors. The role of biological factors is mainly related to the individual, the consumer. These factors include physiological differences based on genetic diversity, perception, and food-related diseases. Food-borne and non-food-borne diseases have a significant impact on diet and consumer behavior. Demographic factors affect food consumption by changing the size and structure of the population; for example, population decline in developed countries reduces per capita consumption. Among the economic factors, price and income play an essential role. Low-income people want access to sufficient quantities of food, while those on higher incomes tend to buy healthy and high-value-added products. The purchasing power of consumers' income and the price of particular goods influence how consumers respond to price changes. Social factors are social relations that may express membership or separation from particular groups. Cultural factors include individual, social, and psychological factors and components. It is essential to mention the value system, which also determines consumer behavior in the long term. Psychological factors influence the acceptance or rejection of a particular food by individuals and the significance and role of the accepted food (LEHOTA, 2004). Hungarian household consumption patterns are influenced by several factors, includ-

ing income and demographic changes - more working women and single-person households, larger pensioner population - and lifestyle changes (HOFMEISTER-TÓTH et al. 2011). Using national consumption statistics, TRICHOPOULOU et al. (2002) compared food consumption patterns and changes over ten years in seven European countries. Their research has shown that the education level impacts the understanding and processing of health and environmental information.

Traditional and regional food on the food market

Traditional and regional products/food are defined as agricultural products that are produced traditionally, have a historical past, and are linked to a specific region where they are still present in today's food market. The terms traditional, national, and Hungarian can also be applied to these products found in their common Traditions-Flavours-Regions Collection. Regional and local products differ from the definition because they are connected to a narrower area, but their production is not linked to tradition. We define conventional, classic, or mass-produced products/food as those food products that are produced in large quantities under industrial conditions that also meet general standards, have no specific raw material or technological requirements, and are commercially available. Conventional products are differentiated by different branding in the commercial market. Organic, biological, or organic products/food may only come from farming practices that do not use artificial fertilizers, pesticides, insecticides, growth regulators, or feed additives. Instead, the system is based on crop rotation, animal and plant fertilizers, manual weed control, and biological control of various pests (SZAKÁLY et al., 2010).

In 1993, the European Union launched the "Euroterroirs" (Europe's Countryside) program, a French initiative to collect traditional and local food from European regions also, support their economic exploitation, and promote them to consumers. Hungary was the first of the pre-accession countries of Central and Eastern Europe to join the program in 1998. The 'Traditions-Flavours-Regions' initiative aimed to collect traditional and regional food from the Hungarian regions and contribute to their promotion and economic exploitation (PALLÓNÉ KISÉRDI, 2003). To be included in the collection, a product must meet various criteria, such as its history, the traditional nature of the production method, the connection to the specific region, the knowledge and awareness of the product, and the existence of production and marketing (CSERHALMI et al. 2001).

The book contains a professional historical description of 300 traditional and regional products by region and within these by sector. Compared to the list of other European countries, the Hungarian collection is particularly rich in regional fruit and vegetables, which are more than one third of all products. The regional classification was based on the first authentic historical reference (SZAKÁLY et al. 2010).

Traditional and regional food products of the North Great Plain region

The natural and economic geography of the North Great

Plain region is favorable for agricultural production, and the differences in production areas allow for their specialization. The area's agriculture can provide a secure base for the previously established food industry, and most of the crops, livestock, and animal products produced in the region are supplied to domestic or foreign consumers while meeting local demand (CSIZMAZIA et al. 2007). The Northern Great Plain region is characterized by saline and sandy areas, black soils rich in humus on the borders of farms and gardens, and the products of livestock and crop production, such as the famous apples of the 'Szabolcs-Nyírség' region, the plums from' Beszterce' also the 'szatmári' plum jam and walnut' pálinka.' The quality of agricultural products and food is also significantly influenced by the local conditions, the physical environment, and the food habits and traditions associated with a particular region (CSERHALMI et al. 2001).

The Northern Great Plain region is included in the Traditions-Flavours-Regions Collection with 58 products, making it the second most prosperous region in terms of products in Hungary after the Southern Great Plain region. The typical product groups and products of the North Great Plain region are:

- Meat, poultry, game: Bronze turkey, Guinea fowl, Sheep from'Hortobágy', Hungarian goat, Hungarian grey cattle, White Hungarian hen, Hungarian curly-feathered goose, Roe deer;

- Meat products:' Csécsi' bacon,' Csemege Debrecen sausage; Smoked bacon with paprika,' Vállaji' Swabian ribbed bacon,' Vállaji' Swabian ham;

- Fruits grown, picked, and processed: Plums from' Beszterce,' Plums from' Penyige,' walnuts from' Milota,' Dried plums, Cherries from' Nagykörű,' Gypsy cherries, Sour cherries from' Debrecen,'' Pándy' sour cherries, Gooseberry from' Hajdúság,' Apples from' Szabolcs,' Dried apples, Dried pears;

- Vegetables grown, picked, and processed: Horseradish from' Hajdúság,' Potatoes from' Kisvárda,' Cabbage from' Hajdúság,'' Sziki' chanterelle mushrooms, Field carnation mushrooms, Pumpkins from' Nagydobos';

- Drinks:' Szatmári pálinka' from plums,' Pálinka' from walnuts,' Szabolcsi pálinka' from apple;

- Cereals and products of the milling industry: maize grits;

- Confectionery products: Jam from Cornus,' Szatmári' jam from plums;

- Confectionery and bakery products:' Debreceni vert' honey scones,' Debreceni vásári füzéres' pretzels,' Dübbencs,' Bread scones,' Kunsági' pretzels, Chimney cake, Matzo scone,' Vesu';

- Dairy products: Goat cream cheese, Goat curd, Rounded cottage cheese, Soft goat cheese,' Parenyica' cheese;

- Herbs, spices, seasonings: Poppy seeds,' Sziki' chamomile;

- Pasta: Spiral pasta, Knitted pasta,' Lebbencs' pasta;

- Others: Acacia honey from Nyírség, Roasted sunflower seeds (SZAKÁLY et al. 2010; CSERHALMI et al. 2001).

MATERIALS AND METHODS

In the primary research, I used a quantitative method through questionnaires. The questions mainly analyzed consumers' preferences, knowledge, purchasing habits, and risk management related to traditional and regional food. In the questionnaire survey, it was essential to assess the willingness to pay more for traditional and regional food and to determine conclusions about the crucial economic conditions for food production and the specificities of traditional and regional food consumption in the Northern Great Plain region. The questionnaire survey was conducted between 16 December 2019 and 22 May 2020, and during the data collection, only the responses of the inhabitants of the region were collected.

The survey was conducted exclusively online for the residents of the counties of Hajdú-Bihar, Szabolcs-Szatmár-Bereg, and Jász-Nagykun-Szolnok. The questionnaire was created using the Google Docs application, and participation in the survey was voluntary. The online questionnaire was available on a social networking site, and 1,349 people filled it out, all giving valid answers. The total sample size for the Northern Great Plain region was 1,349 (n=1,349).

RESULT AND DISCUSSION

Socio-demographic characteristics of the sample

The demographic characteristics of the sample were categorized by gender, age group, educational level, and type of municipality of residence. Information was also requested on subjective income status and the household's per capita income. Women accounted for 85.6% of the respondents, and almost a quarter of them belonged to the 40-49 years age group, while the 30-39 years' and' 18-29 years age groups were nearly equally represented. Almost half of the respondents have a higher education level or live in cities with county status. The number of responses from municipalities with less than 2.000 inhabitants is relatively low. One-fifth of the respondents in the sample have a per capita family income of between 101-150 thousand HUF, 16.5% of them have over 200 thousand HUF, and 5% have less than 50 thousand HUF. The socio-demographic characteristics of the sample are shown in Table 1 below.

Table 1. Socio-demographic characteristics of the sample.

Presentation of the sample. (N = 1,349)		
Demographic groups	N	%
Gender		
Man	194	14.4%
Woman	1,155	85.6%
Age groups		
18–29 years	310	23.0%
30–39 years	315	23.4%
40–49 years	329	24.4%
50–59 years	220	16.3%
Over 60 years	175	13.0%
Education level		
Primary school	23	1.7%
Vocational school	164	12.2%
Graduation	521	38.6%
Higher education	641	47.5%
Type of settlement		
City of county status	642	47.6%
Settlement with over 10,000 inhabitants	347	25.7%

Settlement between 2,000–10,000 inhabitants	285	21.1%
Settlement with less than 2,000 inhabitants	75	5.6%
Per capita income in the household		
Less than 50 thousand HUF	68	5.0%
51–75 thousand HUF	143	10.6%
76–100 thousand HUF	215	15.9%
101–150 thousand HUF	276	20.5%
151–200 thousand HUF	210	15.6%
Over 200 thousand HUF	223	16.5%
No answer	214	15.9%

Source: Own elaboration.

Hypothesis tests

My research aimed to characterize and analyze the economic position of traditional and regional food and products among local consumers in the Northern Great Plains region. I focused on local specificities, asking the opinions of the region's inhabitants on the consumption of traditional and regional food and dishes to protect the domestic market and products and strengthen their competitiveness. Local and traditional products are mainly relevant for local businesses and tourism, so they are unsuitable for solving the region's deeper structural problems. However, they can help to develop the economy and meet the specific needs of different social groups through their' supporting' role.

The first hypothesis

H1: Local people who often eat traditional and regional dishes in their households also choose to eat them in catering establishments.

The survey asked how often local residents eat traditional Hungarian food in their households, and when they visit a catering establishment, how usually they choose traditional Hungarian food from the menu. The cross-tabulation analysis of the two variables and the frequency of consumption of traditional and regional food in the households, in the context of consumption of traditional and regional food in catering establishments, is shown in Table 2 below.

Table 2. Frequency of consumption of traditional and regional food in the households, in the context of consumption of traditional and regional food in catering establishments.

		When you visit a catering establishment, how often do you choose traditional Hungarian dishes?			
		Mostly I don't choose (%)	Sometimes yes, sometimes no (%)	Mostly I choose (%)	Total (%)
How often do you eat traditional Hungarian food in your own household?	No more than once a month (%)	51,10%	38,30%	10,60%	100,00%
	No more than once a week (%)	23,80%	55,40%	20,80%	100,00%
	Several times a week (%)	11,10%	46,80%	42,10%	100,00%
	Daily (%)	5,70%	32,40%	61,80%	100,00%
	Total (%)	13,70%	44,80%	41,50%	100,00%

Source: Own elaboration.

The association between the two variables was found to be significant (p<0.01) when tested by Pearson's chi-square (χ2) test, meaning that the frequency of eating traditional food at home is associated with the frequency of eating traditional food when visiting catering establishments. Since both variables form an ordinal scale, I also tested this relation with a Spearman correlation, which has a value of 0.33, p<0.001. The latter means that the more often one eats traditional food at home, the more often one eats it in a catering establishment. The magnitude and pattern of this relation can be seen more clearly in the row percentages in Table 2. The table shows that as the frequency of eating at home increases, there is a monotonic increase in the proportion of people who would mostly choose traditional Hungarian food in catering establishments (10.6%, 20.8%, 42.1%, 61.8%). At the same time, there is a monotonic decrease in the proportion of people who would mostly not choose traditional Hungarian food in catering establishments (51.1%, 23.8%, 11.1%, 5.7%).

Overall, the hypothesis H1 is confirmed.

The second hypothesis

H2: Local residents who often eat traditional and regional food in their own households consider it important that these products are produced using local ingredients.

Table 3 below presents a cross-tabulation analysis of the variables—the frequency of consumption of traditional and regional food in the households in relation to the importance of using local ingredients.

Table 3. The frequency of household consumption of traditional and regional food in relation to the importance of using local ingredients.

		How important is it to you that a food product is made using local ingredients?			
		Very relevant (%)	Relevant (%)	Irrelevant (%)	Total (%)
How often do you eat traditional Hungarian food in your own household?	No more than once a month (%)	2,00%	34,70%	63,30%	100,00%
	No more than once a week (%)	13,30%	58,80%	27,90%	100,00%
	Several times a week (%)	19,30%	64,20%	16,50%	100,00%
	Daily (%)	33,10%	56,90%	10,00%	100,00%
	Total (%)	20,90%	60,30%	18,80%	100,00%

Source: Own elaboration.

The relation between the two variables was found to be significant ($p<0.01$) when tested using Pearson's chi-square ($\chi 2$) test, which suggests that the frequency of eating traditional food at home is associated with the extent to which consumers consider that it is essential that a food product is produced by using local ingredients. The two variables form an ordinal scale, so I also tested the relation using the Spearman correlation. The value of the Spearman correlation is 0.33, $p<0.001$. This means that the more often a resident consumes traditional food in his/her household, the more critical it is for him/her to use local ingredients. The row percentages in Table 3 show that, as the frequency of consumption at home increases, the proportion of consumers who consider it relevant to the importance of using local ingredients increases monotonically (2.0%, 13.3%,

19.3%, 33.1%). In addition, the proportion of consumers who do not consider its importance is monotonically decreasing (63.3%, 27.9%, 16.5%, 10.0%).

Overall, the hypothesis H2 is confirmed.

The third hypothesis

H3: Local residents who often choose traditional Hungarian food in catering establishments are willing to pay more for a food product which is made from traditional local ingredients.

Table 4. The relation between the frequency of choosing traditional Hungarian food in catering establishments and the willingness to pay for food produced from traditional local ingredients.

		Would you pay more for a food product made from traditional local ingredients?			
		Yes (%)	Maybe (%)	No (%)	Total (%)
When you visit a catering establishment, how often do you choose traditional Hungarian dishes?	Mostly I don't choose (%)	2,00%	34,70%	63,30%	100,00%
	Sometimes yes, sometimes no (%)	13,30%	58,80%	27,90%	100,00%
	Mostly I choose (%)	19,30%	64,20%	16,50%	100,00%
	Total (%)	20,90%	60,30%	18,80%	100,00%

Source: Own elaboration.

When tested by Pearson's chi-square (χ2) test, the relation between the two variables was found to be significant (p<0.01). This suggests that the frequency of choosing traditional Hungarian food in a catering establishment is associated with the willingness of a local resident to pay more for a food product that is made from traditional local ingredients. The two variables form an ordinal scale with a Spearman correlation of 0.33, p<0.001. This means that the more often consumers choose traditional Hungarian food in a catering establishment, the more willing they are to pay more for food that is made from traditional local ingredients. The row percentage data in Table 4 show that as the frequency of choosing traditional Hungarian food in a catering establishment increases, the willingness to pay for a food product made from traditional local ingredients increases monotonically (2.0%, 13.3%, 19.3%). In addition, the proportion of consumers unwilling to pay more for this food product decreases monotonically (63.3%, 27.9%, 16.5%).

Overall, the hypothesis H3 is confirmed.

I used the Kruskal-Wallis test to compare the commitment to traditional and regional food of groups based on each back-ground variable - age, type of settlement, and household per capita income. I characterized the level of commitment along four questions:

- How important is it for you that the food product is produced by using local ingredients?
- Would you be willing to pay more for a food product that is made from traditional local ingredients?
- How often do you eat traditional Hungarian food in your household?
- When you visit a catering establishment, how often do you choose traditional Hungarian food?

The fourth hypothesis

H4: As age increases, the level of commitment to traditional and local food among local residents rises.

The level of commitment to traditional and regional food for each age group was compared using the Kruskal-Wallis test, with significant differences at p<0.01. The level of commitment to traditional and regional food for each age group of local residents is shown in Figure 1 below.

Figure 1. Level of commitment to traditional and local food for each age group of local residents.
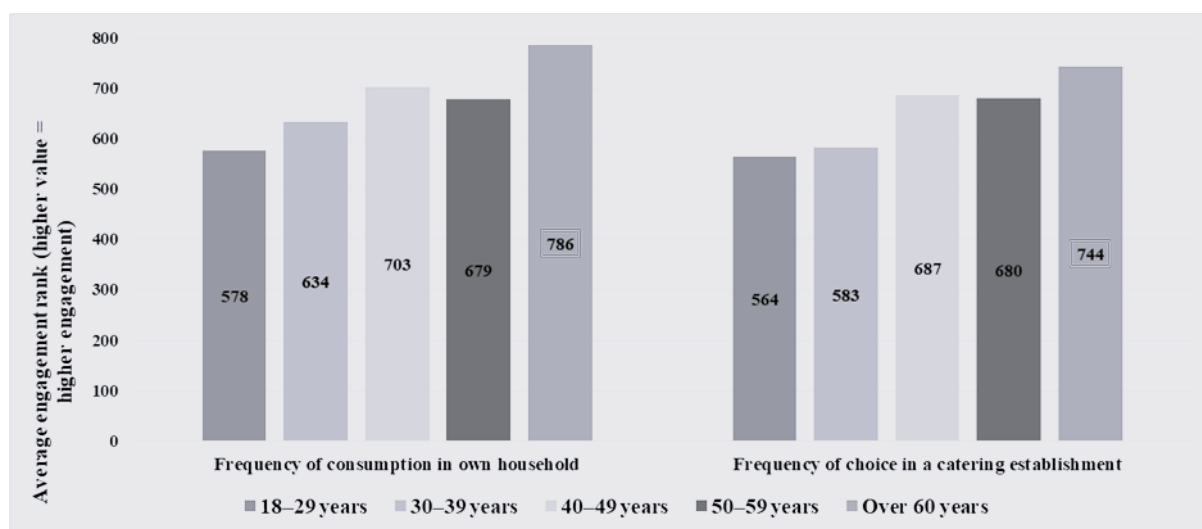
Source: Own elaboration.

In the case of the variables local ingredients and willingness to pay, the lower the values of the question, the higher the commitment, so for both the importance of local ingredients (average rank: 584) and willingness to pay (average rank: 566), the' over 60 years age group is the most committed to traditional and local food. The 18-29-year-old age group has the lowest level of commitment based on the average rank values of the importance of local ingredients (756) and willingness to pay (739).

For the variables frequency of consumption in one's own household and frequency of choice at the catering establishment, higher values indicate higher commitment. The' over 60 years' age group consume traditional Hungarian food most often in their own household (average rank: 786) and choose traditional Hungarian food most often in catering establishments (average rank: 744). The' 18-29 years age group is the least engaged (average rank: 578 and 564).

Overall, the hypothesis H4 is confirmed.

The fifth hypothesis

H5: In some regional municipalities, the commitment to traditional and local food increases as the number of inhabitants decreases.

The Kruskal-Wallis test was used to compare residents' commitment to traditional and regional food in each settlement type, with a significant difference between settlement types, p<0.01. The level of commitment to traditional and local food for each type of settlement is shown in Figure 2 below.

Figure 2. Level of commitment to traditional and local food for each type of settlement.
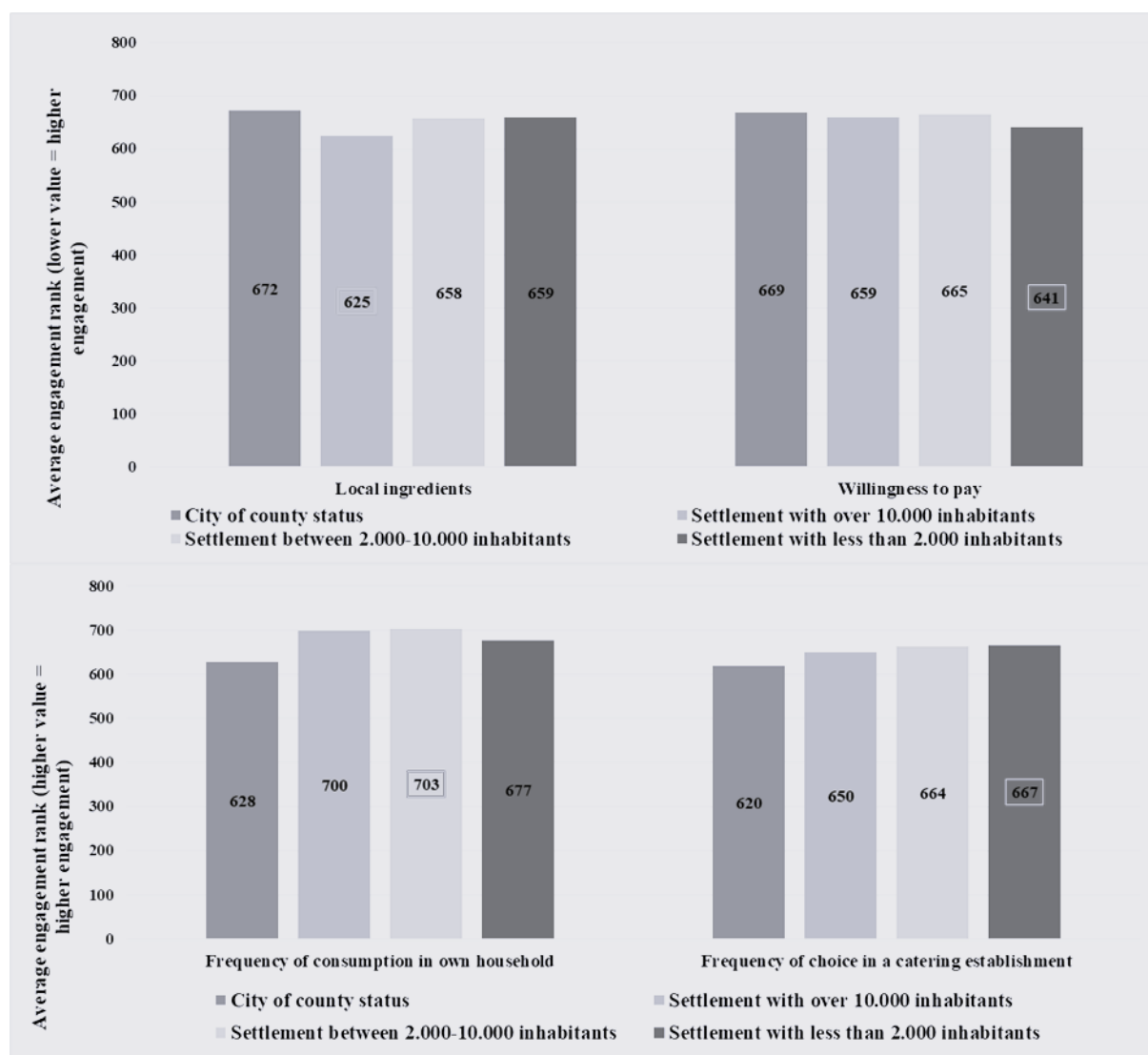
Source: Own elaboration.

For consumers living in settlements with over 10,000 inhabitants, it is most important that a food product is produced using local ingredients (average rank: 625). However, willingness to pay is highest in settlements with less than 2,000 inhabitants (average rank: 641). In both cases, the level of commitment is the lowest in cities with county status (average rank: 672 and 669).

In their households, people living in settlements with between 2.000 and 10.000 inhabitants eat the most often traditional Hungarian food (average rank: 703), while people living in settlements with less than 2.000 inhabitants most often choose to eat in catering establishments (average ranking: 667).

Overall, the hypothesis H5 is partially confirmed.

The sixth hypothesis

H6: As the household's per capita income decreases, the level of commitment to traditional and local food increases.

I compared the commitment of consumers in each income group to traditional and regional food using the Kruskal-Wallis test, with a significant difference between groups, p<0.01. The level of commitment to traditional and local food as a function of the income per capita in the families of local residents is shown in Figure 3 below.

Figure 3. The level of commitment to traditional and local food as a function of the income per capita in the families of local residents.
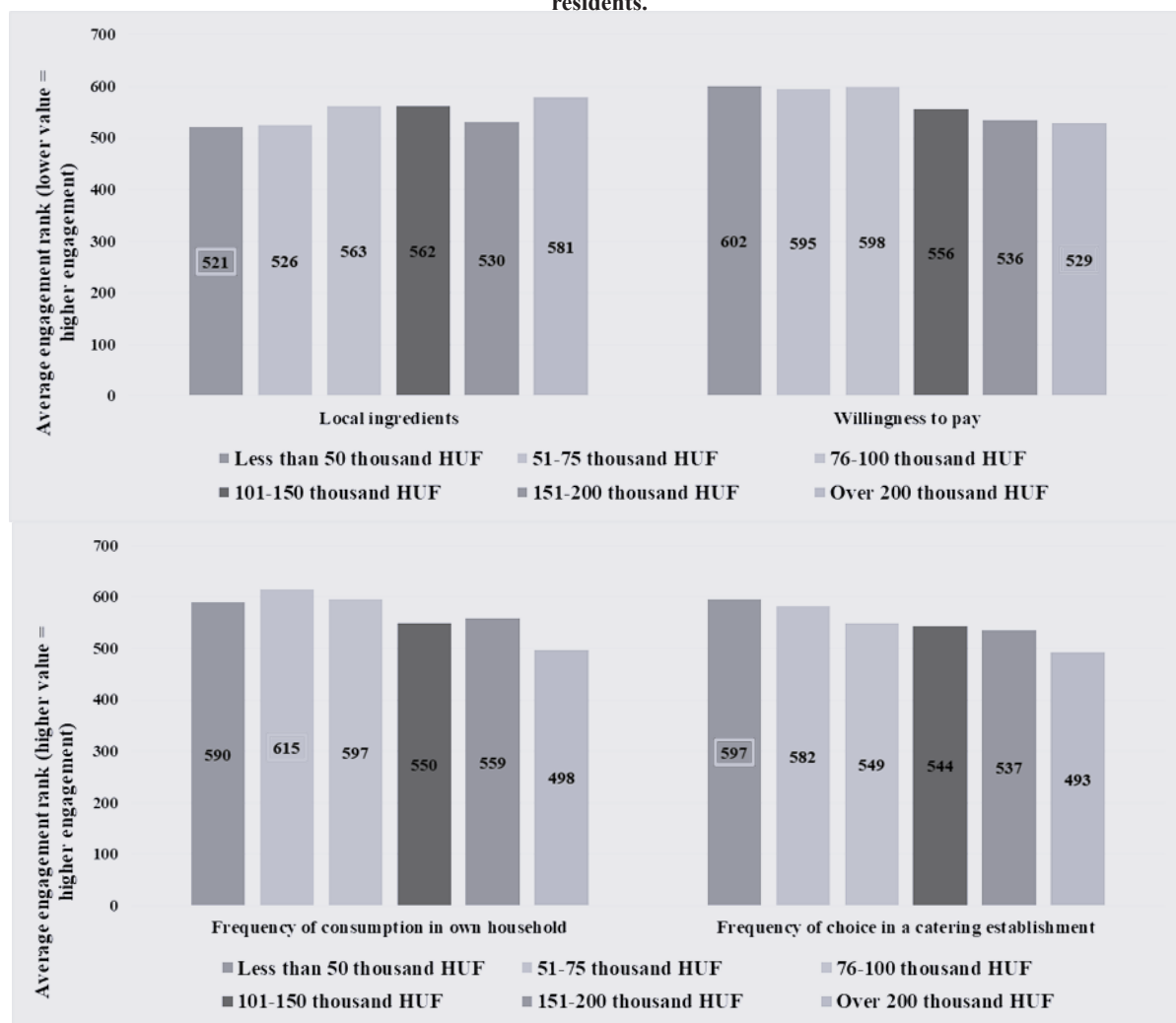
Source: Own elaboration.

Residents of the region are most committed to using local ingredients if their per capita family income is less than 50 thousand HUF (average rank: 521). In comparison, consumers are most willing to pay more for a food product made from traditional local ingredients if their per capita family income is over 200 thousand HUF (average rank: 529).

The highest frequency of consumption in own households belongs to the income group between 51 and 75 thousand HUF (average rank value: 615), and the highest frequency of choices in catering establishments belongs to the income group with a per capita family income of less than 50 thousand HUF (average rank value: 597). In both cases, the least committed consumers are those whose per capita family income is over 200 thousand HUF (average rank values: 498 and 493).

CONCLUSION

Traditional and local food can contribute to economic growth and tax revenues in the region:
- provide opportunities for industry to develop produc-

tion, start-up small and medium-sized enterprises, and create jobs in underdeveloped areas;
- provide more choice in the retail and catering sectors, allowing a higher proportion of locally produced food products to be used locally;
- can be used in rural development programs to promote and boost tourism, for example, through the organization of taste tours and themed events;
- enhance the overall attractiveness and image of the region and the country (SZAKÁLY et al. 2010).

Local people like to buy and consume traditional and local food that they find attractive and valuable. As a result of the research, the following correlations can be established:
- as the frequency of eating at home increases, there is a monotonic increase in the proportion of people who would prefer to eat traditional food in restaurants;
- as the frequency of consumption in the home increases, the proportion of people for whom a traditional food product must be made using local ingredients is growing monotonously;
- as the frequency of choosing traditional Hungarian food

in catering establishments increases, the willingness to pay for food made from traditional local ingredients increases monotonically;

- in terms of the importance of local ingredients and willingness to pay, the' over 60 years age group is the most committed to traditional and local food, and they are the most likely to consume traditional Hungarian food in their own households, also catering establishments,

- for consumers living in settlements with over 10.000 inhabitants, it is essential that a food product is produced using local ingredients, while the willingness to pay is highest in settlements with less than 2.000 inhabitants;

- in their own households, people living in settlements with between 2.000 and 10.000 inhabitants most often eat traditional Hungarian food, while people living in settlements with less than 2.000 inhabitants most often choose it in catering establishments;

- consumers with a per capita family income of over 200 thousand HUF are most willing to pay more for a food product made from traditional local ingredients, and the income group of 51-75 thousand HUF has the highest consumption frequency in their own households;

- inhabitants of the region with a per capita family income of less than 50 thousand HUF are the most committed to using local ingredients, and they are also the most likely to choose traditional Hungarian dishes in catering establishments.

It is an important objective to ensure that Hungarian consumers prefer domestic food products, because more production and sales of traditional and local food products would provide local people with the opportunity to gain employment and income, which is essential for better living conditions and economic growth in the future.

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