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O ČASOPISU

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ARTICLES – ČLANCI

Managing team performance in higher education institutions through friendship prevalence, work engagement, and organizational citizenship behavior: A structural equation modeling study*

Shofia Amin¹, Susi Adiawaty², Juliana Juliana³, Hermin Endratno⁴,
Hasmin Tamsah⁵, Muthia Shahnaz⁶

Abstract

Improving university teamwork performance is essential, especially due to the worldwide pandemic. This study examined a model for enhancing university performance by increasing friendship prevalence, work engagement, and Organizational Citizenship Behavior (OCB) among employees. This study used a quantitative design by distributing online questionnaires to 132 employees of

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universities in Indonesia. Then, the data were analyzed using Structural Equation Modeling (SEM)-Amos version 23. The study found a significant and positive effect among the variables: 1) Friendship prevalence has a significant positive effect on work engagement and OCB; 2) Work engagement also has a significant positive effect on OCB and team performance; and 3) OCB also has a significant positive effect on team performance. Moreover, the relationships between friendship prevalence and OCB, and friendship prevalence and team performance were mediated by work engagement. However, this study found that OCB could not mediate the relationship between work engagement and team performance. The study indicated that friendship prevalence is the predictor of work engagement. Thus, it is recommended for universities to build and improve good friendship among employees.

Key words: friendship prevalence, organizational citizenship behavior, structural equation modeling, team performance, quantitative study, work engagement

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1. Introduction

Institutions must become more responsive, adaptive, and competitive in addressing various challenges, particularly in light of the global impact of the COVID-19 pandemic. To create a superior and competitive institution, fostering good relationships among employees is essential. Each employee brings unique skills, knowledge, and experiences, which can contribute to effective teamwork. Through teamwork, institutions can flexibly adapt and react to a turbulent and dynamic environment. In addition, working in a team will fulfill several employees' social needs: social interaction and affiliation (Richter et al., 2011). Vigoda-Gadot et al. (2007) explained that the success of an institution mostly depends on the willingness of all employees to achieve the institution's goals. Therefore, every employee should not rely solely on their individual abilities. Fostering a friendly relationship among employees is crucial for building a strong team (Kahn and Heaphy, 2013). Maintaining good and effective working relationships with employees can encourage to achieve organizational goals and can improve employees' innovative behavior (Asadullah et al., 2017; Zheng et al., 2019). By having good relationships among fellow employees, each employee will get job satisfaction and be more engaged in teamwork (McBain and Parkinson, 2017).

In education context, Yavuzkurt and Kırıl (2020) explained that friendships among teachers, staff, and employees in schools affected their work performance. Amjad et al. (2015) added that an institution that involves friendship prevalence would increase employee comfort, job satisfaction, teamwork, and work performance. The comfort and satisfaction of friendship prevalence will increase work engagement, Organizational Citizenship Behaviour (OCB), and team performance. Work engagement can be defined as a situation where employees have high morale indicated by their involvement (Bakker et al., 2011). Meanwhile, OCB is a positive

behavior towards the organization that is indicated by employees' willingness to create effective teamwork (Singh and Singh, 2009). Both work engagement and OCB are stemmed from friendship prevalence and can increase team performance. Thus, friendship prevalence is an important research topic because its impact is beneficial for enhancing positive attitudes and outcomes (Zarankin and Kunkel, 2019).

However, the main problem that most institutions face these days is building and improving teamwork performance. Previous researchers found factors that influence team performance: team composition, work structure, task characteristics, and team building (Hwang, 2018). Chiang et al. (2020) found another factor: team emotion suppression climate and authoritarian. Meanwhile, (Yang et al., 2020) found that team diversity interacted with team reflexivity positively influenced team performance through team decision quality. Umar et al. (2020) also found that training effectiveness and team performance by soft-skill competency and employee creativity effectively increased team performance. Those studies did not specifically emerge the mechanism of improving team performance. Most empirical research on the relationship between friendship prevalence and performance shows inconsistent results (Choi and Ko, 2020). Moreover, research on team performance is still found to be limited. It is indicated that only 46 studies on this topic were published in journals indexed by the Bielefeld Academic Search Engine (BASE) from 2016 to 2021 (Open Knowledge Maps, 2021).

Therefore, this study aims to develop a model for improving team performance through friendship prevalence as the determinant of work engagement and OCB team to improve team performance, specifically in the scope of higher education institutions. There have not been many studies examining the relationship between a model involving team performance, friendship prevalence, work engagement, and OCB team. Thus, this study aims to enrich the literature on these topics and provide a useful reference model for institutions seeking to improve team performance. The research questions of this study are formulated to answer eight hypotheses related to the theoretical frameworks and previous studies, which will be further explained in the next sections. The hypotheses are formulated as follows:

H1: Friendship prevalence has a significant positive effect on work engagement.

H2: Friendship prevalence has a significant positive effect on the OCB team.

H3: Work engagement has a significant positive effect on the OCB Team.

H4: Work engagement has a significant positive effect on team performance.

H5: OCB team has a significant positive effect on team performance.

H6: Friendship prevalence has a significant positive effect on the OCB team through work engagement.

H7: Friendship prevalence has a significant positive effect on team performance through work engagement and OCB team.

H8: Work engagement has a significant positive effect on team performance through the OCB team.

2. Literature review

This study examined a model for improving university performance involving several indicators such as friendship prevalence, work engagement, and OCB. Thus, this section presents several frameworks and related studies to describe the relationship between each variable. Further explanations are presented in the three subsections below.

2.1. Friendship prevalence on work engagement and OCB team

Understanding the relationship between self-engagement and work relationships in a workplace is very important (Kahn, 2010; Kahn and Heaphy, 2013), especially in building good teamwork (Richardson and West, 2010; Torrente et al., 2013). According to McBain and Parkinson (2017), the scale of friendship in workplaces is not only getting acquainted. It often happens because of the comfort between co-workers who complete long hours together and interact frequently (McCarthy and Levin, 2019). It includes friendly attitudes, mutual trust, commitment, genuine attachment, sympathy, shared values, and interests (Berman and West, 2002; Boje and Jørgensen, 2014). It is also established through reciprocity, and the ability to open up emotionally (Cronin, 2014). However, it does not include romantic relationships (Berman and West, 2002). It aims to build social support and work engagement (Schnorpfeil et al., 2002; Ugwu et al., 2022).

The friendship prevalence in the workplace can lead to OCB. When substantial friendships exist within an organization, they foster positive and constructive behavior such as working voluntarily, supporting colleagues, and contributing to the organization's success (Thiagarajan et al., 2017). Significant friendships with co-workers can help employees feel more secure in managing their job demands and increase their willingness to assist their colleagues (Kahn, 2010). Employees who feel secure and have job satisfaction will be happier and have high work engagement (Schaufeli et al., 2006). Several studies found that friendship prevalence contributes positively to work engagement and improves employees' performance (Ting and Ho, 2017). Khairy et al. (2023) also found a significant relationship between OCB and workplace friendship with work engagement. It is because employees can gain strength from co-workers and establish comfortable atmosphere through the friendship prevalence. Therefore,

the friendship that employees made can influence their work engagement and grow their organizational citizenship behavior. From the explanation above, the hypotheses are formulated as follows:

H1: Friendship prevalence has a significant positive effect on work engagement.

H2: Friendship prevalence has a significant positive effect on the OCB team.

2.2. Work engagement on OCB team and team performance

Work engagement is a psychological component (Niswaty et al., 2021) conceptualized as an affective state and positive spirit (Bakker et al., 2011). It is an attitude that describes individuals fully involved with their work and defined by their dedication, vigor, and absorption (Schaufeli et al., 2006). Vigor shows a willingness to invest more energy and a high mental resilience at work. Dedication refers to job involvement and strong identification with the job. Meanwhile, absorption represents one's complete concentration and preoccupation with work (Llorens et al., 2007). In other words, work engagement consists of three key elements: vigor, dedication, and absorption. Work engagement characterized by vigor, dedication and absorption is important as it can reduce the intentions of not being present in an organization and unfriendly work environment (Dai et al., 2021; Karatepe et al., 2020). Work engagement also can positively influence team performance (Mäkikangas et al., 2016; Tims et al., 2013). The positive relationship work engagement and team performance has been proven in several studies (Christian et al., 2011; Demerouti et al., 2014). Previous studies found that work engagement improves: (1) students' task performance in groups (Salanova et al., 2003); (2) employees' service climate (Salanova et al., 2005); (3) positive collective influence and efficacy beliefs (Vera et al., 2011); and (4) individual work engagement level (Schaufeli et al., 2006). Consistent with the JD-R WE model (Bakker et al., 2011; Bakker and Demerouti, 2017), many studies show that work engagement has high consequences on performance (Christian et al., 2011; Demerouti et al., 2014). Work engagement enhances performance by boosting employee morale, enabling longer working hours, and demonstrating a commitment to their work. The relationship between work engagement and team performance is consistently positive (Bakker and Demerouti, 2017).

As previously stated, work engagement can increase team performance and employees' willingness to work harder. Employees' willingness to work harder is also known as organizational citizenship behavior. OCB encompasses positive and constructive actions that individuals willingly undertake to assist their colleagues and benefit the organization (Thiagarajan et al., 2017). OCB can occur at any time based on an individual's personal decision whether they want to do it or not (Coyle-Shapiro and Kessler, 2000; Dulac et al., 2008). Individuals who

frequently engage in OCB are those who are recognized for going the extra mile or exceeding the minimum effort required to complete their tasks. Organ (2018) stated that the formal reward system does not explicitly recognize OCB through salary increases or promotions. However, OCB can help achieve organizational goals and increase the effectiveness of organizational functions. The advantages of OCB for organizations are: enhancing productivity, helping organizations cope with limited resources, leading to greater coordination among employees, and organizational adaptability. Nowadays, most organizations expect employees to perform beyond their regular job descriptions and cope with competitive pressures (Thomas et al., 2017). Alqarni et al. (2023) also found that OCB can increase innovation and organization team performance. In other words, OCB has an essential role in an organization because it affects the effectiveness of team performance (Bergeron et al., 2013; Organ, 2018).

Some studies found a strong relationship between OCB and teamwork. Podsakoff et al. (2014), in their research, suggested that there is a relationship between OCB and the effectiveness of teams or work units in organizational performance settings. Other research also showed a significant positive relationship between OCB and teamwork satisfaction in supporting team performance (Chan and Lai, 2017; Nohe and Michaelis, 2016; Singh and Singh, 2009). They also found that the higher the OCB of members of a work team, the higher the job satisfaction of the team, and vice versa. It was also found that there was a positive and significant effect of individual OCB and teamwork OCB on employee performance (Foote and Li-Ping, 2008; Mohamed Riad et al., 2019; Nawaz and Gomes, 2018). The higher the individual OCB and the teamwork OCB, the higher the employee performance will be. Thus, OCB has been identified as an essential indicator for the performance of employees or members in an organization (Vigoda-Gadot et al., 2007). In other words, work engagement and organizational citizenship behavior are interplay and can influence team performance. From the explanation above, the following hypothesis can be formulated:

H3: Work engagement has a significant positive effect on the OCB Team.

H4: Work engagement has a significant positive effect on team performance.

H5: OCB team has a significant positive effect on team performance.

2.3. Mediation effect

The mediation effect is an analysis that identifies the mechanism underlying an observed relationship between an independent variable and a dependent variable involving a third explanatory variable, known as a mediator variable. This study will test the mediation effect of the relationship between four variables: friendship prevalence, work engagement, OCB team, and team performance.

Friendship prevalence among employees fosters greater engagement in organizational activities (McBain and Parkinson, 2017) that is shown by the employee's willingness to work together (Berman and West, 2002). Additionally, strong prevalence of friendship can also encourage the improvement of the OCB team, characterized by the positive and constructive behaviors such as voluntarily completing tasks and helping colleagues, which is beneficial for the organization (Thiagarajan et al., 2017). Furthermore, a strong friendship among employees can construct a solid team performance. This study develops the concept about the mechanism of how the friendship prevalence affects team performance.

This relationship has an interesting consequence with two concepts that become mediators: work engagement and the OCB team. In other relationships, the OCB team can also mediate the relationship between work engagement and team performance (Christian et al., 2011; Demerouti et al., 2014; Mäkikangas et al., 2016). The consequences that arise from this concept create an indirect relationship between the conceptualized variables. Thus, the hypotheses are formulated as follows:

H6: Friendship prevalence has a significant positive effect on the OCB team through work engagement.

H7: Friendship prevalence has a significant positive effect on team performance through work engagement and OCB team.

H8: Work engagement has a significant positive effect on team performance through the OCB team.

3. Research methodology

This study used a quantitative approach by using Structural Equation Modeling (SEM)-Amos version 23 in analyzing the data. The reasons for choosing the SEM-Amos approach are: 1) SEM-Amos can work with several equations at once where the variables can represent predictors (regressors) as well as criteria (regressions) in one equation (Nachtigall et al., 2003), which is different from the usual regression analysis that must be repeated, 2) SEM-Amos can test the mediation process simultaneously (McNabb, 2018; Tabachnick and Fidell, 2012). The respondents of this study are 132 employees of universities in Indonesia who were willing to fill out online questionnaires. Each statement of the questionnaire item is counted on a Likert scale (1 = strongly disagree to 7 = strongly agree).

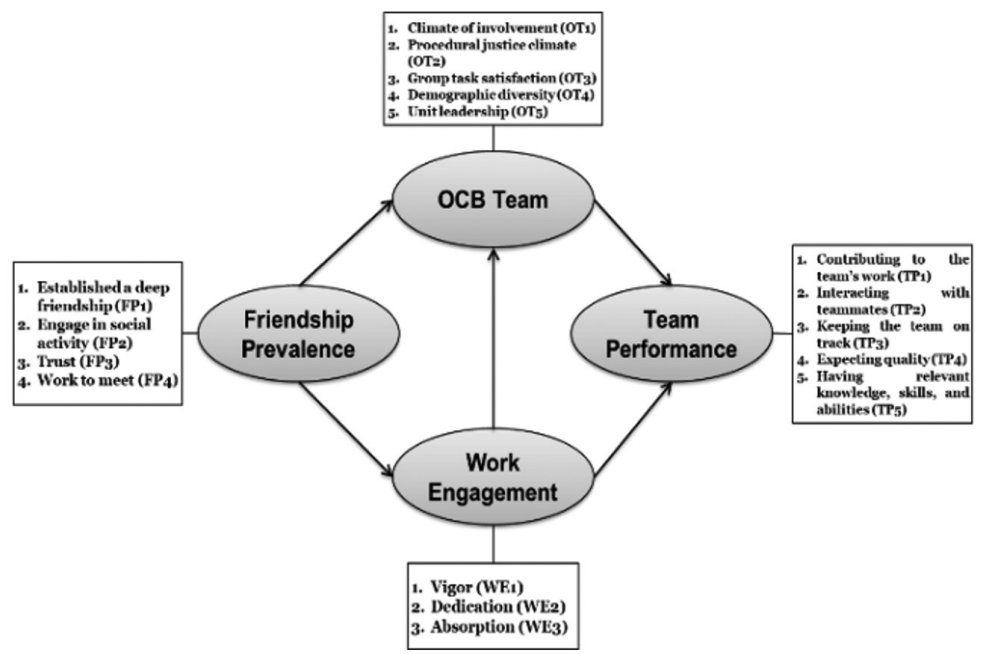
After the data were collected, the data were tested in two stages. The first test confirmed that each indicator could accurately measure its latent variable using the Confirmatory Factor Analysis technique. Indication of loading factor >0.5 ; Critical

Ratio value is greater than 2, and Standard Error does not indicate a poor fit value. The smallest S.E. value close to zero and the largest indicated that the model has poor fit data (Hair et al., 2017). Meanwhile, the measurement of construct validity in this study used the value of Construct Reliability (C.R.) > 0.7 and Average Variance Extracted (AVE). Meanwhile, the measurement of construct validity in this study used the value of Construct Reliability (C.R.) > 0.7 and Average Variance Extracted (AVE). It is suggested by Jogiyanto (2011) that when the value of average variance extracted (AVE) has represented internal consistency, the internal consistency test has filled the construct validity based on criteria because the valid consistency is reliable (Triwidyati and Tentama, 2020).

The Friendship Prevalence (FP) variable measures the number of friendships in the workplace, characterized by informal, interpersonal, and voluntary interactions between employees in an organizational environment. This variable is assessed using the following indicators: (1) Establishing a deep friendship (FP1); (2) Engaging in social activities (FP2); (3) Trusting colleagues (FP3); and (4) Working to connect with colleagues (FP4) (Dai et al., 2021; Zhuang et al., 2020). Work Engagement (WE) manifests the affective involvement of team members in teamwork. This variable is measured by the Vigor indicator (WE1); Dedication (WE2), and Absorption (WE3) (Bongcayat and Guhao, 2020). Furthermore, the OCB Team (OT) variable reflects the positive behavior of team members willing to work exceeding their main task to help their colleagues. This variable is measured by the indicators: very punctual (OT1); follows the rules (OT2); gladly helps integrate new colleagues (OT3); assists colleagues (OT4); and cheers up colleagues (OT5) (Dick et al., 2008). Then, the Team Performance (TP) variable is the behavior of team members that reflects the process of achieving team performance. This variable is measured by the indicators: Contributing to the teamwork (TP1); Interacting with teammates (TP2); Keeping the team on track (TP3); Expecting quality (TP4); Having relevant knowledge, skills, and abilities (TP5) (Hwang, 2018).

Based on the previous literature review, a theoretical framework has been developed outlining how friendship prevalence, OCB team, and work engagement influence a team's innovative behaviour. Figure 1 below illustrates the influences of the three factors on team performance.

Figure 1: The Influence of Friendship Prevalence, OCB Team, and Work Engagement on Team Performance



Source: Adapted from Bongcayat and Guhao (2020), Dai et al. (2021), Dick et al. (2018), Hwang (2018), and Zhuang et al. (2020).

4. Empirical data and analysis

This study examined a model for improving university performance and tested eight hypotheses related to friendship prevalence, work engagement, and organizational citizenship behavior. The data were collected using the methodology explained in the previous section. Thus, this section presents the empirical data and analysis, including the respondents' profiles and the data analysis. Some tables and figures, as well as the statistical results, are also presented in the subsections below.

4.1. Respondent's profile

The respondents are from the three largest islands in Indonesia: Java, Sulawesi, and Sumatra. They are dominated by civil servants with academic degrees of masters and doctorates. The complete demographic respondents are presented in Table 1 below.

Table 1: Respondents’ demography

Demographic Items	Frequency	%
Gender		
1. Male	68	51.52
2. Female	64	48.48
Total	132	100
University Categories		
1. Public University	27	20.45
2. Private University	105	79.55
Total	132	100
Academic Degree		
1. Doctorate	26	19.70
2. Master’s	76	57.58
3. Bachelor’s	28	21.21
4. High School Graduates	2	1.51
Total	132	100
Employee Status		
1. Civil Servant	18	13.64
2. Non-Civil Servant	114	86.36
Total	132	100
Job Task		
i. Employee	49	37.12
ii. Lecturer	54	40.91
iii. Lecturer with additional assignments (unit leader)	29	21.97
Total	132	100
Origin		
1. Java Island	85	64.39
2. Sulawesi Island	30	22.73
3. Sumatera Island	17	12.88
Total	132	100

Source: Data collection (Authors).

4.2. Data analysis

The results of the model’s measurement after the two testing stages were Confirmatory Factor Analysis (CFA) and Model Fit Testing. The statistical results are shown in Table 2 below.

Table 2: Statistical Result

Vari-ables	Indicators	Standardized Estimate	Estimate	Standard Error	Critical Ratio	P Value	Construct Reliability	Variance Extracted
Friendship Prevalence (FP)	• Established a deep friendship (FP1)	0.636	0.895	0.139	6.450	***	0.85	0.50
	• Engage in social activity (FP2)	0.684	0.933	0.142	6.569	***		
	• Trust the colleagues (FP3)	0.718	1.000			-		
	• Work to meet colleagues (FP4)	0.663	1.059	0.163	6.511	***		
Work Engagement (WE)	• Vigor (WE1)	0.776	1.000			***	0.94	0.83
	• Dedication (WE2)	0.819	1.103	0.110	9.980	***		
	• Absorption (WE3)	0.876	2.241	0.222	10.087	***		
OCB Team (OT)	• Very punctual (OT1)	0.741	0.985	0.103	9.528	***	0.92	0.80
	• Follow rules (OT2)	0.833	0.990	0.087	11.418	***		
	• Gladly help integrating new colleagues (OT3)	0.885	1.000			-		
	• Help colleagues (OT4)	Deleted item						
	• Cheer up colleagues (OT5)	Deleted item						
Team Performance (TP)	• Contributing to the team’s work (TP1)	0.715	1.093	0.139	7.877	***	0.95	0.82
	• Interacting with teammates (TP2)	0.763	1.208	0.144	8.419	***		
	• Keeping the team on track (TP3)	0.804	1.221	0.138	8.868	***		
	• Expecting quality (TP4)	Deleted item						
	• Having relevant knowledge, skills, and abilities (TP5)	0.734	1.000			-		
Model Fit Testing		Cut of Value				Result		Remark
Chi-Square		df = 72, χ^2 = 92.808				140.851		Marginal
Significance		≥ 0.05				0.000		Marginal
CMINDF		≤ 2				1.956		Fit
GFI		≥ 0.90				0.868		Marginal
AGFI		≥ 0.90				0.809		Marginal
TLI		≥ 0.90				0.918		Fit
CFI		≥ 0.90				0.935		Fit
RMSEA		0.03 - 0.08				0.08		Fit

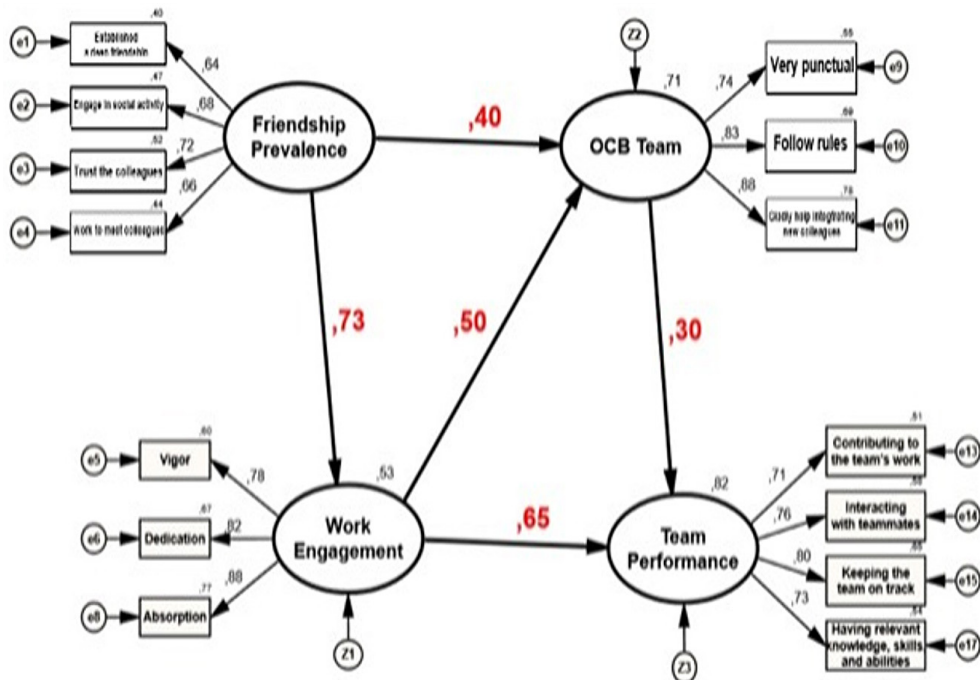
Note: *** (Significant at level P < 0.01)

Source: Author’s calculation by Structural Equation Modeling (SEM)-Amos software version 23.

The data showed that the friendship prevalence and work engagement have a loading factor value of 0.6 for each indicator. Meanwhile, the organizational citizenship behavior team variable has two excluded indicators: help colleagues (OT4) and cheer up colleagues (OT5). Team performance has one indicator that is excluded from the model: the indicator of expecting quality (TP4). The excluded indicators were deleted because the loading factor value of each indicator were below 0.6, which is considered to be invalid.

All retained indicators have a loading factor value > 0.5 ; Critical Ratio ≥ 2.00 ; and P-Value < 0.05 , which means that each indicator is valid and can measure the latent variable. The value of construct reliability (CR) ≥ 0.7 and variance extracted (AVE) ≥ 0.5 indicates the data has a very good level of reliability. Thus, data used in this study is valid and reliable. The results of the complete measurement are shown in Figure 2 below.

Figure 2: Structural Equation Model



Source: Measurement results (authors).

The model structurally can be said to be suitable. It is proved by the goodness of fit value that has met the suitability value, especially the value CMIN/DF=1.956 (≤ 2.00); TLI = 0.918 (≥ 0.90); CFI = 0.935 (≥ 0.90); and RMSEA = 0.08 (0.03 – 0.08).

After getting the suitable model, the data involving the research hypotheses were tested by the Structural Equation Modeling (SEM)-Amos software version 23. The hypothesis testing is presented in Table 3 below.

Table 3: Hypothesis testing

Hypothesis	Standardized estimate	Estimate	Standard Error	Critical Ratio	P Value	Result
H1: Friendship Prevalence (FP) → Work Engagement (WE)	0.728	0.595	0.097	6.116	***	Supported
H2: Friendship prevalence (FP) → OCB team (OT)	0.399	0.511	0.168	3.052	0.002	Supported
H3: Work Engagement (WE) → OCB Team (OT)	0.504	0.791	0.201	3.934	***	Supported
H4: Work Engagement (WE) → Team Performance (TP)	0.651	0.617	0.138	4.457	***	Supported
H5: OCB Team (OT) → Team Performance (TP)	0.297	0.179	0.077	2.328	0.020	Supported
H6: Friendship Prevalence (FP) → Work Engagement (WE) → OCB Team (OT)	0.367	estimates/bootstrap (two tailed significance-BC)			0.005	Supported
H7: Friendship prevalence → Work Engagement (WE) and OCB Team (OT) → Team Performance (TP)	0.702				0.007	Supported
H8: Work Engagement (WE) → OCB Team (OT) → Team Performance (TP)	0.150				0.072	Not Supported

Note: *** (Significant at Level P < 0.01)
Source: Author’s calculation by Structural Equation Modeling (SEM)-Amos software version 23.

Table 3 showed that of the eight hypotheses, seven hypotheses were accepted: (1) Friendship prevalence significantly has a positive effect on work engagement, (2) Friendship prevalence significantly has a positive effect on the OCB team, (3) Work engagement significantly has positive effect on OCB Team, (4) Work engagement significantly has a positive effect on team performance, (5) OCB team significantly has a positive effect on team performance, (6) Friendship prevalence has a positive effect on OCB team through work engagement as partial mediator, and (7) Friendship prevalence significantly has a positive effect on team performance through work engagement and OCB team. However, the eighth hypothesis, (8) *work engagement significantly affects team performance through the OCB team*, is rejected.

5. Results and discussion

This study found seven valuable points based on the results of the study. First, the results indicated that friendship prevalence directly had a positive effect on work engagement. The first result is in line with several studies (Balakrishnan and Dwivedi, 2021; Xiao, 2017; Zahoor et al., 2021). The previous studies found that friendship prevalence is built by trust which later will increase the work engagement of employees. The results of the current study indicate that an increase in the prevalence of friendship among colleagues significantly enhances work engagement. Based on the respondents' answers, the most significant loading factor value of the friendship prevalence is Trust the Colleagues (FP3) of 0.718. The first result indicates that trust among colleagues is the primary foundation for forming friendships in the workplace. Trust motivates individuals to share personal information, revealing their genuine opinions, agendas, and emotions (Zarankin and Kunkel, 2019). The friendship will encourage high engagement in work because of the support and mutual assistance. Meanwhile, the strongest factor of work engagement is absorption (WE3), with a loading factor of 0.876. Work engagement is employees' optimal attachment to their work involving their physical, cognitive, and emotional. It is natural that absorption is the most significant contributor of work engagement. By being involved physically, cognitively, and emotionally, employees will be pleasure to work with full concentration. Then, feelings of pleasure and enjoyment of working will also make them difficult to get away from work.

The second result indicates that friendship prevalence has a direct and positive relationship with the OCB Team. It implies that an increase in the friendship prevalence will significantly increase the OCB Team. This result aligns with Nohe and Michaelis (2016) that showed a positive relation between individual-level trust in leaders and OCB team. Nohe and Michaelis (2016) summarized five factors that became the antecedents of the OCB Team: procedural justice climate, climate of involvement, group task satisfaction, unit leadership, and demographic diversity. Group task satisfaction and unit leadership will be formed if team members trust each other. Mutual trust, commitment, and reciprocal linking are the foundations of friendship. In other words, by trusting each other with friends, work collaboration based on friendship will be formed so that the willingness to help colleagues in a team becomes strong which increase the OCB team.

The third result indicates that work engagement has a direct positive relationship with the OCB Team. It means that increasing work engagement will also increase the OCB Team. This study found that absorption as the dominant contributor to work engagement stimulated employees to help colleagues and work exceed their primary tasks. It is in line with previous studies which proved that work engagement greatly contributed to the OCB Team (Mohamed Riad et al., 2019;

Sahoo and Mohanty, 2019). The previous studies share similarities in the findings; work engagement can trigger employees; willingness to help their colleagues as a form of their engagement to work.

The fourth result indicates that work engagement has a direct positive relationship with team performance. Khairy et al. (2023) also examined this relationship and identified a significant positive correlation. Employees who are highly engaged in their work have a substantial impact on team performance. The main contributor in achieving team performance based on the results of this study is employees' ability to keep the team on track of the group or institution's desires (keeping the team on track). Keeping the team on track will create consistent behavior on the right track so that positive behaviors are accumulated, which is an indicator of performance measurement (Rahmadani et al., 2020; Rothbard and Patil, 2012).

The fifth result is that the OCB Team also had a direct and positive relationship to team performance. The results indicated that 'gladly help integrating new colleagues' (OT3) was a dominant indicator of the OCB Team. Gladly help integrating new colleagues, willing to help work, and supporting colleagues strengthened cooperation and cohesiveness, reflecting the social learning process in a team context. The teamwork enhanced the institution's atmosphere and a sense of togetherness among employees which later generated spontaneous activities to help colleagues. Thus, each employee's behavior contributes significantly to the team's overall performance (Hwang, 2018).

The next results show that work engagement had a significant role as a partial mediator in the relationship between friendship prevalence and the OCB team (6), and work engagement and OCB also mediate the relationship between friendship prevalence and team performance simultaneously (7). The results indicated a significant and direct relationship between friendship prevalence and the OCB team. The result reinforces the fact that team performance is influenced by employee's work engagement, mutual support, and team members' help. The results are novel because other studies have not tested the mediation effect of this study's variables. Put differently, this study showed that work engagement can mediate the relationship between friendship prevalence and OCB team as well as friendship prevalence and team performance.

However, the eighth result of the hypothesis test was rejected. The eighth result indicates that the OCB Team could not mediate the link between work engagement and team performance. While work engagement directly affects the OCB Team, and the OCB Team also affects team performance, the OCB Team did not significantly mediate work engagement and team performance. As stated by Hwang (2018), team performance is a multi-level process where team members engage in their teamwork. Therefore, employees' teamwork engagement directly or indirectly has a significant effect on increasing team performance. This result differs from

related studies that found that the OCB team could mediate work engagement team performance (Nizar et al., 2022; Sugianingrat et al., 2019). The other studies found that the presence of the OCB will strengthen the outcome of work engagement and performance. This study's different result might happen because this study applies different indicators of OCB team which include: very punctual (OT1); following the rules (OT2); gladly helping integrate new colleagues (OT3); helping colleagues (OT4); and cheering up colleagues. Meanwhile, the other studies used the indicators of the OCB team such as courtesy, civic virtue, conscientiousness, and quality (Nizar et al., 2022). Thus, the different indicators might cause different results.

Overall, the results showed that friendship prevalence within institutions is essential as it can significantly influence work engagement and the OCB team, which later can also affect team performance. Friendship can be fostered not only by employees but also by the institution itself, which can create an environment that encourages relationships. For example, the institution can build a sense of solidarity and togetherness among employees through various training initiatives and cultural collaboration. It is essential for institutions to enhance friendly vibes among employees as not only do workplace friendships fulfill social needs but also improve job satisfaction and performance (Choi and Ko, 2020).

6. Conclusions

This study found that friendships in the workplace can influence teamwork, which will ultimately increase work engagement and create good work performance. It is proved that by eight hypotheses, 7 of which can be accepted. Friendship prevalence significantly and positively affects work engagement and the OCB team (H1 and H2). Work engagement has a significant positive impact on the OCB team and team performance (H3 and H4). Likewise, the OCB team significantly and positively influences team performance (H5). Then, work engagement can mediate the relationship between friendship prevalence and team OCB (H6) as well as friendship prevalence and team performance (H7). The results of this study show that the predictor of work engagement is friendship prevalence, which can influence OCB and team performance through work engagement. In other words, increasing the prevalence of friendship in the workplace is crucial for creating teamwork and producing work engagement and performance. Thus, institutions need to raise the awareness of working in a team by providing activities that foster a friendly atmosphere to strengthen employees' friendships. This study recommends that institutions improve team performance through increasing friendship prevalence, which can be done by increasing trust between employees through character building and competency development. Moreover, as this study is limited to investigating influential indicators of increasing friendship prevalence,

doing a qualitative study to explore an in-depth understanding of employee factors for sustaining friendship to increase teamwork performance in universities or any institution is highly recommended for future researchers. Furthermore, it is hoped that this study can enrich the literature on the importance of building teamwork in an institution and become a consideration for policymakers to facilitate employees to be more engaged and united in their organization through healthy friendships to achieve its goals and success.

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Upravljanje uspješnošću timskog rada u visokoškolskim ustanovama kroz prevalenciju prijateljstva, radnu angažiranost i organizacijsko građansko ponašanje: Studija modeliranja strukturne jednadžbe

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Sažetak

Poboljšanje timskog rada na sveučilištima od suštinske je važnosti, osobito u vrijeme svjetske pandemije. Cilj ove studije bio je ispitati model za poboljšanje uspješnosti sveučilišta povećanjem prevalencije prijateljstva, radnog angažmana i organizacijskog građanskog ponašanja (OCB) među zaposlenicima. Ova studija koristila je kvantitativni dizajn distribuiranjem online upitnika za 132 zaposlenika sveučilišta u Indoneziji. Zatim su podaci analizirani pomoću strukturnih modela jednadžbi (SEM – Structural Equation Modeling) – Amos verzije 23. Istraživanjem je potvrđen značajan i pozitivan učinak među sljedećim varijablama: 1) Prevalencija prijateljstva ima značajan pozitivan učinak na radnu angažiranost i OCB; 2) Radna angažiranost ima značajan pozitivan učinak na OCB i na uspješnost timskog rada; i 3) OCB ima također značajan pozitivan učinak na timsku izvedbu. Štoviše, odnosi između prevalencije prijateljstva i OCB-a, te prevalencije prijateljstva i uspješnosti timskog rada nastaju posredstvom radnog angažmana. Međutim, ovo istraživanje potvrđuje da OCB ne može posredovati u odnosu između radnog angažmana i uspješnosti timskog rada. Studija je pokazala da je prevalencija prijateljstva prediktor radnog angažmana. Stoga se sveučilištima preporuča graditi i unapređivati dobro prijateljstvo među zaposlenicima.

Ključne riječi: prevalencija prijateljstva, organizacijsko građansko ponašanje (OCB), modeliranje strukturnih jednadžbi, timska izvedba, kvantitativna studija, radni angažman

JEL klasifikacija: C83, D23, I23, J24, M12, M54

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Unlocking the pension fund performance: A systematic literature review approach*

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Abstract

Pension funds have a pivotal role in financial systems, managing significant assets and contributing to economic growth through capital market investments. Identifying the key factors that influence their performance is essential for ensuring sustainable and adequate pension systems. The paper aims to identify the determinants of pension fund performance that directly contribute to competitiveness in financial markets by enabling efficient capital allocation and improved governance. The research employed two methods: a systematic literature review (SLR) and a bibliometric analysis (BA). The results indicate that five main factors influence pension fund performance: capital market developments, fund size and investment characteristics, corporate governance, behavioural and political influences, and regulatory and legislative environment. A bibliometric analysis reveals current trends in pension fund performance research and examines the relationship between the quality of a country's pension system and the origin of relevant research. The results provide valuable insights for fund managers, policymakers, and other stakeholders, thereby enhancing the decision-making process and deepening the understanding of the implications for pension fund performance, pension systems, and pension beneficiaries.

Keywords: pension fund performance, bibliometric analysis, SLR

JEL classification: C52, D53, J32, G23

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1. Introduction

Institutional investors account for the largest share of investment activity worldwide (Erhemjamts and Huang, 2019), with institutional pension funds standing out in particular, with assets under management of more than USD 55.7 billion in 2023 (Thinking Ahead Institute's, 2024). The unique role and position of pension funds arise from their function as financial intermediaries, as they channel savings into investments via the capital market and directly influence the growth of individual and national savings, thus contributing to economic growth (Demirgüç-Kunt and Levine, 1995). The importance of pension funds for society and the well-being of citizens stems from individual responsibility and the burden on public budgets to ensure a stable and predictable future income in retirement. The nature of national pensions is of great interest not only for public policy in times of decreasing fiscal flexibility and aging populations but also for the design of private pension plans by companies for their employees. Moreover, pension assets are a large and important part of the national financial systems (Aggarwal and Goodell, 2013).

Pension funds are currently dealing with many challenges such as: an aging population, an increasing number of retirees and changes in the labour market and many others. The sustainability and adequacy of pension systems are therefore becoming increasingly important when it comes to capitalized pension savings and efforts to improve the performance of pension funds. This pressure is made even worse by the ongoing challenges and geopolitical and financial uncertainties around the world. Pension fund performance is the backbone of adequate retirement savings and reduces the risk of income shortfalls in retirement due to portfolio allocation inefficiencies (Hinz et al., 2010). Recently, low investment returns, low interest rates and a lack of economic growth have further worsened the financial situation of pension systems worldwide. For this reason, the study of pension fund performance and the factors that determine returns has received much research attention in recent years.

Conducting a systematic literature review (SLR) on the factors that influence pension fund performance is crucial for various stakeholders. For fund managers, it could provide important insights to make informed investment decisions, optimise asset allocation and implement effective risk management strategies. Policymakers could benefit from the insights they need to formulate policies that ensure the stability and sustainability of pension systems and protect the interests of pensioners. For pension fund members and contributors, such reviews could improve financial literacy by clarifying how their investments are managed and what factors influence performance, ultimately increasing their confidence in the management of their retirement savings. Building upon prior research, this study aims to identify the key factors deemed critical to pension fund performance. To accomplish this objective, the following research questions (RQs) were analysed through the application of the systematic literature review (SLR) method:

RQ1: What factors influence pension fund performance?

RQ2: How do these factors affect the performance of pension funds?

In addition to these research questions, the study analysed current trends in the literature dealing with pension fund performance factors. Furthermore, the bibliometric analysis includes an examination of the relationship between the quality of a country's pension system and the origin of the relevant research papers. On this basis, two further research questions were investigated:

RQ3: What are the current trends in the study of pension fund' research performance in terms of authors, journals, participating countries and institutions?

RQ4: Do most research papers come from countries with highly rated pension systems according to the Mercer CFA Institute Global Pension Index 2023?

These research questions will close the gap by identifying key factors impacting pension fund performance while enhancing understanding of their interplay within financial and regulatory frameworks. The findings aim to support sustainable pension systems, inform policies, and optimize investment strategies for long-term economic stability.

The remainder of the review paper is organized according to the IMRAD structure. The first part of the research introduces the topic, the second chapter explains the data and methodology. The third chapter deals with the research findings, including the systematic literature review (SLR) and the bibliometric analysis. The final part of the paper summarizes the discussion and presents the conclusions.

2. Data and methodology

This article uses a systematic literature review (SLR) and a bibliometric analysis (BA) to identify the articles that make the most important contributions to the topic of pension fund performance.

2.1. Systematic literature review

The SLR encourages researchers to search for studies outside their field and networks by introducing extensive search methods, predefined search terms, and standardized inclusion and exclusion criteria (Robinson and Lowe, 2015), while the BA provides a broader view of the topic.

The search was carried out on October 23, 2023, using the Web of Science databases due to their academic reputation. In this database, the articles in the *Social Science Citation Index (SSCI)*, *Emerging Sources Citation Index (ESCI)*, *Science Citation Index Expanded (SCI Expanded)* and the *Conference Proceedings Citation Index (CPCI-S and CPCI-SSH)* were accepted. Boolean operators such as *OR* and *AND* were used to refine the search process. The *AND* operator was used to narrow the search results, while the *OR* operator was used to broaden the search results. Besides the mentioned operators, we used \$ as a truncation symbol, which helped us to find the root of certain words, and brackets () to control the order of operations in the search. The final search term we used was:

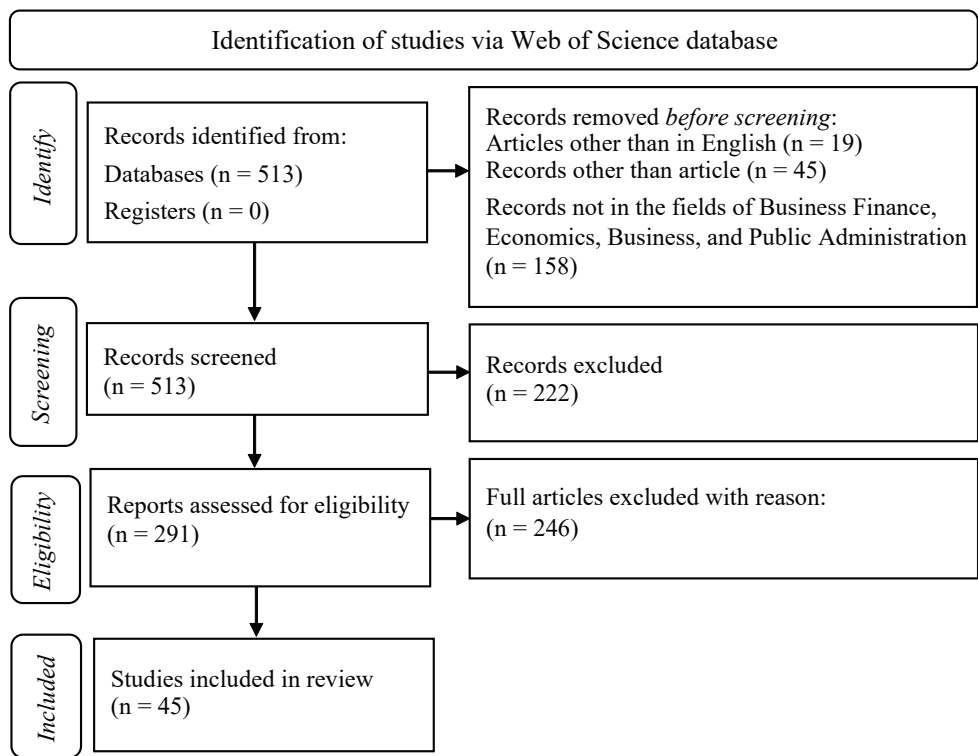
*(implications OR influence OR impact) AND (financial success OR performance)
AND (pension fund\$ OR retirement fund\$ OR pension system\$)*

This SLR review relied on the PRISMA framework of Page et al. (2021) to answer questions RQ1 and RQ2. PRISMA is an appropriate protocol for conducting SLRs as it encourages reviewers to carefully document their review plans to avoid arbitrary decisions (Shamseer et al., 2015). According to Petrović and Karanović (2024: 414) “PRISMA is structured methodology which enhances the review’s transparency and replicability, ensuring a rigorous and high-quality analysis”.

In the first phase of the keyword search, 513 potential articles were identified. However, since only English-language articles were accepted, 19 articles were excluded. The next exclusion criterion was to search for research articles, excluding proceedings papers, review articles, early access, book chapters, and editorial material. We also included articles from the Web of Science categories of Business Finance, Economics, Business and Public Administration. The extracted articles were published between 1997 and 2024. This SLR was conducted by authors who undertook various tasks, including writing the manuscript, developing selection criteria and bias assessment strategies, extracting data, developing the search strategy, analysing statistics, providing feedback, and approving the final manuscript.

To ensure the relevance of the analysis, the authors first reviewed the abstracts and selected the most relevant to the core themes of the study. In the final phase, a data synthesis was performed based on the results of a quantitative analysis to assess the quality of the articles. This systematic approach ensures that the selected literature contributes directly to the research objectives and that the conclusions are based on high quality evidence. This process excluded 468 articles with justification, leaving 45 articles for quality assessment. Figure 1 shows the inclusion and exclusion of literature at each stage (PRISMA 2020 flow diagram).

Figure 1: Prisma flow diagram



Source: Author’s calculations

2.2. Bibliometric analysis

Bibliometric Analysis (BA) is a quantitative technique for analysing large amounts of scientific bibliography and bibliometric data in a specific field. Nowadays, it is used as a form of analysis to uncover emerging research trends in articles and journal performance (Donthu et al., 2021). The primary advantage of BA is to understand global research trends in a particular field (Alsharif et al., 2022). In our view, BA serves as a comprehensive method for statistically analysing productivity indicators at different levels, including years, authors, countries, and institutions. In addition, this approach facilitates the identification of correlations, such as co-authorships, citations, and other forms of collaboration, thus providing valuable insights to the reader. In this study, a BA is used to answer research questions aimed at better understanding the impact of the topic on the performance of pension funds. A bibliometric analysis was conducted using Biblioshiny software (Aria and Cuccurullo, 2017), following the methodology of several previous studies (Uskoković et al., 2024; Rani and Goyal, 2024; Sethi and Mahadik, 2024). The initial step of this analysis was to present the general data of the sample used in the BA in Table 1.

Table 1: Main information about data

Information	Explanation	Number
Timespan	Period of publication	2002:2022
Sources (Journals, Books, etc)	Number of unique publication outlets (journals, books, conferences).	45
Documents	Total number of documents	63
Annual Growth Rate %	Average yearly increase in the number of documents.	10.96
Document Average Age	Average (current year - publication year)	8.16
Average citations per doc	Average number of citations per document	12.54
Total number of References	Total number of references cited across all documents	2559
Keywords Plus (ID)	Words extorted from the titles of cited references	198
Author's Keywords (DE)	Keywords that are given by the authors	225
Authors	Total number of authors	131
Authors of single-authored docs	Single author per article	9
Single-authored docs	Total number of documents written by a single author	12
Co-Authors per Doc	Average number of co-authors per document	2.32
International co-authorships %	Percentage of documents authored by researchers from different countries	23.81
Article	Peer-reviewed standard journal article	54
Article; early access	Article published online before final print	7
Article; proceedings paper	Article also presented in a conference proceeding.	2

Source: Author's calculations

The timeframe for academic papers on the topic of *Influence on the performance of pension funds* spans from 2002 to 2022. The analysis of annual production shows a recognizable upward trend in the number of published papers.

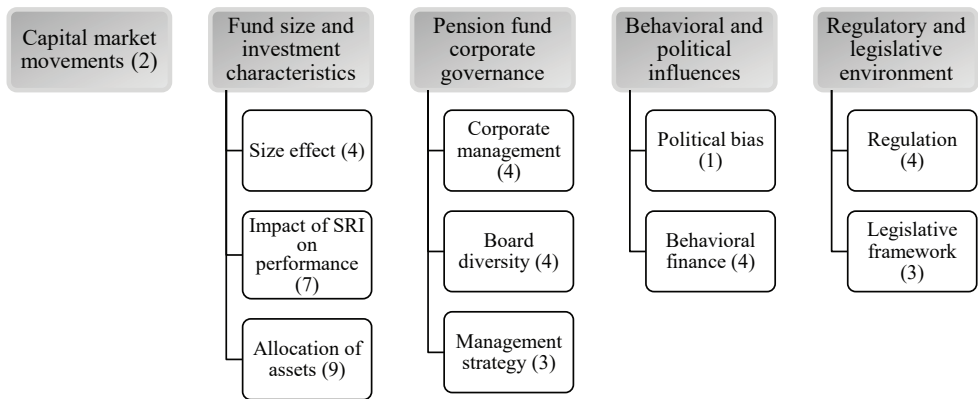
3. Results

This chapter presents the findings of the systematic literature review and the bibliometric analysis. The review identifies five main categories of factors that influence the performance of pension funds, while the bibliometric analysis highlights current research trends. The results are organised according to the defined research questions in order to provide a comprehensive and structured insight into the topic.

3.1. Factors influencing the pension fund performance – SLR

Based on the reviewed literature, to address RQ1, “What factors influence the performance of pension funds?”, the findings can be categorized into five main groups, as illustrated in Figure 2.

Figure 2: Main Indicators Affecting Pension Fund Performance According to Published Literature



Source: Author’s calculations

Each of these factors is elaborated in separate chapters to address RQ2: *How do these factors affect the performance of pension funds?*

3.1.1. Capital market movements

Movements on the capital markets can have a significant impact on the performance of institutional investors, especially pension funds, as pension funds spread their investments across various capital market instruments. This diversification can make pension funds susceptible to fluctuations on the equity and bond markets, as they are sensitive to market changes. Pension funds must therefore manage their portfolios carefully to minimise the risks associated with market fluctuations.

According to Chovancova et al. (2019), pension funds are more dependent on the performance of the bond market than the equity market. They emphasise the importance of improving the management of pension savings, especially in the context of low interest rates, whereby the interests of savers should be prioritised by both regulators and managers. Bikker et al. (2010) found that the equity market has a significant impact on pension fund investments, as positive equity performance increase higher equity investments in both the short and long term. Pension funds are also more sensitive to negative news from the stock market than positive news.

In addition, larger pension funds tend to invest more in equities, which makes them more sensitive to fluctuations in equity performance.

Overall, movements on the capital markets have an important role in the investment strategies and results of pension funds. This emphasises the need for careful risk management and strategic asset allocation to protect against market fluctuations.

3.1.2. Fund and investment characteristics

Size effect

Economies of scale in the active money management industry contribute significantly to lower expense ratios, which has a direct impact on the performance of pension funds. Several studies have examined how factors such as fund size, governance and market conditions affect cost savings and returns. Larger funds benefit most from diversification and lower administration costs, leading to better overall performance. Cummings (2016) examined the impact of fund size on Australian pension funds by analysing a sample of 284 funds. His study showed that larger funds benefit from advantages such as greater diversification, economies of scale and cost reductions for investors. Similarly, Bikker and De Dreu (2009) analysed the impact of size, governance, pension plan design and outsourcing decisions on Dutch pension funds using a data set of 10,000 observations. They found that larger funds achieve significant savings in both administrative and investment costs, which has a positive impact on their overall performance. Bikker and Meringa (2022) analyse the different effects of consolidation on pension funds of different sizes. They find that smaller funds are less affected by consolidation than larger funds. This suggests that the impact of consolidation on the returns of larger pension funds may be more pronounced. Adami et al. (2014) examined the performance of UK pension funds using three models focusing on fund size, market returns and momentum. Their analysis found that while these factors contribute to returns, they only partially explain them, particularly for smaller funds, with the momentum factor having a minimal effect. In summary, the size effect shows that larger pension funds use economies of scale to achieve lower expense ratios, greater diversification and significant cost savings, contributing to better performance overall.

Impact of SRI on performance

In recent decades, the impact of socially responsible investing (SRI) on investment performance has been a focus of academic research. The main objective of these studies has been to investigate whether the consideration of ‘sustainable, responsible and ethical’ aspects in investment strategies influences investment outcomes. The general conclusion of the research to date is that SRI has a mixed, but generally neutral, impact on pension fund performance.

Marlowe (2014) examined the performance of publicly funded pension portfolios containing SRI compared to portfolios without such components. The study found that both portfolios performed similarly, suggesting that the concept of *social responsibility* does not significantly affect performance in this context. Moss and Farrelly (2015) examined the impact of a mix of global listed and UK unlisted real estate investments on the performance of UK defined contribution (DC) pension funds. The research shows that the inclusion of listed and unlisted real estate can lead to efficient risk-return outcomes for UK DC pension fund investors seeking better performance and liquidity. Alda (2018) investigated whether socially responsible pension funds have different performance characteristics to conventional funds. The analysis found that both types of funds use similar investment strategies, with socially responsible funds exhibiting better timing in some strategies while adhering to certain social responsibility criteria. Nonetheless, the study found no significant differences in performance, investment style or timing between socially responsible and conventional funds, suggesting that investors who prioritise social values can achieve comparable financial results. A later study by Alda (2020) examined the impact of SRI on traditional investment management. The results suggest that the environmental, social and governance (ESG) scores of both conventional and SRI funds are influenced by common characteristics such as fund age, turnover and costs, which are consistent with SRI characteristics. In addition, a higher intensity of ESG screening has been associated with higher returns and greater fund inflows. Alda (2022) examined the impact of corporate social responsibility (CSR) controversies on UK pension and investment funds. The study found that different types of CSR controversies affect fund performance in different ways. While ethical issues often improve performance, controversies about customers and employees tend to have a negative impact on performance. Fund managers tend to maintain their portfolios in response to CSR controversies, particularly in the case of socially responsible funds, while conventional fund managers tend to avoid controversial companies. Effective CSR engagement strategies can mitigate negative investor reactions, although concerns about symbolic CSR practices persist, highlighting the need for transparent communication between fund managers and investors. Hoepner and Schopohl (2018) found that the performance of Swedish and Norwegian state pension funds was not affected by the exclusion of companies involved in unethical practises. Apostolakis et al. (2018) examined retirees' intentions to adopt SRI within pension plans, highlighting the role of attitudes, social norms, perceived efficacy and trust in influencing investment behaviour. Understanding these behavioural factors is critical to advancing socially responsible investment practices, particularly in discussions about incorporating individual choices into pension schemes.

While research has consistently shown that socially responsible investing (SRI) generally has a neutral impact on pension fund performance, several studies suggest that SRI and related practices such as ESG screening and CSR engagement can

influence investment outcomes and fund management strategies. Despite the mixed results, understanding the behavioural and financial implications of SRI is critical for both investors and fund managers and highlights the importance of effective communication and strategic management to align social values with financial goals.

Asset allocation

Effective capital allocation has a crucial role in the performance of pension funds. Research shows that the inclusion of real estate in pension fund portfolios improves diversification and risk-adjusted returns, as studies of investments in Nigeria, Germany and the UK have shown. In addition, regional differences in asset allocation and investment strategies highlight the importance of strategic real estate investments and the selection of appropriate benchmarks to improve pension fund performance.

Umeh and Okonu (2018) found that the integration of real estate into the portfolios of Nigerian pension funds improves diversification and performance and increases risk-adjusted returns. Their results showed a weak positive correlation with federal and government bonds, but a strong positive correlation with money market securities and corporate bonds. Newell and Marzuki (2016) found that UK real estate investment trusts (REITs) generated lower risk-adjusted returns compared to UK equities, despite robust performance following the global financial crisis. Despite the high correlation with the equity market, UK REITs are crucial for small pension funds and defined contribution funds due to their liquidity, underlining their importance in diversified real estate portfolios. A later study by Newell and Marzuki (2018a) on German REITs found that although these REITs initially had lower risk-adjusted returns, they outperformed German equities and real estate companies after the financial crisis from 2007 to 2015. This finding underscores their value in mixed investment portfolios, particularly for pension funds and institutional investors seeking liquid exposure to German real estate. Overall, these studies highlight the differential impact of real estate and equity investments on portfolio performance across different regions and investment types. Newell and Marzuki (2018b) have also shown that student residences generate high returns and contribute to diversification in real estate portfolios. This underlines their importance as a key asset class for pension funds and sovereign wealth funds. Broeders and De Haan (2020) conducted an analysis of 455 Dutch pension funds covering the period from 2007 to 2016. Their results suggest that asset allocation is responsible for 39% of the variation in returns over time. In contrast, benchmark selection, timing and security selection contributed to 11%, 9% and 16% of the variation in returns, respectively. Among these factors, benchmark selection proved to be the most influential factor, explaining 33% of the variation in fund returns. Lopez and Walker (2021) examined the investment performance of Chilean

pension funds using an extended return-based style analysis that also takes into account regulatory constraints and currency hedging. Their results show that Chilean pension fund returns closely tracked their style benchmarks from 2003 to 2017, suggesting that tactical asset allocation strategies did not provide significant benefits. This suggests that the strategies employed by fund managers and their security selection effectively covered the associated costs. Even and Macpherson (2008) found that investment in shares of the sponsoring company can influence the performance of pension funds. The study discusses the factors that influence these investment decisions, such as the cost of non-diversification and its impact on risk-adjusted returns. Large investments in employer stock can have a negative impact on performance, while smaller holdings generally have minimal impact. Since 2001, public pension plans have increasingly relied on alternative investments. Peng and Wang (2024) found that alternative investments, particularly private equity, have a generally positive but small and unsustainable effect on investment performance. An et al. (2016) discovered a significant negative correlation between pension fund ownership and REIT crash risk, in contrast to bank ownership. This correlation is due to the ownership of pension funds, which provide patient capital and effective governance due to their long investment horizon, stronger incentives and better monitoring capabilities.

Effective capital allocation is central to improving pension fund performance, with the integration of real estate proving to be an important factor in improving diversification and risk-adjusted returns. Studies in various regions, including Nigeria, Germany and the UK, have shown that real estate investment and strategic asset allocation contribute significantly to fund performance. The results also highlight the differential impact of real estate and equity investments, with regional differences underlining the importance of appropriate benchmark selection and liquidity considerations. In addition, factors such as risk appetite following poor performance, benchmark selection and the influence of employer equity investments highlight the complexity of pension fund management. Taken together, these findings highlight the need for well-informed investment strategies and effective management practises to optimise pension fund outcomes.

3.1.3. Pension fund corporate governance

Corporate Governance and Management

Recent research emphasises the critical role of governance and strategic practices in the performance of pension funds. Effective governance, characterised by transparency, accountability and active oversight, combined with advanced investment strategies, leads to significantly better returns and fewer inefficiencies. These strategies often include diversified portfolios and data-driven decision-making. Conversely, poor governance and outdated investment approaches

negatively impact performance and lead to lower returns and higher inefficiencies. Therefore, strong governance and innovative strategies are key to optimising pension fund outcomes.

Liu and Ooi (2019) examined the impact of related-party outsourcing and interlocking trustees and directors on the performance of Australian pension funds. Their study found that these practices are associated with suboptimal investment outcomes for fund members, primarily due to conflicts of interest and operational inefficiencies. The researchers also identified problems with the current definitions and roles of independent directors and found that these problems could affect the equitable distribution of funds among members. Their findings are particularly relevant in light of the ongoing reviews by the Pension Productivity Commission, which is looking at these governance issues and aims to improve the effectiveness of pension fund management. Akomea-Frimpong et al. (2022) examined the impact of sound corporate governance practises on pension fund performance. Their study showed that a transparent financial structure, fair treatment of shareholders, strong internal controls and effective monitoring by audit committees are associated with better performance outcomes for pension funds. In addition, their analysis found that factors such as board composition, board member experience, frequency of board meetings and gender diversity contribute significantly to the effectiveness of governance practises and therefore pension fund performance. Abinzano et al. (2017) examined the impact of governance structures on the fees and performance of pension plans in Spain. Their analysis found that effective governance mechanisms that facilitate the alignment of interests and strengthen management oversight led to significantly lower fees and better performance for employer-sponsored pension plans than for individual plans administered by companies that manage both types of pension plans. The study underscores the importance of decision-makers' bargaining power in lowering fees and optimising performance outcomes. Black (2006) concludes that there is a significant correlation between the performance of a company's pension fund and its financial health. If the pension funds perform well, the company can reduce future contributions, which has a positive effect on cash flow and the share price. Conversely, poor performance leads to increased financial obligations for the company, negatively affecting earnings and cash flow. The volatility of pension fund investments is reflected in the volatility of the company's financial ratios. Consequently, pension fund management has a crucial role in the company's strategy, influencing its risk profile and financial stability.

In summary, recent research highlights the central role of governance and strategic practices in improving pension fund performance. Effective governance, marked by transparency, accountability, and sound oversight, combined with advanced investment strategies, leads to better returns and fewer inefficiencies. Together, these studies confirm that strong governance and strategic innovation are essential to optimising pension fund outcomes.

Board Diversity

According to several authors, the performance of pension funds is closely linked to governance structures and board diversity. Empirical studies show that factors such as fractionalization and the overall composition of the board can influence investment returns. However, the results make it clear that effective governance practices and ethical management are key to optimising performance and mitigating risk. While board diversity and structure are important, efficient governance and ethical oversight have a critical role in improving pension fund outcomes.

Veltrop et al. (2015) argue that board diversity influences performance through the representation of different interest groups and the formation of factions within the board. Their research indicates that such factionalisation can undermine board effectiveness and adversely affect financial returns. However, the study emphasises that the reflexivity of the board, its ability to self-assess and adapt, can mitigate these negative effects. Pennacchi and Rastad (2011) found that pension funds with greater participant representation on their boards are more likely to opt for riskier investment portfolios, indicating a preference for potentially higher returns. Jackowicz and Kowalewski (2012) found that the composition of the supervisory board and the knowledge and motivation of its members are crucial for improving the performance of pension funds in Poland. Their study highlights the need for robust internal governance mechanisms, as existing remuneration systems are often insufficient to enforce manager discipline. The study concludes that while the presence of older and less educated board members can have a negative impact on profitability, increasing the number of external board members generally leads to an improvement in fund returns. The study also identifies weaknesses in external and internal governance structures and highlights the role of fund activism and behaviour in performance. It argues for a more proactive role for governments and regulators in the selection of board members and calls for further research to fully understand the impact of various governance factors on pension fund performance. Benson et al. (2011) emphasise the critical role of corporate boards in ensuring ethical practices and effective risk management. They argue that broader organisational responsibilities and systemic issues are overlooked when financial failures are attributed solely to individual directors. In their study, which concludes that adherence to recommended practices is associated with better financial outcomes, they examine governance practices in pension plans and their impact on financial performance. Key factors include the size of the board of directors, the frequency of conflict checks, and the function of the investment committee. The study highlights that effective governance is essential for making sound investment decisions and dealing with fluctuating returns, and calls for further research to improve pension plan governance practices.

In summary, the current evidence suggests that governance structures and board diversity have a significant impact on pension fund performance. There is also evidence that board size and composition can influence investment returns.

Overall, these studies show that while board diversity and structure matter, efficient governance and ethical oversight are critical to improving pension fund performance. To improve pension fund performance, further research is needed to investigate and refine these governance practices.

Management Strategy

The implementation of effective management strategies and the introduction of new technologies are key factors in improving the performance of pension funds, according to a recent study. There is evidence that consolidation is particularly beneficial for larger funds and brings significant advantages. In addition, there are promising opportunities to improve both returns and stability through advances in active management practises and the introduction of collective defined contribution (CDC) schemes.

Garcia (2010) argues that organisations that exhibit suboptimal performance should implement enhanced strategies to improve their results. Factors such as problematic relationships, unequal access to information and poor strategic planning are often blamed for inefficiencies. The study makes a strong case for the integration of new technologies as a means of implementing best practise in pension fund management. This underscores the importance of technological advancement in optimising performance and eliminating inefficiencies. Gonzalez et al. (2020) show that the combination of a high level of activity and a longer holding period improves the performance of pension funds. Specifically, they find that a one-month increase in the duration of active management within one year can increase annual returns by around 3.3 %. Collective Defined Contribution (CDC) plans, a pension scheme proposed for the UK, were examined by Owadally et al. (2022). Their research shows that CDC plans offer benefits for both employers and employees as the risk is spread across different generations. This also stabilises pensions in the face of financial market volatility. Simulations comparing CDC plans to traditional pensions show that CDC plans generally provide retirees with higher average replacement rates and less income uncertainty.

The study highlights the importance of effective management strategies and technological advances in improving the performance of pension funds. Taken together, these findings underscore the importance of strategic innovation and effective management practises in optimising pension fund outcomes.

3.1.4. Behavioural and Political Influences

Behavioural and political biases

Political bias can lead to underperformance by tempting management to invest in companies that are politically favoured rather than those that offer the best returns.

Such bias can lead to sub-optimal asset allocation, reduced diversification and potential conflicts of interest, ultimately impacting the overall financial performance of the fund. Bradley et al. (2016) claim that public pension funds sometimes prefer to invest in local companies that are politically active, e.g. through lobbying or donations to local politicians. This can lead to these funds investing too much in these companies, which may not be optimal for their overall investment returns.

Behavioural biases pension management to make sub-optimal investment decisions, which affects overall performance. Previous studies have shown that pension fund performance can fluctuate due to liquidity, behavioural biases, herding behaviour and the influence of past returns. Arbaa and Varon (2020) found that investors are risk-averse and overreact in bull and bear markets. They also consider liquidity as an important factor influencing the flow–performance curve. They found that high liquidity leads to a linear relationship between flows and returns, while increased risk turns the curve into a concave curve, challenging previous research. Verma and Verma (2018) investigated behavioural biases such as the disposition effect and the house money effect in the investment decisions of US-defined benefit pension funds. The study shows that past losses lead to investment more in riskier investments and less in safer investments, confirming loss aversion. In addition, pension-related variables also influence the trading behaviour of the funds. Overall, while the disposition effect is evident, there is no evidence of the house money effect in the portfolio decisions of these pension funds. Alda and Ferruz (2016) investigated whether the performance of Spanish pension funds decreases or increases when pension funds herd. They found that pension funds that do not herd or follow certain strategies do not show significant differences in performance compared to herd funds. Ferruz et al. (2007) examined the short-term performance persistence of Spanish equity pension plans from 1999 to 2006 and found a significant relationship between historical returns and investment flows, providing insight into how past performance influences investor behaviour in these portfolios. The correlation between investment flows (cash and investor flows) and past performance is statistically significant in almost all the annual periods studied.

3.1.5. Regulatory and Legislative Environment

Regulatory changes

The replacement of managers and policy decisions have a significant impact on the performance of pension fund performance and affect returns, risks and overall efficiency. Dopierala and Mosionek-Schweda (2020) found that regulatory changes, such as increased regulation and restrictions on investments such as government bonds, have a significant impact on the performance of pension fund performance. Witkowska et al. (2019) analyse the impact of political decisions on the Polish investment fund market, focusing on how changes in pension fund activity affect

the efficiency of investment funds with stable growth strategies. They compare the performance of pension funds and mutual funds managed by the same companies under the new regulations and conclude that pension funds outperform mutual funds in terms of returns, but face higher portfolio risks and lower efficiency due to the regulatory changes. Alda (2016) used an event study to examine the impact of manager changes on the performance of pension funds. The study concluded that manager turnover is often triggered by poor excess returns and certain manager characteristics such as team leadership, gender diversity and experience. It also found that longer manager tenure can lead to higher gross returns, but does not necessarily improve excess returns. Similarly, Afolabi and Sy (2015) emphasize the challenge for pension funds to find a balance between short and long-term goals, while adhering to strict governance standards that are important for risk management and benefits for plan sponsors and beneficiaries.

Legislative Framework

According to previous findings, legislative interventions have had a particular impact on pension funds by lowering returns, changing strategic shifts between conservative and growth-oriented funds and influencing the level of risk without lowering it uniformly.

Papik and Papikova (2021) found that legislative interventions reduced the average daily return of pension funds by 0.01% to 0.03%. Mitkova and Mlynarovič (2020) analyzed the impact of regulatory changes on conservative and growth-oriented funds in the second and third pillars and found that regulation shifted the efficiency frontier for conservative funds towards higher returns without increasing risk, while it led to strategic changes for growth-oriented funds after 2009. Hoepner and Schopohl (2020) concluded that while regulatory changes had a significant impact on investment strategies, they did not necessarily lead to a reduction in risk. They found that the 2009 regulation led to a reduction in risk with no change in returns, while the relaxation of regulation in 2012 allowed growth funds to increase risk to achieve higher potential returns.

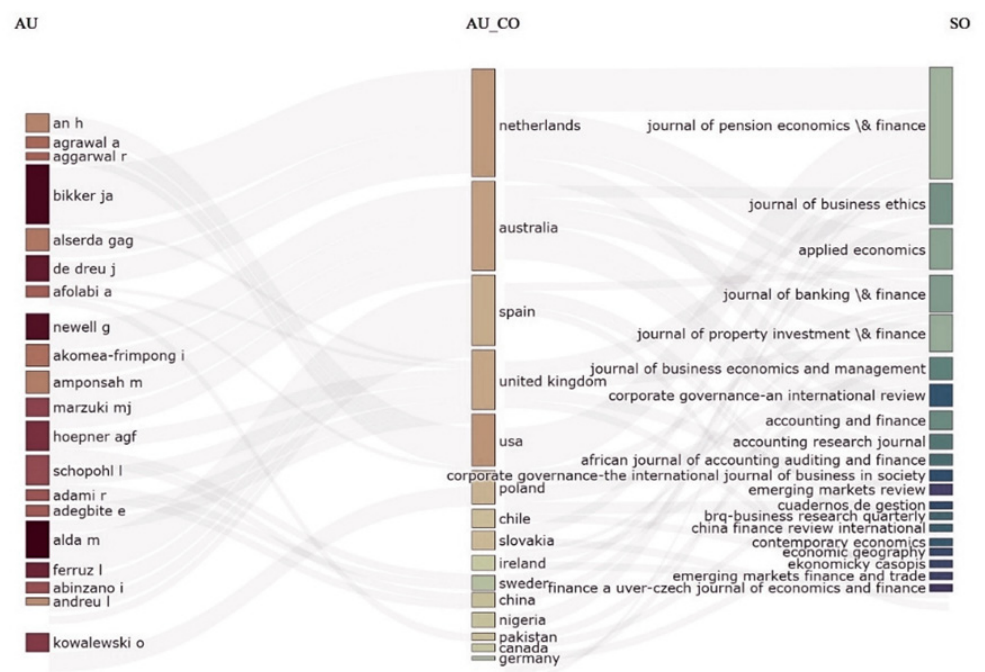
3.2. Current trends in analysis of pension fund performance – Bibliometric Analysis

Second part of analysis of the factors influencing the performance of pension fund analysed the current trends in terms of authors, journals, countries and institutions. A further aim was to investigate whether most research papers originate from countries with highly rated pension systems, suggesting a correlation between the quality of a country's pension system and the origin of the corresponding research papers. On this basis, two further research questions were investigated using bibliometric analysis:

- RQ3: What are the current trends in the study of pension fund’ research performance in terms of authors, journals, participating countries and institutions?*
- RQ4: Do most research papers come from countries with highly rated pension systems according to the Mercer CFA Institute Global Pension Index 2023?*

A three-field plot based on the Sankey diagram shows the interrelationship between affiliation, country and source (journals) in Figure 3. The three highlighted elements are emphasized by their height and different colour to underline their relevance; the higher the rectangle, the greater the strength or connection between them. The diagram also shows that authors from countries such as the Netherlands, Australia, Spain and the UK have made significant academic contributions to highly rated journals such as the Journal of Pension Economics and Finance, Journal of Business Ethics, Applied Economics and others.

Figure 3: Three-field plot: author, country and source



Source: Author’s construction

To identify the most important authors, the h-index was chosen as the main indicator and the results are shown in Table 2.

Table 2: Most relevant authors according to the H-indeks

Element	h_index	g_index	m_index	TC	NP	PY_start
Alda, Mercedes	3	5	0.333	43	5	2016
Bikker, Jacob A.	3	4	0.188	65	4	2009
Newell, Graeme	3	3	0.333	57	3	2016
De Dreu, Jan	2	2	0.125	56	2	2009
Ferruz, Luis	2	2	0.125	10	2	2009

Notes: h_index – Hirsch index, g-index measures a scholar's overall scientific productivity, m-index measures the impact of a scholar's work by combining the h-index and g-index, TC total citations, NP number of publications, PY publication year.

Source: Author's calculations

The analysis has identified three authors who have had the greatest influence on research into the determinants of pension funds. The H-index (Hirsch, 2005) was used as the most important indicator to measure the scientific contribution an author, the second criterion was the g-index (Egghe, 2006). In addition to the authors listed in the following table, the five most important scientific journals in this field were identified based on the number of articles published and the H-index.

Table 3: Most relevant journals

Element	h_index	g_index	m_index	TC	NP	PY_start
Journal of Pension Economics and Finance	3	8	0.176	111	8	2008
Journal of Property Investment and Finance	3	4	0.3	44	4	2015
Journal of Banking and Finance	3	3	0.15	110	3	2005
Journal of Business Ethics	3	3	0.214	57	3	2011
Applied Economics	2	3	0.125	15	3	2009

Source: Author's calculations

To examine whether the majority of studies come from countries with reputable pension systems, Mercer CFA Institute Global Pension Index 2023 (Mercer, 2023) has created an index composed of adequacy, sustainability, and integrity. Based on the scores awarded, the Table 4 displays the performance of pension systems in 2023.

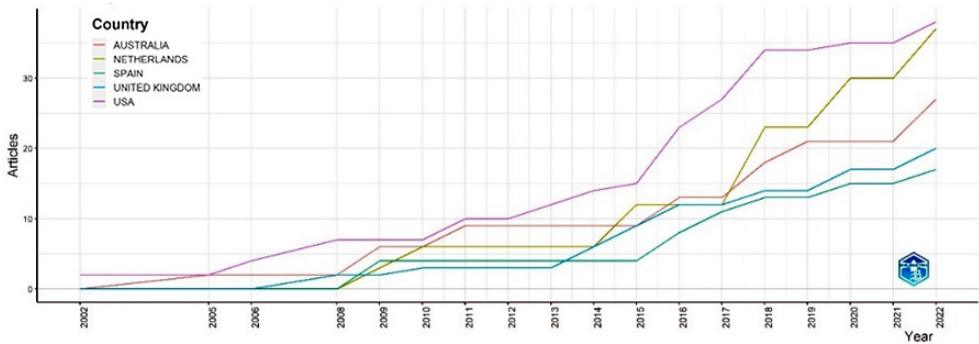
Table 4: Pension system performance results in 2023

Grade	Index value	Pension system
A	>80	Netherlands, Iceland, Denmark, Israel
B+	78-80	Australia, Finland, Singapore
B	65-75	Norway, Sweden, UK, Switzerland, Canada, Ireland, Chile, Uruguay, Belgium, New Zealand, Portugal and Germany

Source: Adapted from Mercer (2023)

Country production over time as displayed in Figure 4, measures the frequency of authors’ appearances based on their country affiliation. The most prolific authors in this research area come from the USA, the Netherlands, Australia, the United Kingdom, and Spain. From this, it can be deduced that three of these five countries have strong pension systems.

Figure 4: Country production over time



Source: Author’s calculations

In addition to analysing country production, it was important to evaluate the citation frequency of the most frequently cited countries and to derive an overall index value. The results in Table 5 show that five countries received a B grade, three countries a C grade and one country an A grade.

Table 5: Most cited countries

Country	Citation	Overall index grade
USA	263	C+
Netherlands	154	A
Australia	88	B+
Canada	83	B
UK	76	B
Spain	57	C+
Poland	28	C
Portugal	15	B
Italy	10	C
Chile	6	B

Source: Author's calculations

Based on the results of the 2023 pension system on the one hand and the country production and prominence of the most frequently mentioned countries on the other, research question 2 can be answered in the affirmative. It can be observed that the research papers predominantly come from countries with highly rated pension systems. From the perspective of the most frequently mentioned countries, it can be deduced that they mostly belong to rating class B, which according to Mercer (2023: 9) represents “a system with a solid structure that has many commendable features, but also shows room for improvement, which distinguishes it from a class A system”.

4. Discussion

The research objectives were achieved by categorizing the determinants into five key areas: capital market movements, fund size and investment characteristics, pension fund corporate governance, behavioural and political influences, and regulatory and legislative environment. Each of these areas provides unique insights into the mechanisms driving pension fund performance, with implications for both academic research and practical fund management.

The movements in the capital markets influence the performance of pension funds primarily via the bond and equity markets (Chovancova et al., 2019). More specifically, pension funds are closely linked to the performance of the bond markets, which provide liquidity, particularly in a low-interest-rate environment. Positive equity market performance encourages higher equity investments, while negative news leads to sensitivity and lower performance (Bikker et al., 2010). Larger funds that are heavily invested in equities are more susceptible to market

volatility. Effective management strategies must therefore balance these influences to protect and grow pension savings.

The size effect in pension funds shows that larger funds benefit from economies of scale, resulting in lower expense ratios, greater diversification and significant cost savings that improve overall performance. Studies by Cummings (2016), Bikker and De Dreu (2009) and Adami et al. (2014) show that fund size, governance and market conditions influence these benefits. Larger funds outperform due to these efficiency advantages, while smaller funds are more strongly affected by factors such as market returns and momentum.

Studies show that socially responsible investment (SRI) portfolios in pension funds perform similarly to conventional portfolios, suggesting that social responsibility does not compromise financial returns (Marlowe, 2014). Higher ESG scores, influenced by factors such as fund age and costs, are associated with better returns and inflows (Alda, 2020). CSR controversies affect performance in different ways, with ethical issues improving performance and customer or employee issues detracting from it (Alda, 2022). Attitudes, social norms, perceived efficacy and trust have an important role in the adoption of SRI in pension schemes by retirees (Apostolakis et al., 2018). Overall, SRI funds can achieve comparable financial results while meeting social responsibility criteria.

To summarize the impact of capital allocation, it is important to emphasize that the integration of real estate into pension fund portfolios improves diversification and performance (Umeh and Okonu, 2018). Risk appetite is influenced by past performance and governance, with underperforming funds and those with participant representation taking more risk. Ethical considerations, such as the exclusion of unethical companies, do not have a significant impact on performance, suggesting that socially responsible investing can achieve similar financial results (Hoepner and Schopohl, 2018). These results underscore the importance of real estate, strategic asset allocation and ethical investing in pension fund management.

Board diversity impacts pension fund performance, as stakeholder and internal faction representation can influence effectiveness and returns (Veltrop et al., 2015). However, a board's ability to self-assess and adapt can mitigate this impact. Board composition, knowledge and motivation are critical to improving performance and underline the need for robust internal governance mechanisms. Older, less educated board members have a negative impact on profitability, while more external board members improve returns (Jackowicz and Kowalewski, 2012). As governance structures are often weak, governments and regulators need to have a proactive role in board selection.

When analysing governance, it is important to emphasize that effective governance is crucial to the performance of pension funds. Studies show that conflicts of interest and inefficiencies due to poor governance, as found in Australian pension funds, are

detrimental to performance. In contrast, sound governance, including transparency and strong internal controls, improves outcomes (Liu and Ooi, 2019). Effective governance structures also reduce fees and improve performance, as can be seen in Spanish pension funds (Abinzano et al., 2017). Overall, sound governance practices are critical to optimising pension fund management and achieving better results.

Management strategies should focus on several key principles. To improve suboptimal performance, organizations should implement better strategies that address issues such as poor relationships, unequal access to information and inadequate planning. Integrating new technologies is critical to optimizing pension fund administration and eliminating inefficiencies (Garcia, 2010). Consolidation has a greater impact on larger pension funds than smaller ones and affects their returns more. A high level of activity combined with a longer holding period improves the performance of pension funds, with a slight increase in active management significantly increasing annual returns (Gonzalez et al., 2020). Collective defined contribution (CDC) schemes offer higher average replacement rates and lower income uncertainties compared to traditional pensions by spreading risk across generations, even in the face of financial market volatility (Owadally et al., 2022).

One of the indicators addresses political and behavioural biases in pension fund management. Public pension funds sometimes prefer to invest in politically active local companies, which can harm overall returns (Bradley et al., 2016). Investors are generally risk averse and overreact in both bull and bear markets, with liquidity affecting the flow-performance curve. High liquidity leads to a linear relationship between inflows and returns, while increased risk leads to a concave curve (Arbaa and Varon, 2020). Behavioural biases, such as the disposition effect, influence investment decisions in US-defined benefit pension funds, with earlier losses leading to riskier investments. However, the house money effect is not observed (Verma and Verma, 2018). In Spanish pension funds, performance is not affected by herd behaviour and past performance significantly influences investment flows (Alda and Ferruz, 2016).

Regulatory and political changes have a significant impact on the performance of pension fund performance. Regulatory changes, such as the tightening of regulations and investment limits, have a significant impact on pension funds (Dopierala and Mosionek-Schweda, 2020). In Poland, policy decisions have impacted the efficiency of mutual funds, with pension funds outperforming mutual funds in terms of returns but facing higher risks and lower efficiency due to new regulations (Witkowska et al., 2019). The replacement of managers in pension funds is often triggered by poor returns and certain characteristics such as team management and experience, with longer tenures improving gross returns but not excess returns (Alda, 2016). It is a challenge for pension funds to find a balance between short-termism and long-term goals while maintaining strong governance (Afolabi and Sy, 2015).

Legislative intervention has slightly lowered daily returns, while regulatory changes have shifted conservative funds towards higher returns without increasing risk and led to strategic changes in growth funds. Regulatory changes have influenced investment strategies, with the 2009 regulation leading to a reduction in risk for stable returns and the relaxation of measures in 2012 allowing growth funds to increase risk for higher return opportunities (Hoepner and Schopohl, 2020).

5. Conclusion

Pension funds are one of the fundamental factors for an efficient financial system, but also for the sustainability and adequacy of national pension systems. By capitalizing savings, they help to increase citizens' future pension income and reduce the social, economic and political pressure on pension systems. Therefore, a deep insight into the factors that influence their performance is of great interest to the professional and scientific public. The aim of this study was to summarise the available research on indicators that influence the performance of pension funds and the current trends in this area. Two methods were used in the study to answer the research questions: an SLR and a bibliometric analysis. When analysing the research papers using the PRISMA framework, studies that did not fall within the scope were excluded, resulting in a final sample of 45 papers (published between 2002 and 2022). Based on the results, the papers were categorized into five groups: capital market movements, fund size and investment characteristics, pension fund corporate governance, behavioural and political influences, and regulatory and legislative environment. The results underline that effective management, governance and strategic asset allocation are critical to enhancing pension fund performance, contributing to broader financial stability and sustainability. More precisely, to improve efficiency and long-term sustainability of pension funds, it is important that policy makers strengthen corporate governance, ensure a flexible but effective regulatory framework and promote sustainable long-term investment strategies, while fund managers should adopt a strategic approach to asset allocation, match investments to the size of the fund and apply international best practises in day-to-day management.

Based on the bibliometric analysis, the study highlights the authors, journals and countries that have contributed most to the topic. In addition, the fourth research question is partially confirmed, as three of the five countries with the most prolific authors in this research area — the Netherlands, Australia and the United Kingdom — are among the best-performing pension systems according to the Mercer CFA Institute Global Pension Index 2023. By offering actionable insights for optimizing fund performance, the study contributes to enhancing the competitiveness of pension systems within the global financial landscape.

Finally, some limitations should be noted: The reliance on a single database such as Web of Science may have meant that relevant literature accessible through other databases was omitted. Furthermore, by focusing the study on peer-reviewed journal articles, other potentially relevant sources such as book chapters and reports were excluded. The keyword-based method of article selection may also lead to subjective biases that may affect the accuracy of the results. In addition, bibliometric properties may not be consistent over time, and distributional patterns within the impact of different indicators on pension fund performance may still evolve. Further research should extend the analysis to databases such as Scopus and combine academic articles with industry reports to gain insights into the practical challenges faced by pension fund managers. In addition, future research should utilize qualitative methods such as interviews with industry experts to gain deeper insights into management strategies and challenges.

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Uvid u uspješnost mirovinskih fondova: Sustavni pregled literature

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Mirovinski fondovi imaju ključnu ulogu u globalnim financijskim sustavima, upravljajući značajnom imovinom i pridonoseći gospodarskom rastu kroz ulaganja na tržištima kapitala. S obzirom na izazove poput starenja populacije i fiskalnih neravnoteža, identificiranje čimbenika koji utječu na uspješnost mirovinskih fondova ključno je za osiguranje održivih i adekvatnih mirovinskih sustava. Ovo istraživanje sustavno analizira ključne čimbenike koji utječu na uspješnost mirovinskih fondova, ističe prevladavajuće trendove u literaturi i mapira geografsku distribuciju istraživanja. Cilj ovog rada je identificirati determinante uspješnosti mirovinskih fondova koje izravno odgovaraju na izazove konkurentnosti na financijskim tržištima te omogućuju učinkovitiju alokaciju kapitala i učinkovitije upravljanje. Kako bi se postigli navedeni ciljevi, primijenjena je metoda sustavnog pregleda literature (SLR) i bibliometrijska analiza (BA) za identificiranje i analizu čimbenika koji utječu na uspješnost mirovinskih fondova. Web of Science korišten je kao primarna baza podataka za SLR i BA, a proces je proveden prema PRISMA 2020 okviru kako bi se osigurala temeljita i nepristrana selekcija relevantne literature. Primjenom rigoroznih kriterija za odabir i isključivanje, identificirano je ukupno 45 visokokvalitetnih radova koji su uključeni u analizu. Rezultati ukazuju na pet glavnih čimbenika koji utječu na uspješnost mirovinskih fondova: kretanja na tržištima kapitala, veličina fonda i karakteristike ulaganja, korporativno upravljanje u mirovinskim fondovima, bihevioralni i politički utjecaji, te zakonodavni okvir. Bibliometrijska analiza otkrila je aktualne trendove u istraživanju uspješnosti mirovinskih fondova, te ispitala odnos između kvalitete mirovinskog sustava neke zemlje i porijekla relevantnih istraživanja. Rezultati nude praktične uvide za upravitelje fondova, kreatore politika i dionike, poboljšavajući proces donošenja odluka i produbljujući razumijevanje implikacija za mirovinske ishode i šire financijske sustave.

Ključne riječi: mirovinski fondovi, upravljanje, društveno odgovorno ulaganje, alokacija imovine, tržišta kapitala

JEL klasifikacija: C52, D53, J32, G23

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The impact of well-being on work performance: Analyzing the mediating role of work satisfaction*

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Abstract

This study investigates the impact of employee well-being—emotional, economic, and relational – on organizational performance, emphasizing the mediating role of job satisfaction. A quantitative method was applied using survey data collected from 191 employees in Dâmbovița County, Romania. Structural Equation Modeling (SEM-PLS) was employed to test the proposed hypotheses. Results indicate that economic and emotional well-being positively influence job satisfaction, which in turn significantly predicts work performance. Economic well-being also directly affects performance. However, relational well-being does not show significant effects. The study offers theoretical contributions by outlining the unique influence of each well-being dimension, along with practical implications for HR policies aimed at enhancing employee satisfaction and performance. The research provides new insights into how job satisfaction influences the relationship between various types of well-being and performance in a Central-Eastern European context.

Keywords: emotional, economic and relational well-being, employee, work satisfaction, performance

JEL classification: J28, M12, M54, D23

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1. Introduction

The increasing complexity of the modern workplace has intensified the relevance of studying the relationships among employee well-being, job satisfaction, and work performance. These aspects—spanning emotional, economic, and relational dimensions—have become central themes in human resources and organizational psychology (Ma and Marion, 2025; Wright and Cropanzano, 2000; Dong et al., 2025; Cooper et al., 2019). Well-being is now widely acknowledged as a multidimensional construct linking personal and professional domains (Kaur and Singh, 2024).

Existing literature commonly highlights two critical facets of well-being: the balance between positive and negative emotional states, and the social dimension involving interpersonal stability. Well-being, while subjective and variable, remains a vital predictor of both satisfaction and performance outcomes (Smith, 2023; Giamos et al., 2023). At the organizational level, well-being has evolved from a wellness concern to a strategic HRM issue with measurable effects on employee motivation and output (Hennicks et al., 2022).

Performance refers to actions that produce results exceeding standard expectations. Individual performance is a fundamental concept in work and organizational psychology, encompassing only actions relevant to organizational objectives (Guerci et al., 2022). The originality of this paper lies in its analysis of the types of well-being—emotional, economic, and relational – and their potential influence on professional performance, mediated by job satisfaction. A satisfied employee is both happy and productive, which enhances performance, as highlighted in Hawthorne’s study (Wicker, 2011). Thus, job satisfaction is the state of balance an individual achieves when fully meeting conscious or unconscious needs or expectations, resulting in fulfillment and pride in their work. Job satisfaction brings emotional pleasure and fosters a positive attitude and improved performance (Guerci et al., 2022; Van Tuan and Khoi, 2019).

This study makes a valuable contribution to the existing literature (Robert et al., 2006; Bergbom and Kinnunen, 2014) by comprehensively analyzing the distinct features of the three types of well-being. Additionally, we examine the interplay between well-being, job satisfaction, and work performance to identify practical measures for enhancing organizational performance. From a theoretical perspective, this paper adds to previous research by highlighting the specific features of the three types of well-being in relation to job satisfaction and performance.

This study contributes to the field by disaggregating well-being into three types—emotional, economic, and relational – and examining their differential impacts on work satisfaction and performance. Importantly, job satisfaction is explored as a mediating variable that bridges well-being and employee performance. The article

is structured as follows: Section 2 reviews the literature, presents the conceptual framework and hypotheses. Section 3 details the research methodology. Section 4 discusses the empirical results. Finally, Section 5 outlines the study's theoretical and managerial implications, limitations, and directions for future research.

2. Literature review, research hypothesis and conceptual model

We used a relational approach to generate a set of hypotheses. The investigators analyzed specialized literature on the relationships among three types of well-being, job satisfaction, and performance. Next, we defined the research framework and presented a conceptual model that served as the basis for defining the results.

2.1. Analysis of Emotional Well-Being and Job Satisfaction

Well-being is among the paramount objectives of the worldwide health system, a dynamic model that promotes an optimal lifestyle. Emotional well-being is equated with life satisfaction, meaning, and positive affect (Feller et al., 2018). The hedonic view is the most widely accepted method of emotional well-being, being the individualistic approach which emphasizes good feelings and focusing on pursuing pleasure and happiness. The eudaimonic theory was introduced here as psychological well-being based on Carol Ryff's scale (Keyes, 2002).

A good working environment that ensures well-being is also an essential element of supporting employees' happiness as well as the performance of organizations. A working environment with a good climate was found to raise productivity, service quality, sales performance, customers' satisfaction, creativity, and innovation while lowering stress (Rahmi, 2018). There is a popular conception that individuals would not likely be very satisfied if they did not like what they do. As work becomes meaningful and purposeful, employees become happier and healthier. Such experiences generate cognitive and affective-behavioral commitment, trust, integrity, and active involvement in business processes (Wright and Cropanzano, 2000).

Psychological well-being is a crucial determinant of individual performance, especially when linked to physical activity (Ramírez-Gomez et al., 2024). A study conducted with 225 students emphasized the significant role of emotional factors in achieving psychological adjustment and managing perfectionism (Lee et al., 2024). Experts have proposed various strategies to enhance well-being and job performance, such as remote work arrangements (Das et al., 2025), or cultivating self-compassion within a psychologically safe work environment, as demonstrated in a study involving 253 radiographers in France, which found a positive association between workplace well-being and health (Jacquet et al., 2024).

Emotional and psychological well-being are particularly important in the education sector, where they shape teachers' performance trajectories and are closely tied to job satisfaction and success, as shown in studies using Partial Least Squares Structural Equation Modeling (PLS-SEM) (Tong, 2025). Employees who report low levels of psychological well-being tend to experience performance declines, as evidenced by research involving 311 Chinese teachers and 256 Iranian teachers (Wang and Derakhshan, 2025). Moreover, emotional well-being may be adversely affected by excessive workload, stress, and burnout, which negatively impact performance – this was confirmed in a study using structural equation modeling and Mplus software among 62 managers and 315 subordinates (Guan et al., 2025).

Thus, we claim that H1 – Emotional well-being positively affects employee work satisfaction and H1a: Employee job satisfaction mediates the influence of emotional well-being on employee work performance.

2.2. Economic well-being and work satisfaction

Economic well-being refers to the current and future financial prosperity of the person, household, and community in order to meet day-to-day requirements and make intelligent financial choices. Economic well-being is enhanced by public policy through education regarding finances, accessibility of financial products, and accessibility of stable and equal economic resources. Financial prosperity is also increased by skill development for efficient money management (Kaur and Singh, 2024).

Recent studies have shown that economic well-being is both a determinant and a consequence of job satisfaction. Ravid and Malul (2017) argue that economic conditions influence job satisfaction, while job satisfaction itself may be affected by economic stability. Fluctuations in income and job security can impact mental health and overall happiness (Cannas et al., 2019). Furthermore, financial well-being is an important factor in shaping individuals' attitudes toward money and is associated with broader measures of social progress. For instance, studies using Partial Least Squares Structural Equation Modeling (PLS-SEM) have demonstrated that financial well-being positively affects risk tolerance and social performance (Mathew et al., 2024; Rad et al., 2023).

A large-scale study involving 3,716 respondents across 193 Chinese schools revealed a direct positive link between well-being and job satisfaction (Ma and Marion, 2025). However, workplace stressors such as illegitimate tasks or excessive email workload have been shown to reduce satisfaction, as observed in studies on 338 hospitality employees (Dong et al., 2025) and 1,372 employees from various sectors (Martin et al., 2025). These stressors can jeopardize financial as well as emotional health, ultimately affecting work performance and spreading consequences to employee families. Additionally, research among 3,547 educators

indicated that higher incomes contribute to improved well-being and reduce levels of teachers' and students' stress, particularly when viewed from racial and ethnic strands (Burkhardt et al., 2025).

Thus, we claim that: H2 – Economic well-being positively affects employee work satisfaction and H2a: Employee job satisfaction mediates the influence of economic well-being on employee work performance.

2.3. Relational well-being and work satisfaction

Relational or social well-being refers to the extent to which individuals function effectively in their social lives and workplace relationships, including their capacity for collaboration and positive interaction with peers. This dimension of well-being is a central focus of various theoretical models, such as the Mental Health Continuum (Keyes, 2002), the Workplace Flourishing Model (Rothmann et al., 2019), the Safe Flourishing Model (VanderWeele, 2017), and Self-Determination Theory, which conceptualizes relationality as a fundamental psychological need involving feelings of love, care, and connectedness.

Social well-being is grounded in the quality of interpersonal relationships that support the achievement of professional goals and is positively associated with job satisfaction (Çek and Eyupoglu, 2020). It also plays a critical role in strengthening organizational culture, fostering loyalty, and nurturing a sense of belonging (Hennicks et al., 2022). A study involving 87 nurse educators found a positive relationship between well-being and workload when supported by self-guided exercises (Rinne et al., 2024). Another study highlighted that open and positive group communication enhances team cohesion and group stability (Jurewicz et al., 2024).

In healthcare settings, relational well-being – particularly the quality of interactions with patients – has been shown to influence both job satisfaction and performance, as demonstrated in a study of 8,386 respondents in China (Lin et al., 2025). A systematic review of 97 articles further revealed that frequent administrative demands and time constraints can negatively affect healthcare professionals' relational well-being, leading to decreased performance outcomes (Pryor et al., 2025).

Moreover, job satisfaction and performance can be enhanced through the implementation of green human resource management (HRM) practices that promote sustainable communication and trust-based relationships between managers and employees, as confirmed by a study of 384 hospitality workers in China (Shahzad et al., 2025).

Thus, we claim that: H3 – Relational well-being positively affects employee work satisfaction and H3a: Employee job satisfaction mediates the influence of relational well-being on employee work performance.

2.4. Work satisfaction and organizational performance

Job satisfaction and performance must be placed within the broader context of the interplay between work and personal life. Such integration – also referred to as work-life integration – has been the focus of a great deal of research, such as concerns regarding work-family conflict, leisure time, and work-life balance (Fisher, 2002). Non-integration has been linked to a variety of unfavorable results, such as physical and mental disease, depression, and chronic tiredness (Hämmig and Bauer, 2009).

Research across various fields supports the positive influence of satisfaction on performance. For instance, student satisfaction with academic activities has been shown to correlate with academic success (Tsusaki et al., 2024), and similar findings have emerged in sports psychology, where satisfaction enhances athletic performance (Lucia et al., 2023).

Among working professionals – such as teachers, nurses, and corporate employees – studies using Partial Least Squares Structural Equation Modeling (PLS-SEM) have identified several workplace factors that influence performance. These include team atmosphere, interpersonal relationships, group dynamics, workload, physical workspace (including outdoor space and comfort), autonomy at work (Judi et al., 2025), and perceived organizational support (Li et al., 2025; Luo et al., 2025).

Work-life balance and job performance are strongly interrelated, as demonstrated in a study of 253 hotel employees in Gran Canaria, which found that maintaining a healthy equilibrium between personal and professional responsibilities significantly enhances work outcomes (Dorta-Afonso et al., 2025).

Thus, we claim that: H4 – Work satisfaction determines employee work performance.

2.5. Emotional well-being and performance

In contemporary society, maintaining a balance between personal and professional life is essential, as it plays a critical role in sustaining individual motivation and overall well-being (Ford et al., 2018). Given the intrinsic link between work experiences, mental health, and psychological well-being, employment is not only a means of securing prosperity but also a fundamental source of happiness and fulfillment (Feller et al., 2018; Warr and Nielsen, 2018).

From an organizational standpoint, employees who find meaning and satisfaction in their work tend to experience more frequent positive emotions and enhanced engagement (Wesarat et al., 2014). As a result, the concept of performance has evolved beyond mere economic output to include a more human-centered perspective – focusing on factors such as leadership quality, open communication, physical activity, and therapeutic practices (Sun et al., 2024; Tanwar et al., 2024).

Workplace stress manifests both physically and mentally, and numerous studies have demonstrated that psychological well-being has a significant direct impact on various performance-related indicators, including creativity, productivity, work engagement, and overall effectiveness. This has been evidenced through PLS-SEM-based research across diverse populations: teachers (Tong, 2025), Generation Z expatriates (Duong et al., 2025), 1,200 early childhood educators (Wang et al., 2025), university students involved in virtual exercise programs (Gumusgul et al., 2025), a global sample of 16,086 software engineering professionals (Godliauskas and Smite, 2025), and 337 employees in the agriculture and banking sectors in China (Liu et al., 2025).

Thus, we claim that: H5 – Emotional well-being determines employee work performance.

2.6. Economic well-being and performance

Numerous studies have demonstrated that economic or financial well-being has a direct and positive impact on organizational performance (Mahendru, 2021; Arifin et al., 2022; Topor et al., 2024). Financially secure and motivated employees – those whose short-term needs are met – tend to contribute more effectively to individual and, by extension, organizational outcomes. Factors such as financial education, asset management, savings for education (Ansong et al., 2023), and financial security (Weziak-Bialowolska et al., 2023), along with policies related to credit usage and financial literacy (Gladstone and Barrett, 2023), play key roles in fostering this well-being.

The logic underpinning these relationships is that employee effort leads to performance, financial performance yields tangible results, and these outcomes further enhance job satisfaction and motivation. Research employing models such as PLS-SEM has provided empirical support for these dynamics. For instance, studies have shown that financial incentives and economic well-being positively influence work performance among 169 employees (Saini et al., 2025), support product development in the automotive sector (Zeng et al., 2025), improve distribution safety (based on a review of 43 articles) (Soro et al., 2025), and drive green innovation across 4,275 Chinese firms (Deng et al., 2025).

Thus, we claim that: H6 – Economic well-being determines employee work performance.

2.7. Relational well-being and performance

Research has proved that interactions at work with fellow human beings directly impact workers' performance and quality of life. The interactions are what facilitate better production, improved belongingness, and increased normative conformity

among workers in a given group (Ruggeri et al., 2020; Colenberg and Jylhä, 2021). The connection between emotional well-being and performance is typically mediated by prosociality and comprises a range of core dimensions, including adaptability, innovativeness, work quality, proactivity, technical skills, coaching, support, and organizational goal congruence (Warr and Nielsen, 2018). Mood, emotional activation, and leisure activities are also critical factors that characterize experience and performance in the workplace (Ruedl et al., 2024).

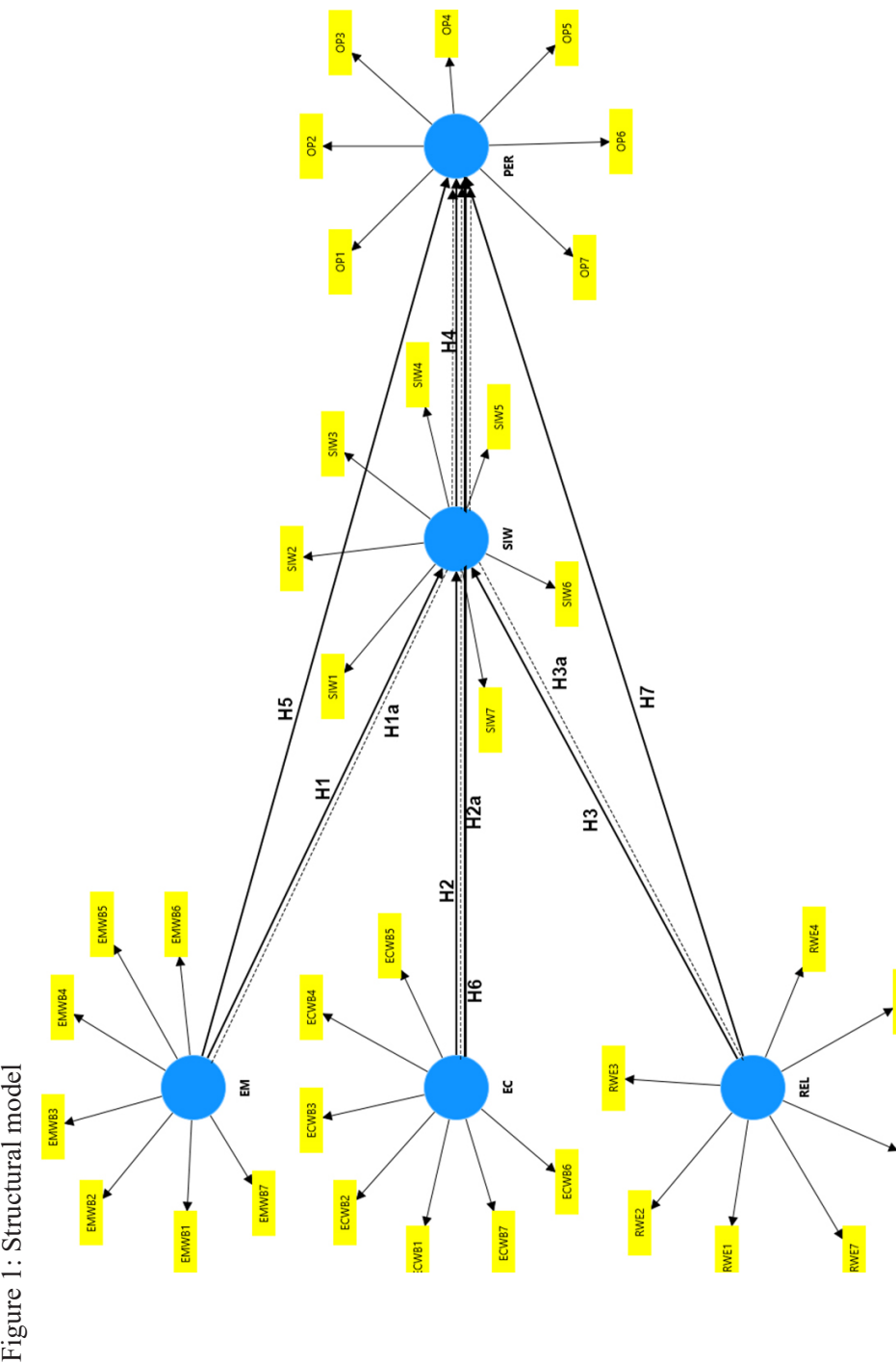
Given that employees typically spend at least eight hours per day in the workplace, the quality of social relationships becomes especially relevant. Studies have indicated that strong interpersonal connections at work can enhance innovation (Farooqi et al., 2025), improve communication – particularly among expatriate workers (Aldandachly et al., 2025) – and support team-based performance, as demonstrated in the sports domain where trust and relational clarity influence outcomes (Barrett et al., 2025). These findings have been validated through a variety of analytical models and research approaches.

Thus, we claim that H7 – Relational well-being determines employees' work performance.

3. Research methodology

Based on the literature review (Yu and Chen, 2023; Lee and Kim, 2023; Amirian et al., 2023) and well-being theory, we propose the conceptual model (Figure 1), in which employee well-being directly influences work satisfaction and work performance.

Adults typically spend approximately one-third of their waking hours at work. Performance outcomes are more likely to be achieved when individuals perceive their jobs as satisfying, and when employment conditions and organizational policies are perceived as attractive and supportive (Burke, 2017). Grant et al. (2007) identified three core domains of well-being-emotional (or psychological), physical (or economic), and social (or relational)-which collectively contribute to both job satisfaction and workplace performance. Conversely, under adverse working conditions that negatively affect these same three domains, employees are more likely to experience burnout and reduced performance (Shkoler et al., 2021). Building on the extensive body of literature that explores various facets of well-being (Guerci et al., 2022; Burke, 2017), this study focuses specifically on three key dimensions-emotional, economic, and relational well-being-in order to conduct a targeted analysis of their impact on job satisfaction and performance.



Source: Authors' contribution, made with SmartPLS 4.0

This study proposes to examine the impact of well-being on work performance and to explore the mediating role of job satisfaction between the well-being factors (emotional, economic, and relational) and work performance. The study is made on employees from Dambovit County, Romania, outlining the importance of well-being at work in obtaining work performance. The questionnaire (Table 2) was developed using a five-point Likert scale (1- total disagreement and 5 – total agreement).

The study population consisted of employees with valid and complete work contracts from Dâmbovița County, Romania. Data collection was carried out between December 2024 and January 2025. While the intention was to use a random sampling strategy, practical constraints led to the adoption of a convenience sampling approach, based on accessibility and willingness to participate. Despite this limitation, efforts were made to include participants from diverse organizational roles and age groups to improve representativeness. A total of 200 employees were contacted, and 191 responded, yielding a high response rate of 95.5%, which reflects the strong relevance of the topic. The authors gathered a considerable amount of data from the survey, which they then analyzed and used to draw meaningful conclusions. Overall, the study provides valuable insights into the attitudes and opinions of employees in Dambovit County, Romania. Table 1 illustrates the socio-demographical data of the respondents. As we may observe, from the 191 respondents, 60.7% are male, 59.2% are employees, and 33.5% are between 31-45 years, 30.9% are under 30 years, 24.1% are above 60 years, and 11.5% are between 31-45 years.

Table 1: Demographic characteristics of the respondents

Characteristic	N	%	Characteristic	N	%	Characteristic	N	%
<i>Gen</i>			<i>Position</i>			<i>Age</i>		
Male	116	60.7	Employee	113	59.2	< 30 years	59	30.9
Female	75	39.3	Manager	78	40.8	31-45 years	22	11.5
						46-60 years	64	33.5
						> 60 years	46	24.1

Source: Authors' calculations

The model was based on using partial least squares-based structural equation modeling in SmartPLS 4.0 (Table 2).

Table 2: Confirmatory Factor Analysis and Descriptive statistics

Con- struct	Item	Measure	Mean	Loading (St.Est.)	Chro alpha	AVE	CR
1. Employee well-being							
1.1. Emotional well-being							
	EMWB1	When I wake up, I feel refreshed.	4.702	0.823	0.925	0.690	0.940
	EMWB2	My personal and professional lives are balanced.	4.691	0.809			
	EMWB3	While working, I feel joyful.	4.277	0.802			
	EMWB4	While working, I remain calm and relaxed.	4.037	0.905			
	EMWB5	While working, I feel happy.	4.283	0.804			
	EMWB6	The work atmosphere brings me satisfaction.	4.042	0.905			
	EMWB7	I am satisfied with the ergonomics of my workspace.	4.283	0.758			
1.2. Economic well-being							
	ECWB1	My company pays for my training programs.	4.215	0.919	0.977	0.872	0.979
	ECWB2	My company offers me the opportunity to get a management position.	4.23	0.959			
	ECWB3	The wage increases are made based on performance.	4.246	0.966			
	ECWB4	Different employee assurance is paid of my company.	4.513	0.762			
	ECWB5	My company is paying our vacations.	4.277	0.987			
	ECWB6	My company is paying the taxes for doing studies in the field.	4.262	0.976			
	ECWB7	The increases or allowances are well-deserved by the employees.	4.246	0.949			
1.3. Relational well-being							
	RWE1	I easily collaborate with my department colleagues.	4.262	0.989	0.981	0.898	0.984
	RWE2	I continuously collaborate with my direct managers.	4.251	0.968			
	RWE3	I relate easy with colleagues from other departments.	4.22	0.930			
	RWE4	Relationship with suppliers or customers is based on trust.	4.23	0.959			
	RWE5	Communication with my colleagues is based on constant feedback.	4.22	0.927			
	RWE6	Work relationship is a win-win type.	4.209	0.925			
	RWE7	Relationship is leading to obtaining benefits.	4.209	0.934			

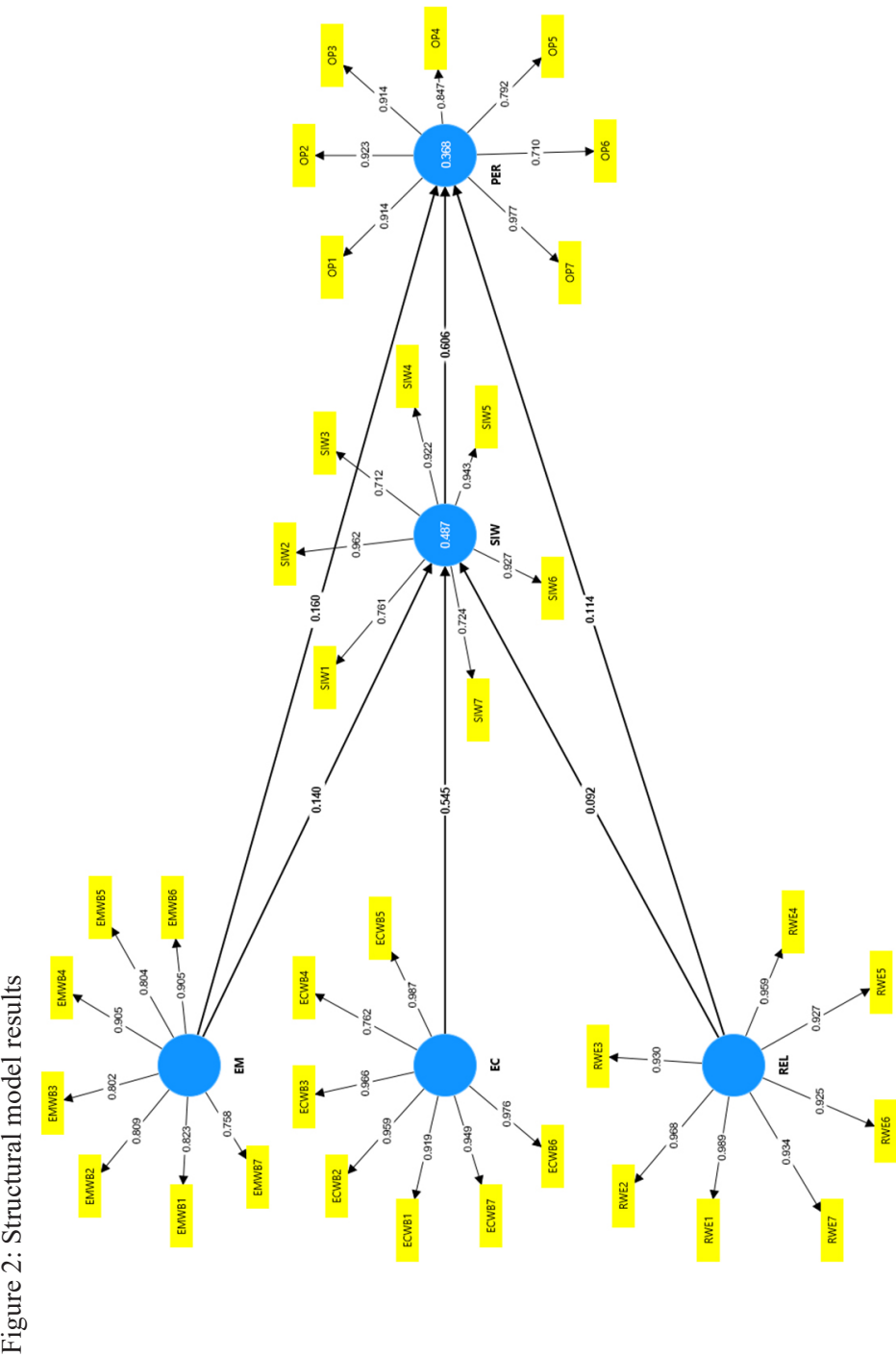
Source: Authors' calculations

Table 2: Confirmatory Factor Analysis and Descriptive statistics (continues)

Con-struct	Item	Measure	Mean	Loading (St.Est.)	Chro alpha	AVE	CR
2. Satisfaction in work							
	SIW1	Different tasks offer me satisfaction.	4.571	0.761	0.936	0.734	0.950
	SIW2	At work I am let to be creative.	4.44	0.962			
	SIW3	At work I am fulfilled.	4.34	0.712			
	SIW4	At work I can take autonomous decisions.	4.403	0.922			
	SIW5	Work environment let me share knowledge and experiences.	4.419	0.943			
	SIW6	I am heard and understood.	4.419	0.927			
	SIW7	Work culture is based on inter-relationship.	4.471	0.724			
3. Organizational performance							
	OP1	Individual performance is leading to organizational performance.	4.576	0.914	0.946	0.761	0.957
	OP2	Salary increases is based on individual performance.	4.581	0.923			
	OP3	Individual performance is well seen at work.	4.576	0.914			
	OP4	The employees who obtain performance are offered as examples for others in official meetings.	4.565	0.847			
	OP5	Performing, I obtain awards and distinctions.	4.545	0.792			
	OP6	Performance matters for obtaining an executive position.	4.487	0.710			
	OP7	I am happy when I obtain performance.	4.607	0.977			

Source: Authors' calculations

The collected data has been thoroughly examined to determine the accuracy and effectiveness of the measurements and to authenticate the connections among the underlying concepts (Figure 2).



Source: Authors' contribution, made with SmartPLS 4.0

Findings suggest the internal consistency of the model (Table 1) because all item loadings are over 0.7 (Hair et al., 2010); Cronbach alpha's exceeding 0.7 (Henseler and Sarstedt, 2013); and CR (composite reliability) values are also over 0.7 (Nemțeanu et al., 2022). According to the Fornell and Larcker (1981) procedure, AVE's value is higher for each latent variable than the correlation coefficient between the competent and all distinct variables (Table 3).

Table 3: Discriminant validity analysis

	ECWB	EMWB	OP	RWE	SIW
ECWB	1				
EMWB	0.359	1			
OP	0.368	0.151	1		
RWE	0.975	0.341	0.342	1	
SIW	0.685	0.368	0.606	0.671	1

Note: ECWB: economic well-being, EMWB: emotional well-being, RWE: relational well-being, OP: organizational performance, SIW: satisfaction in work.

Source: Authors' calculations

4. Results

The analysis was developed to evaluate the relationship among the latent variables. It was conducted to determine which hypotheses were supported. Based on the t-statistics, four out of the seven hypotheses were supported, while the remaining three were not confirmed (see Table 4). Emotional well-being positively influenced job satisfaction ($\beta = 0.140$; T-value = 1.664; $p < 0.1$). Therefore, greater emotional well-being for employees will lead to more satisfied employees; thus, H1 is accepted.

Economic well-being also positively impacts job satisfaction ($\beta = 0.545$; T-value = 2.152; $p < 0.1$), indicating that when employees obtain economic well-being, they are more satisfied with their jobs, so H2 is supported. Relational well-being does not influence job satisfaction ($\beta = 0.545$; T-value = 2.152; $p > 0.1$), indicating that a greater relationship with employees does not bring better job satisfaction, so H3 is not supported. Of the three dimensions of well-being presented, economic well-being is the only dimension that affects organizational performance statistically significantly ($\beta = 0.331$; T-value = 2.07; $p < 0.1$), suggesting that increased economic well-being yields increased performance and thus H6 is valid. Emotional well-being is not significant ($p = 0.102$), although it is close to the significance level; thus, H5 cannot be accepted. Relational well-being is not a factor ($p = 0.726$), and hence H7 is not accepted. Job satisfaction is a positive and significant factor of organizational performance ($\beta = 0.606$; T-value = 10.936; $p < 0.001$), and hence H4 is accepted.

Table 4: The path coefficients of the structural equation model

Paths	Path Coeff. (P) or (β)	Sample mean (M)	Standard deviation (STDEV)	T statistics (P/STDEV)	P values	Hypothesis
EMWB -> SIW (H1)	0.140	0.143	0.084	1.664	0.096*	H1 – supported
ECWB -> SIW (H2)	0.545	0.591	0.253	2.152	0.031*	H2 – supported
RWE -> SIW (H3)	0.092	0.045	0.261	0.352	0.725	H3 – not supported
SIW -> OP (H4)	0.606	0.609	0.055	10.936	0.000***	H4 – supported
EMWB -> OP (H5)	0.085	0.087	0.052	1.638	0.102	H5 – not supported
ECWB -> OP (H6)	0.331	0.361	0.160	2.07	0.039*	H6 – supported
RWE -> OP (H7)	0.056	0.027	0.159	0.350	0.726	H7 – not supported

Note: * $p < 0.1$; ** $p < 0.01$; *** $p < 0.001$

Source: Authors’ calculations

The study also evaluated the mediating effect of job satisfaction between the three types of well-being and organizational performance (Table 5).

Table 5: Test of mediation

Paths	Path Coeff. (P) or (β)	Sample mean (M)	Stand. deviation (STDEV)	T statistics (P/STDEV)	P values	Hypothesis
EMWB -> SIW -> OP (H1a)	0.085	0.087	0.052	1.638	0.102	H1a – not supported
ECWB -> SIW -> OP (H2a)	0.331	0.361	0.16	2.07	0.039	H2a – supported
RWE -> SIW -> OP (H3a)	0.056	0.027	0.159	0.35	0.726	H3a – not supported

Note: Significance levels: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Source: Authors’ calculations

The mediation analysis (Table 5) indicates the positive and significant indirect effects of economic well-being on organizational performance ($\beta = 0.331$; T-value = 2.07; $p < 0.039$), so H1a is supported; the indirect effect of emotional well-being on organizational performance is not significant ($\beta = 0.085$; T-value = 1.638; $p > 0.05$), indicating that H1a is not supported; and also for relational well-being on organizational performance the impact is not significant ($\beta = -0.102$; T-value = 5.875; $p < 0.05$), indicating that H3a is not supported.

5. Results and discussion

Tolstoy once said, *If you want to be happy, be!* This idea also applies to organizations – if they want happy employees, they must invest in their well-being. Starting with emotional or psychological well-being can lead to better individual performance, which can improve overall organizational performance (Wright and Cropanzano, 2000).

This study examined how emotional, economic, and relational well-being affect job satisfaction and, ultimately, organizational performance. The findings confirm the theoretical assumption that well-being contributes to job satisfaction, which in turn significantly predicts individual and organizational performance. From a theoretical standpoint, the study extends existing frameworks by empirically isolating the specific effects of each dimension of well-being. From a practical perspective, the results suggest that employers should consider differentiated strategies that promote economic and emotional well-being to maximize employee outcomes. For employees, understanding how their well-being affects job satisfaction and performance may enhance self-awareness and career planning. Managers can use these insights to tailor well-being programs and organizational policies to improve motivation and reduce resistance to change. For organizations, aligning reward systems with performance and fostering a culture of trust and collaboration are important steps.

Limitations of the study include the use of a convenience sample and a geographically limited dataset. Future studies could expand the sample scope, employ longitudinal designs, and further explore the mediating or moderating variables involved in the well-being–performance nexus.

The influence of emotional or psychological well-being on job satisfaction is positive and strong ($\beta = 0.140$; T-value = 1.664; $p < 0.1$), which has been observed by many researchers (Lee and Kim, 2023; Desrumaux et al., 2023). A study made on 343 Chinese teachers indicated that 56.4% of work satisfaction is predicted by psychological well-being (Han, 2022). Another study made on 341 teachers showed that 16% of the variance in psychological well-being was explained by perceived work satisfaction (Sood and Kour, 2023).

Economic or financial well-being is positively influencing job satisfaction ($\beta = 0.545$; T-value = 2.152; $p < 0.1$) and is indicated in other studies (Sandoval-Reyes et al., 2023; Silva and Dias, 2023). Also, an association between financial well-being and work satisfaction was observed among 358 working adults from three underdeveloped areas in China (Wu et al., 2024). Among 334 workers from Macao (China), the same association was found to be strong and positive (To et al., 2023).

Our study found that relational or social well-being does not have a statistically significant influence on job satisfaction ($\beta = 0.545$; T-value = 2.152; $p > 0.1$).

However, this finding contrasts with prior research that has reported a positive association between relational well-being and job satisfaction. For example, a study conducted among 403 workers in South Africa demonstrated that social well-being is positively related to job satisfaction (Hennicks et al., 2022). Similarly, research in Sweden showed that while hedonic well-being (focused on material aspects) negatively affects satisfaction, eudaimonic well-being (centered on social interaction and relationships) has a positive influence (Hansen, 2015). A separate study conducted in a Finnish transportation company also reported a positive relationship between relational well-being and job satisfaction (Bergbom and Kinnunen, 2014).

Despite the growing emphasis on relational dynamics in what is often referred to as the *fifth era of marketing* – the era of relationships – Romanian employees may not yet perceive interpersonal relationships as direct contributors to performance. Financial well-being continues to be regarded as a dominant motivator, even though it tends to have short-term effects that may fade over time. In contrast, strong and mutually beneficial workplace relationships can serve as powerful long-term motivators; however, they are still often perceived as secondary in importance.

Of the three types of well-being in consideration, the economic or financial well-being is the only one that showed statistically significant influence on organizational performance to the extent that it accounted for 33.1% variance ($T\text{-value} = 2.07$; $p < 0.1$). In consonance with empirical evidence derived through research conducted in Indonesia and the Netherlands, financial well-being, similarly, in this finding, portrays a positive impact on performance (Mahendru, 2021; Arifin et al., 2022). On the other hand, emotional or psychological well-being played only a slight role in our study ($p = 0.102$), despite previous research showing a positive and significant relationship (Lee and Kim, 2023). Relational or social well-being exerted no significant influence on performance ($p = 0.726$), in contrast to other findings that emphasize its relevance (Zhu et al., 2024). Job satisfaction, though, was strongly and statistically correlated with organizational performance ($\beta = 0.606$; $T\text{-value} = 10.936$; $p < 0.001$), which is a finding that is congruent with an extensive literature base (Kwon et al., 2023; Sen et al., 2024). Job satisfaction explains 60.6% of the variance in organizational performance based on our findings, which means that satisfied employees are far more likely to be the drivers of performance improvements.

The lack of a substantial effect of relational well-being on job satisfaction or performance is contrary to findings in Western organizational contexts, where interpersonal relations are more likely to be at the center of employee motivation. One possible explanation lies in cultural or contextual differences. In Romanian organizations, especially post-communist or hierarchically structured organizations, work relationships are likely to be more formal and task-related, which may detract from their perceived affective value. One factor is that relational support can be expected primarily outside of work, e.g., from community or family, reducing its significance at work.

In practice, organizations can leverage these insights by designing tailored well-being programs. For example, HR operations can offer emotional well-being programs that include mindfulness training, stress management classes, or psychological counseling access. Financial well-being programs can include tailored financial education classes, employee savings programs, or performance-based rewards linked to individual goals. These concrete actions not only enhance satisfaction and performance but also contribute to creating a stronger, more engaged workforce.

6. Conclusions

This study examined how emotional, economic, and relational well-being affect job satisfaction and, ultimately, organizational performance. The findings confirm the theoretical assumption that well-being contributes to job satisfaction, which in turn significantly predicts individual and organizational performance.

From a theoretical standpoint, the study extends existing frameworks by empirically isolating the specific effects each dimension of well-being. From a practical perspective, the results suggest that employers should consider differentiated strategies that promote economic and emotional well-being to maximize employee outcomes.

For employees, understanding how their well-being affects job satisfaction and performance may enhance self-awareness and career planning. Managers can use these insights to tailor well-being programs and organizational policies to improve motivation and reduce resistance to change. For organizations, aligning reward systems with performance and fostering a culture of trust and collaboration are important steps.

Limitations of the study include the use of a convenience sample and a geographically limited dataset. Future studies could expand the sample scope, employ longitudinal designs, and further explore the mediating or moderating variables involved in the well-being–performance nexus.

Theoretical organizational performance implications are closely associated with individual performance. Through the identification and comprehension of the determinants of employee performance, organizations can regularly track and study these variables in order to guide future improvement efforts. Employee well-being is one of the most important among such determinants. Therefore, by investigating the interdependencies of well-being, job satisfaction, and organizational performance, this study contributes to the existing literature by providing a nuanced analysis of emotional, economic, and relational well-being and their association with both job satisfaction and overall performance. As far as practical significance is concerned, the study shows that organizations stand to benefit significantly from measuring

employees' well-being across all three dimensions-emotional, economic, and relational. Such measurements can potentially provide valuable information for the development of targeted interventions that enhance individual and organizational performance.

So, there are important practical implications:

- for employees: they can improve their performance by analyzing their three types of well-being: emotional, economic, and relational. They can identify the positive and negative factors that influence their individual performance and trace the effects by determining the causes that led to low performance.
- for managers: they could determine which type of well-being is influencing employee performance, so they can build a plan based on increasing the influence of each type, by building a positive and strong culture, a positive and transparent communication system, a relationship based on trust and plans for working together, to reduce the resistance to change, to collaborate better and create strong alliances based on knowledge sharing.
- for organizations: they should implement good work policies and establish strong payment systems that reward performance rather than rely on preconceived criteria. They should continuously promote good practices of work related to collaboration, communication, and relationships as interpersonal connections increasingly drive the economy. However, the study indicated that relational well-being does not have a positive effect on satisfaction and organizational performance.

In short, organizational performance enhancement relies on creating a positive workplace that promotes emotional, economic, and relational well-being. Since the performance of individuals directly affects organizational outcomes, attending to these aspects of well-being is of critical importance. There are several limitations of this study. One key limitation is that it focuses on a single population within a specific setting. Future research could broaden the analysis by including diverse and varied samples from different regions, industries, or organizational sectors. Additionally, while we investigated the impact of three dimensions of well-being, we did not explore other potential moderators or mediators that may provide greater insight into these relationships. Based on our findings, we propose some directions for future research. First, future research may investigate the mediating effect of job satisfaction in the relationship between emotional, economic, and relational well-being and organizational performance more intensively. Second, researchers should explore how each aspect of well-being contributes to both individual and organizational outcomes. Finally, future research can offer managerial recommendations on how to enhance employee satisfaction through interventions that target directly all three forms of well-being towards ultimately enhancing organizational long-term effectiveness.

Subsequent work should explore these associations in comparative settings—that is, in various industries or national cultures—to determine whether the patterns observed hold in less hierarchically structured work environments. Longitudinal studies would also be valuable in understanding how well-being dimensions' influence evolves over time, particularly in response to organizational change, economic recessions, or public health crises. Qualitative data synthesis would further expose latent subjective experiences beneath the statistical connections, enriching our understanding of employee well-being.

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Utjecaj dobrobiti na radni učinak: Analiza posredničke uloge zadovoljstva poslom

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Sažetak

U ovom se radu istražuje utjecaj dobrobiti zaposlenika – emocionalne, ekonomske i relacijske – na organizacijsku uspješnost, s naglaskom na posredničku ulogu zadovoljstva poslom. Primijenjuje se kvantitativna metoda korištenjem podataka ankete prikupljenih od 191 zaposlenika u okrugu Dâmbovița u Rumunjskoj. Za testiranje predloženih hipoteza korišteno je strukturno modeliranje jednadžbi (SEM-PLS). Rezultati pokazuju da ekonomska i emocionalna dobrobit pozitivno utječe na zadovoljstvo poslom, što zauzvrat značajno predviđa radnu uspješnost. Ekonomska dobrobit također izravno utječe na uspješnost. Međutim, relacijska dobrobit ne pokazuje značajan utjecaj. Ova studija daje teorijski doprinos opisujući različit utjecaj svake dimenzije dobrobiti i praktične implikacije za politike ljudskih resursa usmjerene na poboljšanje zadovoljstva i učinka zaposlenika. Istraživanje pruža nove uvide u to kako zadovoljstvo poslom posreduje u vezi između različitih vrsta dobrobiti i učinka u kontekstu srednjoistočne Europe.

Ključne riječi: emocionalna, ekonomska i relacijska dobrobit, zaposlenik, zadovoljstvo poslom, radni učinak.

JEL klasifikacija: J28, M12, M54, D23

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Aging workforce and labour market trends in the European Union: A bibliometric analysis*

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Abstract

This study examines the main consequences of Europe's ageing population, including its effects on the labour market, employment dynamics, education, and socio-economic inequalities. It aims to identify and analyse trends and thematic priorities of these challenges, as well as regional differences within the EU (European Union). We used VOSviewer to perform a bibliometric analysis to analyse the publications indexed in the Web of Science Core Collection. The general overview of this area was based on the scientific fields of economics, business and demography. The results show a clear difference in thematic focus between Central and Eastern European (CEE) countries and Western European (WE) countries. The main emphasis in research in CEE countries concerning the challenges of an ageing workforce is on (un)employment. This research takes an optimistic view of the potential benefits of migration. In contrast, research in WE countries focuses primarily on the social impacts of migration, socio-economic inequalities and policy interventions. Moreover, WE studies are cited more frequently and have more influence, indicating their central role in shaping EU-wide discussions and policies. This research led to the conclusion that while ageing remains a challenge for Europe as a whole, regional priorities and the heterogeneity of scientific results reflect different socio-economic contexts and policy requirements. Bridging this gap between regions in different contexts requires a careful and integrated approach that could balance the potential positive effects of migration and address inequalities between Member States. This

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research highlights the need for collaborative policy and cross-regional knowledge exchange to mitigate the impact of ageing populations on the European labour market and socio-economic structure.

Keywords: *population ageing, ageing workforce, labour market, bibliometric analysis*

JEL classification: *J14, J21, C80, J26, O15*

1. Introduction

The inevitable ageing of the working population on the *old continent* and in the European Union (EU) in particular brings with it a number of challenges and problems that could have a negative impact on the economy and the dynamics of the labour market, and require a rethink of the policy framework. In the face of major demographic change, the EU needs to make choices to balance social well-being and the quality of life with maintaining sustainable economic growth. This study therefore summarises recent work on the challenges from the perspective of labour market development and the ageing of the workforce. Basic information on the demographic and economic impact of an ageing population can be found in the comprehensive reports published by the European Commission in 2015 and 2020. These reports show that the proportion of people aged 65 and over will increase significantly in the future. This highlights the need for policy changes to address labour market issues and topics such as the sustainability of European pension systems. The latter is also confirmed by Eurostat (2020), which emphasises the impact of longer working lives and later retirement on employment patterns and the need for targeted measures to maintain economic activity. Several factors influence the engagement of older workers in the labour market. Perhaps the most important are workplace policies, education and healthcare systems. As the International Labour Organisation (ILO) notes in its analysis of measures to sustain labour force participation in 2020, traditional measures may underestimate the contributions of older workers, requiring a more nuanced understanding of the economic impact of ageing. At the same time, a bibliometric study by Llena-Nozal et al. (2022) shows how customised HRM (Human Resource Management) strategies can help prevent age-related productivity losses and promote intergenerational collaboration.

The connection between ageing and productivity is one of the most important topics explored in empirical research. A 2016 International Monetary Fund (IMF) analysis underlines the relevance of innovation and skills development in mitigating the slightly negative relationship between the ageing of the labour force and productivity in the EU. Another study linking ageing, labour markets and education, especially after the disruption caused by COVID-19 (Tomljanović et al., 2023), emphasises the need to close the gap between the EU and its leading global competitors, especially in the areas of digital skills and productivity.

Following the research of Cristea et al. (2020), complementary data show how proactive labour market reforms, such as flexible working hours and lifelong learning, can maintain productivity in ageing societies. Policy initiatives that address the ageing workforce are also gaining importance. In order to retain older workforce, the Organization for Economic Co-operation and Development (OECD) (2020) recommends improved training initiatives and incentives as best practises for age-inclusive policies. A similar study by Naumann and Hess (2021) examines the ways in which age-friendly workplace policies are able to simultaneously increase employee satisfaction and reduce early retirement rates.

A recent study published by Kelin et al. (2023) emphasises the importance of education in the world of ageing populations. With a much higher labour income, people with a high level of education can cover their consumption over a more extended period of economic life than people with a low and medium level of education. They can also pass on some surplus resources to those whose consumption exceeds their income: children and the elderly. As the proportion of highly educated people in the population continues to increase, this should partially mitigate the negative impact of an ageing population on economic sustainability. As young, well-educated people are often also attractive to the largest European economies, other EU countries, especially emerging economies, are trying to retain their most promising labour force. A study of international business students found that countries should make additional efforts to encourage them to stay, not only by providing a more competitive income for the labour force but also by reducing corruption and improving the overall quality of life (Sokolić et al., 2024).

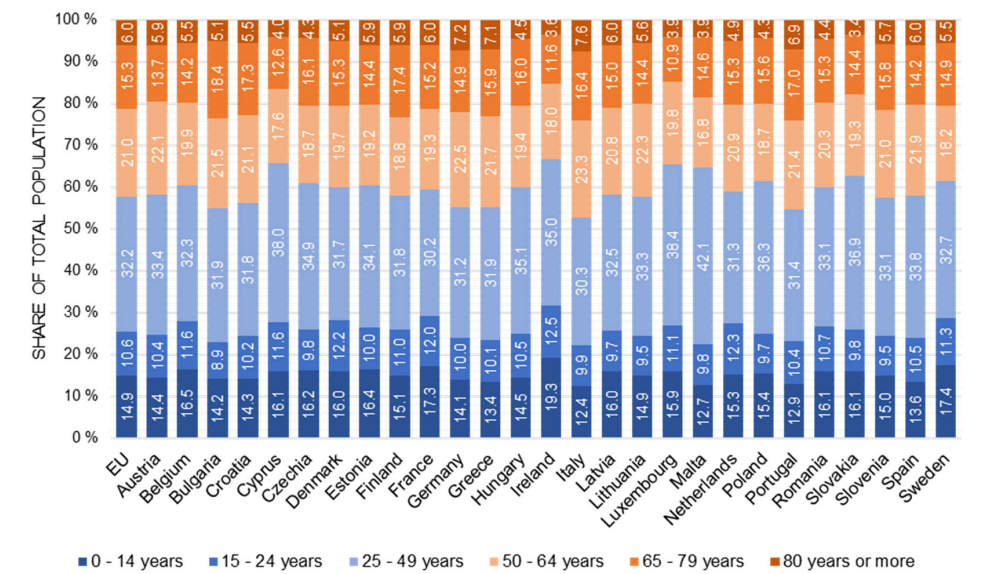
The socio-economic impact caused by an ageing workforce often goes beyond the workplace and productivity aspects. Based on the work of Pinto et al. (2014), which investigates the links between economic growth, labour force participation and health, improvements in the latter area can lessen the negative impact of an ageing population on GDP growth. Other similar studies, such as the one from Cyclus and Al Tayara (2021), complement these findings by further stating that in order to maintain growth within ageing economies, it is important to invest in healthcare. Along with that, immigration and intergenerational equity also play an important role. For example, Nagarajan and Sixsmith (2021) argue that it is possible to offset labour shortage triggered by ageing population in a given economy by implementing suitable immigration laws and incentives as this will attract younger population to places where this is enforced. Furthermore, Grdović Gnip (2023), while investigating the connection between economic success and migration, concludes that GDP per capita and employment are the main factors that drive the inflow and outflow of migrations at the regional level. Additionally, Mok et al. (2022) explain in details how communication between generations contributes to greater social integration and, ultimately, better economic

outcomes. In conclusion, the EU's ageing workforce necessitates a layered approach that considers investments in health and education, HRM tactics and regulatory reform. Nevertheless, whereas the literature offers potential solutions that would transform demographic change into an opportunity for social justice and sustainable progress, some obstacles to implement those in practice still remain.

The long-term trend of an ageing population has been observed by the EU for many years. Historically, low birth rates, increasing life expectancy, and migration patterns (e.g., in EU Member States, which are characterised by a net influx of pensioners) are the causes of this phenomenon. Population projections indicate that the total number and proportion of older adults in the EU population will increase rapidly in the coming decades. According to 2023 data, people under the age of 14 make up 14.9% of the total EU population, while people of working age (between 15 and 64) account for 63.8% of the EU population. More significantly, the elderly (65 years and older) comprise 21.3% of the EU population. The latter corresponds to an increase of 3.1 percentage points (pp) compared to ten years ago and 0.3 pp compared to the previous year (Eurostat, 2024-a). In 2023, the lowest proportions of young people were recorded in Italy (12.4%), Malta (12.7%) and Portugal (12.9%), while the highest proportions of young people were found in Ireland (19.3%), Sweden (17.4%) and France (17.3%). Only three EU Member States (Germany +0.2 pp, Portugal +0.1 pp and Czechia +0.1 pp) recorded an increase in the proportion of young people in their population between 2022 and 2023, while the proportion in the other EU Member States fell or remained the same (Malta recorded the largest decrease of 0.7 pp). The countries with the highest proportion of inhabitants aged 65 and over were Portugal (24.0%), Italy (24.0%), Bulgaria (23.5%), Finland (23.3%) and Greece (23.0%), while Luxembourg (14.9%) and Ireland (15.2%) had the lowest proportions. A detailed age structure of the population in 2023, based on the main age groups in the EU Member States (in % of the total population), can be seen in Figure 1.

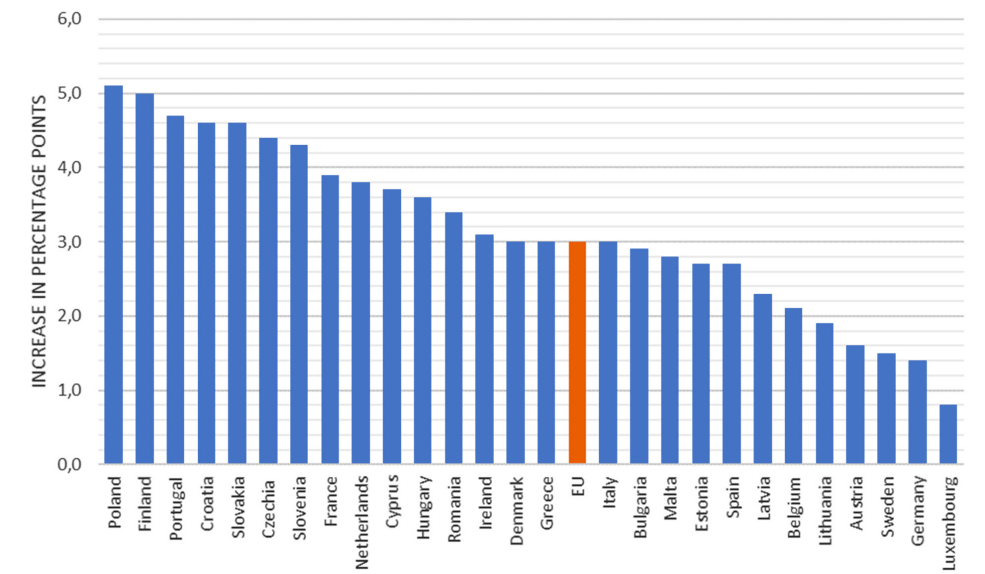
More worrying is that, except for Malta, Czechia and Estonia, all EU Member States will see an increase in the proportion of people aged 65 and older in 2023 compared to 2022 (Eurostat, 2024-b). Figure 2 shows an increase in the proportion of the population aged 65 or older (in percentage points) over the last ten years in the EU Member States. Further projections (Eurostat, 2024-c) show a significant increase in the population aged 80 and over, from 6.9% in 2023 to 15.3% in 2100.

Figure 1: Population age structure by major age groups in EU Member States (in % of the total population), 2023



Source: Author’s calculations, based on Eurostat, 2024-b

Figure 2: Increase in the share of the population 65 years or older from 2013 to 2023 in EU member states (in pp)



Source: Author’s calculations, based on Eurostat, 2024-c

Based on the above-stated introduction to the research, several research questions emerge:

1. How has research on the relationship between ageing and employment evolved over time?
2. How do different countries address the economic impact of an ageing workforce in policy and business research?
3. What are the significant themes and gaps in the literature on ageing, employment and migration in the labour market?

The research questions raised will be addressed through the continuation of this study by conducting a bibliometric analysis of 684 relevant documents. Importantly, the analysis goes beyond providing a descriptive overview of the publication corpus. More precisely, using the VOSviewer, we are able to identify important research clusters and track thematic trajectories that have evolved over time within the field. The latter provides a structured understanding of how the scientific focus has developed in relation to these topics, which topics are of interest in certain countries and, finally, highlight the areas that are still underexplored. Emphasising these patterns adds analytical depth to the study and provides insights that would not be apparent from a purely narrative overview.

This study builds upon a growing body of bibliometric and scientometric analyses that have examined various aspects of the relationship between economic impact of ageing. For instance, previous studies have investigated how ageing populations affect economic growth (Nagarajan et al., 2013), or inspected socio-economic, health and policy aspects of ageing (Mahmood and Dhakal, 2022). Works such as Cucculelli et al. (2023) have conducted bibliometric and content analyses regarding ageing and entrepreneurship, identifying key regional dynamics and local demographic influences. Nevertheless, all of aforementioned works have focused on analyses in the global context, often without a specific emphasis on the European labour markets or interconnected role of ageing, employment, migration, and policy responses. To address this gap, our research provides a systematic bibliometric mapping of existing scholarly work on this topic. This is done by identifying key patterns in the development of ageing and employment research, and by identifying cross-national differences in policy and business responses across Europe, as well as overlaps with migration dynamics in European labour markets.

The data and methods used in the analysis are described in detail in the *Data Description and Methodology* section, while the results of the bibliometric analysis are presented in the *Empirical Results* section. The last section (*Discussion and Conclusions*) compares our main findings with previous research, highlighting the main conclusions and suggesting possible future study directions.

2. Data description and methodology

The Web of Science Core Collection (WoS CC) database from Clarivate Analytics is the most comprehensive citation database in the world. The WoS CC includes papers published in the most prestigious periodicals, covering journals in open-access, conference proceedings and books among others. Being recognised as one of the most relevant scholarly databases, specifically in social sciences, it includes a deep historical coverage of the latter mentioned publications. More precisely, since the WoS website was founded in the late 1990s, its three journal citation indices, namely the Science Citation Index Expanded (SCIE), the Social Sciences Citation Index (SSCI) and the Arts and Humanities Citation Index (A&HCI), have been widely used in academic research (see, e.g., Liu et al., 2020), and therefore it's the reason we also choose to do so. Also, note that, to avoid overlaps, we limit our analysis exclusively to publications indexed in WoS CC, as many journals are indexed in different databases.

To collect, retrieve and summarise prior work regarding the impact of population ageing on labour markets, we apply bibliometric analysis (Gross and Pritchard, 1969). Essentially, bibliometric analysis presents a statistical analysis that is utilised to find critical authors or research papers, as well as to identify their relationships by examining all literature regarding a particular topic or field (De Bellis, 2009; Peterson et al., 2016). For the bibliometric analysis in the sequel, the articles were searched and retrieved from the WoS CC. The decision to use the WoS CC to conduct the bibliometric analysis in this article was made due to this database being considered the standard one used in the industry in most fields and is the most commonly used database for bibliometric research (Li et al., 2018; Ivanović and Ho, 2019).

The data manipulation and bibliometric analysis in this study was conducted with the help of the VOSviewer software tool, version 1.6.19. This software, developed in 2010 by Nees Jan van Eck and Ludo Waltman of Leiden University, enables the creation and exploration of maps based on network data (van Eck and Waltman, 2009). Although it is primarily intended for analysing academic datasets, it can also be used with any network data (e.g. social networks). One of three visualisation modes (network, overlay or density) is used to examine co-authorship, co-occurrence, citation, bibliographic coupling, and co-citation linkages (Donthu et al., 2021; Arruda et al., 2022).

For the document search, the following combinations of keywords were used in the article title, abstract and author keywords fields: Ageing, Economy, Employment, Demography, EU, European Union and Labour. For the analysis period, we opted for all years for which data on publications were available (January 1993 to September 2024). Using the previously mentioned filters, we obtained 1649 documents. Next, we limited our search to topics related to Business economics, Demographics and Economics, which left us with 698 documents. To

enable bibliometric analysis, we further excluded books and book chapters from our search, resulting in a final set of 684 documents. A detailed overview of the document filtering steps is presented in Table 1.

Table 1: Detailed search process

Filtering Category	Inclusions/Exclusions	Excluded document	Obtained documents
Initial search	Web of Science Core Collection search using combined Boolean queries on ageing, labour, employment, economy, demography, pensions and productivity in the EU context. (ageing AND labour AND EU) OR (ageing AND employment AND EU) OR (ageing AND labour AND European Union) OR (ageing AND employment AND European Union) OR (ageing AND economy and EU) AND (ageing AND economy AND European Union) OR (ageing AND demography AND EU) and (ageing AND demography AND European Union) OR (ageing AND productivity AND EU) OR (ageing AND productivity AND European Union) OR (ageing AND pensions AND EU) OR (ageing AND pensions AND European Union)		1649
Publication years	January 1993 – September 2024		
Research area	From the initial 1649 documents, we retained only those indexed under Economics (453), Business (138), and Demography (107) since these categories align most with the study on the economics and labour implications of ageing. We therefore excluded documents from over 40 other research areas including Management (126), Public Environmental and Occupational Health (121), Sociology (105), Multidisciplinary Sciences (96), Environmental Sciences (68), Education and Educational Research (63), Law (60), Public Administration (58), Geography (52), Political Science (49), International Relations (39), as well as smaller number of documents from fields such as Engineering (9) and Computer Science (4), and various medical disciplines with the most being from Gerontology (53), General Medicine (23) and Psychology (12).	951	698
Document types	Document types such as books and book chapters were excluded from the search, leaving us with research articles (501), proceeding papers (201), review articles (8), early access (3), and editorial material (3).	14	684
Languages	We keep all the languages spoken on the European continent, with the final filtered documents written in English (648), Czech (11), Spanish (11), Slovak (8), and French (6).		684

Source: Author's calculations

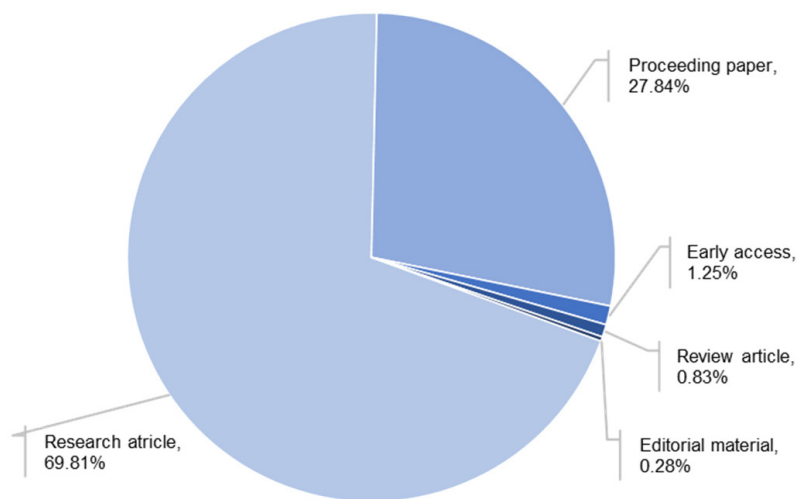
3. Empirical results

The Results of the bibliometric analysis carried out, which are presented in the continuation of the paper, focus on the distribution of the types of obtained documents, the distribution of the journals in which the filtered documents were published, the co-occurrence of keywords in research on ageing workers and the labour market, the distribution across research fields and the distribution of influential authors, institutions and countries.

3.1. Documents published by type and distribution over publication journals

Of the 698 obtained documents, 504 are research articles, 201 proceeding papers, nine are early accesses, six are review articles, and two are editorial material. Since some documents are categorised in more than one category, the sum of all types of documents is greater than the number of all obtained documents. The distribution of the types of obtained documents can be seen in detail in Figure 3. With regard to the WoS categories to which the filtered documents belong, the distribution is as follows: most documents (454) belong to the field of Economics, 127 to Business Economics (management and business finance), 109 to Demography, 73 to Industrial Relations Labor, 27 to Regional Urban Planning, 23 to International Relations, 21 to Sociology, while the minority of them (about 100 publications) belong to the themes related to topics in Environmental Sciences, Health, Law and Mathematics.

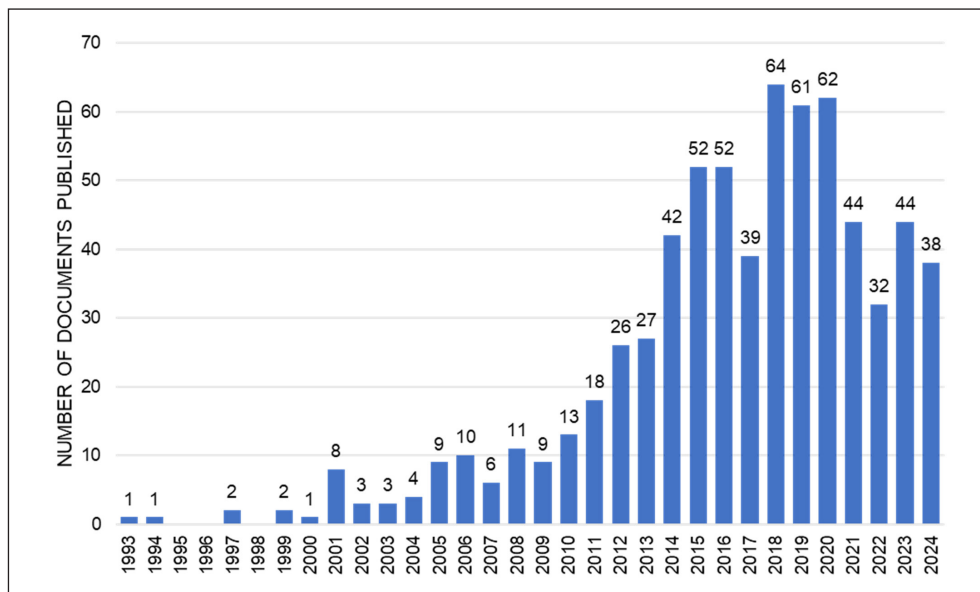
Figure 3: Distribution of types of obtained documents



Source: Author's calculations

Regarding the time frame of the publications of the filtered documents, we can see from the chart in Figure 4 that most documents related to the ageing workforce and their impact on labour market trends have been published in the last decade. A notable increase in publications started in 2011, peaking in 2015 and 2016 (104 publications in these two years) and reaching a new high in 2018, with the most publications in a year (64 publications) concerning the topic. From 1993 to 2004, the issue was of scarce concern to scientific research.

Figure 4: Number of documents published by year 1993-2024



Source: Author's calculations

In addition to the distribution of the types of documents published, we were also interested in the distribution of the journals in which the filtered documents were published. Table 2 lists the ten journals that published the most research articles from the previously stated research field - the research areas in economics, business economics, and demographics, with the topics of ageing, economy, employment, demographics, EU, European Union, and labour. They provide information on the number of articles published in each journal, the total number of citations, the Journal Impact Factor (JIF), the quartile to which the journal belongs, and its publisher.

Table 2: The top ten journals with most published research articles from the observed research field

Journal name	Published articles	Total citations	JIF (2023)	Quartile (2023)	Publisher
Demographic Research	17	530	2.1	Q2	Max-Planck Institute for Demographic Research
International Journal of Manpower	12	136	4.6	Q1	Emerald Group Publishing Ltd.
International Migration	9	164	1.6	Q2	Wiley-Blackwell Publishing Ltd
Transformations in Business and Economics	8	29	1.8	Q2	Vilnius University Press
Economic Modelling	7	65	4.2	Q1	Elsevier B.V.
European Journal of Population	7	222	1.9	Q2	Springer Netherlands
International Journal of Comparative Labour Law and Industrial Relations	7	32	0.8	Q3	Wolters Kluwer (UK) Ltd.
Population and Development Review	7	227	4.6	Q1	Wiley-Blackwell Publishing Ltd
Transfer: European Review of Labour and Research	7	29	2.9	Q1	SAGE Publications Ltd.
Work, Employment and Society	7	261	2.7	Q1	SAGE Publications Ltd.

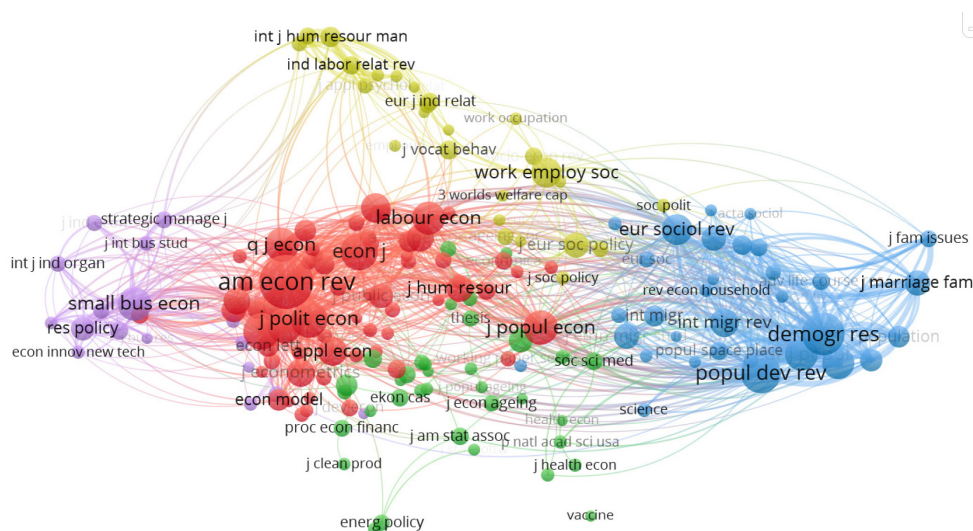
Source: Author's calculations

Table 2 shows that Demographic Research, International Journal of Manpower and Procedia Economics and Finance are the three journals with the most publications on the ageing workforce and labour market trends (eleven or more publications each in this area). In terms of the JIF, the International Journal of Manpower and Population and Development Review are journals with the highest JIF (both 4.6), followed by Economic Modelling (4.2), Transfer: European Review of Labour and Research (2.9) and Work, Employment and Society (2.7). In addition to the journals listed in Table 2, relevant documents were also found in the proceedings of four conferences, namely the International Multidisciplinary Scientific Conferences on Social Sciences and Arts, the International Scientific Conference on Economics and Social Development, the International Conference on Business Excellence and the International Days of Statistics and Economics.

Five or more publications on our topic have appeared at each conference. We also found that Springer Nature is the most influential publisher, with 66 publications. The research focus of its most prominent journals is on topics such as ageing, unemployment, retirement and immigration policy, human resource management and planning.

The frequency with which two authors, documents or journals of more recent works are cited together is called co-citation. The basic assumption behind co-citation is that works regularly mentioning the same sources have a common theme. The basic idea is that the more frequently two authors, documents or journals are cited together, the stronger the link between them. Therefore, co-citation analysis effectively evaluates the connections and links between documents, authors or journals (Small, 1973). Research clusters begin to form when numerous authors cite the same pairs of documents, other authors or journal titles together. Each defined cluster represents a different topic and reflects the common lines of research in each cluster (Dothu et al., 2021). Figure 5 shows the co-citation network of the top ten journals, with each cluster represented by a different colour. The larger the circles are, the more documents are published in the respective journal, while the lines represent the connections between the journals. Five major research clusters can be defined, namely economics (red), demographics (blue), medicine (purple), ageing (green) and sustainability (yellow).

Figure 5: The top ten journals' co-citation network



Source: Author's construction

population growth rates in general (Eurostat, 2020), suggesting that efforts yield a certain level of success in mitigating the problem of an ageing population in the EU.

Table 3: The keywords with the most occurrences

Keyword	Occurrences	Total link strength
employment	77	246
Europe	49	190
age	47	186
European Union	59	170
impact	44	166
unemployment	60	160
gender	38	146
labour market	48	135
migration	40	118
growth	29	112
countries	25	110
education	26	109
performance	23	98
productivity	22	96
fertility	19	93
inequality	20	83
determinants	20	80
retirement	25	77
family	18	74
human capital	14	72

Source: Author's calculations

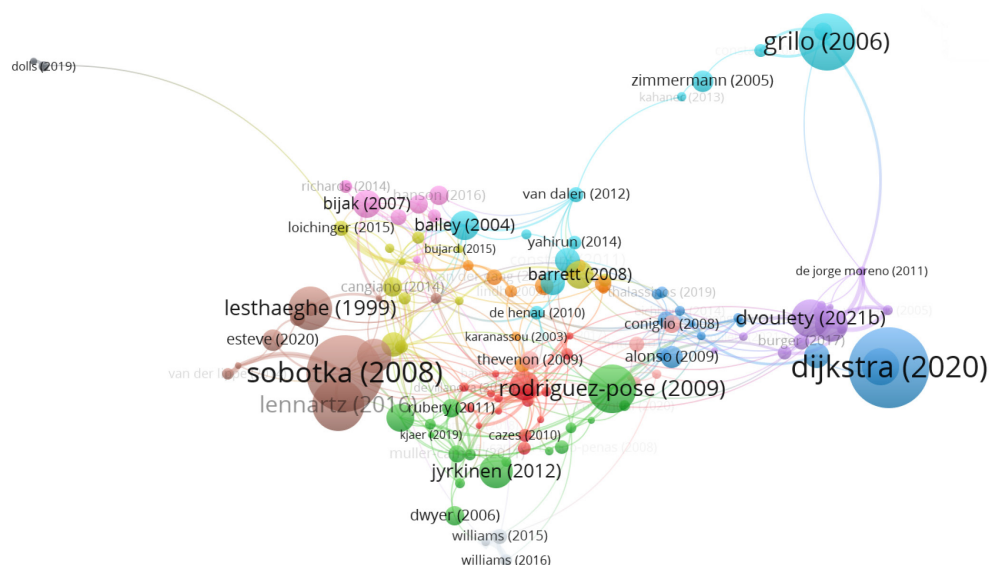
Analysing research over time provides valuable insights into the significance of various topics. The researchers examined the implications of ageing populations, labour market dynamics and demographic transitions on economic integration and sustainability in Europe, drawing on insights from the United States. Research initially focused on the mobility of older workers and self-employment in Spain and France, and later on pensions, health, and migration across the EU, as well as on issues related to fertility rates. In addition, global issues such as gender inequalities, the impact of the Great Recession and regional trends in innovation and migration, particularly in Romania, were analysed. The COVID-19 pandemic emphasised the challenges in education and income distribution and highlighted the vulnerability of women and young adults. Brexit has also highlighted the complexity of inequality and support policies. The research papers emphasised the relationship between

demographic changes, policy responses and economic resilience and looked at job satisfaction and poverty within broader social dynamics.

In addition to analysing citations and identifying trends and gaps in research on a particular topic, bibliographic coupling can also be used. Bibliographic coupling is a similarity metric that employs citation analysis to determine whether two documents are similar. It is based on the idea that if two works refer to a common third work in their bibliographies, these two works deal with a similar topic (Martyn, 1964; Weinberg, 1974). Moreover, the number of jointly cited publications can help assess how closely the two works are related. Similar to the co-citation analysis, we can also form research clusters based on the topic addressed by the documents in a particular cluster.

Figure 7 illustrates the network of bibliographic coupling of documents, while Table 4 presents the bibliographic coupling clusters that give an insight into the different research topics defined by each cluster. The clusters are colour-coded, as explained in Table 4, highlighting the main research topics and authors. Predominant research areas include unemployment, market transitions, labour market adjustment, technological innovation, population ageing, and labour force projections. Conversely, studies focusing on fertility and family attitudes, mobility and demographic change, labour market adjustment and technological innovation have the greatest impact on the research field.

Figure 7: Document bibliographic coupling network



Source: Authors construction

Table 4: Bibliometric clusters categorisation

Cluster ID	Size	Research topic
1 – red	17	topics related to unemployment
2 – green	16	topics related to labour market transitions
3 – blue	13	topics related to labour market adjustment and technological innovation
4 – yellow	12	topics related to the ageing of the population and labour force projections in the EU
5 – purple	12	topics related to R&D and firm performance
6 – turquoise	12	topics related to mobility and demographic changes
7 – orange	11	topics related to labour force ageing and levels of education
8 – brown	11	topics related to fertility and family attitudes
9 – pink	8	topics related to migrations
10 – light green	6	topics related to the inclusion of marginalised labour groups
11 – grey	3	topics related to self-employment
12 – black	2	topics related to income distribution

Source: Author’s calculations

3.3. Documents published by authors, countries and institutions

The WoS CC data shows that the documents obtained involve 201 authors, 59 countries/regions, and 201 institutions. In this paper, we continue to highlight the authors’ contributions to research on the ageing labour force and its impact on market trends in the EU and perform a co-authorship analysis based on countries and institutions.

Twenty-five authors published at least three papers in the field of our research between the years 1993 and 2024. To determine the top authors, we considered their publication history, number of citations, and overall strength of affiliation. The details can be found in Table 5. The analysis of the number of papers published by each author revealed that Butkus, M. (8) and Matuzeviciute, K. (7) from Lithuania authored the most publications. At the same time, Loichinger, E. is the most frequently cited author on the list for research on population dynamics.

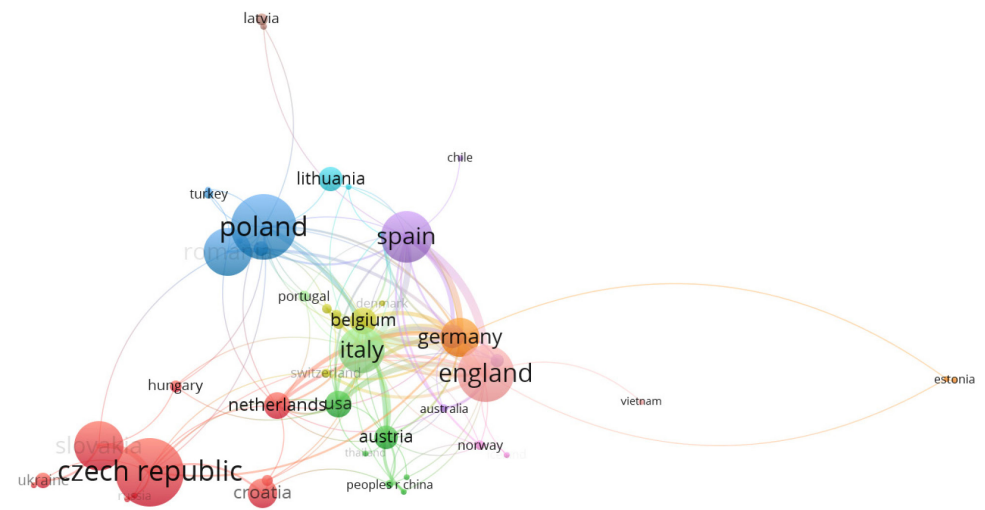
One of the most important indicators of a country’s interest in a particular topic is the number of publications in that country. Figure 8 shows the map of the co-authorship analysis (based on countries/regions). Most publications come from Europe, followed by Far Eastern and North American countries.

Table 5: Authors by the number of published documents

Author	Documents	Citations	Total link strength
Butkus, Mindaugas	8	28	23
Matuzeviciute, Kristina	7	26	21
Dargenyte-Kacileviciene, Laura	4	3	12
Rupliene, Dovile	3	10	11
Seputiene, Janina	3	10	11
Dolls, Mathias	2	16	10
Doorley, Karina	3	37	10
Flek, Vladislav	5	36	10
Loichinger, Elke	2	51	10
Mysikova, Martina	6	39	10
Paulus, Alari	2	26	10
Schneider, Hilmar	2	26	10
Sommer, Eric	2	26	10
Hala, Martin	3	12	8
Barrios, Salvador	2	46	6
Gandullia, Luca	2	7	5
Privara, Andrej	3	18	5

Source: Author’s calculations

Figure 8: Map of co-authorship analysis (based on countries/regions)



Source: Author’s construction

In addition to the information in Figure 8, Table 6 shows the top twelve countries/regions according to the overall strength of their co-authorship relationships with other countries. European countries dominate the list regarding the number of documents published, with Poland and Czechia at the top. At the same time, England, Germany, Italy, Spain, and Belgium also have a high number of publications. England is the most influential country, with 1,688 citations, followed by Belgium with 1,006 citations and Italy with 747 citations.

Table 6: The top twelve countries/regions by the number of published documents, citations and the total strength of the co-authorship links with other countries/regions

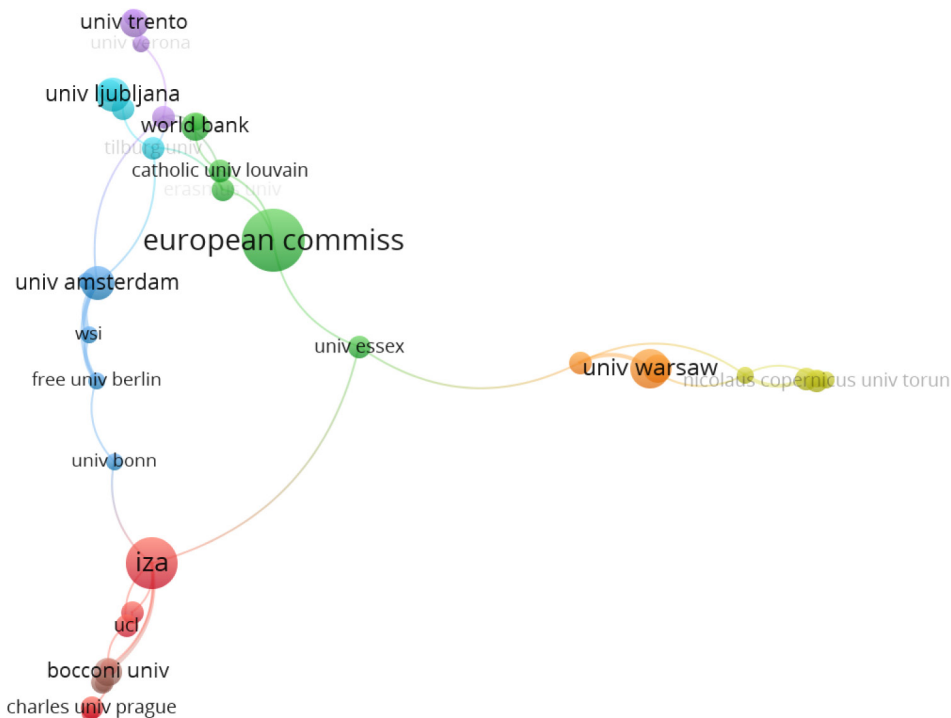
Country	Documents	Citations	Total link strength
England	66	1688	65
Germany	42	549	53
Italy	52	747	47
Spain	59	634	42
Belgium	26	1006	27
Austria	23	404	25
USA	26	344	23
Poland	80	490	20
France	23	498	19
Netherlands	26	504	19
Czechia	84	358	16
Ireland	11	240	11

Source: Author's calculations

We are also interested in which institutions are most influential in relation to the same topic. Figure 9 shows the map of the analysis of co-authorship (based on institutions).

Table 7 shows the twelve leading institutions ranked according to the strength of their co-authorship with other institutions. Regarding the number of publications, the University of Economics in Bratislava leads with 16, followed by the Institute of Labor Economics with 9. In addition, the Institute of Labor Economics has the highest number of citations, with 174, closely followed by the University of Amsterdam, with 168 citations. Among the most influential institutions in this particular field of research are three in Germany, two in the Netherlands and two in Slovakia, both in Bratislava. The remaining institutions are in Austria, Italy, England, Belgium and the USA.

Figure 9: Map of co-authorship analysis (based on institutions)



Source: Author's construction

Table 7: The top twelve institutions by number of published documents, citations and the total strength of the co-authorship links with other institutions

Institution	Documents	Citations	Total link strength
University of Amsterdam	6	168	8
IZA – Institute of Labor Economics	9	174	7
The Austrian Academy of Sciences	3	132	5
Bocconi University	5	82	5
Comenius University	6	28	5
Free University of Berlin	3	53	5
University of Economics in Bratislava	16	56	5
University of Oxford	4	21	5
WSI – The Institute of Economic and Social Research	3	5	5
Catholic University of Louvain	4	91	4
CEPR – Center for Economic and Policy Research	3	37	4
Tilburg University	4	69	4

Source: Author's calculations

3.4. The most cited publications

The most frequently cited publications on this topic are listed in Table 8. As anticipated, the majority of these highly cited works were published over a decade ago. At the top of the list is the 2020 publication titled *The Geography of EU Disconnect*. In this paper, the authors discuss various demographic challenges within the EU, which they believe contribute to a range of other issues. Although the study was published several years ago, it remains highly relevant as it addresses the health and economic consequences of unemployment, ageing populations, low fertility rates and increased life expectancy in EU countries. The authors highlight the necessity of encouraging active ageing and lifelong learning as well as the importance of effective human resource management, corporate social responsibility and self-employment through entrepreneurial activities.

Table 8: The most cited documents

Authors	Title	Year of publication	Citations
Dijkstra, L., Poelman, H., Rodríguez-Pose, A.	The geography of EU discontent	2020	295
Sobotka, T., Toulemon, L.	Changing family and partnership behaviour: Common trends and persistent diversity across Europe	2008	273
Grilo, I., Irigoyen, J. M.	Entrepreneurship in the EU: To wish and not to be	2006	183
Lennartz, C., Arundel, R., Ronald, R.	Younger adults and homeownership in Europe through the global financial crisis	2016	161
Rodríguez-Pose, A., Tselios, V.	Education and income inequality in the regions of the European Union	2009	147
Vuontisjärvi, T.	Corporate social reporting in the European context and human resource disclosures: An analysis of Finnish companies	2006	138
Lesthaeghe, R., Willems, P.	Is low fertility a temporary phenomenon in the European Union?	1999	126
Dvoulety, O., Srhoj, S., Pantea, S.	Public SME grants and firm performance in European Union: A systematic review of empirical evidence	2021	105
Alabrese, E., Becker, S. O., Fetzer, T., Novy, D.	Who voted for Brexit? Individual and regional data combined	2019	103
Falk, M., Katz-Gerro, T.	Cultural participation in Europe: Can we identify common determinants?	2016	102
Matysiak, A., Sobotka, T., Vignoli, D.	The great recession and fertility in Europe: A sub-national analysis	2021	91
Jyrkinen, M., Mckie, L.	Gender, age and ageism: experiences of women managers in Finland and Scotland	2012	90

Source: Author's calculations

4. Discussion

The results of the analysis indicate regional differences, especially with regard to the thematic focus. In addition, it is necessary to consider the impact of population ageing on labour markets and productivity, as well as the impact of technology and innovation. At the end of this section, both implications and recommendations for policy design are given.

4.1. Regional Differences in Research Trends and Priorities

The analysis shows significant regional differences in terms of scientific interest and output related to ageing, employment and migration within the EU. Countries such as Czechia, Poland and Slovakia have a high visibility in research and often focus on issues of labour out-migration, unemployment and the economic potential of migration. These countries have generated a considerable volume of research, probably due to their specific economic and demographic challenges related to the ageing of their populations.

In contrast, economically stronger countries such as Germany, the United Kingdom, the Scandinavian countries and the Benelux countries are relatively underrepresented in terms of publication volume, although their studies tend to have a higher scientific impact. Mediterranean countries such as Spain and Italy follow a similar trend. Scholars from these countries focus more on societal impacts, socio-economic inequalities and policy responses, suggesting that countries that receive larger migrant flows are more likely to research the social dimensions of migration, while the less affected countries focus on economic concerns.

4.2. Impact of Ageing on Labour Markets and Productivity

Population ageing has a significant impact on productivity, labour dynamics and socio-economic policies in the EU. Demographic change in the EU, influenced by negative population growth and longer average life expectancy, has a strong impact on labour markets and requires an extension of the working life of the population. Factors such as education, health and adaptability of the workplace play a crucial role in the attempt to prolong the productive engagement of older workers. Empirical findings emphasise the importance of innovation, lifelong learning and age-friendly employment practises in mitigating negative effects.

The key factor associated with longer economic independence for older people is education, as higher levels of education have a positive impact on longer economic independence and other social benefits. In addition, strategic investment in healthcare helps to maintain labour force participation and GDP in ageing societies.

4.3. Role of Technology, Innovation and Migration

Research emphasises that innovation and human resource management strategies are central to addressing productivity challenges in ageing societies. As the EU is under constant migratory pressure, these influxes, if strategically managed, can compensate for labour shortages, boost economic growth and breathe new life into ageing labour markets. Therefore, an approach that combines an appropriate immigration policy with investment in lifelong learning programmes and intergenerational equity initiatives is crucial. Different regions have different priorities: Central and Eastern European (CEE) countries have so far attracted fewer labour migrants and therefore study migration primarily as a source of economic revitalisation, while Western European (WE) countries have already been a destination for a large proportion of migrants in recent decades. Research in the WE countries, therefore focuses on the challenges of integration and social cohesion. Despite the large volume of research from CEE countries, WE studies tend to be cited more frequently and are more influential, indicating the need for greater cross-regional cooperation and knowledge exchange.

4.4. Policy Implications and Recommendations

In view of the continuing demographic trend, the EU must take coordinated and proactive policy responses. Reforming pension systems, improving healthcare and promoting intergenerational cooperation are essential components. Innovative HRM practises, equitable access to resources and lifelong learning are key policy areas to turn demographic challenges into opportunities for sustainable development and social cohesion. When looking at the differences between WE and CEE countries in terms of migration flows, it can be seen that a different policy focus is needed. WE countries need to narrow the gap between the education, skills and quality of life levels of migrants and the native population, not only to ensure better integration and social cohesion, but also to maximise the growth potential created by the influx of labour. Policies in CEE countries should aim to avoid some of the negative effects of future migration flows, such as the creation of migrant ghettos and inequality between different population groups in general. The main benefit that could support policy making in CEE countries would be access to knowledge and best practise from WE countries that already have extensive experience in this area. Strategies should reconcile economic and social objectives, bridge regional disparities and support policy learning in the EU. Ensuring the participation of older adults through adaptable jobs and continuous training can maintain productivity and mitigate demographic pressures.

5. Conclusion

This bibliometric analysis of almost 700 documents provides a comprehensive overview of research trends on ageing, employment and migration in the EU. It covers the period from 1993 to 2024, and shows not only the analysis of keywords, but also provides insights into bibliographic coupling clusters and different research topics defined by each cluster. The results confirm that population ageing remains a key issue with profound economic and social implications. The research landscape is heterogeneous, there are differences between regions, i.e. between WE countries and CEE countries, both in terms of research focus and impact. One of the most important findings of this study is therefore that although ageing is a major topic in Europe, the scientific focus is different. The difference in scientific focus probably reflects very well the differences in the broader context that these regions experience. The focus on different aspects of the influx of migrant labour is probably most evident in this sense. The findings emphasise the need for a unified European approach, greater transnational cooperation and the sharing of knowledge and best practise. Current trends, characterised by demographic stagnation and the changing needs of the labour market, suggest that this area will continue to attract academic attention.

A major limitation of this study is that it focuses exclusively on EU-related publications, thus lacking a comparative perspective with other ageing economies such as Japan or China. Including this aspect in future studies would contribute to a deeper global understanding and allow for more robust policy responses. Future studies should extend the geographical scope beyond the EU and include comparisons with other large ageing economies such as Japan, South Korea or China. In addition, longitudinal studies focusing on the long-term effects of specific policy measures, such as age-friendly employment regulations or migration incentives, could provide valuable insights into effective strategies to address the challenges of an ageing labour force.

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Starenje radne snage i trendovi tržišta rada u Europskoj uniji: bibliometrijska analiza

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Sažetak

U ovom radu razmatrane su neke od glavnih posljedica starenja europskog stanovništva, kao što su utjecaj starenja na tržište rada, dinamiku rada, obrazovanje i socio-ekonomske nejednakosti. Cilj ovog istraživanja identificirati je i analizirati trendove i tematske prioritete tih izazova, kao i regionalne razlike unutar Europske unije. Bibliometrijska analiza publikacija indeksiranih u Web of Science Core Collection bazi rađena je pomoću VOSviewera. Pregled se temeljio na znanstvenim područjima ekonomije, poslovne ekonomije i demografije. Rezultati pokazuju jasnu razliku u tematskom fokusu između zemalja srednje i istočne Europe te zemalja zapadne Europe. Glavni naglasci u istraživanjima provedenih u zemljama srednje i istočne Europe u vezi s izazovima starenja radne snage su na (ne)zaposlenosti. Kod tih istraživanja prisutan je optimističan pogled na potencijalne koristi od migracija. Nasuprot tome, istraživanja u zemljama zapadne Europe prvenstveno se usredotočuju na društvene utjecaje migracija, socio-ekonomske nejednakosti i politikama intervencija. Radovi iz zapadne Europe češće su citirani i imaju veću vidljivost, što ukazuje na njihovu središnju ulogu u oblikovanju rasprava i politika na razini cijele EU. Ovo istraživanje dovodi do zaključka da, iako starenje ostaje izazov za Europu u cjelini, regionalni prioriteti i heterogenost znanstvenih rezultata odražavaju različite socio-ekonomske kontekste te potrebe za različitim politikama. Premošćivanje ovog jaza između regija zahtijeva pažljiv i integriran pristup koji može uravnotežiti potencijalne pozitivne učinke migracija i riješiti nejednakosti među državama članicama. Iz ovog istraživanja vidljiva je i naglašena potreba za suradnjom i međuregionalnom razmjenom znanja kako bi se ublažio utjecaj starenja stanovništva na europsko tržište rada i socio-ekonomsku strukturu.

Ključne riječi: starenje stanovništva, starenje radne snage, tržište rada, bibliometrijska analiza

JEL klasifikacija: J14, J21, C80, J26, O15

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Idiosyncratic momentum factors: A path to improved risk-return trade-offs^{*1}

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Abstract

The paper examines the risk and return characteristics of four distinct (idiosyncratic) momentum factors, as well as their time-varying exposures to common risk factors. The research demonstrates that applying more advanced factor models in returns residualization, such as the Fama and French five-factor model and the Stambaugh and Yuan mispricing model, enhances the risk and return profile of momentum factors, constructed as a zero-cost winners-minus-losers portfolio, and effectively reduces time-varying exposures to systematic risk factors. Idiosyncratic momentum factors exhibit lower downside risk as compared to total return momentum factors. This paper also discusses the risk-based versus behavior-based theories which aim to explain the returns of momentum either as a compensation for risk or as a result of behavioral mispricing correction and suggests that both theories are important in explaining momentum returns, but lean more towards behavioral explanations, such as underreaction effect resulting from slow dissemination of information among investors. This research supports recent findings that indicate that idiosyncratic momentum is an anomaly distinct from total return momentum.

Keywords: asset pricing, idiosyncratic momentum, factor models, time-varying risk

JEL classification: G11, G12, C58

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1. Introduction

Momentum strategies involve buying recent winners and selling recent losers, as in Jegadeesh and Titman (1993), who show these strategies yield positive excess returns, challenging efficient market hypothesis. Momentum returns are debated, with risk-based explanations attributing them to compensation for risk while behavioral theories explain momentum returns with investor underreaction and overreaction to new information (Barberis et al., 1998; Harrison and Stein, 1999).

Grundy and Martin (2001) note that momentum portfolios exhibit time-varying risk exposures, which causes return volatility during periods of market distress. Blitz et al. (2011, 2020) improve momentum strategies by ranking stocks using idiosyncratic returns instead of total returns, successfully reducing exposure to systematic risk factors. This study builds on these findings by constructing idiosyncratic momentum factors using the Fama and French (1992) three-factor model, Fama and French (2015) five-factor model, and Stambaugh and Yuan (2017) mispricing model. We find that idiosyncratic momentum factors, particularly those constructed utilizing the five-factor and mispricing models, deliver better risk-adjusted returns and lower downside risk than total return momentum. Conditional regressions reveal reduced systematic exposures, leading to fewer severe drawdowns for idiosyncratic momentum factors.

This paper demonstrates the benefits of utilizing advanced asset pricing models in momentum strategy design, such as improved risk and return trade-offs and reduced downside risk. The research results align with behavioral theories, emphasizing investor underreaction caused by the gradual dissemination of information as key driver of idiosyncratic momentum returns.

The rest of this paper is organized as follows. Section 2 presents the literature review regarding momentum and reversal effects, followed by a literature review of the most common academic asset pricing models and idiosyncratic momentum and develops hypotheses. Section 3 describes the sample construction and empirical methods performed to construct and test momentum portfolios. Section 4 presents the descriptive statistics of momentum portfolios as well as the results of empirical tests, which are elaborated further in a discussion. Section 5 concludes.

2. Literature review

This section covers the most common literature in momentum, thus providing a broader perspective on the issues encountered by academics and practitioners. In this section, the theoretical framework regarding the total return momentum anomaly is exposed first, followed by the reversal effect. Afterward, the recent advances in the literature on asset pricing models are presented. This section

concludes with a presentation of the literature on idiosyncratic momentum and hypotheses development.

2.1. Momentum and reversal effects

Momentum refers to the tendency of assets with strong past performance to continue outperforming, while those with weak past performance continue underperforming, challenging the efficient market hypothesis. Jegadeesh and Titman (1993) showed that a strategy that buys past winners and sells past losers yields significant abnormal returns. Subsequent studies, including Chan et al. (1996), Asness (1997), and Asness et al. (2013), found that momentum generates abnormal returns across markets, across asset classes like bonds, currencies, and commodities, and across economic environments (Rouwenhorst, 1998). Carhart (1997) highlighted momentum's critical role in mutual fund performance by showing that a four-factor model which adds momentum to Fama and French three-factors explains mutual fund returns.

Momentum returns vary significantly by market conditions. To this note, Cooper et al. (2004) found that momentum returns are stronger in rising markets when overall risk aversion tends to be lower. On similar note, Chordia and Shivakumar (2002) linked momentum returns to business cycle, citing poor performance during downturns with high volatility. An interesting observation comes from Hanauer (2014) who observed that Japan exhibits weaker momentum, a fact generally referred to as an empirical failure of momentum, linking this finding to historically highly volatile market dynamics. Momentum existence inspired both behavioral and risk-based explanations. On one hand, Daniel et al. (1998) and Barberis et al. (1998) attribute it to behavioral factors such as investor underreaction and overreaction due to systematic market inefficiency in processing information. This explanation is further emphasized by Jegadeesh and Titman (2001) and supported by Harrison and Stein (1999) who provides theoretical support. Evidence of market inefficiencies in processing information driving momentum returns is provided in Harrison et al. (2000) who found that stocks with low analyst coverage exhibit stronger momentum. One interesting explanation comes from Chui et al. (2010) who argues that individualism as a cultural factor plays a role in momentum returns and shows that countries with high levels of individualism exhibit more pronounced momentum than countries with low levels of individualism. On the other hand, risk-based explanations suggest momentum returns are a compensation for risk. Within risk-based theories, one of the most explanations is from Agarwal and Taffler (2018) who tied momentum profits to financial distress and Avramov et al. (2007) who linked momentum returns to the mispricing of credit risk. It is also found that tax-loss selling around the end of year contributes to momentum anomalies (Grinblatt and Moskowitz, 1993; Griffiths and White, 1993; D'Mello et al. 2003).

Reversal effect can be classified as either short-term or long-term reversal. It is a tendency of assets that have performed well to perform poorly in the near or distant future and vice versa. Short-term and long-term reversals are supposed to be driven by different mechanisms. From a purely behavioral perspective, short-term reversal is caused by investor overreaction to new information, which causes temporary mispricing. Jegadeesh (1991) presents evidence of short-term reversals in U.S. and U.K. stock markets. Short-term reversals influence momentum portfolio formation period, leading researchers to exclude the most recent week or month of returns when constructing momentum portfolios. As a further explanation of short-term reversals, Gutierrez and Pirinsky (2007) found that institutional investors drive short-term reversals through contrarian strategies which involve buying underperforming and selling outperforming stocks, believing recent price movements misrepresent valuations. Long-term reversals are also tied to overreaction but over extended periods, which then represents a gradual mean reversion. DeBondt and Thaler (1985) show that poorly performing stocks over three to five years often outperform later, attributing this to behavioral factors like investor overconfidence.

2.2. Asset pricing models

The cornerstone in financial economics has been the development of asset pricing (factor) models which try to describe the risk and return relationship of risky assets. Since the idea of the single factor model, which is derived from optimality conditions under portfolio theory, there has been a growing body of literature on multi-factor models, which aim to extract cross-section return premiums and thus explain the variation in stock returns.

Modern portfolio theory, introduced by Markowitz (1952) provided a new framework of investing and risk management. Markowitz emphasizes the importance of diversification as rational choice investors make and the trade-off between risk and return. Markowitz demonstrated that an investor attains the highest level of utility by selecting a combination of assets that minimizes the risk for a given level of return and vice versa. The foundation on MPT, served William Sharpe (1964) to develop the first equilibrium model of asset prices, the capital asset pricing model (CAPM) which predicts linear relationship between expected return and systematic risk. A year later, John Lintner (1965) contributed to the development of CAPM by including aspects of portfolio selection and risk asset valuation.

The CAPM of Sharpe (1964) and Lintner (1965) introduced a new framework for investment but faced criticism in the 1980s and 1990s when the empirical evidence began to emerge. Fama and French (1992) addressed this by proposing the three-factor model, adding size (SMB) and value (HML) factors to explain cross-sectional variation in returns. Fama and French (1993) demonstrated the improved

explanatory power. Fama and French (2015) introduced the five-factor model, adding profitability (RMW) and investment (CMA) factors to the existing ones. RMW captures the outperformance of high-profitability stocks, and CMA captures the outperformance of conservative investment firms. While the model explains more risk dimensions, it omits momentum due to weak risk-based justification. Momentum increases the model's stochastic discount factor volatility, with concerns that it is impossible for risk to change that frequently. However, Fama and French (2018) add the momentum factor to their model.

Due to the plethora of behavioral errors investors consistently make, Stambaugh and Yuan (2017) proposed a mispricing model to improve the explanatory power by incorporating systematic mispricing. The model includes market, size, and two mispricing factors: MGMT (management-related anomalies) and PERF (performance-related anomalies). They argue that behavioral biases lead to systematic mispricing, which traditional models fail to capture. The mispricing model better explained the cross-section of stock returns than the competing models of Fama and French but without sacrificing the model's ability to capture return variance.

2.3. Idiosyncratic momentum and hypotheses development

Traditional momentum strategies focus on total returns over the formation period. Grundy and Martin (2001) showed that momentum loads positively on systematic risk factors when they experience positive premiums in the formation period and negatively when they exhibit negative premiums. This means that a momentum strategy will exhibit negative returns when systematic factor premiums exhibit opposite sign in holding period compared to formation period. This issue led Blitz et al. (2011) to construct a risk management technique which attempts to isolate stock-specific returns by removing the effects of systematic factors and form portfolios by sorting stocks on idiosyncratic (residual) returns. The study by Blitz et al. (2011) thus states there are risks involved with total return momentum which are not compensated with additional returns and that successful mitigation of those risks leads to improved momentum performance.

Building on the foundation of Blitz et al. (2011), Blitz et al. (2020) further explore the idiosyncratic momentum anomaly by extending the analysis to a set of international markets. They found that idiosyncratic momentum is well observed in international markets and conclude it is a global phenomenon. Blitz et al. (2020) state that the prominent explanations for the momentum premium, such as crash risk, investor overconfidence and overreaction cannot explain idiosyncratic momentum profits and conclude that the long-term behavior of idiosyncratic momentum provides support for the underreaction hypothesis. Chaves (2016) found that idiosyncratic momentum exists across developed and emerging economies, suggesting it is not driven by specific market conditions but rather a more fundamental aspect of investor behavior.

The persistence of idiosyncratic momentum anomaly among regions points out to a consistent pattern of mispricing giving support to behavioral explanations for its existence.

Since the paper of Blitz et al. (2011) there have been several significant developments in asset pricing models and this paper focuses on two recent models, Fama and French (2015) five-factor model and Stambaugh and Yuan (2017) mispricing model. Following the recent developments in asset pricing models, the first hypothesis of this paper is formulated as:

H1: Sorting stocks on idiosyncratic returns obtained by using Fama and French (2015) five-factor model and Stambaugh and Yuan (2017) mispricing model as opposed to total returns improves the risk and return relationship of momentum factors.

Given the nature of construction of Stambaugh and Yuan (2017) mispricing model and the body of literature on behavioral explanations for momentum effect, this research is concerned with the explanatory power of mispricing model over momentum. Thus, the second hypothesis of this paper is formulated as:

H2: The mispricing model of Stambaugh and Yuan (2017) achieves greater explanatory power over momentum factor specifications compared to Fama and French (1992) three-factor model and Fama and French (2015) five-factor model.

The success of idiosyncratic momentum depends on the level of reduction in time-varying systematic factor exposures. The reduction in dynamic factor exposures is the main goal of return residualization. Since in this paper the idiosyncratic momentum is constructed using more advanced factor models compared to Blitz et al. (2011) and Blitz et al. (2020), the third hypothesis is formulated as:

H3: Using more advanced factor models in obtaining idiosyncratic returns results in lower dynamic exposures of idiosyncratic momentum portfolios to systematic risk factors.

3. Sample and methodology

This section provides an overview of the datasets used in this study and describes the cleaning procedures performed to obtain the sample for analysis. A detailed outline of empirical procedures utilized is outlined next. In this paper, four momentum factors are constructed: total return momentum factor, idiosyncratic momentum factor FF3, idiosyncratic momentum factor FF5 and idiosyncratic momentum factor M4, differing with respect to factor model used in obtaining idiosyncratic returns. For all momentum factor portfolios, this study adopts an

approach of using formation period of previous twelve months with the exclusion of the most recently ended month to avoid short-term reversal effect (12-2 formation period) and holding period of one month.

3.1. Sample construction

Monthly stock data is obtained from the Center for Research in Security Prices (CRSP). Observations are collected for all common equity stocks (sharecodes 10 and 11) listed on NYSE, AMEX, and NASDAQ stock exchanges over the period from January 1965 until December 2022. The final sample covers 54 years, beginning in January 1968 and ending in December 2022. To accommodate a rolling regression window of 36 months for the estimation of alphas and betas for individual stocks, an additional three years of data have been included. Data for monthly factor-mimicking portfolios returns, as well as one-month U.S. T-Bill rate and monthly NYSE size breakpoints are obtained from Kenneth R. French data library. Data on monthly mispricing factors returns are obtained from Robert R. Stambaugh data library.

To avoid microstructure concerns, this paper excludes all observations for a single stock if the mean share price during the listed period is below \$1. This allows us to obtain continual data for each listed entity. To accommodate the rolling window regression requirement of 36 months, stocks with less than 36 months of total observations are removed from the sample. Following the work of Blitz et al. (2020), each month the stocks which are below the 20th percentile of NYSE market capitalization breakpoint are excluded from the sample. By excluding small-cap stocks, it is ensured the sample contains only liquid stocks. Furthermore, the stock-month observations with missing price, return or shares outstanding data are excluded. In this way, relevant variables can be calculated without obtaining missing values. The market capitalization of each stock in each month is calculated by multiplying the end-of-month price of stock i with shares outstanding of stock i at specific month t . The final sample contains 1100 stocks at the beginning of 1968 and 2690 stocks at the end of 2022.

3.2. Total return momentum procedure

Total return momentum factor is constructed following the methodology outlined in Jegadeesh and Titman (1993), an approach which forms the basis for most cross-sectional momentum strategies. The formation period spans the prior twelve months, excluding the most recently ended month.

Specifically, the cumulative return for month t is calculated from $t - 12$ to $t - 2$. The cumulative returns are calculated for every stock-month observation using the formula:

$$\text{Momentum}_{i,t} = \left[\prod_{j=t-12}^{t-2} (1 + R_{i,j}) \right] - 1, \quad (1)$$

where $R_{i,j}$ is the monthly return of stock i in month j . The cumulative return serves as a ranking criterion when sorting stocks into portfolios. Stocks with the highest cumulative return over the formation period are placed into “winners” portfolio (P10) and stocks with the lowest cumulative return over the formation period are placed into “losers” portfolio (P1).

3.3. Idiosyncratic momentum procedure

To obtain idiosyncratic returns, this paper closely follows the procedure established by Blitz et al. (2011) and expanded upon Blitz et al. (2020). Three distinct idiosyncratic momentum factors are constructed by isolating the residual (idiosyncratic) component of stock returns utilizing different asset pricing models. The objective is to capture the portion of return not explained by systematic risk factors contained in each respective asset pricing model, a measure reflecting stock-specific events.

Firstly, idiosyncratic momentum factor (FF3) is constructed by isolating idiosyncratic returns using the Fama and French (1992) three-factor model. To isolate idiosyncratic returns the following equation is estimated for all stocks in the sample over the 36-month rolling window:

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_{1,i} MKT_t + \beta_{2,i} SMB_t + \beta_{3,i} HML_t + \varepsilon_{i,t}. \quad (2)$$

In the second step, idiosyncratic returns are calculated as:

$$\varepsilon_{i,t} = R_{i,t} - R_{f,t} - \hat{\alpha}_i - \hat{\beta}_{1,i} MKT_t - \hat{\beta}_{2,i} SMB_t - \hat{\beta}_{3,i} HML_t, \quad (3)$$

where $R_{i,t}$ is the return of stock i at time t . $R_{f,t}$ is the risk-free rate, MKT_t , SMB_t and HML_t are the three Fama and French factors and $\beta_{1,i}$, $\beta_{2,i}$ and $\beta_{3,i}$ are the factor loadings, α_i is the stock i 's intercept and $\varepsilon_{i,t}$ is the idiosyncratic (residual) return. The residuals represent the portion of stock return unexplained by systematic factors. There are certain differences in literature regarding the treatment of estimated alpha in the estimation of idiosyncratic returns. Blitz et al. (2011) exclude the alpha when estimating idiosyncratic returns and argue that alpha, since it is estimated in a 36-month window that extends further back than the formation period, is capturing long-term reversal effect. On the other hand, Gutierrez and Pirinsky (2007) and Blitz et al. (2020) include the alpha in the calculation of idiosyncratic returns. This paper aims to stay consistent with recent literature, so the alpha is included in the calculation of idiosyncratic returns.

Secondly, idiosyncratic momentum factor FF5 is constructed by isolating idiosyncratic returns using the Fama and French (2015) five-factor model. Since this model captures more risk dimensions than Fama and French (1992) three-factor model, the aim is to achieve a greater reduction in systematic risk exposures. To obtain idiosyncratic returns, the following equation is estimated over the 36-month rolling window for all stocks in the sample:

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_{1,i} MKT_t + \beta_{2,i} SMB_t + \beta_{3,i} HML_t + \beta_{4,i} RMW_t + \beta_{5,i} CMA_t + \varepsilon_{i,t}. \quad (4)$$

Idiosyncratic returns are obtained as:

$$\varepsilon_{i,t} = R_{i,t} - R_{f,t} - \hat{\alpha}_i - \hat{\beta}_{1,i} MKT_t - \hat{\beta}_{2,i} SMB_t - \hat{\beta}_{3,i} HML_t - \hat{\beta}_{4,i} RMW_t - \hat{\beta}_{5,i} CMA_t, \quad (5)$$

where $R_{i,t}$ is the return of stock i at time t . $R_{f,t}$ is the risk-free rate, MKT_t , SMB_t , HML_t , RMW_t and CMA_t are the three Fama and French factors and $\beta_{1,i}$, $\beta_{2,i}$, $\beta_{3,i}$, $\beta_{4,i}$ and $\beta_{5,i}$ are the factor loadings, α_i is the stock i 's intercept and $\varepsilon_{i,t}$ is the idiosyncratic return.

Finally, the idiosyncratic momentum factor M4 is constructed by isolating idiosyncratic return using the Stambaugh and Yuan (2017) mispricing model. To obtain idiosyncratic returns the following equation is estimated over the 36-month rolling window for each stock in the sample:

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_{1,i} MKT_t + \beta_{2,i} SMB_t + \beta_{3,i} MGMT_t + \beta_{4,i} PERF_t + \varepsilon_{i,t}. \quad (6)$$

In the next step, idiosyncratic returns are obtained as:

$$\varepsilon_{i,t} = R_{i,t} - R_{f,t} - \hat{\alpha}_i - \hat{\beta}_{1,i} MKT_t - \hat{\beta}_{2,i} SMB_t - \hat{\beta}_{3,i} MGMT_t - \hat{\beta}_{4,i} PERF_t, \quad (7)$$

where $R_{i,t}$ is the return of stock i at time t . $R_{f,t}$ is the risk-free rate, MKT_t , SMB_t , $MGMT_t$ and $PERF_t$ are the four mispricing factors and $\beta_{1,i}$, $\beta_{2,i}$, $\beta_{3,i}$ and $\beta_{4,i}$ are the factor loadings, α_i is the stock i 's intercept and $\varepsilon_{i,t}$ is the idiosyncratic return.

3.4. Portfolio construction

After obtaining idiosyncratic returns for all stocks in the sample, three idiosyncratic momentum factors are constructed, differing by the asset pricing model used to obtain idiosyncratic returns. Total return momentum signal used for portfolio sorting is the cumulative return over the period from $t - 12$ to $t - 2$. Idiosyncratic return momentum signal is obtained using a different approach. Instead of calculating cumulative idiosyncratic returns, the signal is obtained by simply summing the idiosyncratic returns over the formation period and then scaling them by their standard deviation. In this way, it is ensured that idiosyncratic returns are treated differently than total returns since idiosyncratic returns are prediction errors rather than actual returns. The motivation to volatility-scale idiosyncratic returns stems from the observation that idiosyncratic returns are noisy signal across stocks, so volatility scaling allows to uncover those stocks which are experiencing extreme stock-specific returns across the cross-section. Idiosyncratic return momentum signal for portfolio sorting procedure is thus calculated as:

$$IdiosyncraticMomentum_{i,t} = \frac{\sum_{j=t-12}^{t-2} \varepsilon_{i,j}}{\sqrt{\sum_{j=t-12}^{t-2} (\varepsilon_{i,j} - \bar{\varepsilon}_i)^2}}, \quad (8)$$

where $\varepsilon_{i,j}$ is the idiosyncratic return of stock i in month j and $\bar{\varepsilon}_i$ is the mean idiosyncratic return over the formation period. After obtaining four variables, using the methodology described above, where each variable represents respective momentum score, decile portfolios are constructed each month such that the highest “winners” decile (P10) contains stocks with the highest average momentum score, and the lowest “losers” decile (P1) contains stocks with the lowest average momentum score. In line with Blitz et al. (2011) and Blitz et al. (2022) as well as standard academic practice, the portfolios are equally weighted. Institutional investors in practice opt for different weighting schemes, such as value weighting or signal weighting schemes, to either satisfy capacity constraints or to magnify the potential alpha of the signal.

Momentum factors are then formed in each month by taking a long position in the top decile portfolio and a short position in the bottom decile portfolio. This represents a zero-cost investment strategy, and any returns released from such strategy are attributable to the effects of an anomaly (sorting variable). These positions are held for one month. In the following month, the ranking process is applied again, and the portfolios are reformed. The returns of the factors are calculated as the return spread between the highest decile portfolio (P10) and the lowest decile portfolio (P1). The monthly rebalancing ensures the strategy remains responsive to changes in stock rankings and recent performance.

3.5. Empirical testing procedure

Firstly, the performance of decile portfolios is evaluated using the following metrics: annualized average return, annualized standard deviation, Sharpe ratio, and factor model alphas. Additionally, in line with the methodology employed by Blitz et al. (2011), conditional models are constructed to estimate the alphas of factor portfolios and investigate the effect of returns residualization on dynamic exposures to common risk factors.

To evaluate the performance of each momentum portfolio, monthly alphas are estimated with respect to three factor models: CAPM, Fama and French (1992) three-factor and Fama and French (2015) five-factor models. In addition, t-statistics are presented to determine the statistical significance of estimated alphas. Furthermore, factor spanning tests of four momentum factors are conducted to investigate whether momentum can, and to what extent, be explained with other common factors.

As in Grundy and Martin (2001) and Blitz et al. (2011), conditional factor models are constructed for each of the three factor models employed in estimating idiosyncratic returns. Conditional models are constructed by augmenting the model with conditional variables related to each factor, where conditional variables take on the value of the respective factor premium for particular month if the average factor premium over the formation period from $t - 12$ to $t - 2$ was positive, and zero otherwise. The following equations outline the conditional models:

$$R_{i,t} - R_{f,t} = \alpha_i + FF3_t + FF3_t^{UP} + \varepsilon_{i,t} \quad (9)$$

$$R_{i,t} - R_{f,t} = \alpha_i + FF5_t + FF5_t^{UP} + \varepsilon_{i,t} \quad (10)$$

$$R_{i,t} - R_{f,t} = \alpha_i + M4_t + M4_t^{UP} + \varepsilon_{i,t} \quad (11)$$

Idiosyncratic momentum factor returns are regressed only on a (conditional) model which was used for obtaining the idiosyncratic returns. This approach of conditional regression allows us to analyze whether persistence in factor returns presents unnecessary risk and is this risk successfully mitigated by employing the returns residualization process.

4. Results and discussion

This section provides analysis and interpretation of results and ends with a discussion. Descriptive statistics and return analysis of momentum portfolio are presented first. Next, the results of conducted empirical tests including factor

spanning tests and conditional framework regressions are presented, followed by the downside risk and performance over time. The main aim of this section is to either confirm or reject the hypotheses formulated in the Literature review section.

4.1. Portfolios descriptive statistics

Portfolios descriptive statistics start by examining the descriptive statistics of four momentum factors as well as the decile portfolios. Table 1 provides a comprehensive description of the characteristics of decile portfolio across four different momentum specifications. To investigate the drivers of momentum factors performance, both the short and long legs of the factors are examined. The analysis of intermediate portfolios (P2 – P9) offers insight into the impact of sorting variable across the broader stock universe. Additionally, the Gibbons, Ross and Shanken (GRS) F-test is performed to assess the statistical significance of alphas across the decile portfolios, allowing us to determine whether the observed momentum behavior deviates significantly from statistical norms. Table 1 also presents the p-values of the GRS test statistics.

The first section of Table 1 shows descriptive statistics for total return momentum portfolios. The return pattern across deciles is non-monotonic, with the lowest decile not yielding the lowest return. The Sharpe ratio shows some consistency but does not follow a strictly increasing trend. The *Mom* factor, defined as the return spread between winners and losers' portfolios, achieves an annualized return of 3.29% with a Sharpe ratio of 0.15. All ten portfolios, except the *Mom* factor, exhibit statistically significant alphas across three asset pricing models. In contrast, the idiosyncratic momentum factor based on the Fama and French three-factor model (*iMomFF3*) significantly improves portfolios metrics, including a Sharpe ratio increase to 0.59. The residualization procedure enhances the risk and return trade-off, concentrating high idiosyncratic return stocks in winner portfolio and low idiosyncratic return stocks in loser portfolio. *iMomFF3* alphas are more significant in higher deciles. While the *iMomFF3* factor shows significant alphas under CAPM and the Fama and French three-factor model, it loses significance under the five-factor model, which captures more relevant risk dimensions. The third section of Table 1 highlights idiosyncratic momentum portfolios based on the Fama and French five-factor model (*iMomFF5*). These portfolios display a monotonic increase in annualized returns and a decrease in volatility across deciles. The *iMomFF5* Sharpe ratio improves to 0.71, a 20% increase over *iMomFF3*. Alphas remain positive and statistically significant under CAPM and three-factor model but are less significant under the five-factor model. The pattern of alpha significance mirrors *iMomFF3*, with higher significance concentrated in higher deciles.

Table 1: Performance of decile portfolios

Mom	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P10-P1	GRS _p
Return	23.18	16.97	16.38	15.51	15.66	16.29	17.02	18.27	20.80	27.15	3.29	
Volatility	29.13	21.67	19.02	17.39	16.54	16.11	16.41	16.95	18.67	23.53	21.65	
Sharpe	0.80	0.78	0.86	0.89	0.95	1.01	1.04	1.08	1.11	1.15	0.15	
α CAPM	0.58	0.31	0.33	0.31	0.34	0.39	0.43	0.51	0.64	1.71	0.02	
t-stat	(3.06)	(2.58)	(3.49)	(3.83)	(4.61)	(6.14)	(6.55)	(7.16)	(7.41)	(12.17)	(0.12)	0.00
α FF3	0.45	0.17	0.18	0.17	0.21	0.28	0.33	0.45	0.63	1.79	0.24	
t-stat	(2.68)	(1.70)	(2.50)	(2.89)	(3.88)	(6.10)	(6.94)	(8.26)	(9.17)	(16.63)	(1.06)	0.00
α FF5	0.69	0.23	0.17	0.11	0.12	0.19	0.25	0.35	0.57	1.85	0.05	
t-stat	(4.08)	(2.21)	(2.28)	(1.94)	(2.39)	(4.23)	(5.36)	(6.47)	(8.11)	(16.95)	(0.22)	0.00
iMomFF3	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P10-P1	GRS _p
Return	14.46	15.18	15.25	17.19	16.79	18.06	17.93	19.39	20.16	21.99	6.66	
Volatility	20.60	19.17	18.31	18.10	17.70	17.68	17.52	17.45	17.92	18.50	11.33	
Sharpe	0.70	0.79	0.83	0.95	0.95	1.02	1.02	1.11	1.13	1.19	0.59	
α CAPM	0.14	0.22	0.25	0.39	0.37	0.47	0.46	0.57	0.61	1.46	0.21	
t-stat	(1.38)	(2.56)	(3.17)	(5.23)	(5.19)	(6.48)	(6.70)	(8.01)	(8.00)	(16.97)	(1.69)	0.00
α FF3	0.02	0.10	0.13	0.26	0.25	0.35	0.27	0.45	0.51	1.31	0.25	
t-stat	(0.32)	(1.55)	(2.31)	(5.10)	(5.01)	(7.11)	(5.99)	(9.70)	(8.98)	(19.49)	(2.01)	0.00
α FF5	0.05	0.08	0.09	0.21	0.20	0.28	0.27	0.38	0.38	0.42	1.31	
t-stat	(0.56)	(1.19)	(1.58)	(4.05)	(3.29)	(5.64)	(5.99)	(8.08)	(7.42)	(18.11)	(1.19)	0.00
iMomFF5	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P10-P1	GRS _p
Return	13.92	14.99	16.27	16.51	16.38	17.75	18.31	19.87	19.92	22.05	7.21	
Volatility	20.12	19.05	18.47	17.89	17.97	17.68	17.47	17.69	17.93	18.29	10.23	
Sharpe	0.69	0.79	0.88	0.92	0.94	1.00	1.05	1.12	1.11	1.21	0.71	
α CAPM	0.11	0.21	0.32	0.35	0.37	0.44	0.49	0.59	0.60	1.47	0.25	
t-stat	(1.15)	(2.47)	(4.06)	(4.72)	(5.05)	(6.31)	(6.94)	(8.42)	(7.77)	(17.38)	(2.24)	0.00
α FF3	0.00	0.10	0.19	0.23	0.24	0.33	0.37	0.48	0.49	1.38	0.28	
t-stat	(0.04)	(1.46)	(3.33)	(4.36)	(4.91)	(7.02)	(8.01)	(10.48)	(8.95)	(20.3)	(2.51)	0.00
α FF5	0.00	0.07	0.16	0.17	0.18	0.26	0.3	0.41	0.43	1.32	0.22	
t-stat	(0.03)	(0.92)	(2.69)	(3.25)	(3.60)	(5.63)	(6.44)	(8.93)	(7.62)	(19.03)	(1.86)	0.00
iMomM4	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P10-P1	GRS _p
Return	13.48	14.80	15.58	16.48	17.65	18.29	18.88	19.90	21.58	22.72	8.22	
Volatility	20.47	19.05	18.22	17.72	17.45	17.25	17.41	17.52	17.47	18.04	12.34	
Sharpe	0.66	0.78	0.86	0.93	1.01	1.06	1.08	1.14	1.24	1.26	0.67	
α CAPM	0.09	0.21	0.28	0.36	0.45	0.50	0.54	0.61	0.73	1.61	0.31	
t-stat	(0.80)	(2.21)	(3.93)	(4.62)	(5.96)	(6.70)	(7.30)	(7.75)	(8.93)	(17.29)	(2.13)	0.00
α FF3	-0.04	0.06	0.12	0.21	0.30	0.33	0.38	0.46	0.59	1.49	0.34	
t-stat	(-0.4)	(0.74)	(1.97)	(3.55)	(5.42)	(6.75)	(7.83)	(8.45)	(10.0)	(19.43)	(2.30)	0.00
α FF5	0.05	0.05	0.06	0.15	0.20	0.24	0.30	0.35	0.49	1.41	0.16	
t-stat	(0.43)	(0.63)	(0.96)	(2.59)	(3.74)	(4.99)	(6.14)	(6.53)	(8.42)	(18.01)	(1.11)	0.00

Source: Author's calculations

The final section of Table 1 presents idiosyncratic momentum portfolios based on the mispricing model of Stambaugh and Yuan (*iMomM4*). These portfolios show monotonic return increase and volatility decrease across deciles. P1 decile achieves a 13.48% annualized return, while P10 decile reaches 22.72%. The Sharpe ratio of 0.67 is slightly lower than *iMomFF5* of 0.71. Alphas for CAPM and three-factor model are significant at 5% level, but the five-factor model alpha is not statistically significant.

Based on evidence presented in Table 1, the first hypothesis is confirmed, and it is concluded that using idiosyncratic returns in sorting stocks to form portfolios does indeed improve the risk and return trade-off compared to total returns.

4.2. Factor spanning tests

In this subsection, factor spanning tests are conducted to evaluate whether the four momentum factors can be considered as distinct factors or if they are subsumed by traditional asset pricing models. To conduct factor spanning tests, the returns of the four momentum factors are regressed on the Fama and French (1992) three-factor and Fama and French (2015) five-factor model. Additionally, the returns are also regressed on the Stambaugh and Yuan (2017) mispricing model.

Table 2: Factor spanning tests (FF3 and FF5)

	Alpha	Mkt-Rf	SMB	HML	RMW	CMA	Adj. RSQ
Mom	0.24	-0.30	-0.03	-0.55			0.09
	(1.06)	(-5.66)	(-0.42)	(-7.09)			
	0.05	-0.23	-0.01	-0.81	0.13	0.57	0.10
	(0.22)	(-4.22)	(-0.01)	(-7.64)	(1.23)	(3.49)	
iMomFF3	0.25	-0.08	-0.04	-0.09			0.01
	(2.01)	(-2.84)	(-0.91)	(-2.32)			
	0.15	-0.05	0.00	-0.19	0.13	0.21	0.02
	(1.19)	(-1.81)	(-0.10)	(-3.42)	(2.27)	(2.33)	
iMomFF5	0.28	-0.07	-0.03	-0.07			0.01
	(2.51)	(-2.98)	(-0.79)	(-2.03)			
	0.22	-0.06	0.00	-0.13	0.10	0.12	0.02
	(1.86)	(-2.20)	(-0.10)	(-2.65)	(1.93)	(1.55)	
iMomM4	0.34	-0.11	0.03	-0.07			0.01
	(2.30)	(-3.42)	(0.81)	(-1.40)			
	0.16	-0.05	0.08	-0.26	0.20	0.42	0.04
	(1.11)	(-1.62)	(1.62)	(-3.79)	(2.98)	(3.97)	

Source: Author's calculations

Table 2 presents the results of factor spanning tests for four momentum factors. Total return momentum (*Mom*) factor yields statistically insignificant three-factor alpha of 24 basis points per month, while the loadings on market and value factors are negative and statistically significant at 1% level. The negative loading on value factor aligns with the findings of Asness et al. (2013), who report that value and momentum exhibit a persistent negative correlation, potentially offering diversification benefits to investors. Continuing with the five-factor model, *Mom* factor generates a small, statistically insignificant alpha of 5 basis points per month, with significant negative loadings on market and value factors, and a significant positive loading on the investment factor. Compared to the three-factor model, the statistical significance of the market factor decreases slightly, while the significance of the value factor increases. The positive loading on the investment factor suggests that total return momentum factor is more exposed to firms with conservative investment policies, rather than those with aggressive ones. The idiosyncratic momentum factor (*iMomFF3*) in Table 2 generates a three-factor alpha of 25 basis points per month, which is statistically significant at the 5% level. The loadings on the market and value factors remain negative, though with lower t-statistics. Furthermore, *iMomFF3* produces a positive five-factor alpha, though statistically insignificant, of 15 basis points per month. The idiosyncratic momentum factor (*iMomFF5*) in Table 2, generates a three-factor alpha of 28 basis points per month with a statistical significance at 5% level and with similar factor loadings as the *iMomFF3* factor specification. *iMomFF5* factor produces a five-factor monthly alpha of 22 basis points, significant at 10% level, with significant negative loadings on the market and size factors, and insignificant positive loadings on the profitability and investment factors. Finally, the idiosyncratic momentum factor *iMomM4* generated a three-factor alpha of 34 basis points per month, with statistical significance at 5% level. The factor loadings for *iMomM4* behave similarly to those of *iMomFF3* and *iMomFF5*. Furthermore, *iMomM4* yields a five-factor alpha of 16 basis points per month, though this result lacks statistical significance. The factor loadings are negative for the market and value factors, while being positive for the investment and profitability factors.

Finally, the explanatory power of Stambaugh and Yuan's mispricing model over the four momentum factors is assessed and presented in Table 3. The results show that this model consistently outperforms both Fama and French three-factor and five-factor models in explaining the momentum factor returns, thereby supporting the second hypothesis of this paper. All four momentum factor alphas are negative, indicating the mispricing model fully subsumes the return premia associated with total and idiosyncratic return momentum.

Table 3: Factor spanning test (M4)

	Alpha	Mkt-Rf	SMB	MGMT	PERF	Adj. RSQ
Mom	-0.99	0.07	0.17	0.10	1.12	0.45
	(-4.67)	(1.33)	(2.43)	(1.31)	(21.65)	
iMomFF3	-0.16	0.03	0.02	0.09	0.40	0.20
	(-1.24)	(1.13)	(0.65)	(1.87)	(12.21)	
iMomFF5	-0.05	0.01	0.03	0.08	0.31	0.15
	(-0.47)	(0.51)	(0.82)	(1.74)	(10.18)	
iMomM4	-0.36	0.09	0.16	0.29	0.49	0.29
	(-2.65)	(2.66)	(3.56)	(5.70)	(14.79)	

Source: Author's calculations

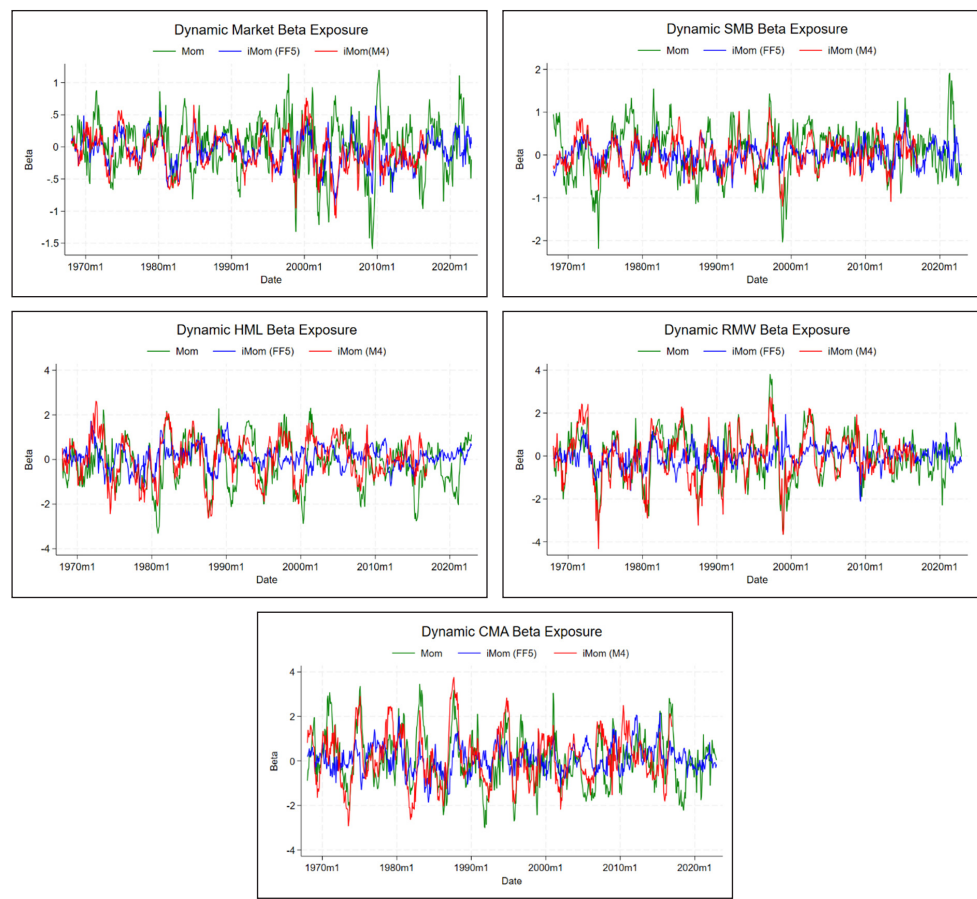
4.3. Dynamic exposures to risk factors

This section examines the time-varying behavior of factor exposures associated with momentum strategies. Traditional momentum strategies carry uncompensated risks which stem from the persistence in common factor returns. With the use of return residualization procedures, the aim is to reduce uncompensated risks. This section provides analysis of conditional factor regressions, highlighting the impact of return residualization on conditional factor exposures.

The variation in Fama and French five-factor betas is first presented graphically for three momentum factors: *Mom*, *iMomFF5* and *iMomM4*. Figure 1 illustrates the variation over time of the difference between the average beta of portfolio P10 and portfolio P1 for each of the three momentum factors. In each of the five charts in Figure 1, the net portfolio betas of *iMomFF5* and *iMomM4* factors exhibit greater stability as compared to the betas of *Mom* factor. Notably, during periods of market-wide distress, *iMomFF5* experiences a significantly lower market beta than the total *Mom* factor. Beyond market beta exposures, the charts also show that *iMomFF5* and *iMomM4* exhibit greater stability across other Fama and French five-factors. Specifically, *iMomFF5* demonstrates the lowest volatility in factor exposures, followed by *iMomM4*, which still shows some volatility, particularly in its exposures to value (HML), investment (CMA), and profitability (RMW) factors.

Next, a conditional regression framework is employed. As outlined in the methodology section, this paper follows the approach of Blitz et al. (2011), which incorporates conditional variables into the regression model. Using this framework, the alphas and regression coefficients are estimated for three idiosyncratic momentum factors relative to their respective conditional regression models. For comparative purposes, the same conditional models are also applied to the total return momentum factor, allowing for the analysis of how the residualization process reduces the risk of persistence in common factor returns.

Figure 1: Dynamic factor exposures



Source: Author’s calculations

Table 4 presents the results of conditional regression for *iMomFF3* and *Mom* factors. The alpha for *Mom* is negative and statistically insignificant, while the alpha for *iMomFF3* is positive, amounting to 14 basis points per month, though also statistically insignificant. When comparing coefficients for the risk factors, *iMomFF3* exhibits lower coefficients across all risk factors, accompanied by lower t-statistic values. This highlights the effectiveness of the residualization procedure in reducing a substantial portion of the unrewarded dynamic factor exposure.

Table 4: Conditional up-factor model spanning test (FF3)

	Alpha	Mkt-Rf	SMB	HML	Mkt-Rf ^{UP}	SMB ^{UP}	HML ^{UP}	Adj. RSQ
Mom	-0.15	-0.74	-0.61	-1.29	0.79	0.85	1.42	0.37
	(-0.78)	(-11.05)	(-6.03)	(-13.85)	(9.35)	(6.58)	(11.15)	
iMomFF3	0.14	-0.23	-0.16	-0.27	0.27	0.18	0.33	0.09
	(1.20)	(-5.61)	(-2.60)	(-4.58)	(5.12)	(2.25)	(4.13)	

Source: Author's calculations

In Table 5, the same analysis is presented but for the *iMomFF5* and *Mom* factors. The *iMomFF5* factor yields an alpha of 13 basis points per month, though statistically insignificant. In contrast, *Mom* factor exhibits a negative alpha of 38 basis. The coefficients for unconditional and conditional factors are significantly reduced as compared to *Mom* factor.

Table 5: Conditional up-factor model spanning test (FF5)

	Alpha	Mkt-Rf	SMB	HML	RMW	CMA	Mkt-Rf ^{UP}	SMB ^{UP}	HML ^{UP}	RMW ^{UP}	CMA ^{UP}	Adj. RSQ
Mom	-0.38	-0.62	-0.54	-1.10	-0.43	-0.09	0.68	0.77	1.00	1.22	-0.50	0.43
	(-1.9)	(-9.1)	(-5.5)	(-9.2)	(-3.1)	(-0.5)	(8.27)	(6.00)	(7.09)	(6.75)	(2.48)	
iMomFF5	0.13	-0.17	-0.13	-0.21	0.05	0.10	0.18	0.19	0.21	0.14	-0.07	0.07
	(1.13)	(-4.2)	(-2.2)	(-2.9)	(0.67)	(0.95)	(3.79)	(2.50)	(2.48)	(1.32)	(-0.61)	

Source: Author's calculations

Finally, in table 6, the conditional regression framework for *iMomM4* and *Mom* factors are presented. It can be observed that both *Mom* and *iMomM4* produce negative and statistically significant alphas relative to conditional mispricing model. This is in line with the previous result of mispricing model performing better in explaining momentum returns. The coefficients, however, exhibit a similar pattern as in previous regressions.

Table 6: Conditional up-factor model spanning test (M4)

	Alpha	Mkt-Rf	SMB	MGMT	PERF	Mkt-Rf ^{UP}	SMB ^{UP}	MGMT ^{UP}	PERF ^{UP}	Adj. RSQ
Mom	-0.86	-0.30	-0.39	-0.39	0.51	0.52	0.72	0.44	0.51	0.54
	(-4.38)	(-4.02)	(-3.51)	(-2.86)	(4.21)	(6.20)	(5.39)	(3.00)	(3.91)	
iMomM4	-0.31	0.01	0.12	0.40	0.27	0.12	0.03	-0.18	0.23	0.30
	(-2.35)	(0.14)	(1.56)	(4.31)	(3.26)	(2.07)	(0.41)	(-1.84)	(2.61)	

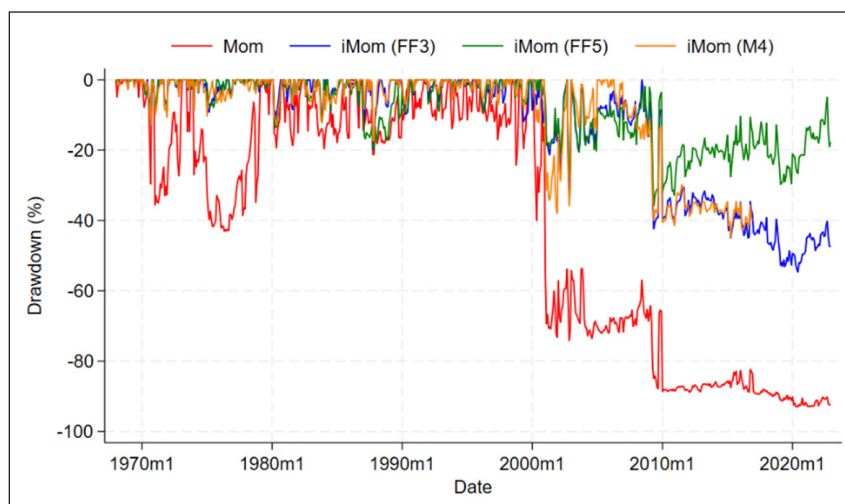
Source: Author's calculations

This section shows that using returns residualization to isolate idiosyncratic returns in momentum factor construction reduces time-varying exposures to common risk factors. The Fama and French (2015) five-factor model most effectively reduces dynamic exposures, followed by the Stambaugh and Yuan (2017) mispricing model. Our analysis shows that models with greater explanatory power, like Fama and French five-factor model, are more effective in reducing dynamic exposures than simpler models, such as the three-factor model. Evidence presented in Figure 1 and Tables 4, 5, and 6 supports the third hypothesis which states that utilizing advanced asset pricing models lowers dynamic exposures to systematic risks.

4.4. Downside risk

Momentum exhibits severe crashes triggered by market factor premia exhibiting opposite sign in holding period relative to formation period. These crashes are especially pronounced during times of market distress. This section presents the downside risk characteristics of four momentum factors constructed in this paper. The presence of severe drawdowns is associated with higher distributional momentum, which leads to higher kurtosis measures. It is one of the risks to which investors exhibit the greatest aversion to. In the context of lower partial moments, investors are concerned with the downside risk more than they are concerned with overall volatility. To assess the magnitude of downside risk and the frequency of drawdown occurrence, drawdowns of four momentum factors are presented in Figure 2.

Figure 2: Momentum drawdowns



Source: Author's calculations

From Figure 2, several insights can be drawn. It is evident that the *Mom* factor experiences the most significant and prolonged drawdowns throughout the sample period, a highly undesirable feature. In contrast, the *iMomFF5* exhibits the smallest drawdowns, followed by *iMomM4* and *iMomFF3*. This reinforces the advantages of using idiosyncratic returns when constructing momentum portfolios, as they more effectively mitigate the risks associated with dynamic factor exposures.

Furthermore, Table 7 presents the maximum percentage drawdowns incurred by four momentum factors along with the date of the drawdown and the associated market-wide theme prevailing at the time of drawdown occurrence. The *Mom* factor and *iMomFF3* experienced its biggest drawdown during Covid-19, while *iMomFF5* experienced its biggest drawdown during the global financial crisis.

Table 7: Maximum drawdowns of momentum factors

	Maximum drawdown (%)	Date	Event
Mom	-92.97	June 2020	Covid-19
iMomFF3	-54.63	June 2020	Covid-19
iMomFF5	-35.88	May 2009	Financial crisis
iMomM4	-44.94	April 2015	

Source: Author's calculations

The findings presented in this section confirm the significant improvements in the risk and return relationship of momentum when employing the residualization procedure outlined by Blitz et al. (2011) and Blitz et al. (2020).

4.5. Discussion

This paper investigates the performance of idiosyncratic momentum factors constructed using three different asset pricing models. Portfolio metrics of the three idiosyncratic momentum factors are examined as well as the total return momentum factor, alongside spanning tests to check whether other anomalies, and to what extent, can explain momentum returns. Conditional framework regressions were constructed by augmenting the asset pricing regression models with conditional factors to test whether the risk of persistence in common factor returns is reduced in idiosyncratic momentum factors relative to total return momentum factor. Additionally, the downside risk associated with these factors was assessed to provide a comprehensive understanding of factor performance.

One of the key risks associated with momentum investing is its high dynamic exposure to systematic risk factors. This causes momentum strategies to exhibit severe drawdowns when the market premium shifts sign in holding period

relative to formation period. This phenomenon is particularly concerning for investors who rely on momentum strategies, such as mutual funds and hedge funds, as it can lead to significant losses during market downturns. By employing a return residualization technique using advanced asset pricing model, it is shown that it is possible to effectively isolate idiosyncratic returns and achieve a more favorable risk and return trade-off, which is a crucial aspect for investors seeking to optimize their portfolios. This led to improvement in all portfolio metrics, especially Sharpe ratios, which measure the risk-adjusted return of an investment. This approach also reduced dynamic factor exposures, which are considered unrewarded risks in momentum investing. By minimizing these exposures, investors can achieve a more stable and predictable performance from their momentum strategies.

The key benefit of idiosyncratic momentum factors is reduced volatility and better return profile compared to total return momentum factor. The *iMomFF5* factor achieves the highest Sharpe ratio of 0.71, indicating a superior risk-adjusted return. In contrast, the *Mom* exhibited a Sharpe ratio of 0.15, highlighting the advantages of using idiosyncratic returns to form momentum portfolios. Furthermore, idiosyncratic momentum factors demonstrated lower downside risk, with the maximum drawdown during the global financial crisis being -35.8% for *iMomFF5* factor, compared to -57.4% *Mom* factor. This difference in drawdown magnitudes supports the findings of previous studies, especially those of Blitz et al. (2020), who argue that idiosyncratic momentum is more resilient during market downturns. This resilience is a critical consideration for investors looking to protect their portfolios from severe losses during periods of market distress.

Despite the appealing results in terms of high Sharpe ratios driven by both return enhancement and risk reduction, this paper has several limitations that should be acknowledged. First, our choice of portfolios design, which equally weights stocks and reforms itself every month, may not align with optimal institutional application, since due to constraints they face, they opt for different weighting schemes. Second, our approach to portfolios design, while common in academic setting, imposes unnecessary transaction costs which on most occasions significantly diminishes the alpha of a factor-based strategy. Additionally, this paper focuses solely on U.S. stock market, limiting the generalizability of results.

While using idiosyncratic returns in sorting stocks to form momentum portfolios offers advantages, including better return profiles, reduced volatility, and lower downside risk, it is essential to consider the limitations associated with implementation. Future research should explore the utilization of very recent academic factor models in residualizing returns, as well as the issue of minimizing transaction costs or using alternative weighting schemes. By addressing these issues, one can gain a more comprehensive understanding of the potential benefits and drawbacks of idiosyncratic momentum investing.

5. Conclusion

This paper demonstrated the benefits of sorting stocks on idiosyncratic returns as opposed to total returns when constructing momentum portfolios. By isolating idiosyncratic returns using three distinct asset pricing model, it is possible to achieve a more favorable risk and return profile compared to portfolios constructed using total returns. The findings of this paper highlight the importance of addressing the unrewarded risks in momentum investing which occur during broad market direction changes.

Given the significant academic debate about the underlying causes of momentum returns, this paper aligns with both risk-based and behavioral explanations, but however, leans more towards the behavioral explanations such as underreaction and subsequent overreaction caused by gradual dissemination of information among investors. We do not neglect risk-based explanations, because it could to some extent explain momentum returns, but fails in explaining idiosyncratic momentum returns. This could lead us to a conclusion that idiosyncratic momentum is a distinct anomaly from total return momentum, with some overlapping between them. Thus, the behavioral explanations offer a more plausible argument for the existence of idiosyncratic momentum. The underreaction to new information is often attributed to cognitive biases and limits to arbitrage, which prevents prices from adjusting immediately to new information.

This research contributes to the ongoing debate by providing empirical evidence that supports the superiority of idiosyncratic momentum strategies. By employing advanced asset pricing models like the Fama and French five-factor model and the Stambaugh and Yuan mispricing model, we were able to isolate the idiosyncratic component of stock returns more effectively. This approach not only enhanced the risk-adjusted returns but also mitigates the downside risk associated with traditional momentum strategies. The reduction in systematic risk exposure is particularly significant during periods of market-wide distress, where traditional momentum strategies tend to underperform.

Furthermore, the findings of this paper have practical implementations for portfolio management. Investors seeking to exploit momentum anomalies can benefit from focusing on idiosyncratic returns, thereby achieving better diversification and risk management. This approach aligns with the growing body of literature which emphasizes the idiosyncratic component of returns in searching for anomalous behavior.

In conclusion, this paper underscores the value of idiosyncratic momentum in enhancing the risk and return profile within a broader momentum investment style cluster. By addressing the limitations of traditional approaches to momentum portfolios design and incorporating advanced asset pricing models, this paper provides a framework for constructing more advanced momentum portfolios.

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Faktori idiosinkratskog zamaha: Put do poboljšanih kompromisa rizika i povrata

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Sažetak

Ovaj rad istražuje karakteristike rizika i povrata četiri različita (idiosinkratska) faktora zamaha, kao i njihovu vremenski promjenjivu izloženost uobičajenim faktorima rizika. Istraživanje pokazuje da primjena naprednijih faktorskih modela u rezidualizaciji povrata, poput Fama-French pet-faktorskog modela i Stambaugh-Yuanovog modela pogrešne procjene, poboljšava profil rizika i povrata faktora zamaha, konstruiranih kao portfelj „dobitnici minus gubitnici“ bez troškova i učinkovito smanjuje vremenski promjenjivu izloženost sistemskim faktorima rizika. Faktori idiosinkratskog zamaha pokazuju i niži rizik nepovoljnih kretanja u usporedbi s faktorom zamaha ukupnog povrata. Rad također raspravlja o teorijama temeljenim na riziku nasuprot teorijama temeljenim na ponašanju koje nastoje objasniti povrate zamaha ili kao kompenzaciju za preuzeti rizik ili kao rezultat korekcije bihevioralne pogrešne procjene cijena. Sugerira se da su obje teorije važne u objašnjavanju povrata zamaha, ali se rad više priklanja bihevioralnim objašnjenjima, poput efekta podreakcije koji proizlazi iz spore diseminacije informacija među investitorima. Ovo istraživanje podržava nedavne akademske rezultate koji ukazuju da je idiosinkratski zamah anomalija koja se razlikuje od zamaha ukupnog povrata.

Ključne riječi: vrednovanje imovine, idiosinkratski zamah, faktorski modeli, vremenski promjenjivi rizik

JEL klasifikacija: G11, G12, C58

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Impact of GHRM practices on environmental performance in the hospitality industry*

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Abstract

This research provides empirical evidence of a unique model that examines the relationships between green human resource management practices (GHRMPs), green innovation (GI), and environmental strategies (ES) in enhancing environmental performance (EP) in the hospitality industry. A quantitative approach using the partial least structural equation modeling (PLS-SEM) technique by SMART PLS 4 was adopted to achieve the aims of this study. The data collected by surveying 291 managers, and supervisors of 3-star, 4-star and 5-star hotels and resorts in Vietnam showed that GHRM practices (green recruitment – GR, green training and development – GTD, green reward management – GRM) had significant impacts on both green innovation and environmental performance of the hospitality business. Furthermore, it was found that green innovation acts as a mediator in the

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relationship between GHRMps and environmental performance. Moreover, this research has demonstrated a positive moderating effect of environmental strategies on the relationship between GHRMps and environmental performance in the hospitality industry. We introduced a new model that has proved to be effective within Vietnam's hospitality sector. Our findings suggest that leaders and managers in hospitality organizations should recognize the value of green initiatives as a strategic asset and utilize it to accomplish their broader management objectives.

Keywords: *green human resource management practices, green innovation, environmental performance, environmental strategies, hospitality industry.*

JEL classification: *Q56, L83, M12, M14*

1. Introduction

Protecting the ecosystem is now the main priority because the levels of environmental pollution have escalated to a point that can be described as catastrophic for our planet. The public's awareness of "greening" the environment is unwarranted given the rise in climate change, clearing of forests, and environmental contamination (of the land, water, and air). Environmental contamination is also a contentious topic in Vietnam. The responsibility for environmental protection falls on everyone in society, from individuals to all enterprises and organizations. It is not just the responsibility of the government or specific professional groups. The increasing focus on environmental, economic, and social sustainability in the hospitality industry has emerged in response to mounting environmental worries and the need for sustainable approaches. According to the General Statistics Office of Vietnam (2022), regarding the domestic tourism market, the Vietnam National Administration of Tourism estimates that there will be 8.5 million arrivals of domestic tourists in 2022, an increase of 21.4% over the same period in 2021. Of these visitors, more than 5.6 million will spend the night in tourist accommodations. In the first three months of 2022, there were a total of 26.1 million domestic travelers.

Recently, few prior research has been conducted to determine whether GHRMps based on the AMO theory have a favorable effect on green innovation (GI) and environmental performance (EP) (Awan et al., 2022; Kuo et al., 2022), and paradoxical studies have been used to look into how GHRMps affect sustainable environments (Awwad et al., 2022). Having said that, the related research only focused on the mediating role of GI on the relationship between GHRMps and EP. There are still more gaps in the moderating role, especially environmental strategies, in those relationships to enhance EP. So far, researchers have published studies on various facets of GHRMps and GI. Theoretical investigations have been conducted to enhance our comprehension of the existing literature on GHRMps (Renwick et al., 2016) as well as empirical studies has been carried out to explore the impacts of GHRMps to EP (Nguyen and Nguyen, 2024). Furthermore, only a limited number of researchers have extensively examined the utilization or implementation of GHRMps

in Vietnam hospitality industry. In fact, the authors found very little GHRMps-related research (Nguyen et al., 2022; Nguyen and Nguyen, 2024); one example is Pham et al. (2020), but this article solely elucidated the connections among green training, green performance, and green involvement concerning corporate environmental performance. That is to say this gap needs to be studied in different elements in terms of green innovation and environmental strategy or a different context, especially in the Vietnamese hospitality industry. Besides, there is still no article analyzing the lack of points element of environmental strategies in Vietnam.

In this research, the study sets forth the following objectives:

Firstly, to investigate the relationships of three main factors of GHRMps in terms of green recruitment, green training and development, and green reward management has the capacity to enhance employees' skills, motivation, and opportunities to improve the environmental performance of hotels. As a result, this has a direct impact on the development of eco-friendly innovative products and innovative procedures within the hotel industry.

Consequently, we have selected GI as a crucial mediator in order to investigate the relationship between GHRMps and the environmental performance of hotels.

In addition, the study examines the moderating role of environmental strategies between green HRM practices and environmental performance.

Lastly, to provide recommendation, improvement, and development suggestion for sustainable performance based on the purpose to experiencing the samples of luxurious accommodations in Vietnam.

For those purposes, the research questions are proposed as below:

- (1) How do GHMRps impact green innovation and environmental performance?
- (2) How does green innovation affect the hotel's environmental performance?
- (3) How does green innovation mediate the relationship between GHMRps and environmental performance?
- (4) How does environmental strategies moderate the relationship between green innovation and environmental performance?
- (5) Based on the research results, what can the authors suggest for hotels and resorts, solutions and directions to apply GHRM practices in the Vietnamese market?

This research consists of the following parts: (1) The introduction, (2) Literature review including theoretical framework, definitions, hypothesis development, and conceptual framework, (3) Methodology encompassing instrumentation, data collection, and analysis, (4) Empirical data and analysis elucidates the outcomes

within the Vietnamese context, emphasizing the mediating role of green innovation and the moderating effect of environmental strategy on the relationship between Green HRM practices and environmental performance. After that, section (5) deliberates on and summarizes our discoveries as well as theoretical and practical implications. In section (6) concluding section, we draw conclusions regarding the study's findings and discuss their implications, limitations, and a recommended approach for future research.

2. Literature review

In this segment, the pertinent literature regarding the research topics is examined. It delves into the literature concerning theoretical background of the research. Subsequently, research hypotheses are formulated, and a conceptual model is constructed by synthesizing previous research on the interrelations within these domains.

2.1. Theoretical background

Employing the ability-motivation-opportunity (AMO) theory as a framework, we conducted an examination of the relationship between human resource management (HRM) and performance. Our argument is based on the notion that GHRM should be evaluated through three distinct sets of GHRMps: green training and development, green employee motivation, and green employee involvement. By utilizing this approach, we aim to shed light on the impact of these specific practices on organizational performance in the context of sustainability (Nguyen et al., 2022). According to previous studies (Awan et al., 2022, Awwad Al-Shammari et al., 2022; Irani et al., 2022), the AMO framework (Appelbaum et al., 2000) is frequently used in studies on HRM productivity. This research also utilizes the Resource-Based View (RBV) to elucidate the strategic importance of green human resource management (GHRM) in enhancing green innovation and environmental performance (Awwad Al-Shammari et al., 2022; Kuo et al., 2022). According to the corporation's RBV, a firm's productivity and competence are contingent its ability to make use of key assets that possess value, rarity, and are problematic to follow by competitors in the market (Barney, 1991). When applying the RBV to the relationship between HRM and performance, leadership and employees are viewed as critical resources, on par with other resources held by the firm.

2.2. Hypothesis development

In this research, the authors employed two theoretical perspectives; AMO and RBV to explore the relationships between examine GHRM practices, green innovation,

environmental strategy, and environmental performance. This section proposes the hypotheses of the research, and a conceptual model is constructed by synthesizing previous research on the interrelations within these domains.

2.2.1. GHRMps and GI

GHRMps refers to the development, implementation and ongoing maintenance of policies, practices and systems that promote environmentally friendly behavior among employees within the organization and thereby bring many benefits to the organization. individuals, society, the natural environment, and the entire organization (Meira et al., 2023). Renwick et al. (2013) identified three key elements of GHRM: promoting green skills, increasing green employee motivation, and providing green opportunities. GI focuses on coming up with environmentally friendly goods and procedures (Albort-Morant et al., 2016) by incorporating eco-design concepts into organizational operations, using greener raw materials, and trying to reduce emissions, water use, power use, and other raw material utilization (Khuong et al., 2023; Gunasekaran and Spalanzani, 2012).

Previous research indicates that human resource management systems have an impact on innovation (Fu et al., 2015; Wei et al., 2011; De Winne and Sels, 2010; Jiménez-Jiménez and Sanz-Valle, 2008). We argue that human resource management systems influence administrative, process, and product innovation (Jiménez-Jiménez and Sanz-Valle, 2008). Considering the three dimensions of GHRMps as a whole, they contribute to promoting GI. Based on the logic outlined above and drawing upon the RBV (Barney, 2001) and the AMO framework (Appelbaum et al., 2000), we predict that organizations that value and leverage the potential of their human resources will institutionalize GHRMps to attract, motivate, and provide opportunities to their green workforce, thus harnessing their potential for green process and product innovation. Consequently, this study proposes the following hypotheses:

H1a: GR has a positive effect on GI.

H1b: GTD has a positive effect on GI.

H1c: GRM has a positive effect on GI.

2.2.2. GI and EP

According to the RBV, successful cooperation is achieved by effectively managing organizational resources to generate positive results and establish market leadership (Singh et al., 2019). EP is considered a significant opportunity for companies to enhance their competitive advantage in a win-win scenario.

Prior research, as evidenced by studies like Weng et al. (2015), Lin et al. (2013), and de Burgos-Jiménez et al. (2013), has illustrated that within enterprises, GI is regarded as a proactive approach aimed at enhancing EP. The authors of these studies argue that EP is influenced by the quality of sustainable products, the implementation of environmentally friendly processes, and innovations in products. Additionally, integrating ecological sustainability into business practices and product development, as highlighted in research by Oliva et al. (2018), Chen et al. (2015), and Dubey et al. (2015), plays a pivotal role in shaping EP. GI is closely associated with the organization's environmental management strategy and yields favorable effects on EP, as indicated in studies such as Adegbile et al. (2017), Kammerer (2009), and Chen et al. (2006). Furthermore, green product and process innovation not only mitigate adverse environmental impacts but also enhance a company's financial and social performance by reducing waste and lowering costs, as observed in the research conducted by Weng et al. (2015). It is important to note that GI should not be seen solely as reactive measures to stakeholder pressures, but rather as proactive organizational intentions and practices aimed at improving EP and achieving a competitive edge (Kratzer et al., 2017; de Burgos-Jiménez et al., 2013). Drawing upon the RBV, we predict that green process and product innovation are essential corporate resources that firms utilize to boost their EP and gain positive reputation among key stakeholders. Therefore, we propose the following hypotheses:

H2: GI has a positive effect on EP.

2.2.3. GHRMps and EP: mediating role of GI

Previous research suggests that there is substantial evidence supporting the impact of GHRMps on both GI as demonstrated by studies like Zhou et al. (2018) and Chang and Chen (2013), as well as green firm performance, as indicated in research by O'Donohue and Torugsa (2016) and Nguyen and Nguyen (2024). Furthermore, earlier studies underscore the significance of recruiting employees based on their environmental values, attitudes, and expertise, emphasizing the need for a green recruitment and selection system to ensure that new employees align with the organization's environmental principles and values, a point highlighted by Renwick et al. (2013) and Jackson and Seo (2010).

Similarly, GTD programs, such as those focused on enhancing employees' skills in areas like analyzing eco-friendly workplaces, recycling, waste management, and energy conservation, as discussed in studies by Singh and El-Kasar (2019) and Renwick et al. (2013), along with the integration of environmental objectives, responsibilities, and assessments into the performance management framework (Renwick et al., 2013; Jabbour and de Sousa Jabbour, 2016), are identified as fundamental Human Resource Management (HRM) practices that contribute to

enhanced Environmental Performance (EP). In light of these insights, we propose that GHRMps have an indirect impact on firm EP through the mediating role of green process and product innovation. This perspective is grounded in the AMO theory (Appelbaum et al., 2000) and the Resource-Based View (RBV) theory by Barney (2001). Thus, we propose the following hypotheses:

H3a: GI mediates the relationship between GR and EP.

H3b: GI mediates the relationship between GTD and EP.

H3c: GI mediates the relationship between GRM and EP.

2.2.4. The moderating role of ES in the relationship between GI and EP

ES refers to a set of initiatives and activities undertaken by an organization to mitigate its environmental impact in operational and production processes (Albino et al., 2009). It involves the implementation of programs, policies, and processes that support product development, reduce energy consumption, and manage waste through sustainable practices (Rodrigue et al., 2013).

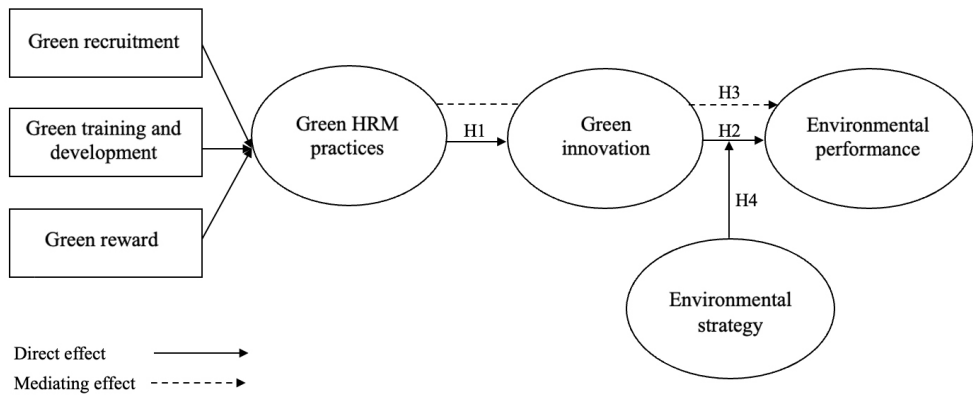
ES incorporates ecological factors into an organization's operational strategies and facilitates the execution of environmental initiatives to attain sustainable EP (Cao and Chen, 2019). While ES has a substantial impact on EP (Latan et al., 2018), there is ambiguity regarding its direct influence on EP (Li et al., 2016). Some studies suggest that ES serves as an intermediary variable that directly links ES to business performance (Dai et al., 2017; Feng et al., 2014), while others propose that ES moderates the relationship between variables (Ahmad et al., 2018; Chen et al., 2015). In light of this literature, we propose that ES could act as a moderator in the relationship between GI and EP. Based on this, we hypothesize that:

H4: ES moderate the relationship between GI and EP.

2.3. Conceptual Framework

From the above developed hypotheses, the authors proposed the research model includes 4 factors: Green HRM practices, Green innovation, Environmental performance, Environmental strategy.

Figure 1: Conceptual model



Source: Authors' compilation

3. Methodology

This section presents the research methodology, encompassing strategies for sample design and data collection, as well as the quantitative research approach that will be employed to gather data and analyze the research findings.

3.1. Research methods

To carry out this study, this research is conducted through two stages:

Stage one: After completing the translation of the questionnaire in personal opinion, the authors started to hold an interview with academic and practical experts. In response to the comments, a few minor modifications were implemented. A pilot study was conducted to guarantee clarity, and surveys were administered to 50 individuals in order to obtain their feedback. The sample comprises of respondents who exhibit diversity in various aspects including gender, age, education, work experience, employment position, and other relevant characteristics. The survey respondents consisted of males, who accounted for 62% of the total. Within the group of respondents, 32% fell within the age range of 40 to 50 years old. Roughly 46% of the respondents to the survey possess a minimum of a Master's degree. Half of the participants, accounting for 50%, reported having work experience ranging from 15 to 20 years, while only 10% indicated that they had more than twenty years of overall work experience. Moreover, regarding the employment role examined in this study, 54% of the survey participants identified themselves as human resources managers.

Stage two: The anticipated quantitative sample consists of 291 data points and is intended for model testing and hypothesis validation. To carry out empirical analysis using the proposed model, the researchers provided the official surveys with both hard-copy questionnaires for in-person evaluation and distributed Google Forms links for online assessment. The authors administered this questionnaire to managers employed at 3, 4, and 5-star hotels and resorts in Vietnam. The authors attempted to employ snowball techniques via the human resources department head to disseminate surveys to other departments within the hotels and resorts. SmartPLS software version 4.0 is employed for data processing with a two-step approach. At first, the authors meticulously examined the measurement model to confirm its reliability and validity (using statistics of Cronbach's Alpha, Outer loadings, Composite Reliability (CR), Average Variance Extracted (AVE), The variance exaggeration factor (VIF), Heterotrait – Monotrait ratio (HTMT). Following that, we assessed the structural model to verify its predictive accuracy and relevance, establish the significance of proposed pathways, and evaluate the strength of relationships among thematic constructs.

3.2. Data collection

To examine the proposed hypotheses, we conducted an empirical investigation at the organizational level within upscale lodging establishments in Vietnam, specifically focusing on 4-star and 5-star hotels and resorts. The surveys were intended for individuals holding positions such as shift leaders, supervisors, managers, and directors within various departments of hotels (including human resources, front office, housekeeping, food and beverage, sales and marketing, etc.) or members of the board of management team (such as deputy general managers, assistant general managers, general managers, etc.). To ensure diversity in our sample regarding skill level, professional experience, policy implementation, and other relevant factors, we employed maximum variation sampling. Given the limited personal connections with all Vietnamese 5-star hotels and resorts snowball sampling also was utilized.

The authors employed two primary approaches in gathering data: both direct and indirect methods. In terms of the face-to-face approach, the authors leveraged personal connections with former colleagues currently employed in 4-star and 5-star hotels across various cities such as Ho Chi Minh City, Vung Tau City, Phan Thiet City, Nha Trang City, and others. Additionally, the authors actively engaged in hospitality-specific events such as meetings, workshops, and job fairs held in Ho Chi Minh City and other provinces in Vietnam. As for the online approach, aimed at broadening the survey's target population, the authors utilized two primary data sources to distribute online self-administered surveys (accessible via Google Forms) to participants through email, Facebook, Zalo, etc., facilitating data collection from hotels or resorts inaccessible for direct visitation by the researcher.

3.3. Measurement scales

The scale used to measure the influence of these factors is the 7-point Likert scale which are 1 is *strongly disagree*, 2 is *disagree*, 3 is *disagree to some extend*, 4 is *neutral*, 5 is *agree to some extend*, 6 is *agree*, 7 is *strongly agree*. In the research scope, the authors propose a research model including 6 factors and 43 variables: Green Recruitment, Green Training and Development, Green Reward Management, Green Innovation, Environmental Strategy, Environmental Performance.

A measurement scale with containing 43 items from six constructs was collected based on several studies as presented in table a1 of the Appendix. To be precise,

- Green Recruitment: 7 items based on studies of Peter (1996), Jabbour (2013), Renwick et al. (2013), Opatha (2013).
- Green Training and Development: 7 items based on study of Yusoff and Nejati (2019).
- Green Reward management: 8 items based on studies of Bhushan and Mackenzie (1992), Crosbie and Knight (1995), Renwick et al. (2008), Renwick et al. (2013), Milliman and Clair (2017).
- Green innovation: 9 items based on study of Chen et al. (2006), Chiou (2011), El-Kassar and Singh (2019).
- Environmental strategies: 5 items based on study of Fraj et al. (2015).
- Environmental Performance: 7 items based on study of Kim et al. (2019).

4. Empirical data and analysis

In this section, the results and conclusions of quantitative investigations are showcased. SmartPLS software version 4.0 was utilized to conduct Partial Least Squares Structural Equation Modeling (PLS-SEM) for 291 cases. The quantitative analysis initiates by outlining respondent characteristics and subsequently proceeds to assess the measurement and structural models. Furthermore, supplementary details regarding the outcomes are provided.

4.1. Reliability and Convergent validity

The scale has good reliability when it has a variable value in the range [0.7; 0.9]. Nunnally Hair et al. (2019) declared that Cronbach's Alpha ≥ 0.6 is an acceptable scale in terms of reliability. Thus, if Cronbach's Alpha coefficient < 0.6 , it is excluded from the model.

As per Joe et al. (2010), Internal Consistency Reliability is assessed using the Composite Reliability index, they have noted that the extent of consistency among items within the same variable is evident when the Composite Reliability index surpasses 0.8 (though values in the range of 0.6-0.7 are deemed acceptable in research literature). Consequently, the authors have employed an assessment of the Composite Reliability index to examine the internal consistency reliability, as presented in Table 1. Based on the findings in Table 1, all variables exhibit a Composite Reliability index exceeding 0.6.

Table 1: Reliability and validity

Variables	Code	Outer loading	Cronbach's Alpha	Composite reliability (CR)	Average variance extracted (AVE)
Environment Performance (EP)	EP1	0.874	0.939	0.940	0.732
	EP2	0.839			
	EP3	0.887			
	EP4	0.798			
	EP5	0.866			
	EP6	0.865			
	EP7	0.856			
Environmental Strategy (ES)	ES2	0.893	0.906	0.908	0.842
	ES3	0.909			
	ES5	0.921			
Green Innovation (GI)	GCI1	0.888	0.929	0.933	0.670
	GCI2	0.887			
	GCI3	0.821			
	GCI4	0.774			
	GCI5	0.745			
	GPDI1	0.768			
	GPDI2	0.829			
	GPDI4	0.806			
Green Recruitment (GR)	R1	0.905	0.945	0.948	0.785
	R2	0.787			
	R3	0.889			
	R4	0.887			
	R6	0.919			
	R7	0.909			
Green Reward (GRW)	RW1	0.858	0.939	0.942	0.733
	RW2	0.795			
	RW3	0.821			
	RW4	0.863			
	RW6	0.903			
	RW7	0.904			
	RW8	0.824			

Variables	Code	Outer loading	Cronbach's Alpha	Composite reliability (CR)	Average variance extracted (AVE)
Green Training and Development (GTD)	TD1	0.852	0.940	0.941	0.771
	TD3	0.913			
	TD4	0.816			
	TD5	0.861			
	TD6	0.908			
	TD7	0.910			

Source: Authors' compilation

As outlined by Hair et al. (2013), the assessment of convergent validity serves the purpose of evaluating how strongly a scale correlates with alternative measures within the same variable. To gauge this level, we rely on the AVE index (Average Variance Extracted), considering variables to exhibit convergent validity when the associated value exceeds 0.5, as suggested by Joe et al. (2010). Moreover, as depicted in Table 1, all the variables have AVE indices exceeding 0.5, signifying that the convergence values of all variables are satisfactory and authentic.

4.2. Discriminant validity

Heterotrait – Monotrait ratio (HTMT) was used in this study to assess the discriminant validity of the scale. With the HTMT index, Garson (2016) suggests that the discriminant value between the two latent variables is ensured when the HTMT is less than 1. The HTMT table below shows that all values are < 0.85, as suggested by Hart et al. (2011). Thus, the distinction between factors in this research model is guaranteed. Therefore, to consider the discriminant and representativeness of each variable, the outcomes of the data analysis shown in Table 2.

Table 2: Discriminant validity – Heterotrait – Monotrait ratio (HTMT) matrix

	EP	ES	GI	GR	GRW	GTD
EP						
ES	0.536					
GI	0.843	0.485				
GR	0.825	0.597	0.817			
GRW	0.762	0.516	0.717	0.695		
GTD	0.843	0.455	0.807	0.743	0.684	

Note(s): Environmental performance (EP), Environmental strategy (ES), Green Innovation (GI), Green recruitment (GR), Green reward (GRW), Green training and development (GTD)

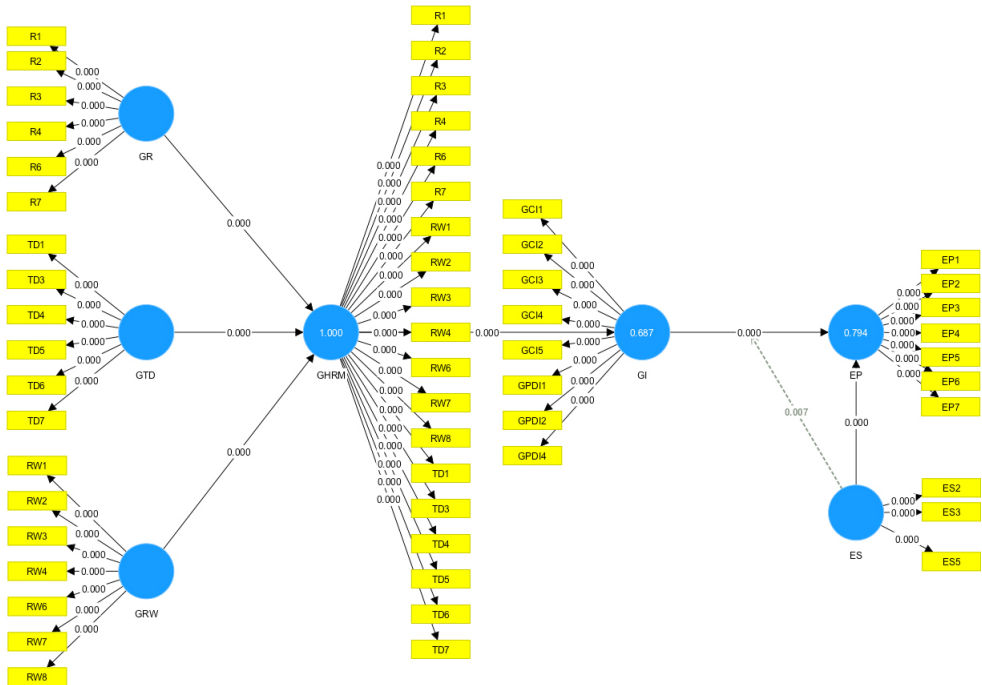
Source: Authors' compilation, 2023

4.3. Structural model – hypothesis testing

In this study, the authors employ bootstrapping to evaluate the significance of the path coefficient. They utilize 5000 bootstrap samples, each containing the same number of cases as the original observations. Initially, the authors scrutinize the P-value to assess hypotheses and determine their reliability. According to Hair et al. (2013), a higher P-value suggests lower reliability of the hypothesis, whereas a P-value below 0.05 is deemed suitable for assessing the validity of the research model. This process generates T-statistics to evaluate the significance of the model's paths. For relationships within the 95% confidence interval, indicating statistical significance, the T-value (T-statistics) should be equal to or greater than 1.96 to be deemed satisfactory.

In this research, GHRM practices were conceptualized as a second-order formative construct consisting of first-order dimensions as presented in Figure 2. Multi-item scales were utilized to measure both the first-order dimensions and the second-order constructs. Similar to the choice of a formative model for GHRM practices, this study observed some overlap among the first-order dimensions of each construct, indicating shared themes, and noted that these dimensions also contributed to the measurement of the second-order construct's conceptual model (Kirchoff et al., 2016).

Figure 2: PLS-SEM model testing



Source: Authors' compilation from Smart PLS

Table 3: Hypothesis testing results

Hypotheses	Relationship	Path coefficients (β)	T statistics	P values	Decision
H1a	GR -> GI	0.312	36.759	0.000	Accept
H1b	GTD -> GI	0.304	30.513	0.000	Accept
H1c	GRW -> GI	0.323	31.000	0.000	Accept
H2	GI -> EP	0.813	30.884	0.000	Accept
H3a	GR -> GI -> EP	0.254	21.471	0.000	Accept
H3b	GTD -> GI -> EP	0.247	19.374	0.000	Accept
H3c	GRW -> GI -> EP	0.262	21.309	0.000	Accept
H4	ES x GI -> EP	0.036	2.717	0.007	Accept

Note(s): Environmental performance (EP), Environmental strategy (ES), Green innovation (GI), Green recruitment (GR), Green reward (GRW), Green training and development (GTD)

Source: Authors’ compilation, 2023

The Path coefficient table result showed that P–values of all effects are < 0.005, so it can be concluded that the hypotheses H1a, b, c; H2; H3a, b, c; H4 are all reliable. Then, all the T statistics are > 1.96 shows that the T-statistics are generated to evaluate the significance of the model’s paths.

Based on the results of Table 3, hypotheses H1a, H1b, H1c, H2, H3a, H3b, H3c, H4 are accepted because the results of the data analysis have been summarized in Table 3 above.

5. Results and discussion

This section provides a comprehensive discussion aimed at enhancing the theoretical and practical implications of the research findings. As indicated by the results of the study, Green HRM practices exert an influence on both environmental performance and green innovation. These findings suggest various management implications regarding how organizations can effectively enhance their environmental initiatives and performance.

5.1. Discussion

The implementation of GHRM practices, including green recruitment, green training and development, and green reward management, has been identified as significantly contributing to the advancement of green innovation. These results align with the discoveries made by Jia et al. (2018), Roscoe et al. (2019), Al-Ghazali and Afsar (2021), Awan et al. (2022), and Irani et al. (2022), which also

highlighted the interaction between green innovation and GHRM practices. These findings corroborate previous research, providing additional evidence for the beneficial impact of GHRM practices on fostering green innovation.

Mediating effect (GHRMps – GI – EP): As per the findings of this research, Green Human Resource Management practices influence both environmental performance and green innovation. To achieve superior environmental performance, it is recommended to recruit individuals with environmental expertise and ideas, provide green training, and implement performance management strategies. Moreover, commitment and collaboration within human resource management significantly contribute to business innovation, while human resource management systems impact both managerial and product innovation. These results provided additional support to earlier research, reinforcing the notion that greater evidence exists for the beneficial impacts of Green Human Resource Management practices on fostering environmental performance through green innovation (Imran et al., 2021; Awan et al., 2022; Awwad Al-Shammari et al., 2022). This model still produces positive outcomes when we analyze and apply it to the hotel service environment. Green Human resource management practices including green recruitment, green training and development, and green reward management indirectly influences environmental performance through green innovation, which is a valuable asset for environmental performance.

Moderating effect (ES – (GI and EP)): the findings of this research affirmed our argument that environmental strategy has been found to play a significant moderating role in facilitating the relationship between green innovation and environmental performance in the hospitality industry in Vietnam. This study filled a gap in the existing body of literature by incorporating corporate environmental strategy as a noteworthy moderator to the relationship between green innovation and environmental performance. The insights provided by employees regarding the corporate environmental strategy are crucial for managing the correlation between green innovation and environmental performance, especially since these behaviors are typically not formally evaluated or rewarded within standard HRM practices.

5.2. Theoretical implication

Firstly, according to this study, green human resource management has an impact on green innovation and environmental performance. To attain high environmental performance, suggest employing people with environmental ideas and knowledge, green training, and performance management. While commitment and cooperation in GHRMps have a definite impact on business innovation, human resource management systems influence both managerial and product innovation.

Secondly, the present study adds to existing knowledge by emphasizing the significance of green innovation in enhancing environmental performance and

acting as a positive mediator in the association between green HRM practices and environmental performance. Additionally, this finding underscores that the adoption of GHRM strategies and the promotion of green innovation are beneficial for a company's long-term sustainability.

Lastly, this study contributes to the existing body of literature through the incorporation of environmental strategy as a moderator between green innovation and environmental performance to fill the knowledge gap highlighted in earlier studies (Dai et al., 2017; Naz et al., 2023).

5.3. Practical implication

Based on the research findings presented earlier, there are several practical implications that managers in the hotel management and business sectors can derive. Notably, the study reveals that green innovation emerges as the variable with the most robust and favorable impact on environmental performance (Irani et al., 2022; Awan et al., 2023). This study underscores the benefits of green innovation within the hotel industry, underscoring its dual advantages, encompassing both financial and environmental benefits.

Hotels that have adopted green practices should sustain these measures, as they represent a long-term trend that is gaining growing interest among tourists and is likely to be a determining factor in their hotel choices. Furthermore, the continued implementation of green practices enables hotels to achieve cost savings in their operations, including expenses related to electricity, water, and cleaning supplies (Kuo et al., 2022).

Green practices in Vietnam, as well as globally, have expanded beyond conventional and familiar actions. As environmental awareness and responsibility continue to evolve, hotels in Vietnam are progressively and actively implementing green practices in various ways that are tailored to each stage of their operations (Nguyen et al., 2022). This includes incorporating the concept of constructing guest hotels in the most environmentally sustainable manner possible and adopting the use of eco-friendly materials throughout their ongoing activities.

Moreover, managers in Vietnam recognize that the commitment of employees is crucial for the successful implementation of green initiatives in hotels. They understand that without the support and engagement of their staff, the hotel's efforts to adopt environmentally friendly practices would not be possible. They assert that the significance of embracing green practices resides in the individuals who directly execute them, encompassing every employee across all departments. They assert that the significance of embracing green practices resides in the individuals who directly execute them, encompassing every employee across all departments.

6. Conclusions

This research significantly contributes to the scientific community by introducing a novel model, validated specifically for the Vietnam hospitality industry. While prior studies have shown the effectiveness of implementing green human resource management practices in promoting environmental sustainability within businesses (Awan et al., 2022; Kuo et al., 2022), there's been a lack of comprehensive studies in this particular sector. Therefore, this study delves deeply into enhancing the environmental performance of “green” hotels by establishing robust scientific and theoretical frameworks, developing new models and questionnaires, and empirically validating hypotheses. Serving as a synthesis study, this research confirmed that core GHRM practices—including green recruitment, green training and development, and green reward management—significantly contribute to the advancement of environmental performance, particularly through their influence on green innovation. Furthermore, this research has demonstrated a positive moderating role of environmental strategies between the relationship of GHRMps and environmental performance in hospitality industry, thus providing a reference point for future research and guiding subsequent studies. This research anticipates contributing to a holistic understanding of green HRM practices that facilitate green innovation and environmental performance.

Although this study has achieved its original purpose, there are still some limitations.

Initially, it's important to note that the scope of this study is limited to a specific context, specifically Ho Chi Minh City, Vietnam. Furthermore, the study exclusively targets hotels in the 3-, 4-, and 5-star categories. Further research can be done through a partnership with higher levels such as the Vietnam National Administration of Tourism, and the General Statistics Office, etc. to gain access to extensive and accurate data sources.

Another concern pertains to the limitations in the sampling approach. The utilization of a convenience sampling method for data collection diminishes the sample's representativeness. Consequently, the study's findings may lack the necessary reliability and cannot be extended to the wider population. To overcome this limitation, future studies can combine multiple sampling methods. Simultaneously, broadening the study's scope to enhance the inclusiveness of the sample.

The authors only reused the questionnaires from previous studies with adjustments suitable for our country but without any changes or modifications. In the follow-up study, the team will review the study objectives, adjust, and modify the questions, test and evaluate the questionnaires, use additional questions, and seek expert advice. From there, a new questionnaire was built that is more suitable to the research model.

Last but not least, this research investigated the role of green innovation as a mediator between GHRM practices and environmental performance, and environmental strategy as a moderating factor in the relationship between green innovation and environmental performance. Following the Triple Bottom Line framework (Elkington, 1997), which evaluates organizational success based on economic, social, and environmental factors, future research should concentrate on examining these relationships in terms of economic and social performance at the organizational level. Additionally, considering that employee engagement in green behaviors and a sense of corporate social responsibility can impact environmental performance, the authors suggest that future studies explore the moderating influence of pro-environmental behavior and organizational citizenship behavior at both individual and organizational levels, and also consider modeling corporate social responsibility as a mediator.

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Utjecaj GHRM praksi na ekološku učinkovitost u ugostiteljstvu

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Sažetak

Ovo istraživanje pruža empirijske dokaze jedinstvenog modela koji ispituje odnose između praksi zelenog upravljanja ljudskim resursima (GHRMP), zelenih inovacija (GI) i ekoloških strategija (ES) u poboljšanju ekološke učinkovitosti (EP) u ugostiteljstvu. Za postizanje ciljeva ove studije usvojen je kvantitativni pristup korištenjem tehnike modeliranja parcijalnih najmanjih strukturnih jednadžbi (PLS-SEM) pomoću SMART PLS 4. Podaci prikupljeni anketiranjem 291 menadžera i nadzornika hotela i odmarališta s 3, 4 i 5 zvjezdica u Vijetnamu dokazuju da GHRM prakse (zeleno zapošljavanje – GR, zelena obuka i razvoj – GTD, upravljanje zelenim nagradama – GRM) imaju značajan utjecaj i na zelene inovacije i na ekološke performanse u ugostiteljstvu. Nadalje, otkriveno je da zelene inovacije djeluju kao posrednik u odnosu između GHRM praksi i ekoloških performansi. Štoviše, ovo istraživanje ukazuje na pozitivan moderirajući učinak ekoloških strategija na odnos između GHRM praksi i ekološke učinkovitosti u ugostiteljstvu. Uvođenjem novog modela, koji je potvrđen kao učinkovit u vijetnamskom ugostiteljskom sektoru, rezultati našeg istraživanja sugeriraju da bi lideri i menadžeri u ugostiteljskim organizacijama trebali prepoznati vrijednost zelenih inicijativa kao stratešku imovinu i koristiti je za postizanje svojih širih upravljačkih ciljeva.

Ključne riječi: zelene prakse upravljanja ljudskim resursima, zelene inovacije, ekološka učinkovitost, ekološke strategije, ugostiteljstvo.

JEL klasifikacija: Q56, L83, M12, M14

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Examining the hidden link: How public debt impacts income inequality in OECD member states^{*1}

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Abstract

The theory of redistribution, which argues that individuals from higher-income groups are the primary holders of public debt, serves as the theoretical foundation for our research. The impact of redistribution based on the realization of receipts from interest on the public debt, cannot be entirely offset by the insufficient progressiveness of the tax system. Given that it significantly affects how income is distributed, the paper also considers the financial structure aspect, which is measured by the ratio of bank-based to market-based financing. The purpose of this paper is twofold. First, examine whether public debt increases inequality in income distribution, and second, test if the relative increase in market financing compared to bank financing increases inequality in income distribution. Thus, the paper investigates whether, in countries where public debt ownership is not distributed equally, public debt has a non-negligible effect on income transfer between different socioeconomic groups. The empirical part of this work was conducted using a dynamic panel model on a sample of 27 OECD member countries, for the period from 2004 to 2021. Precisely, we employ the Vector Error

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Correction Model (VECM). Research findings indicate that an increase in state borrowing results in a long-term redistribution of income from lower-income groups to higher-income groups. Conversely, an increase in the financial system's emphasis on bank financing results in a short-term decrease in income inequality. So, while high levels of public debt are certainly a cause for concern, it is crucial to also consider the distribution of this debt within the economic policy-making process, and when evaluating its potential impact on economic inequality.

Keywords: income inequality, financial structure, redistribution theory, panel VECM

JEL classification: D63, H60, C33

1. Introduction

The issue of inequality has existed throughout history, and its level depends on how successfully social elites find ways to justify it (Piketty, 2020). Thus, greater interest in inequality may result from unjustified factors contributing to it. It is important to note that inequality has increased in most developed countries over the past thirty years and persistent and widening gap in the distribution of wealth and income has various implications. Therefore, it becomes increasingly important to understand the factors that contribute to its emergence and persistence. In doing so, it is necessary to consider both the role of the market and the role of the state, as these two concepts cannot be viewed separately. One of the areas that requires careful examination and is directly related to governance, is the role of public debt in the distribution of income, as it has become a key tool for managing economic stability and stimulating growth. However, its political and economic repercussions receive minor consideration in the literature.

This paper aims to investigate the relationship between public debt and income inequality in OECD members while considering the financial system, which is closely related to both inequality and government borrowing. Given that this effect depends on the characteristics of the financial system, it is necessary to investigate the implications of the financial structure on income distribution patterns. The first research question (RQ1) deals with the growth of internal public debt, i.e. whether it increases inequality in income distribution. The theory behind the mentioned is called the theory of redistribution, and it is explained in the theoretical part of the paper. The second research question (RQ2) refers to financial development and financial structure, and we test if the relative increase in market financing compared to bank financing increases inequality in income distribution.

The conducted econometric analysis enables a conclusion on the impact of public debt growth on income inequality, as well as the impact of different financial structures on income inequality. It contributes to the literature on the interactions between public debt, financial systems, and income inequality in the context of OECD member states. The findings of this paper will provide policy insight into the problem of growing inequality.

The paper is structured into five sections. Following the introduction, the second section establishes a theoretical foundation for the connection between public debt, financial structure, and income inequality. Section 3 outlines the methodology. The fourth section presents the empirical findings and their implications. Finally, section 5 provides a conclusion.

2. Literature review

Regarding RQ1, the positive effect of public debt on inequality in income distribution is explained by the redistribution theory, which was first described by Henry Carter Adams in his work from 1887. He claimed that while the tax base bears the initial burden of debt repayment, owners of government bonds and other securities are at the top of the income distribution (Hager, 2016). The above implies that during the debt repayment process, although the rich also pay taxes, they also receive interest from government bonds, treasury bills and other instruments. This process reinforces the existing pattern of inequality in wealth and income and strengthens the so-called debt state. More precisely, if the public debt is widely distributed among all income groups, as it should be in democracies, the interest of the general citizenry should not be subordinated to the interest of the dominant holders of public debt.

In order for the theory of redistribution to have an impact on increasing income inequality, a number of assumptions must be met. The first is that the owners of public debt belong to higher-income groups. The second is that the burden of debt repayment falls more heavily on income groups that are not holders of government bonds and other instruments. The impact on income inequality in the case of financing expenditures by increasing public debt depends on the tax system and the way interest is repaid. Interest expenses can be covered by a further increase in the public debt or by an increase in taxes. In the case of a tax increase, taxpayers finance interest payments on government bonds, while bondholders, who also pay taxes, receive tax-financed interest payments. More important than the value of tax revenues, is the progressivity of the tax system. The more progressive the tax system, the greater the tax burden for people with a higher income, which eliminates a part of the effect on the growth of income inequality due to the realization of debt repayment. The last assumption is that interest rates on public debt (i) exceed the growth rate (g). The effect of difference between the two rates, i and g , affects not only the sustainability of the public debt, but also the inequality in income distribution. Piketty (2014) claims that in the long term, the rate of return on capital is higher than the growth rate of real GDP, which increases the gap between capital income and labor income. As a result of the aforementioned, and considering that mostly the rich own capital, income inequality and capital accumulation are growing, and consequently, wealth inequality is also growing.

Piketty (2014) uses real rates, where r , the real annual rate of return on capital, is considered a much broader term than the nominal interest rate.

Nominal interest rates on government bonds, which are considered a risk-free investment, are usually much lower than the average long-term rate of return on capital, so the term $(i - g)$ is also smaller than the term $(r - g)$. However, if the impact of public debt on income inequality is observed, as is the case in this paper, it is useful to observe the movement of the difference between the nominal interest rate and the nominal growth rate.

Although the redistribution theory originated in the 19th century, many authors claim that it is still applicable today. Even if not all of the redistribution theory's assumptions are met, public debt can nevertheless cause an income redistribution from lower to higher income groups. The degree to which the individual assumption is violated will determine how much less of a redistributive effect results in that scenario. Along with the aforementioned assumptions, there are additional factors on which the very strength of the effect of public debt on income inequality depends, and they relate to the structure of public debt regarding the residency of the creditor, the sector of the creditor and the debt instrument. An important determinant is also the objective of the state's borrowing, which is linked to public expenditures and their structure, i.e. whether they relate to a greater extent to social transfers or expenditures on health, defence expenditures, investment in infrastructure, etc. Mainly public expenditures, which can increase equality of opportunity, such as spending on health and education, have a greater effect on inequality in market incomes than social benefits.

The results of the empirical analysis are somewhat inconsistent. In some studies, public debt increases income inequality, in others, it reduces it, while in some cases, its impact is insignificant. These discrepancies in empirical models are not surprising, given the use of different methodologies, time periods, control variables, and samples or groups of countries. Studies also differ in terms of the dependent variable, depending on whether they use (i) external public debt (Prechel, 1985; Akram, 2013; Salti, 2015; Karlin, 2018), (ii) internal public debt (Salti, 2015; Karlin, 2018; Obiero and Topuz, 2021; Sayed, 2020; Akram and Hamid, 2016), (iii) total public debt (Lee, 2005; Tung, 2020; Malla and Pathranarakul, 2021; Arslan, 2019; Sakkas and Varthalitis, 2021), or (iv) interaction variables (Mehmood et al., 2019; Van Bon, 2019). Since the redistribution theory can only be credibly demonstrated using internal public debt as the dependent variable, there are no universally consistent empirical results. However, it can be concluded that a larger number of studies find a positive relationship between internal public debt and income inequality, which is also consistent with the existing economic models (Azzimoti et al., 2014). The inconsistent findings may also be due to different levels of debt, as varying debt-to-GDP ratios can affect both economic growth and income redistribution in different ways (Fetai, B. et al., 2020).

The RQ2 underlying premise is that financial structures based on the market or banks are not mutually exclusive but appear in combination, where one of the two structures is generally more dominant. The literature explaining and comparing bank-based and market-based financial systems varies in approach. Some authors classify a country's financial structure as bank-based or market-based depending on whether bank financing of the non-financial private sector exceeds financing from market sources, and vice versa (Allard and Blavy, 2011). The classification of the financial system as bank-centric or market-centric is inappropriate, given that the individual structure is based on several indicators, such as the size of assets, the number of institutions, the number of clients, and the type of services provided. To correct the shortcomings of such an approach, indicators are used that enable the assessment of the relative importance of banks and markets in financing the economy, without a strict division into a bank-oriented or market-oriented financial system (Gambacorta et al., 2014; Langfield and Pagano, 2016; Iyigun and Owen, 2004). Examples of relative financial structure indicators are presented below. According to Langfield and Pagan (2016), the bank-to-market ratio is calculated using two different methods:

$$\frac{\text{Domestic credit to private sector}}{\text{Total market capitalization of stocks and private bonds}} \quad (1)$$

$$\frac{\text{Total assets of banks}}{\text{Total market capitalization of stocks and private bonds}} \quad (2)$$

We chose the first method considering that some activities such as investment banking should be identified as market activities (Berlin, 2012). Therefore, it seems reasonable to use bank credit to the private sector, as recommended by Čihák et al. (2012). To measure capital market size, this paper follows the traditional literature and uses the total market capitalization of stocks and private bonds. Moreover, the success of the development of a particular financial structure is analysed from the aspect of its impact on inequality in income distribution. In market-based financial systems, stock markets are larger and offer greater choice and higher returns, with high-income earners holding larger shares of stocks in their portfolios. Consequently, inequality in the distribution of income increases to a greater extent in market-based financial systems than in bank-based financial systems (Maldonado, 2017).

3. Research methods

The empirical analysis was conducted on a sample of 27 OECD member states, in the time period from 2004 to 2021. The period was chosen based on data availability, given that some key variables are not available before 2004. OECD members for which data are not available for some of the variables are Costa Rica,

Estonia, Latvia, Lithuania, Slovakia, Denmark, Luxembourg, Turkey, Finland, Israel, Sweden. The main reason for choosing OECD member countries in the model is their heterogeneity in income inequality. Descriptive statistics is presented in Table 1.

Table 1: Descriptive statistics

	GINI	DD	BM	EXP	TAX	DIF
Mean	49.57	41.25	1.91	41.23	7.19	3.34
Median	46.78	31.01	1.47	42.64	7.36	3.23
Maximum	76.17	225.12	9.98	66.82	14.28	22.64
Minimum	37.45	1.90	0.01	18.63	0.95	-0.55
Std.dev.	9.36	35.68	1.42	9.57	3.23	2.61
Skewness	1.44	3.15	1.88	-0.43	-0.14	1.77
Kurtosis	4.29	14.34	7.99	2.64	2.03	10.79
Jarque-Bera	200.90	3376.47	652.83	17.60	3457.43	1369.38
Probability	0.00	0.00	0.00	0.00	0.00	0.00
Sum	24093.32	19880.41	769.5860	19916.36	5021.67	1501.57
Sum sq. Dev.	42503.72	612446.10	809.14	44129.36	4936.84	3042.28
Observations	468	468	468	468	468	468

Source: Authors' calculation

The estimated model includes the dependent variable GINI, the independent variables of interest DD and BM, and the control variables EXP, TAX and DIF. The basis for the selection of variables is the theory of the determinants of income inequality and public debt, and the inclusion of these variables in the model is based on Huntington-Klein (2022). The control variables included in the model were selected based on a thorough review of the literature, identifying variables that influence both public debt and income inequality. Given that taxes and government spending can seemingly amplify or mitigate the effect of public debt on income inequality, it is essential to include them as control variables in the econometric model.

Additionally, based on Piketty's findings, incorporating the interest rate-growth differential is crucial, as research highlights this variable as one of the key drivers of inequality in the modern world. Moreover, it is directly linked to the level of internal public debt, further justifying its inclusion in the analysis. The variables, their description and expected sign are presented in Table 2.

Table 2: Variables description

Dependent Variable	Definition	
GINI	The Gini coefficient before taxes and transfers; based on equal-split series, bounded in the range from 0 to 100	
Independent variables	Definition	Expected sign
DD	Internal public debt in GDP represents the public debt owned by the residents of the state	Positive
BM	The ratio of bank loans to the private sector and the total market capitalization of stocks and private bonds; an approximation of the relative importance of bank financing in relation to capital market financing	Negative
EXP	Government expenditures as a percentage of GDP; including government spending, investments and transfers; the variable refers to consolidated gross debt of general government	Positive/negative
TAX	Income tax revenues as a percentage of GDP; levied on net income (gross income minus tax credits) and capital gains of individuals; the indicator refers to the consolidated tax revenues of general government	Positive/negative
DIF	The interest rate-growth differential is the difference between the nominal interest rate on government bonds with a maturity of 10 years and the nominal GDP growth rate	Positive

Source: Authors' compilation

Since the value of the Gini coefficient from the previous year ($t - 1$) affects its value in this year (t) and since independent variables can affect the dependent variable with different time lags, dynamic panel model is used, more precisely the Vector Error Correction Model (VECM) (Jakšić et al., 2020). VECM is used to model multidimensional time series and is a generalization of the univariate Error Correction Model (ECM) (Suharsono et al., 2017). VECM is based on a reduced Vector Autoregression Model (VAR), suitable for describing the dynamic adjustment of variables in the process of moving towards an equilibrium state. However, for the analysis of long-term correlation, it is necessary to complete the VAR model with an error correction term (ECT), which results in a VECM. The VECM enables the examination of short-term and long-term dynamics between variables and assumes the existence of a cointegration relationship between them. In other words, the cointegration of two or more variables indicates the existence of a long-term equilibrium relationship between them, which allows only short deviations from equilibrium, before readjustment. The stated long-term relationships and the “speed” of error correction are estimated using Johansen’s approach. If the variables are cointegrated and connected in the long term, this does

not necessarily imply the connection of the variables in the short term (Jakšić et al., 2020). Therefore, within the VEC model, the Granger causality test can be used to assess the short-term association and direction of causality between variables. Also, the model assumes that all variables are endogenous, which facilitates implementation (Andrei and Andrei, 2015).

Panel VECM considers the cross-sectional (i) and temporal (t) dimensions of panel data and assumes homogeneous long-run coefficients and adjustment parameters (Groen and Kleibergen, 2003). Its specification is as follows:

$$\Delta y_{i,t} = \Pi_i y_{i,t-1} + \sum_{h=1}^{l_i} \Gamma_{i,h} \Delta y_{i,t-h} + \Phi_i d_{i,t} + \varepsilon_{i,t}, i=1,\dots,N, t=1,\dots,T \quad (3)$$

where $n \cdot n$ matrix $\Pi = \alpha\beta'$, and α and β are $n \cdot r$ matrices of full rank. If the variables are cointegrated, then there is a linear combination of variables that is stationary, and in that case the matrix Π can be decomposed into $\Pi = \alpha\beta'$ (Jakšić et al., 2020: 325–329). The matrix α is the matrix of the “speed” of error correction, and the matrix β is called the cointegration matrix and contains the parameters of the cointegration equations (Jakšić et al., 2020). The expression $\Pi_i y_{i,t-1}$ represents the error correction factor of the model, $d_{i,t}$ represents the deterministic component, and $\varepsilon_{i,t}$ is the error vector. The number of cointegration equations is determined using the Johansen test. In the model, short-term dynamics ($\sum_{h=1}^{l_i} \Gamma_{i,h} \Delta y_{i,t-h}$) and long-term dynamics ($\Pi_i y_{i,t-1}$) are connected through the estimation of the parameters of the matrices $\Gamma_{i,h}$ and Π_i .

4. Results and discussion

Before the evaluation of the panel VECM itself, the following procedure must be carried out: (i) testing the dependence of cross-sectional units, i.e. cross-sectional dependence, (ii) examining whether the variables are stationary, (iii) checking whether the variables are cointegrated, and (iv) determining the optimal number of lags. The variables must be integrated of order one and cointegrated in order to satisfy the conditions for conducting the panel VECM. If the variables are not cointegrated, it is concluded that there is no long-term relationship between them, and the panel VAR model (PVAR) is appropriate.

Depending on the results of the cross-sectional dependence test, panel tests of unit roots of the first generation or panel tests of unit roots of the second generation are applied. Two dependence tests were performed, and the results are as follows: Breusch-Pagan test (LM=2115.951, p-value<0.001) and Pesaran test (CD=32.79027, p-value<0.001). Both tests indicate the rejection of the null hypothesis, i.e. that the variables exhibit some dynamics common to the cross-

sectional units. Considering the results of the tests, it is necessary to use unit root tests of the second generation, which allow different forms of cross-sectional dependence.

Therefore, the Pesaran CIPS test was conducted, and the test results are presented in Table 3. The results show that the variables are non-stationary in levels, with the exception of the GINI and BM variables. The null hypothesis of non-stationarity for the variables GINI and BM is rejected only at a significance level of 10%, and therefore, the variables were used in their first differences. In the first differences, all variables are stationary at the common significance levels. It is assumed that all variables are integrated of order one, and the cointegration analysis of the variables follows.

Table 3: Pesaran CIPS panel unit root test

	Level		First difference	
	constant	constant and trend	constant	constant and trend
GINI	-2.170**	-2.650*	-4.532***	-4.657***
DD	-1.722	-2.033	-3.159***	-3.312***
BM	-2.010*	-2.739**	-3.772***	-3.817***
EXP	-1.520	-2.185	-3.763***	-4.103***
TAX	-1.923	-2.115	-3.517***	-3.578***
DIF	-1.613	-2.483	-3.752***	-3.559***

Note: Statistical significance at 10%, 5% and 1% are denoted by *, **, ***.

Source: Authors' calculation

To examine cointegration, i.e. the connection of variables in the long term, the Pedroni, Kao, and Johansen cointegration tests are performed. Pedroni's and Kao's cointegration tests have a null hypothesis of no cointegration, while the alternative hypothesis assumes the existence of cointegration among the analysed variables. The results of the mentioned tests are presented in Table 4 and indicate the cointegration between the variables in both cases. Johansen's approach is based on the analysis of the rank of the matrix Π , which is equivalent to the number of cointegration equations. Johansen defines two tests for determining the rank of a matrix: The Trace test and the Maximum Eigenvalue test. Testing is carried out successively, i.e. it is stopped the first time when the null hypothesis about the existence of r cointegration vectors cannot be rejected (Jakšić et al., 2020).

Table 4: Panel cointegration tests (Pedroni and Kao)

	Pedroni		Kao
	constant	constant and trend	constant
Modified Phillips-Perron	-8.3408***	-9.1440***	
Phillips-Peron	-4.8088***	-3.5881***	
Augmented Dickey-Fuller	-4.9355***	-4.6684***	-4.7501***

Note: Statistical significance at 10%, 5% and 1% are denoted by *, **, ***.

Source: Authors' calculation

Table 5 shows the results of the Johansen cointegration test, where the tests do not provide the same conclusion about the number of cointegration equations. The Trace test indicates the existence of one unique cointegration relation, while the Maximum Eigenvalue test confirms the existence of two unique cointegration relations. Considering that Johansen and Juselius (1990) recommend applying the Trace test in case of contradictory results of two tests, we conclude that there is one cointegration equation. In conducting the Johansen test, the optimal number of lags was used, the determination of which is described in the next paragraph. The existence of cointegration between the variables was confirmed using all three tests (Pedroni's, Ka's and Johansen's cointegration test), indicating a stable long-term relationship between the variables. Based on the aforementioned, it is confirmed that using the panel VEC model is appropriate. Estimating VECM requires choosing an appropriate lag length k . In determining the appropriate number of lags, this paper follows Schwarz's information criterion, which has the smallest value of the information criterion. To determine the optimal number of lags, the panel VAR model was first estimated, and following the SIC criterion, two lags were selected as the optimal number. When evaluating the panel VECM model, it is necessary to use $(k - 1)$ lags, i.e. one lag.

Table 5: Johansen Cointegration Test Result

Number of cointegration vectors	Trace test value	p-value	Number of cointegration vectors	Max-Eigen test value	p-value
None*	117.4516	0.007	None*	55.1201	0.0005
At most 1	62.3315	0.1709	At most 1*	42.5349	0.0036
At most 2	19.7967	0.9921	At most 2	12.3142	0.9193
At most 3	7.4825	0.9984	At most 3	5.0300	0.9955
At most 4	2.4524	0.9862	At most 4	2.2844	0.9827
At most 5	0.1680	0.6819	At most 5	0.1680	0.6819

Note: Statistical significance at 10%, 5% and 1% are denoted by *, **, ***.

Source: Authors' calculation

Table 6 contains the results of the panel VEC model. When evaluating the model, only the constant is included as a deterministic component, which is considered a standard approach in the implementation of the Johansen procedure (Jakšić et al., 2020). Table 6 shows the coefficients of cointegration equations (upper part of the table) and short-term coefficients (lower part of the table) with the assumption of one cointegration vector. Since the goal of this research is, among others, to determine whether there is a long-term causality between the variables, the coefficients of the cointegration equation are analysed below. There are two implications of the coefficients of the cointegration vector in Table 6 – the first relates to the existence of long-term causality, and the second relates to the speed of adjustment to equilibrium. The speed of adjustment is measured by the error correction factor, which is defined based on the cointegration vector, and is included as an additional term in the VEC model. When the error correction factor is negative and significant, it can be concluded that the variables are cointegrated and converge to the long-run equilibrium, reducing the deviation from equilibrium. Although the VECM presents as many models as there are variables, and in each one uses a different variable as the dependent variable, Table 6 shows only the results of the model in which GINI is the dependent variable. Before the actual interpretation of the coefficients of the cointegration vector, the results from Table 6 were normalized by the GINI variable:

$$\begin{aligned} GINI_{i,t} = & 0.2619 DD_{i,t} + 0.7523 BM_{i,t} - 0.8890 EXP_{i,t} + \\ & + 2.8480 TAX_{i,t} + 9.9814 DIF_{i,t} + 18.2983 \end{aligned} \quad (4)$$

The interpretation of the coefficients of the cointegration vector, that is, the long-term association between variables, follows from equation (4). In the long term, at a significance level of 5%, the DD variable has a positive effect on the GINI variable, which is in accordance with the theory of redistribution, described in the theoretical part of the paper. The BM variable, i.e. the ratio of bank to market financing, indicates a positive effect on income inequality, however, it is not statistically significant in the model. All three control variables are statistically significant at the 5% level, with the EXP variable having a negative effect on the GINI variable, i.e. reducing the inequality in income distribution, while the TAX variable has a positive effect on the dependent variable, which highlights the different effects of fiscal policy on the redistribution of market income. The control variable DIF has a significant and positive effect on the GINI variable, which confirms Piketty's hypothesis regarding the growth of inequality due to the growing difference between the return on capital and the growth rate.

The error correction term (ECT) can be defined as follows:

$$\begin{aligned} Cointeq_{i,t} = & GINI_{i,t} - 0.2619 DD_{i,t} - 0.7523 BM_{i,t} + 0.8890 EXP_{i,t} - \\ & - 2.8480 TAX_{i,t} - 9.9814 DIF_{i,t} - 18.2983 \end{aligned} \quad (5)$$

For the *GINI* variable, the estimated error correction model is as follows:

$$\begin{aligned} \Delta GINI_{i,t} = & -0.1327 * \Delta GINI_{i,t-1} - 0.0006 * \Delta DD_{i,t-1} - 0.1006 * \Delta BM_{i,t-1} + \\ & + 0.0223 * \Delta EXP_{i,t-1} - 0.0686 * \Delta TAX_{i,t-1} - 0.1324 \Delta DIF_{i,t-1} - \\ & - 0.0071 * Cointeq_{i,t-1} - 0.0736 \end{aligned} \quad (6)$$

The parameter estimate with the Cointeq cointegration vector is -0.0071 and is significant (p-value = 0.0010). Considering the negative sign and statistical significance, it can be concluded that there is a long-term causality from the independent variables to the dependent variable GINI. The second implication refers to the speed of adjustment to the equilibrium state and indicates that the GINI variable converges to the long-term equilibrium, reducing the difference from equilibrium by 0.71% per year. In other words, the GINI variable decreases annually by 0.0071 units to reach the equilibrium state.

Table 6: Panel VECM Estimation Output

Variables	Coefficients	SE	t-value	p-value
Estimation of cointegration vector including constant				
<i>GINI</i> _{<i>t</i>-1}	1.0000			
<i>DD</i> _{<i>t</i>-1}	-0.2619***	0.0833	-3.1445	0.0018
<i>BM</i> _{<i>t</i>-1}	-0.7523	2.4406	-0.3082	0.7581
<i>EXP</i> _{<i>t</i>-1}	0.8890**	0.3682	2.4147	0.0163
<i>TAX</i> _{<i>t</i>-1}	-2.8480***	1.0523	-2.7064	0.0047
<i>DIF</i> _{<i>t</i>-1}	-9.9814***	1.3136	-7.5983	0.0000
Constant	-18.2983			
Estimation of VEC model				
Cointeq	-0.0071***	0.0024	-3.3055	0.0010
$\Delta GINI_{t-1}$	-0.1327***	0.0480	-2.7632	0.0058
ΔDD_{t-1}	-0.0006	0.0116	-0.0555	0.9557
ΔBM_{t-1}	-0.1006*	0.0522	-1.9269	0.0541
ΔEXP_{t-1}	0.0223	0.0186	1.1997	0.2304
ΔTAX_{t-1}	-0.0686	0.1107	-0.6202	0.5352
ΔDIF_{t-1}	-0.1324***	0.0400	-3.3082	0.0010
Constant	-0.0736	0.0477	-1.5421	0.1232

Source: Authors' calculation

The coefficients in the second part of Table 6 examine the existence of short-term causality among the variables. Significance was tested using the Wald test, that is, one of the tests on the collective significance of all shifts of a single variable

in the model. The coefficient with the lagged dependent variable is negative and significant with a value of -0.1327. Regarding the independent variables, only the BM variable (including one lag) is significant in the short term, at a significance level of 10%, whereby the RQ2 of this paper can be confirmed, according to which the relative increase in market, in relation to bank financing, increases income inequality. However, the above is valid only in the short term. At the 5% significance level, the variable DIF (including one one) has a negative effect (-9.98) on income inequality, which confirms the assumption that the term (*i-g*) has negative redistributive effects only in the long term. The short-term parameters in front of the variables DD, EXP and TAX have the opposite signs compared to the parameters in the cointegration equation, however, in the short term the mentioned variables are not significant. In conclusion, the Granger causality test shows that changes in the DIF and BM variables in the Granger's sense (at a significance level of 5% for DIF and 10% for BM) cause a change in the GINI variable.

The results are consistent with key theoretical assumptions and prior empirical findings. The positive long-term association between internal public debt and income inequality reinforces the redistribution theory articulated by Hager (2016) and elaborated by Piketty (2014), particularly regarding the (*i-g*) mechanism (see Section 2). Moreover, the findings align with those of Salti (2015), Karlin (2018), and Obiero and Topuz (2021), who also demonstrate a positive link between internal public debt and inequality, confirming the asymmetric burden of debt servicing across income groups. By confirming these relationships in a panel VECM framework using OECD countries, this paper contributes by both supporting and extending the empirical literature on the redistributive impact of public debt.

The diagnostics in the panel VEC model refer to the evaluation of normality, autocorrelation and heteroscedasticity of relational errors. The normal distribution of errors is a prerequisite for interpreting the significance of the estimated coefficients. However, the larger the sample, the more trivial the assumption of normality becomes (Pallant, 2007). Altman and Bland (1995) argue that for samples containing hundreds of observations the distribution of the data can be ignored. The results of the Jarque-Bera test reject the null hypothesis of a normal distribution of relationship errors (at a significance level of 1%), however, considering the arguments of the authors Pallant (2007) and Altman and Bland (1995), the model is still considered adequate. The Lagrange multiplier (LM-test), used to test autocorrelation, is not significant up to the eighth lag (LM=50.4235, p-value>0.05), and therefore the null hypothesis of the absence of autocorrelation cannot be rejected. White's test indicated that there is a problem of heteroskedasticity in the model, however, the VEC model is robust even if the assumption of constant variance is not valid, i.e. if the variance of the relationship errors is heteroskedastic (Bašić, 2022).

In order to confirm the robustness of the model, and considering the imperfections of the Gini coefficient, other variables representing the same fundamental economic interpretations were also applied. Models that use the income share of the richest 10% (TOP10) and the income share of the poorest 50% in total income (BOTTOM50) as alternative measures of income inequality were evaluated. Both models confirm the obtained results above. Precisely, a one-unit increase in internal public debt in the long term affects the increase in the income share of the richest 10% by 4.4423 units and the decrease in the income share of the poorest 50% by 0.1917 units. The coefficients of the cointegration vectors (long-term coefficients) are statistically significant, while the short-term coefficients are not significant. The relationship between the variable BM and TOP10 is negative, which indicates a lower income earned by the richest 10% when the financial system is relatively more focused on banks. The opposite is true for the poorest 50%, whose share in income increases with the increase in the BM variable. The robustness of the model was also confirmed by the DIF variable, whose growth has a positive effect on the income of the richest 10% (49.11), and negatively on the income of the poorest 50% (-3.96), in the long term. Additionally, a model was again estimated with the dependent variable being Gini coefficient of disposable income (GINIdisp), which examines income inequality after taxes and transfers. The coefficients of the estimated model have the same signs as in the original model, and in both models the estimated coefficients of the same variables are statistically significant. The authors can provide tables with results of all three models upon request, due to limited space.

5. Conclusion

The econometric analysis, conducted on a sample of 27 OECD member countries and in period from 2004 to 2021, reveals that an increase in internal public debt (as a share in GDP) by one percentage point causes an increase in inequality in income, measured by the Gini coefficient, by 0.2619 index points in the long term. In other words, the internal public debt affects the increase of income inequality in the long term, while in the short term, its coefficient is negative and insignificant. The research results confirm the theory that public debt helps smooth the tax burden, thereby reducing income inequality in the short term. These findings align with the majority of studies conducted on developed countries (see Section 2). In the short term, people at the lower levels of the income distribution benefit from the increase in public debt, through redistributive policies and tax deferrals. The above leads to an increase in consumption by people with lower incomes, and to higher savings rates by people with higher incomes, whereby the increase in consumption causes an increase in real interest rates and returns on capital. In the medium and long term, considering that mostly the richer earn interest on government bonds, and deferred taxes affect the poorer population to a greater extent, the increase in public

debt has the opposite effect, i.e. it increases inequality in income redistribution. In the macroeconomic context, higher levels of public debt increase credit risks and premiums demanded by holders of public debt, which further strengthens the redistributive effect of public debt.

An increase in nominal interest rates on government bonds with a maturity of ten years, along with a decrease, or a relatively smaller increase in the growth rate, also leads to an increase in inequality in the long run, which further confirms the aforementioned theory. More precisely, a change in $(i-g)$ by one percentage point causes an increase in the Gini coefficient by 9.9814 index points in the long run and decreases the Gini coefficient by 0.1324 index points in the short run. The positive relationship between the term $(i-g)$ and the Gini coefficient of income inequality is explained by the high concentration of ownership of government bonds in the upper classes of the income distribution. As a result of the above, if $(i-g)$ increases, the wealthier population achieves a higher return from investments in government bonds due to the increase in public debt, which consequently increases the gap in market incomes.

The obtained results bring significant policy implications, i.e. the redistributive effects that internal public debt has on income inequality can, with political will, be reduced by an increase in tax progressivity, which would enable a more equal tax burden for the purpose of paying interest on public debt. Another implication refers to the introduction or increase of capital income tax and capital gains tax, which have been reduced in most OECD countries in the last decade. In the context of economic inequality, it is not solely the size of public debt that brings the risks, but also the concentration of ownership of public debt. When ownership of public debt is concentrated in the hands of a few, this can exacerbate existing inequalities in a society. Therefore, while high levels of public debt are certainly a cause for concern, it is crucial to also consider the distribution of this debt within economic policy making process, and when evaluating its potential impact on economic inequality. The main contribution of this paper lies in its examination of the effects of rising internal public debt over both the short and long term. Additionally, most studies on the relationship between public debt and inequality fail to account for financial structure variables. This paper takes a more comprehensive approach, recognizing that in the era of financialization, overlooking the role of the financial system can bias the results and distort economic research findings.

In addition to the obtained results, it is necessary to point out some limitations of the conducted research which open future research avenues on this issue. The limitations are primarily related to the rather short time period. Although the positive effect of internal public debt on income inequality has been confirmed, a longer period of observation could strengthen the observed redistributive effect of public debt. Also, the observation period was characterized by low interest rates, which enabled governments to acquire increasing amounts of public debt. In times

of higher interest rates, this interaction would be different. The same applies to the effect of the capital market on income inequality, which was predicted in the theoretical part to be positive, i.e. to increase income inequality relatively more than a bank-based financial system. The impossibility of proving such a long-term relationship may be the consequence of the observed time period in which interest rates were at extremely low levels. In order to include such variations in the research, it is crucial to examine longer time periods. Finally, it is important to note that the research area of income inequality is interdisciplinary. Thus, in order to gain a comprehensive understanding of inequality patterns and the influence of public debt and financial structure, the next step in our research is augmenting the model with additional control variables beyond the solely economic aspects of income inequality such as political and institutional.

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Istraživanje skrivene veze: kako javni dug utječe na nejednakost dohotka u zemljama članicama OECD-a

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Sažetak

Teorija preraspodjele, koja tvrdi da su pojedinci iz viših dohodovnih skupina dominantni nositelji javnog duga, služi kao teorijska osnova za naše istraživanje. Utjecaj preraspodjele na temelju realizacije primitaka od kamata na javni dug ne može se u potpunosti nadoknaditi nedovoljnom progresivnošću poreznog sustava. S obzirom na to da značajno utječe na način raspodjele dohotka, rad također razmatra aspekt financijske strukture, koji se mjeri omjerom financiranja temeljenog na bankama prema financiranju temeljenom na tržištu. Svrha ovog rada je dvostruka. Prvo, ispitati povećava li javni dug nejednakost u raspodjeli dohotka, a drugo, testirati povećava li relativno povećanje tržišnog financiranja u odnosu na bankovno financiranje nejednakost u raspodjeli dohotka. Stoga rad istražuje ima li javni dug, u zemljama gdje vlasništvo nad javnim dugom nije jednako raspodijeljeno, značajan učinak na prijenos dohotka između različitih socioekonomskih skupina. Empirijski dio ovog rada proveden je korištenjem dinamičkog panel modela na uzorku od 27 zemalja članica OECD-a, za razdoblje od 2004. do 2021. Preciznije, koristimo model vektorske pogreške korekcije (VECM). Prema rezultatima istraživanja, povećanje državnog zaduživanja dovodi do preraspodjele dohotka od nižih prema višim dohodovnim skupinama na dugi rok, dok povećanje naglaska financijskog sustava na bankovno financiranje rezultira kratkoročnim smanjenjem nejednakosti dohotka. Dakle, dok su visoke razine javnog duga zasigurno razlog za zabrinutost, ključno je također razmotriti raspodjelu tog duga unutar procesa donošenja ekonomske politike i pri procjeni njegovog potencijalnog utjecaja na ekonomsku nejednakost.

Ključne riječi: nejednakost dohotka, financijska struktura, teorija preraspodjele, panel VECM

JEL klasifikacija: D63, H60, C33

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How does entrepreneurial culture influence entrepreneurial financial performance through organizational learning, creativity, and competitive advantage?*

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Abstract

This research aims to investigate the influences of entrepreneurial culture on entrepreneurial financial performance via the mediating functions of organizational learning, creativity, and competitive advantage. The authors performed a questionnaire survey to obtain data from 315 entrepreneurs of new ventures in Ho Chi Minh City region, Vietnam in the period from November 2021 to June 2023. The partial least squares structural equation modeling (PLS-SEM) was applied to test the associations between variables in the research framework. Organizational learning, organizational creativity, firm competitive advantage, and entrepreneurial financial performance were all shown to increase in direct correlation with the sharing of positive success stories and social norms. The results also demonstrated the partial mediating roles of organizational learning, organizational innovation, and firm

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competitive advantage in shaping the connections between entrepreneurial culture dimensions (social norms and success stories) and entrepreneurial financial performance. Thus, this study mitigated ongoing debates in the literature, while strengthening the resource-based view theory in the entrepreneurship context. However, this study showed that there is no direct effect of entrepreneurial culture dimensions on entrepreneurial financial performance. The findings provide recommendations for new ventures to better understand and appreciate the cultural factors that are necessary to expand their knowledge and skillset, spark new ideas, and gain a competitive edge, ultimately leading to their sustainable financial success.

Keywords: *entrepreneurial culture, organizational learning, organizational creativity, firm competitive advantage, entrepreneurial financial performance*

JEL classification: *L26, M13, M21, L25, O31*

1. Introduction

Entrepreneurship has been broadly acknowledged as essential forces of the country's wealth in previous decades (Wang et al., 2019). It enhances the employment rate, facilitates creativity, and generates exceptional financial outcomes (Ataei et al., 2020). In 2023, there were 159,294 new ventures in Vietnam, which is higher than the average rate in the phase from 2017 to 2022; having certified venture funds were USD60 billion (Ministry of Planning and Investment, 2023). Ho Chi Minh City (HCMC) is a growing, powerful, and vigorous area that fascinates several different structures of enterprises to conduct their business, and thus it possesses various huge offices (Khuong and Hoang, 2015). HCMC, as the biggest region in terms of its population, is acknowledged as the engine that inspires other regions of the country (Gillen, 2016). It contributed the biggest percentage of GDP in 2022, which was 15.5%, stimulating the entrepreneurial activities and wealth of Vietnam (General Statistics Office, 2022). In the first eight months of 2024, the number of new ventures in HCMC region was 48,664 organizations took the highest percentage, which was equal to approximately 31%, of new ventures in Vietnam (Phong, 2025). However, starting from 2020, 90 percent of businesses suffered losses, shut down, or reduced production as a consequence of the COVID-19 pandemic (Ministry of Finance, 2021), whereas the percentage of successful new ventures was only 5 percent (Vietttokin Consulting, 2019). Especially, there are 85.71% of enterprises operating in HCMC region were extremely influenced by the COVID-19 pandemic (Vu, 2021), whereas enterprises withdrawing from the market in HCMC region accounted for 29% of the total organizations of Vietnam (My, 2021). The extreme fluctuation of entrepreneurship and huge percentage of business failure in Vietnam, especially in HCMC region are the consequences of unfavorable conditions in both external resources – entrepreneurial culture (CUL) of Vietnam (Kreiser et al., 2013; Davari and Najmabadi, 2018; Buccieri et al., 2021) – and internal resources – organizational learning (OL) (Chan et al., 2024; Le at al., 2025), organizational creativity (OC) (Boso et al., 2017; Nguyen et al., 2023),

and firm competitive advantage (FCA) of new ventures (Barney, 1991; Saeidi et al., 2015) – during the COVID-19 epidemic crisis. To address the unfavorable influences of the COVID-19 pandemic, HCMC, has enforced an administrative project, which is *Support programs for a creative and innovative entrepreneurial ecosystem in Ho Chi Minh city period 2021–2025*, having the main objectives were to support the improvement of a healthy entrepreneurial ecosystem, especially the entrepreneurial culture in HCMC region for developing the creative start-ups and their financial outcomes (Ministry of Industry and Trade of the Socialist Republic of Vietnam, 2022). However, there are still various issues embedded in Vietnamese entrepreneurship, and thus researching antecedents of entrepreneurial financial performance (FiPer) in HCMC region, Vietnam is a necessary concern of entrepreneurs, administrators, and other stakeholders, which will be conducted in this study because new ventures and their performance are crucial drivers of the development of entrepreneurship and nation. We examine entrepreneurial culture as the external resources, while organizational learning and organizational creativity are investigated as the internal resources that enable new ventures to gain their firm competitive advantage, ultimately increasing entrepreneurial financial performance to handle the COVID-19 epidemic.

The resource-based view (RBV) theory proposes that firm competitive advantage and entrepreneurial financial performance are relied on their possession of both external and internal unique resources and capabilities which are *valuable, rare, inimitable, and non-substitutable* (Barney, 1991; Duarte Alonso et al., 2025). Previous analyzed entrepreneurial culture as the internal resources which enable new ventures to foster their firm competitive advantage and entrepreneurial financial performance (Kreiser et al., 2013; Davari and Najmabadi, 2018; Buccieri et al., 2021). The other studies utilized organizational learning (Chan et al., 2024; Le et al., 2025) and organizational creativity (Boso et al., 2017; Nguyen et al., 2023) as the internal mechanisms which enhance firm competitive advantage and entrepreneurial financial performance. Although there are some studies which examined the effects of entrepreneurial culture on entrepreneurial financial performance, research gaps still appeared because of these subsequent proofs. Firstly, the papers which approved the impacts of entrepreneurial culture on organizational-level outcomes are scarce (Thai and Mai, 2023). Secondly, ongoing debates which claim that entrepreneurial culture has direct mixed impacts on entrepreneurial financial performance (Coleman and Kariv, 2014; Okoi et al., 2021; Buccieri et al., 2021) or they do not unveil the direct statistically significant influences, instead, internal mechanisms mediate their associations (Wei et al., 2012; Mantok et al., 2019) are still emerged. Thirdly, there are also the same debates in the literature regarding the organizational learning-entrepreneurial financial performance relationships (Yang et al., 2022; Alkhalaf and Badewi, 2024) and organizational creativity-entrepreneurial financial performance associations (Souto, 2022; Setyaningrum et al., 2023). Finally, there are two separated research streams whereas one stream analyzed the influences of entrepreneurial culture on firm

competitive advantage and entrepreneurial financial performance (Kreiser et al., 2013; Davari and Najmabadi, 2018; Bucciari et al., 2021), while the other stream separately investigated the influences of organizational learning and organizational creativity on firm competitive advantage and entrepreneurial financial performance (Chen and Lin, 2023; Nguyen et al., 2023; Musa and Enggarsyah, 2024; Le et al., 2025). Therefore, there is a shortage of study that incorporated those streams and generated the extensive impacts of both internal and external resources on firm competitive advantage and entrepreneurial financial performance (Jayeola et al., 2022)

Because of the existing research gaps, this research focuses on investigating the influences of entrepreneurial culture on entrepreneurial financial performance via the mediating functions of organizational learning, organizational creativity, and firm competitive advantage. Firstly, this research solves the limited literature on the influences of entrepreneurial culture on organizational-level outcomes (Thai and Mai, 2023). Secondly, it applies the RBV theory to examine both the direct and indirect influences of entrepreneurial culture on entrepreneurial financial performance, resolving extant debates in the entrepreneurial culture-entrepreneurial financial performance relationships (Coleman and Kariv, 2014; Wei et al., 2012; Mantok et al., 2019; Bucciari et al., 2021; Okoi et al., 2021). Thirdly, it mitigates the similar extant debates in organizational learning-entrepreneurial financial performance relationships (Yang et al., 2022; Alkhalaf and Badewi, 2024) and organizational creativity-entrepreneurial financial performance associations (Souto, 2022; Setyaningrum et al., 2023). Finally, it fulfills the requirement of Jayeola et al. (2022) by integrating those two research streams to analyze the comprehensive effects of entrepreneurial culture on entrepreneurial financial performance through the internal mechanisms to entirely strengthen the RBV theory. Therefore, this research focuses on answering the consequent research questions:

RQ1. To what extent does entrepreneurial culture directly and indirectly impact entrepreneurial financial performance, firm competitive advantage, organizational creativity, and organizational learning?

RQ2. Do firm competitive advantage, organizational creativity, and organizational learning mediate the relationships between entrepreneurial culture and entrepreneurial financial performance?

Sections of this study are organized as follows: literature review, methodology, empirical data and analysis, results and discussion, and conclusion.

2. Literature review

This chapter provides the foundation for this study by scrutinizing extant literature and developing hypotheses relevant to the study. It indicates the grounded theory

utilized in this study which is the resource-based view. Then, it analyzes the extant findings of previous studies regarding the relationships between entrepreneurial culture, organizational learning, organizational creativity, firm competitive advantage, and entrepreneurial financial performance to propose the related hypotheses to address the research objectives.

2.1. Resources-based view theory

The RBV theory clarifies that the sustainable firm competitive advantage and performance differences between ventures rely on a massive bulk of the resources they possess and manage, which are valuable, rare, inimitable, and non-substitutable (Galbreath, 2005). When resources, which can be classified into external and internal resources, are treasured for enterprises, they allow organizations to accomplish above-average outcomes or larger market share versus rivals in their business sectors (Barney, 1991; Duarte Alonso et al., 2025). This study utilized the RBV theory to examine entrepreneurial culture as external resources and organizational learning and organizational creativity as internal resources which enables start-ups to obtain their firm competitive advantage, ultimately increasing their entrepreneurial financial performance. Regarding internal mechanisms, organizational learning is an internal process which allows new ventures to gain a competitive advantage and increase their financial performance (Patwary et al., 2022; Le et al., 2025). Organizations improve their competitiveness and financial performance through the obtainment, transmission, sharing, and repository of knowledge (Alkhalaf and Badewi, 2024). Moreover, organizational creativity is analyzed as a resource which fosters the firms' outcomes through novel product creation processes (Boso et al., 2017). Besides that, Mikalef and Gupta (2021) also applied the RBV theory to examine the essential sources necessary for construction of artificial intelligence in the organization as well as the organizational creativity as the source of business success. Concentrating on external mechanisms, the RBV theory also indicates that organizations could enhance their resource base by accessing further resources externally like entrepreneurial culture embedded in an entrepreneurial ecosystem (Thampi et al., 2018). Superior organizational performance is the consequence of external resources, such as entrepreneurial culture, which are accumulated to present an effective entrepreneurial ecosystem (Franco-Leal et al., 2020; Buccieri et al., 2021).

2.2. Entrepreneurial culture, organizational learning, organizational creativity, firm competitive advantage, and entrepreneurial financial performance

The dimensions of entrepreneurial culture are crucial forces of organizational learning of new ventures since those elements can be leveraged to create a supportive culture that stimulates constant learning among organizations to respond to external and internal contexts (Yazdanpanah et al., 2023).

Organizational learning is not efficient without favorable conditions such as entrepreneurial culture (Alsabbagh and Khalil, 2017). Specifically, a firm's desire to acquire and develop organizational learning is a result of the emergence of social norms (CULa) regarding organizational creativity, adaptability, risk-taking behaviors, and personal initiatives (Wolff et al., 2015). Prior studies also approved that the presence of social norms facilitates organizational learning of firms (Kreiser, 2011; Dada and Fogg, 2014; Real et al., 2012). Thus, in the case that the culture is conducive to learning attitudes, which is depicted through social norms, the procedure of learning among the members of the enterprise is implemented effectively (Nugroho, 2018). Besides that, success stories (CULb) foster and promote organizational learning by providing an overall picture that motivates organizational members to improve themselves through learning spirit (Elkeles and Phillips, 2007). Hence, the prevalence of successful and effective success stories contributes to the notable level of organizational learning (Ur Rehman et al., 2019).

H1: Social Norms (H1a) and Success Stories (H1b) positively affect Organizational Learning.

Entrepreneurial culture enhances the development of new ideas, experiments, and solutions to employ organizational creativity (Lee and Peterson, 2000). Entrepreneurial culture enables new notions and organizational creativity in exploring new business chances (Dimitratos et al., 2012). Thus environmental culture positively influences organizational creativity and innovation of Chinese enterprises (Chen et al., 2023). Social-cultural norms which support entrepreneurship positively influence organizational creativity by enhancing revolution, adventurousness, and curiosity of new ventures (Zhou et al., 2008). Social norms and success stories have positive impacts on creative thinking and process, contributing to the implementation of creative activities of new ventures (Khazanchi et al., 2007; Nagaoka and Walsh, 2009). In addition, Erez and Nouri (2010) proposed that entrepreneurial culture is positively associated with a greater degree of originality in ideas and the complementary values improve the development of the ideas' applicability. Thus, social norms are essential for fostering organizational creativity, involvement, and achievement (Chua et al., 2014). Social norms are seen as a kind of social capital that is positively linked with organizational creativity by inspiring creative mindsets and behaviors (Walton and Kimmelmeier, 2012; Sözbilir, 2018). The components of social life values, which represent success stories, are favorably associated with organizational creativity because they provide the work values and motivations for life-long personal development to conduct creative activities (Kyvik et al., 2012). Success stories positively contribute into service organizational creativity under the effect of role modeling in the interaction between leader humor and subordinate service organizational creativity (Peng et al., 2020).

Furthermore, a venture could develop its creativity by conducting thorough planning, implementing energetic and stable organizational learning activities, and providing related cultivation strategies (Jiang and Chen, 2017). Organizational learning is the extent to which organizational members learn interactively through collective work, contributing to the improvement of organizational creativity by creating novel and useful ideas, approaches, and solutions (Jeong and Shin, 2019). Thus, the development of procedures, approaches, and actions through organizational learning influences organizations to generate novel ideas which are favorable and pertinent for the improvement of organizational creativity (Frare et al., 2022).

H2: Social Norms (H2a), Success Stories (H2b), and Organizational Learning (H2c) positively affect Organizational Creativity.

According to the RBV theory, firm competitive advantage and entrepreneurial financial performance rely on their possession of both external resources – entrepreneurial culture dimensions – and internal resources – organizational learning and creativity – which are valuable, rare, inimitable, and non-substitutable (Barney, 1991; and Duarte Alonso et al., 2025). There is a forceful propensity that dimensions of entrepreneurial culture are crucial for new ventures to gain sustainable competitive advantage by assisting novel product development (Falahat et al., 2022). Petrakis et al. (2015) argued the significance of entrepreneurial culture as a longstanding crucial source for organizational creativity and competitiveness capacities. The social norms which emphasize cooperation and entrepreneurship norms are positively associated with reciprocal abilities and competitive advantages of new ventures (Zuzel and Zabkar, 2006). Thus, social norms are positively connected with firm competitive advantage because they generate standards for organizational members to employ in their work enabling the firm to make a distinction from its opponents (Kiyabo and Isaga, 2020). Besides that, entrepreneurial commitments and competences, representing success stories, positively affect firm competitive advantage because they are the driving forces which inspire new ventures to enforce rational strategies (Erikson, 2002). Therefore, the prevalence of entrepreneurial role models, representing success stories, stimulates the decisions of the entrepreneurial procedures of new ventures through which they gain their exceptional positions, turning into their competitive advantage (Lafuente et al., 2007).

However, an insignificant association among organizational learning and competitive advantage is found (Zameer et al., 2024). Organizational learning has been extensively analyzed as a crucial mechanism to obtain and create knowledge which helps new ventures to gain competitiveness (Zhang et al., 2023a). Organizational learning is a procedure through which new ventures gain their competitive advantage and strive for survival because it helps them to adapt to the competitive environment and obtain their exceptional market position (Chen and Lin, 2023).

A stream of proof for the positive impacts of organizational creativity on start-ups' competitiveness and performance has been found in the literature (Andari et al., 2007; Huggins and Clifton, 2011). New ventures can obtain a competitive advantage by developing their organizational creativity by using appropriate approaches and procedures of knowledge and creative solutions for issues (Kršlak and Ljevo, 2021). A firm having great organizational creativity through seeking novel knowledge externally and sharing knowledge internally tends to gain their sustainable competitive advantage since it can differentiate itself from its opponents and implement appropriate management decisions (Musa and Enggarsyah, 2024).

H3: Social Norms (H3a), Success Stories (H3b), Organizational Learning (H3c), and Organizational Creativity (H3d) positively affect Firm Competitive Advantage.

Although there are some studies found that entrepreneurial culture possesses mixed effects (Coleman and Kariv, 2014) or even negative effects (Okoi et al., 2021) on the performance of new ventures, entrepreneurial culture dimensions have been proved as essential drivers of financial outcomes of new ventures (Thampi et al., 2018). According to the RBV theory, the features of entrepreneurial culture contribute to the increase of entrepreneurial financial performance in a direct way (World Economic Forum, 2013; Global Entrepreneurship Monitor, 2017; Liguori et al., 2018). Buccieri et al. (2021) supported the positive impact of entrepreneurial culture on the performance of new ventures because it contains established routines creating comprehensive enforcement of novel opportunities. Kreiser et al. (2013) confirmed the effects of the components of social norms on entrepreneurial financial performance, in which risk-taking is negatively U-shaped connected with entrepreneurial financial performance, while others are positively related. Hence, social norms provide a supervisory presence that enables employees to work effectively, increasing the overall performance of their organization (Claypoole and Szalma, 2015). The presence of success stories helps organizational members shape their business directions and motive themselves in conducting their work, allowing new ventures to accomplish their objectives and achieve superior performance (Ur Rehman et al., 2019). The prevalence of entrepreneurial role models, representing success stories, positively influences the discrepancy in entrepreneurial financial performance levels (Lafuente et al., 2007). Davari and Najmabadi (2018) claimed that success stories in learning and research positively influence entrepreneurial financial performance.

Mekic and Dinç (2017) and Yang et al. (2022) discovered an insignificant association among organizational learning and financial performance of firms. On the contrary, organizational learning stimulates knowledge transfer and sharing, causing a development in entrepreneurial financial performance (Jiang and Yuan, 2008). Organizational learning is the enterprise's competencies to sustain or strengthen outcomes depending on its knowledge (García-Morales et al., 2007). Organizations advance their financial performance by the obtainment, transmission,

exchange, and repository of understanding (Alkhalaf and Badewi, 2024). New ventures that stimulate learning processes in a competitive environment among their organization will benefit from their organizational learning to enhance their financial performance since they develop, enforce, clarify, and offer rational solutions to enhance operational effectiveness and optimize resources (Chan et al., 2024). Therefore, the antecedent of firm's profitability relies on utilizing the understanding and learning in the firm (Le et al., 2025).

Practical examinations on the link among organizational creativity and organizational performance are deficient (Zhang et al., 2023b). Besides that, organizational creativity might imply a significant negative influence on organizational outcomes (Setyaningrum et al., 2023). However, organizational creativity is analyzed as a resource which fosters the firms' outcomes through novel product creation processes (Boso et al., 2017; Mikalef and Gupta, 2021; Nguyen et al., 2023) and stimulate new concepts and contradictory aspects (Souto, 2022).

Because a crucial objective of firms is to achieve exceptional financial outcomes, acquiring a sustainable firm competitive advantage is acknowledged as a necessary force for reaching this essential objective (Sigalas et al., 2013; Jeong and Chung, 2023). Enterprises employ their firm competitive advantage to benefit from their strengths to ensure effective outcomes and create values required to continue competing in the marketplace and boosting entrepreneurial firm performance (Astuti et al., 2023). Thus, a positive influence of firm competitive advantage on entrepreneurial firm performance of new ventures has been proved (El-Garaihy et al., 2014; Saeidi et al., 2015). Marolt et al. (2022) also approved that relationship by finding that an SME having a strong firm competitive advantage can create superior values for customers and improve financial outcomes.

H4: Social Norms (H4a), Success Stories (H4b), Organizational Learning (H4c), Organizational Creativity (H4d), and Firm Competitive Advantage (H4e) positively affect Entrepreneurial Financial Performance.

2.3. The mediating effects of organizational learning, organizational creativity, and firm competitive advantage

The mediating functions of organizational learning are also confirmed in the associations among leadership styles and values embedded in entrepreneurial culture and organizational creativity because the leaders of a firm can fully utilize the culture that stimulates creativity and innovation by developing a supportive learning culture to transform it into creative ideas (Hsiao and Chang, 2011). The dimensions of entrepreneurial culture such as social norms and success stories enable new ventures' staff to transfer their abilities, knowledge, and understanding; and then those learning mechanisms provide explanatory power on the improvement of organizational creativity (Karatepe et al., 2012; Torgaloz et al., 2023).

H5: Organizational Creativity is indirectly affected by Social Norms (H5a) and Success Stories (H5b) through the mediating roles of Organizational Learning.

This study utilized the RBV theory to clarify that start-ups can utilize entrepreneurial culture dimensions as external resources to build their internal resources including organizational learning and creativity to obtain their sustainable competitive advantage and enhanced financial performance (Barney, 1991; Duarte Alonso et al., 2025). Thus, the sustainable competitive advantage of new ventures could be developed by utilizing and managing entrepreneurial culture including social norms and success stories through effective learning and improvement activities (Atiku and Fields, 2016). By developing organizational learning, staffs capture the norms and stories of the society and firm to regulate their attitudes and become more motivated and passionate, turning into better productivity and sustainable competitive advantage (Kaupa, 2022). Entrepreneurial culture dimensions facilitate the creation of organizational creativity in seeking novel supportive opportunities, and thus they help new ventures to gain their competitive advantage through leveraging those opportunities (Huggins and Clifton, 2011; Gabrielsson et al., 2014). An entrepreneurial culture including social norms and success stories are essential forces of adequately enforcing and sustaining creative activities among new ventures, and then they carry out those creative practices to gain sustainable competitive advantage (Robertson, 2021). Therefore, entrepreneurial culture dimensions facilitate social legitimization and assist an environment that inspires the learning culture of entrepreneurial organizations, and then those learning mechanisms increase knowledge competencies to create novel ideas and approaches which help new ventures to develop their organizational creativity which increases their competitiveness to achieve better market position (Cooke and De Popris, 2011; Mukhtar et al., 2021; Patwary et al., 2022)

H6: Firm Competitive Advantage is indirectly affected by Social Norms through the mediating roles of Organizational Learning (H6a), Organizational Creativity (H6b), and both Organizational Learning and Organizational Creativity (H6c).

H7: Firm Competitive Advantage is indirectly affected by Success Stories through the mediating roles of Organizational Learning (H7a), Organizational Creativity (H7b), and both Organizational Learning and Organizational Creativity (H7c).

Organizational learning procedures are important for developing creativity since they improve operational efficiency, turning into exceptional organizational competencies and competitiveness (Kor et al., 2007; Jeung, 2011). Hence, new ventures having a learning orientation may seek the external environment for novel concepts and approaches which are analyzed and implemented in their

organizations to develop their organizational creativity which is a treasured source which promotes the generation of unique and hard-to-replicate features (De Vasconcellos et al., 2019; Bhatia, 2021).

H8: Firm Competitive Advantage is indirectly affected by Organizational Learning through the mediating role of Organizational Creativity.

According to the RBV theory, several investigations have researched the mediating functions of organizational learning in the relationships between entrepreneurial culture dimensions and entrepreneurial financial performance in the setting of an entrepreneurial organization because organizational learning provides the processes through which organizational members leverage the external culture to form their business activities, contributing to the increase financial outcomes (Real et al., 2012; Jain and Moreno, 2015). Expanding businesses in an unstable and ambiguous climate having entrepreneurial culture gained the most from organizational learning to enhance entrepreneurial financial performance (Megheirkouni, 2017).

New ventures take advantage of external culture to build their innovative and creative culture and activities are shown to be favorably associated with performance indicators (Wei et al., 2012). Moreover, since entrepreneurial culture dimensions help ventures to find and use new notions and favorable chances, it promotes the organizational creativity of start-ups (Naldi et al., 2015), and organizational creativity is regularly unified in a formation of administrative procedures that emphasize on outcomes by various viewpoints and boost financial performance (Collier et al., 2021) since it create a creative climate among the venture to transform capabilities into superior outputs (Ingram, 2016).

The presence of an entrepreneurial culture is crucial for nascent ventures to gain competitive advantage, which in turns contributes to their exceptional outputs (Falahat et al., 2022). By supporting new product development, entrepreneurial culture dimensions enable new ventures to obtain their competitive advantage which allows them to provide superior values to their customers and thus increase their financial performance (Ramírez et al., 2021; Pratono, 2022).

Thus, the influences of entrepreneurial culture including social norms and success stories on entrepreneurial financial performance are mediated by organizational learning, organizational creativity, and firm competitive advantage (Wei et al., 2012; Jain and Moreno, 2015; Falahat et al., 2022). In general, according to the RBV theory, new ventures can utilize entrepreneurial culture dimensions as external resources to build their organizational learning culture and processes (Mantok et al., 2019) which enable them to build their internal mechanisms by creating appropriate novel ideas and concepts (Frare et al., 2022) to produce their new products and services and create exceptional values for their customers and gain their sustainable competitive advantage (Kršlak and Ljevo, 2021), consequently improving their profitability and financial outcomes (Astuti et al., 2023).

H9: Entrepreneurial Financial Performance is indirectly affected by Social Norms through the mediating roles of Organizational Learning (H9a), Organizational Creativity (H9b), Firm Competitive Advantage (H9c), Organizational Learning and Organizational Creativity (H9d), Organizational Learning and Firm Competitive Advantage (H9e), Organizational Creativity and Firm Competitive Advantage (H9f), and Organizational Learning, Organizational Creativity, and Firm Competitive Advantage (H9g).

H10: Entrepreneurial Financial Performance is indirectly affected by Social Norms through the mediating roles of Organizational Learning (H10a), Organizational Creativity (H10b), Firm Competitive Advantage (H10c), Organizational Learning and Organizational Creativity (H10d), Organizational Learning and Firm Competitive Advantage (H10e), Organizational Creativity and Firm Competitive Advantage (H10f), and Organizational Learning, Organizational Creativity, and Firm Competitive Advantage (H10g).

Lee and Choi (2003) established a mediating function of organizational creativity on the link between knowledge generation process and entrepreneurial financial performance. Moreover, organizational learning enables firms to react to market trends and achieve competitiveness, achieving their sustainable competitive advantage which can be employed to ensure effective performance and generate values necessary for maximizing entrepreneurial firm performance (Xue et al., 2023; Yaskun et al., 2023). Organizational learning facilitates social interactions which transform novel notions into organizational creativity (Hargadon and Bechky, 2006), and then it allows start-ups to generate valuable products and services for their consumers (De Vasconcellos et al., 2019), increasing their financial outcomes (Mukhsin and Suryanto, 2022).

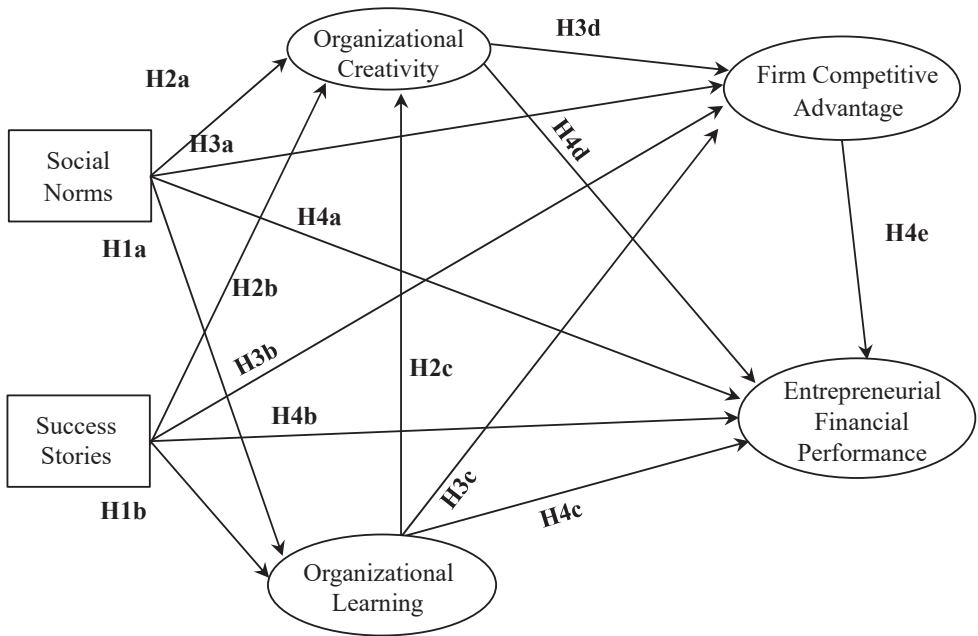
H11: Entrepreneurial Financial Performance is indirectly affected by Organizational Learning through the mediating roles of Organizational Creativity (H11a), Firm Competitive Advantage (H11b), and both Organizational Creativity and Firm Competitive Advantage (H11c).

Organizational creativity is broadly analyzed as a competitive edge which leads to active clients' problem-solving and increased financial performance of new ventures (Vullings and Byttebier, 2015). Organizational creativity plays an essential function in generating a firm competitive advantage via its abilities to create novel concepts relevant to the firm's products, services, procedures, and administrative processes; and then they contribute to the increased profitability and financial performance (Rawley et al., 2018; Tufan and Mert, 2023)

H12: Entrepreneurial Financial Performance is indirectly affected by Organizational Creativity through the mediating role of Firm Competitive Advantage.

Figure 1 indicates the research framework of this study.

Figure 1: Research framework



Source: Authors' construction

3. Methodology

This chapter displays the methodology which explains the survey instruments, the research procedure including the data collection and samples, and a description of the assessment method conducted.

3.1. Survey instruments

This research generated 6 constructs possessing 28 indicators to build a questionnaire according to existing measurements by adopting previous studies having the subsequent factors: 3 items to estimate entrepreneurial financial performance were adopted from Saeidi et al. (2015); 7 items were used to assess entrepreneurial culture, including social norms and success stories, were adopted from World Economic Forum (2013); Global Entrepreneurship Monitor (2017); and Liguori et al. (2018); 5 items were elected from García-Morales et al. (2007) to measure organizational learning; 7 items were utilized to reflect organizational creativity were constructed based on Lee and Choi (2003); and Boso et al. (2017); and 6 items to measure firm competitive advantage were developed from Shore et

al. (1995); El-Garaihy et al. (2014); Sigalas et al. (2013); and Saeidi et al. (2015). It employed a 5-point Likert scale to all indicators proposed in previous studies ranging from Strongly Disagree to Strongly Agree.

3.2. Data collection and samples

Our target population includes entrepreneurs adopted two specific standards: (1) they founded and managed an enterprise by practicing their competencies to achieve their objectives (Beaver, 2003), and they are operating in (2) new ventures that have been operating for no more than 10 years in the HCMC region (Adomako et al., 2018). Entrepreneurs are elected because they can provide an extensive viewpoint and valuable knowledge relevant to research purposes (Sekaran and Bougie, 2016), and the selected operating length enables capturing firms at various phases of development, including those at the establishing, improving, and sustainable phases (Cardon and Kirk, 2015). Due to the recovery of HCMC and the resumption of most companies to normal operations after the COVID-19 epidemic, data were collected both online and offline. Data were collected over the period from November 2021 to June 2023. According to the rule of thumb, a sample size of at least $5 \times 28 = 140$ respondents is required based on 28 observed questionnaires (Hair et al., 1998). The authors obtained information related to as-defined new ventures via several websites including <https://congtymoi.info> and <https://thongtindoanhnghiep.co/>. After that, the authors utilized two standards to elect research population: ventures which (1) have been operating for at most 10 years and (2) are placed in the HCMC region, and then we used their contact detail to distribute our questionnaire. Then, the authors utilized the convenience sampling and snowball sampling approaches to collect necessary responses (Hassan et al., 2019). We gathered the necessary data based on two mechanisms. An online survey performed applying the Google Form was the first mechanism. Thus, we delivered the questionnaire via email, Viber, and Zalo applications. Hard copy survey was other mechanism, which was delivered directly to the chosen participants. There are 50 out of 365 answers in the original responses were left empty since the respondents neglected specific inquiries. The final data consists of 315 valid samples, comprising 215 online and 100 offline survey forms that match the standards.

3.3. Assessment method

Research data was entered using Microsoft Excel and analyzed using partial least squares structural equation modeling (PLS-SEM) by using version 3.0 of Smart-PLS software (Ringle et al., 2015) to conduct an empirical model testing hypothesis (Hair et al., 2018). PLS-SEM has been popular due to its strengths in areas, most often in measurement level, sample size, distributional characteristics, model identification, and factor indeterminacy (Akter et al., 2010). Due to the size

of the sample and the number of indicators for each latent variable, PLS-SEM should be implemented for data processing. Typically, PLS-SEM is a two-step procedure whereas the measurement model and the structural model are reviewed independently. The first step is to analyze data by utilizing the measurement model's validity and reliability including factor loadings, composite reliability (CR), and extracted average variance (AVE) (Fornell and Larcker, 1981; Hair et al., 2018). This is done to guarantee that the researcher doesn't spend time and effort on invalid variables before going on to the subsequent stage of the research procedure, which is investigating the structural model. Once the data have been validated, the structural model estimates may be analyzed to clarify the associations among the latent variables. In addition, the analysis continued to test the coefficient of determination (R^2 values) and predictive relevance (Q^2 values) that reflect the extent to which explanatory factors in the structural model can explain the variability of the dependent variable by calculating the combined influences of exogenous variables on endogenous variables and predict the latent variables relationships (Hair et al., 2018).

4. Empirical data and analysis

This chapter exhibits the research results. The results of the quantitative analysis of 315 respondents by using PLS-SEM illustrate the sample characteristics, followed by the assessment of the measurement model and structural model to assess and confirm the suggested hypotheses.

4.1. Sample characteristics

The authors conducted demographic analysis by using the SPSS 20 to examine the data collected from the respondents. The final data included 365 entrepreneurs and their characteristics were indicated by various categories. The results display the percentages of male and female respondents are approximately equal (50%) in this research sample. Concentrating on the age of respondents, the largest group was 31 to 40 years old (45.1%), followed by under 30 years old (30.8%), 41 to 50 years old (16.8%), and over 50 years old (7.3%). Regarding educational level, most of the respondents have completed university programs (57.1%), followed by college programs (18.4%), postgraduate programs (13.3%), high school programs (6%), and vocational programs (5.1%). Moreover, the participants in this research sample obtained their degree in various majors (others) which account for 44.4%, followed by the participants who majored in economics (27%), management (14.9%), social sciences and humanities (8.3%), and tourism (5.4%). Regarding company size, the small-sized enterprises (11-50 employees) accounted for the highest percentage in this research sample (38.7%), followed by the micro-sized enterprises (under 10

employees) (28.9%), large-sized enterprises (over 100 employees) (19%), and medium-sized enterprises (51-100 employees) (13.3%). Concentrating on the business sectors, the enterprises in this research sample operating in numerous industries (others), which take the highest percentage (33.7%), followed by firms operating in real estate activities (16.2%), manufacturing (15.9%), service activities/tourism (9.8%), retail and distributive trade (8.6%), information technology (7.3%), transportation (4.8%), and agriculture, forestry, fishing, and mining (3.8%). Finally, the enterprises that obtained total annual revenue under VND1 billion or USD 390,000 account for the highest proportion in this research sample (58.4%), followed by firms that achieved VND1-10 billion or USD 391,000-3.9 million (27.0%), and over VND10 billion or over 3.9 million (14.6%).

4.2. Measurement model outcomes

We examined the constructs' validity and reliability to ensure that they could be used throughout the study model's measurement scale. The internal consistency of PLS-SEM is estimated by a statistic called composite reliability (CR). Compared to Cronbach's Alpha, CR is preferable and more accurate since it does not require that item weights are equal (Hair et al., 2018). Six of the latent variables in the study had CR values of at least 0.7, which is the threshold for CR in several types of explanatory research (Hair et al., 2018). All the CR values in Table 1 ranged from 0.809 to 0.934, showing that all the constructions were accepted. Convergent validity may be evaluated with the help of Average Variance Extracted (AVE). According to Hair et al. (2018), AVE of at least 0.5 was satisfactory. Construct values in Table 1 were all more than 0.5, hence the table passes the convergent validity test. Therefore, the findings emphasized that all measurement constructs are accepted. A reliable theoretical model is obtained by excluding components with factor loadings below 0.7 (Hair et al., 2018). No data points were eliminated from the analysis because of low factor loadings (see Table 1). Thus, all 28 measurement scales for the 6 constructs are retained.

Table 1: Measurement Model Evaluation

Constructs	Items	Code	Factor Loadings	Cronbach's Alpha	CR	AVE
Threshold				≥ 0.6	≥ 0.7	≥ 0.5
Organizational Learning (OL)	Acquired and shared much new and relevant knowledge that provided competitive advantage	OL1	0.841	0.898	0.924	0.710
	Members acquired some critical capacities and skills that provided competitive advantage	OL2	0.867			
	Organizational improvements have been influenced fundamentally by new knowledge entering the organization	OL3	0.868			
	Is a learning organization	OL4	0.827			
	Databases are always kept up-to-date.	OL5	0.809			
Entrepreneurial Financial Performance (FiPer)	Return on sales increases	FiPer1	0.934	0.923	0.951	0.867
	Return on assets increases	FiPer2	0.929			
	Return on equity increases	FiPer3	0.930			
Organizational Creativity (OC)	Actively produce novel and useful ideas in product/ service development	OC1	0.851	0.936	0.948	0.723
	Produce more novel and valuable product/service to customers	OC2	0.861			
	Unique and valuable solutions to market problems	OC3	0.851			
	Novel and useful policy and process of business operation	OC4	0.859			
	Novel and useful approaches to problems	OC5	0.844			
	Foster environment that is conducive to our own ability to produce novel and useful ideas	OC6	0.851			
	Considers producing novel and useful ideas (services/products) as important activities	OC7	0.837			

Table 1: Measurement Model Evaluation (continues)

Constructs	Items	Code	Factor Loadings	Cronbach's Alpha	CR	AVE
Firm Competitive Advantage (FCA)	Exploit all market opportunities	FCA1	0.830	0.902	0.925	0.671
	Neutralize all competitive threats	FCA2	0.843			
	Reduction of total expenses at a higher rate	FCA3	0.808			
	Employee highly committed to the organization	FCA4	0.804			
	Customers are satisfied with our firm's products and services	FCA5	0.816			
	Customers are optimistic about long-term future of this corporate	FCA6	0.815			
Social Norms (CULa)	The social values and national culture emphasize creativity and innovativeness	CUL1	0.911	0.889	0.931	0.819
	Encourage entrepreneurial risk-taking	CUL2	0.888			
	Emphasize self-sufficiency, autonomy, and personal initiative	CUL3	0.916			
Success Stories (CULb)	Highly supportive of role model and individual success achieved through own personal efforts	CUL4	0.906	0.930	0.950	0.826
	Emphasizes the responsibility that the individual (rather than the collective) has in managing his or her own life	CUL5	0.921			
	Encourage learning and research	CUL6	0.905			
	People have positive image of entrepreneurship	CUL7	0.904			

Source: Author's calculation

To assess discriminant validity, the idea should have a higher variance with its assessments than other constructs, as assessed by the square root of AVE (Fornell and Larcker, 1981). Table 2 demonstrates that the square roots of AVE for each idea were higher than the correlations between components, indicating no discriminant validity. The discriminant validity was in the range between 0.819 and 0.931. Among constructs, entrepreneurial financial performance was the high adopted from entrepreneurial culture (mean=3.789), followed by success stories (mean=3.925), social norms (mean=3.808), organizational creativity (mean=3.966), organizational learning (mean=3.967), and firm competitive advantage (mean=3.984). Those constructed were sufficient to obtain a high level of 315 entrepreneurs.

Table 2: Discriminant validity coefficients (Formell and Lacker’s criterion)

	Mean	SD	FiPer	FCA	OC	OL	CULa	CULb
FiPer	3.789	0.865	0.931					
FCA	3.984	0.816	0.625	0.819				
OC	3.966	0.830	0.589	0.775	0.851			
OL	3.967	0.858	0.604	0.777	0.761	0.842		
CULa	3.808	0.937	0.521	0.630	0.594	0.705	0.905	
CULb	3.925	0.873	0.532	0.658	0.616	0.690	0.873	0.909

Source: Author’s calculation

4.3. Structural model assessments

In terms of model fit, the coefficient of determinations (R^2 values) assessed the power of explaining independent factors to dependent variables varying from 0 to 1 with the higher number implying a more accurate prediction in the test (Hair et al., 2018). R^2 value of entrepreneurial financial performance implied that the predictor variables (firm competitive advantage, organizational creativity, organizational learning, social norms, and success stories) accounted for 44.4% of the variation in the construct with poor predictive accuracy. Similarly, four predictor variables (organizational creativity, organizational learning, social norms, and success stories) affected 69.8% of the variation in firm competitive advantage, suggesting moderate predictive accuracy. Organizational creativity and organizational learning had R^2 values of 0.595 and 0.520, respectively, demonstrating a reasonable level of prediction accuracy. Hence, social norms, success stories, and organizational learning accounted for 59.5% of the variation in organizational creativity, whereas social norms and success stories accounted for 52% of the variance in organizational learning.

It was possible to use the Blindfolding method in SmartPLS to assess the Q^2 value for model fit (Geisser, 1974). The predictive significance of this study is greater than zero for all constructs, illustrating that all dependent variables have medium-level predictive significance, including entrepreneurial financial performance ($Q^2=0.376$), firm competitive advantage ($Q^2=0.424$), organizational creativity ($Q^2=0.424$), and organizational learning ($Q^2=0.365$).

The direct impacts of all tested hypotheses are illustrated in Table 3. The results showed that for each standard deviation change in social norms and success stories, organizational learning increased by 0.430 and 0.315. H1 was corroborated by H1a and H1b, which stated that the predictor variables social norms ($\beta=0.430$, $p=0.000$) and success stories ($\beta=0.315$, $p=0.001$) had a positive and direct influence on organizational learning.

The results of the test of H2 demonstrated that organizational creativity is favorably and directly impacted by success stories ($\beta=0.207$, $p=0.009$) and organizational learning ($\beta=0.649$, $p=0.000$). Though social norms influenced organizational learning, it was not statistically significant ($\beta=-0.044$, $p=0.605$). The results also showed that for every one standard deviation rise in success stories and organizational learning, the corresponding increase in organizational creativity was 0.207 and 0.649. Consequently, only H2b and H2c were consistent with the data, so H2a was rejected while H2b and H2c were supported.

H3 was supported since the results showed that success stories ($\beta=0.179$, $p=0.0018$), organizational learning ($\beta=0.363$, $p=0.000$), and organizational creativity ($\beta=0.401$, $p=0.000$) had positive and direct influences on firm competitive advantage. However, social norms had no observable influence on firm competitive advantage ($\beta=-0.021$, $p=0.782$). In addition, the data illustrated that 0.179, 0.363, and 0.401 increase in the standard deviation of firm competitive advantage would be compensated for by an increase in the standard deviation of success stories, organizational learning, and organizational creativity. Since H3a was disproved, we accepted H3b, H3c, and H3d and rejected H3a.

There was no statistically significant and direct influence of social norms ($\beta=0.066$, $p=0.403$) or success stories ($\beta=0.077$, $p=0.361$) on entrepreneurial financial performance, rejecting H4a and H4b. Furthermore, entrepreneurial financial performance exhibited positive and significant direct connections with organizational learning ($\beta=0.165$, $p=0.039$), organizational creativity ($\beta=0.161$, $p=0.031$), and entrepreneurial financial performance ($\beta=0.280$, $p=0.000$), supporting H4c, H4d, H4e. The results also demonstrated that 0.165, 0.161, and 0.280 increase in the standard deviation of entrepreneurial financial performance would result from an increase in the standard deviation of organizational learning, organizational creativity, and firm competitive advantage.

Table 3: Path coefficient and hypothesis testing

Hypothesis	Relationship	Path Coefficient- β	T-value	P-value	Decision
H1a	CULa \rightarrow OL	0.430	5.037	0.000*	Supported
H1b	CULb \rightarrow OL	0.315	3.332	0.001*	Supported
H2a	CULa \rightarrow OC	-0.044	0.518	0.605	Rejected
H2b	CULb \rightarrow OC	0.207	2.626	0.009**	Supported
H2c	OL \rightarrow OC	0.649	11.459	0.000*	Supported
H3a	CULa \rightarrow FCA	-0.021	0.277	0.782	Rejected
H3b	CULb \rightarrow FCA	0.179	2.365	0.018**	Supported
H3c	OL \rightarrow FCA	0.363	5.325	0.000*	Supported
H3d	OC \rightarrow FCA	0.401	6.687	0.000*	Supported
H4a	CULa \rightarrow FiPer	0.066	0.837	0.403	Rejected
H4b	CULb \rightarrow FiPer	0.077	0.915	0.361	Rejected
H4c	OL \rightarrow FiPer	0.165	2.064	0.039**	Supported
H4d	OC \rightarrow FiPer	0.161	2.160	0.031**	Supported
H4e	FCA \rightarrow FiPer	0.280	3.643	0.000*	Supported

Note: $p^* < 0.001$, $p^{**} < 0.05$

Source: Author's calculation

Table 4 depicts the functions of organizational learning, organizational creativity, and firm competitive advantage as mediators (H5-12). Organizational learning's mediating functions were analyzed based on two constructs, social norms ($\beta=0.279$, $p=0.000$) and success stories ($\beta=0.204$, $p=0.001$), demonstrating that organizational learning mediated the positive connections between social norms and organizational creativity (H5a), and success stories and organizational creativity (H5b), and thus H5a and H5b were supported.

Regarding H6, organizational learning ($\beta=0.156$, $p=0.001$) and both organizational learning and organizational creativity ($\beta=0.112$, $p=0.000$) play mediating functions in the relationships between social norms and firm competitive advantage, except for the insignificant mediating function of organizational creativity. Thus, the hypotheses H6a and H6c were then supported, while H6b was rejected.

Regarding H7, organizational learning ($\beta=0.114$, $p=0.003$), organizational creativity ($\beta=0.083$, $p=0.018$), and both organizational learning and organizational creativity ($\beta=0.082$, $p=0.006$) acted as mediators in the associations between success stories and firm competitive advantage, indicating that success stories had indirect beneficial influences on firm competitive advantage through the functions of organizational learning, organizational creativity, and both organizational learning and organizational creativity, and thus H7 (H7a-c) are supported.

Table 4: Path coefficient and hypothesis testing (indirect effects)

Hypothesis	Relationship	Path Coefficient- β	T-value	P-value	Decision
H5a	CULa \rightarrow OL \rightarrow OC	0.279	4.449	0.000*	Supported
H5b	CULb \rightarrow OL \rightarrow OC	0.204	3.246	0.001*	Supported
H6a	CULa \rightarrow OL \rightarrow FCA	0.156	3.282	0.001*	Supported
H6b	CULa \rightarrow OC \rightarrow FCA	-0.018	0.512	0.608	Rejected
H6c	CULa \rightarrow OL \rightarrow OC \rightarrow FCA	0.112	3.943	0.000*	Supported
H7a	CULb \rightarrow OL \rightarrow FCA	0.114	3.022	0.003*	Supported
H7b	CULb \rightarrow OC \rightarrow FCA	0.083	2.370	0.018*	Supported
H7c	CULb \rightarrow OL \rightarrow OC \rightarrow FCA	0.082	2.755	0.006*	Supported
H8	OL \rightarrow OC \rightarrow FCA	0.260	5.915	0.000*	Supported
H9a	CULa \rightarrow OL \rightarrow FiPer	0.071	1.789	0.074	Rejected
H9b	CULa \rightarrow OC \rightarrow FiPer	-0.007	0.461	0.645	Rejected
H9c	CULa \rightarrow FCA \rightarrow FiPer	-0.006	0.267	0.790	Rejected
H9d	CULa \rightarrow OL \rightarrow OC \rightarrow FiPer	0.045	1.923	0.055	Rejected
H9e	CULa \rightarrow OL \rightarrow FCA \rightarrow FiPer	0.044	2.492	0.013*	Supported
H9f	CULa \rightarrow OC \rightarrow FCA \rightarrow FiPer	-0.005	0.478	0.633	Rejected
H9g	CULa \rightarrow OL \rightarrow OC \rightarrow FCA \rightarrow FiPer	0.031	2.615	0.009*	Supported
H10a	CULb \rightarrow OL \rightarrow FiPer	0.052	1.829	0.068	Rejected
H10b	CULb \rightarrow OC \rightarrow FiPer	0.033	1.537	0.124	Rejected
H10c	CULb \rightarrow FCA \rightarrow FiPer	0.050	1.892	0.059	Rejected
H10d	CULb \rightarrow OL \rightarrow OC \rightarrow FiPer	0.033	1.752	0.080	Rejected
H10e	CULb \rightarrow OL \rightarrow FCA \rightarrow FiPer	0.032	2.257	0.024*	Supported
H10f	CULb \rightarrow OC \rightarrow FCA \rightarrow FiPer	0.023	1.946	0.052	Rejected
H10g	CULb \rightarrow OL \rightarrow OC \rightarrow FCA \rightarrow FiPer	0.023	2.001	0.046*	Supported
H11a	OL \rightarrow OC \rightarrow FiPer	0.104	2.138	0.033*	Supported
H11b	OL \rightarrow FCA \rightarrow FiPer	0.102	3.043	0.002*	Supported
H11c	OL \rightarrow OC \rightarrow FCA \rightarrow FiPer	0.073	2.905	0.004*	Supported
H12	OC \rightarrow FCA \rightarrow FiPer	0.112	3.121	0.002*	Supported

Note: p* < 0.001, p** < 0.05

Source: Author's calculation

Besides that, organizational creativity was shown to have a mediating influence on the link between two constructs including organizational learning and firm competitive advantage ($\beta=0.260$, $p=0.000$), indicating that the association among organizational learning and firm competitive advantage was associated under the mediating influence of organizational creativity, and thus H8 was supported.

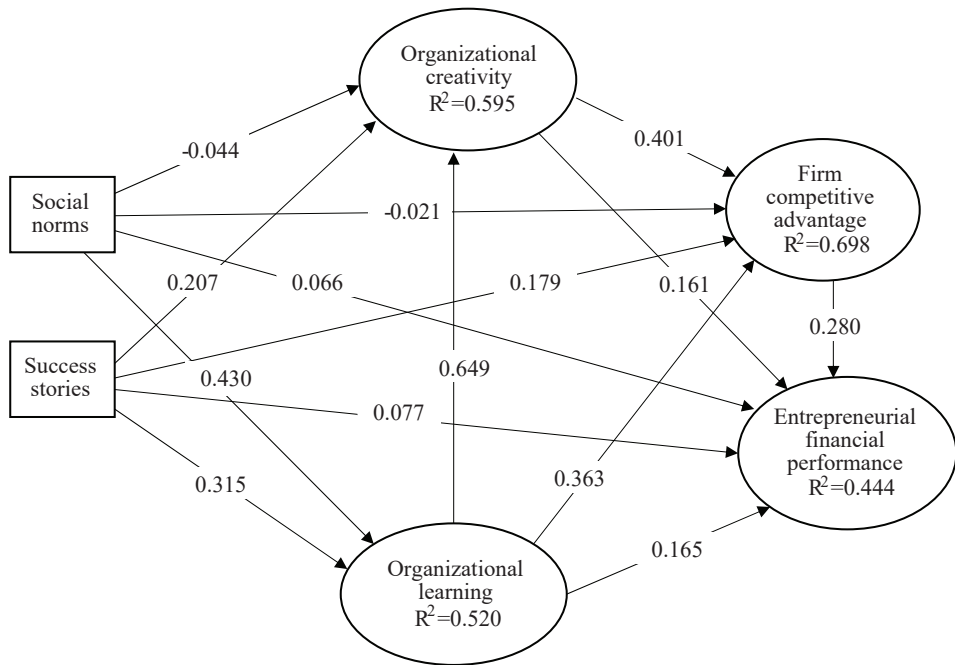
Regarding H9, due to the insignificance of H9a, H9b, and H9c, organizational learning, organizational creativity, and firm competitive advantage were not proven to play any mediating functions solely in the relationships between social norms and entrepreneurial financial performance, and thus the three hypotheses presented were then rejected. Instead, the influences of social norms on entrepreneurial financial performance were mediated by the simultaneous roles of both organizational learning and firm competitive advantage ($\beta=0.044$, $p=0.013$), and organizational learning, organizational creativity, and firm competitive advantage ($\beta=0.031$, $p=0.009$), except the mediating roles of organizational learning and organizational creativity, and organizational creativity and firm competitive advantage, leading to the confirm of H9e and H9f and disconfirm of H9d and H9f.

Furthermore, similar findings were found in H10 in which the impacts of success stories on entrepreneurial financial performance were mediated by the simultaneous functions of both organizational learning and firm competitive advantage ($\beta=0.032$, $p=0.024$), and organizational learning, organizational creativity, and firm competitive advantage ($\beta=0.023$, $p=0.046$), except other mediating functions in H10. Therefore, H10e and H10f were supported, while H10a, H10b, H10c, H10d, and H10f were rejected.

In addition, the research outcomes indicated that organizational creativity ($\beta=0.104$, $p=0.033$), firm competitive advantage ($\beta=0.102$, $p=0.002$), and both organizational creativity and firm competitive advantage ($\beta=0.073$, $p=0.004$) were shown as crucial mediators in the links between organizational learning and entrepreneurial financial performance, and thus H11 (H11a-c) was fully supported.

Finally, regarding the relationships between two constructs including organizational learning and organizational creativity, the firm competitive advantage had a mediating function with $\beta=0.112$, $p=0.002$, which offers that the positive influence of organizational learning on entrepreneurial financial performance was mediated by firm competitive advantage, thus H12 was supported. Figure 2 indicates the results of the structural equation model.

Figure 2: Results of Structural Equation Model



Source: Authors' construction

5. Results and discussions

The study successfully investigated the effects of entrepreneurial culture, including social norms and success stories, on entrepreneurial financial performance via the mediating roles of organizational learning, organizational creativity, and firm competitive advantage using empirical data from 315 entrepreneurs operating in HCMC region, Vietnam.

Firstly, our results approved the previous findings on the positive direct effects of entrepreneurial culture dimensions (Alsabbagh and Khalil, 2017; Yazdanpanah et al., 2023) including social norms (Wolff et al., 2015; Kreiser, 2011; Dada and Fogg, 2014; Real et al., 2012; Nugroho, 2018) and success stories (Elkeles and Phillips, 2007; Ur Rehman et al., 2019) on organizational learning because those crucial elements can be employed to create a supportive culture which facilitates constant learning among organizations to respond to external and internal contexts.

Secondly, our findings favored previous findings which illustrated the positive effects of entrepreneurial culture dimensions (Khazanchi et al., 2007; Nagaoka and Walsh, 2009; Lee and Peterson, 2000; Erez and Nouri, 2010; Dimitratos et al., 2012;

Chen et al., 2023) including success stories (Kyvik et al., 2012; Peng et al., 2020) on increased organizational creativity because they promote the generation of new notions, experiments, and solutions to employ organizational creativity. However, we did not find a positive influence of social norms on organizational creativity, which conflicted with extant studies (Chua et al., 2014; Walton and Kimmelman, 2012; Sözbilir, 2018). Besides that, a positive effect of organizational learning on organizational creativity was confirmed, favoring previous studies (Jiang and Chen, 2017; Jeong and Shin, 2019; Frare et al., 2022).

Thirdly, this study enhanced the RBV theory and strongly supported extant investigations which claimed that entrepreneurial culture dimensions (Petrakis et al., 2015; Falahat et al., 2022) including success stories (Erikson, 2002; Lafuente et al., 2007) as external mechanisms and organizational learning (Zhang et al., 2023a; Chen and Lin, 2023) and organizational creativity (Andari et al., 2007; Huggins and Clifton, 2011; Kršlak and Ljevo, 2021; Musa and Enggarsyah, 2024) as internal mechanisms which allows new ventures obtaining their exceptional market position and firm competitive advantage. However, our results showed no significant influence of social norms on firm competitive advantage, which conflicted with previous research (Zuzel and Zabkar, 2006; Kiyabo and Isaga, 2020). It only worked via internal mechanisms when organizational members were parts of a culture constantly inspired by individuals with high-risk attitudes that awakened learning potential and creativity to achieve a firm competitive advantage.

Fourthly, there were insignificant influences of social norms and success stories on entrepreneurial financial performance. The findings were in opposed with the previous examinations which concluded that entrepreneurial culture dimensions (World Economic Forum, 2013; Coleman and Kariv, 2014; Global Entrepreneurship Monitor, 2017; Liguori et al., 2018; Thampi et al., 2018; Bucciari et al., 2021; Okoi et al., 2021) including social norms (Kreiser et al., 2013; Claypoole and Szalma, 2015) and success stories (Lafuente et al., 2007; Davari and Najmabadi, 2018; Ur Rehman et al., 2019) possess direct mixed impacts on entrepreneurial financial performance. However, this research improved the RBV theory and favored previous findings which confirmed that organizational learning (García-Morales et al., 2007; Jiang and Yuan, 2008; Alkhalaf and Badewi, 2024; Chan et al., 2024; Le et al., 2025), organizational creativity (Boso et al., 2017; Mikalef and Gupta, 2021; Souto, 2022; Nguyen et al., 2023), and firm competitive advantages (Sigalas et al., 2013; El-Garaihy et al., 2014; Saeidi et al., 2015; Marolt et al., 2022; Astuti et al., 2023; Jeong and Chung, 2023) are crucial internal resources of new ventures for creating superior values for their customers and improving their financial outcomes.

Finally, this research enlarged the RBV theory by confirming that the internal mechanisms including organizational learning, organizational creativity, and firm competitive advantage partially mediated the positive impacts of external mechanisms which are entrepreneurial culture dimensions including social norms and success

stories on entrepreneurial financial performance of new ventures. Specifically, this study proved that organizational learning has mediating functions on the relationships among entrepreneurial culture dimensions and organizational creativity, which were in line with existing works (Hsiao and Chang, 2011; Karatepe et al., 2012; Torgaloz et al., 2023). Moreover, our study strongly favored previous findings which suggested that social norms and success stories have indirect effects on firm competitive advantage via organizational learning (Atiku and Fields, 2016; Kaupa, 2022), organizational creativity (Huggins and Clifton, 2011; Gabrielsson et al., 2014; Robertson, 2021), and both organizational learning and organizational creativity (Cooke and De Popris, 2011; Mukhtar et al., 2021; Patwary et al., 2022), except the mediating role of organizational creativity in the social norms and firm competitive advantage associations. Furthermore, organizational learning is crucial for enforcing creative activities, turning into firm competitiveness (Kor et al., 2007; Jeung, 2011; De Vasconcellos et al., 2019; Bhatia, 2021). However, our findings conflicted with the extant studies which suggested that organizational learning (Real et al., 2012; Jain and Moreno, 2015; Megheirkouni, 2017), organizational creativity (Wei et al., 2012; Naldi et al., 2015; Ingram, 2016; Collier et al., 2021), and firm competitive advantage (Ramírez et al., 2021; Falahat et al., 2022; Pratono, 2022) solely mediated the relationships links between social norms, success stories and entrepreneurial financial performance. Instead, this study improved the RBV theory by exploring that organizational learning, organizational creativity, and firm competitive advantage simultaneously mediated the relationships between them, favoring the previous findings (Wei et al., 2012; Jain and Moreno, 2015; Falahat et al., 2022) which found that new ventures can utilize entrepreneurial culture dimensions as external resources to build their internal mechanisms – organizational learning (Mantok et al., 2019) and organizational creativity (Frare et al., 2022) to produce their new products and services, create exceptional values for their customers, and gain sustainable competitive advantage (Kršlak and Ljevo, 2021), consequently improving their financial performance (Astuti et al., 2023). Concentrating on the internal mechanisms through the RBV perspective, organizational learning also postulated indirect impacts on entrepreneurial financial performance through the mediating function of organizational creativity (Lee and Choi, 2003), firm competitive (Xue et al., 2023; Yaskun et al., 2023), and both of them (Hargadon and Bechky, 2006; De Vasconcellos et al., 2019; Mukhsin and Suryanto, 2022), providing that organizational learning stimulates the transformation of novel notions into organizational creativity, and then it enables new ventures to create valuable products and services, increasing their financial performance. Hence, firm competitive advantage has mediating function on in the organizational creativity-entrepreneurial financial performance association (Vullings and Byttebier, 2015; Rawley et al., 2018; Tufan and Mert, 2023).

Regarding theoretical context, this study was differentiated from previous studies and possessed novelty, which contributes significantly to the scientific field, because of these following reasons.

Firstly, by utilizing the most common measurements of entrepreneurial culture embedded in an entrepreneurial ecosystem; including World Economic Forum (2013), Global Entrepreneurship Monitor (2017), and Liguori et al. (2018); that have been explained in a latest review on entrepreneurial ecosystem (Thai et al., 2023), this study surpassed extant articles since it analyzed an extensive perspective of external sources – entrepreneurial culture. In this study, entrepreneurial culture included social norms and success stories which are demonstrated through a creative and innovative culture, risk-taking culture, supportive culture of role models and individual success, the emphasis of individual responsibility, learning and research culture, and the positive image of entrepreneurship. Hence, this research improved the extant literature by creating and approving extensive measurements to analyze entrepreneurial culture as an critical resource for developing new ventures' organizational learning, organizational creativity, firm competitive advantage, and entrepreneurial financial performance, fulfilling the scarcity of studies which verified the impacts of entrepreneurial culture dimensions on organizational-level outputs (Thai and Mai, 2023).

Secondly, by approving that entrepreneurial culture dimensions including social norms and success stories did not have direct influences on entrepreneurial financial performance, instead internal mechanisms – organizational learning, organizational creativity, and firm competitive advantage – mediated their relationships, this study mitigated current debates on entrepreneurial culture dimensions and entrepreneurial financial performance links (Coleman and Kariv, 2014; Wei et al., 2012; Mantok et al., 2019; Bucciari et al., 2021; Okoi et al., 2021). Besides that, it also mitigated extant debates on organizational learning-entrepreneurial financial performance relationships (Yang et al.; 2022; Alkhalaf and Badewi, 2024) and organizational creativity-entrepreneurial financial performance associations (Souto, 2022; Setyaningrum et al., 2023) by confirming positive relationships between them, which highlighted the significance of the learning and creative procedures in increasing entrepreneurial financial performance.

Finally, this study was a groundbreaking investigation providing an extensive view-point of associations among entrepreneurial culture dimensions and entrepreneurial financial performance through the mediating functions of organizational learning, organizational creativity, and firm competitive advantage, which has not been thoroughly examined in previous investigations. Hence, it provided realistic and complicated mechanisms ingrained in their relationships, which was opposed to the separated research streams that investigated solely the effects of external or internal resources on entrepreneurial financial performance to thoroughly broaden the RBV theory.

Regarding practical context, this research offered new ventures several practical methods to enhance their entrepreneurial financial performance in the post-COVID-19 pandemic phases. Furthermore, it provided the government and other stakeholders with the approaches to enhance entrepreneurial culture to facilitate

entrepreneurial financial performance, turning into successful entrepreneurship in a particular region. Firm competitive advantage, organizational learning, and organizational creativity are antecedents that positively increase entrepreneurial financial performance. Regarding firm competitive advantage, new ventures should utilize all favorable chances and overcome all risks by investigating their business operations and their rivals to enforce efficient strategies, leading to a strong competitive status in the market. Moreover, they also have to develop brand recognition, client service, and a quality control structure. Regarding organizational learning, new ventures must obtain adequate knowledge in the external environment and establish a learning environment whereas the novel and appropriate knowledge, competencies, skills, and updated database are shared among the organization, enhancing their learning processes. Regarding organizational creativity, new ventures should create new and valuable notions in product/service improvement, business activities, and problem-solving. The next step is to create an atmosphere that prioritizes putting those strategies into practice by fostering critical thinking, promoting teamwork, boosting employee engagement, modifying creative-thinking techniques, giving training, and rewarding innovation. Finally, this study was a groundbreaking investigation to analyze the utilization of external mechanisms – entrepreneurial culture – to develop internal mechanisms-organizational learning and organizational creativity – enables new ventures to achieve their superior firm competitive advantage, resulting in exceptional entrepreneurial financial performance. In order to inspire a new generation of forward-thinking entrepreneurs, legislators should establish suitable regulations and promote entrepreneurship in the press and mass media, which are crucial in improving the productivity of regional entrepreneurs and their success stories. As a result, they may create a culture that is conducive to entrepreneurship and encourage social norms and values associated with it. Then, start-ups and their leaders are required to understand and appreciate the cultural factors that are necessary to expand their knowledge and skillset, spark new ideas, and obtain their competitiveness, eventually leading to their sustainable financial success.

6. Conclusion

This research investigated the impacts of entrepreneurial culture on entrepreneurial financial performance via the mediating functions of organizational learning, organizational creativity, and firm competitive advantage by analyzing the data collected from 315 entrepreneurs of new ventures in HCMC region, Vietnam. A structured questionnaire and PLS-SEM were used to gather and analyze data. This study provided several findings that extraordinarily contributed to the literature. Firstly, the results indicated that entrepreneurial culture dimensions, including social norms and success stories, have direct impacts on organizational learning, organizational creativity, and firm competitive advantage, fulfilling the scarcity

of studies which verified the influences of entrepreneurial culture dimensions on organizational-level outputs (Thai and Mai, 2023). Secondly, entrepreneurial culture dimensions only had significant and positive indirect impacts on entrepreneurial financial performance via the partial mediating functions of organizational learning, organizational creativity, and firm competitive advantage, and thus this study mitigated the prior debates whether entrepreneurial culture has direct impact on entrepreneurial financial performance (Coleman and Kariv, 2014; Okoi et al., 2021; Buccieri et al., 2021) or have no direct influence in which internal elements mediate the associations among them (Davari and Najmabadi, 2018; Mantok et al., 2019). Thirdly, it also extant debates on organizational learning-entrepreneurial financial performance relationships (Yang et al.; 2022; Alkhalaf and Badewi, 2024) and organizational creativity-entrepreneurial financial performance associations (Souto, 2022; Setyaningrum et al., 2023) by confirming positive relationships between them, which highlighted the significance of the learning and creative procedures in increasing entrepreneurial financial performance. Finally, it was the pioneering research to confirm the partial mediating functions of organizational learning, organizational creativity, and firm competitive advantage in the associations between entrepreneurial culture dimensions and entrepreneurial financial performance, offering a comprehensive perspective of the comprehensive effects of both internal and external resources on entrepreneurial financial performance, fulfilling the requirement of Jayeola et al. (2022) and thoroughly enhancing the resource-based view theory in the entrepreneurship context.

6.1. Limitations and future research

This research provided worthwhile contributions in theoretical and practical fields, however, there are also limitations that must be analyzed in forthcoming research. Firstly, this study collected data via online and offline surveys whereas the online survey might has some constraints creating a deficiency in the validity and reliability of data. Thus, upcoming investigations are suggested to concentrate on collecting data through face-to-face surveys to enhance the quality of return rate, data, and results. Secondly, this study was only conducted at HCMC region of Vietnam – a developing nation, it was only enclosed to HCMC region that might not be acknowledged as a great depiction of the whole nation and the globe, especially advanced countries. Although the findings of this study can be generalized in some developing regions and nations, we recommend future study to be conducted in other backgrounds and advanced countries to obtain further understanding. Thirdly, SMEs (organizations having fewer than 100 staff) took the highest percentage of the data accounting for 80%, leading to the requirement for forthcoming studies to collect data from big businesses to enhance the results of this research. Finally, this research only examined the effects of entrepreneurial culture dimensions on organizational learning, creativity, competitive advantage, and financial performance of new ventures. Nevertheless, other elements of a comprehensive entrepreneurial ecosystem containing policy,

finance, support, human capital, markets, R&D transfer, and networks might possess crucial impacts on those organizational-level outcomes (Thai et al., 2023). Therefore, we recommend further studies to employ a broader viewpoint to investigate the extensive effects of the appropriate antecedents of those variables indicated in the nomological network of an entrepreneurial ecosystem (Thai et al., 2023), combining related theories to achieve better knowledge.

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Kako poduzetnička kultura utječe na financijsku uspješnost poduzetnika kroz organizacijsko učenje, kreativnost i konkurentsku prednost?

Quoc Hoang Thai¹, Khuong Ngoc Mai², Thanh Duc Tran³

Sažetak

Ovo istraživanje ima za cilj istražiti utjecaje poduzetničke kulture na financijsku uspješnost poduzetnika putem posredničkih funkcija organizacijskog učenja, kreativnosti i konkurentske prednosti. Autori su proveli upitnik kako bi dobili podatke od 315 poduzetnika novih pothvata u regiji Ho Chi Minh City, Vijetnam, u razdoblju od studenog 2021. do lipnja 2023. Modeliranje parcijalnih najmanjih kvadrata strukturne jednadžbe (PLS-SEM) primijenjeno je za testiranje povezanosti između varijabli u okviru istraživanja. Pokazalo se da se organizacijsko učenje, organizacijska kreativnost, konkurentska prednost poduzeća i financijska uspješnost poduzetnika povećavaju u izravnoj korelaciji s dijeljenjem pozitivnih priča o uspjehu i društvenim normama. Rezultati su također pokazali djelomične posredničke uloge organizacijskog učenja, organizacijskih inovacija i konkurentske prednosti poduzeća u oblikovanju veza između dimenzija poduzetničke kulture (društvenih normi i uspješnih priča) i financijske uspješnosti poduzetnika. Stoga je ova studija ublažila tekuće rasprave u literaturi, dok je ojačala teoriju pogleda temeljenu na resursima u kontekstu poduzetništva. Međutim, ovo je istraživanje pokazalo da nema izravnog utjecaja dimenzija poduzetničke kulture na financijsku uspješnost poduzetnika. Nalazi daju preporuke za nove pothvate za bolje razumijevanje i uvažavanje kulturoloških čimbenika koji su neophodni za proširenje njihovog znanja i vještina, poticanje novih ideja i stjecanje konkurentske prednosti, što u konačnici dovodi do njihovog održivog financijskog uspjeha.

Ključne riječi: poduzetnička kultura, organizacijsko učenje, organizacijska kreativnost, konkurentska prednost poduzeća, financijska uspješnost poduzetnika

JEL klasifikacija: L26, M13, M21, L25, O31

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Applying extended UTAUT model to examine microlearning adoption: An Empirical study of Vietnamese Telecommunication Companies*

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Abstract

This paper extends the UTAUT model to examine microlearning adoption in the Vietnamese telecommunication industry. A self-administered survey was implemented to collect data from the three biggest Vietnamese telecommunication companies. After two months, we received 349 valid questionnaire responses. The structural equation modeling (SEM) analysis was run in SmartPLS to test the proposed hypotheses. Our research findings revealed that performance expectancy is the most crucial factor determining employees' intention to use the microlearning system. In addition, effort expectancy and management support positively impact the intention to use the system. However, social influence and facilitating conditions do not statistically influence the intention to use microlearning. Our findings suggest that corporate managers should give more attention to the design of the e-learning system so that microlearning can be integrated into different platforms to facilitate employees' access to the system. Furthermore, managers should showcase to promote microlearning adoption by employees.

Keywords: microlearning adoption, telecommunication industry, unified theory of acceptance and use of technology (UTAUT), Vietnam

JEL classification: I20, M12, M15, L96

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1. Introduction

Organizations have witnessed rapid advancements in information and communication technologies (ICT) in recent years, comparable to the pace of progress during the fourth Industrial Revolution. In the era of the Industrial Revolution 4.0, advancements in artificial intelligence, automation, engineering, technology, robotics, data analytics, social networks, and mobile platforms have resulted in profound transformations in how society, the economy, and organizations function (Bloem et al., 2014). The progress in information and communication technology (ICT) has resulted in the proliferation of novel applications and services across several industries, necessitating enterprises to modify their operational methods and processes. Digital transformation is an unavoidable phenomenon that impacts companies of all kinds globally. Consequently, the work environment is increasingly characterized by technology-driven operations and a rapid pace.

Moreover, the evolving work environment demands that employees regularly enhance their knowledge and capabilities. Within this particular environment, the expectations for lifelong learning are transforming towards providing instructions that are delivered precisely when needed, and training tailored to specific needs (Brandenburg and Ellinger, 2003; Nanjappa et al., 2023). Microlearning is an effective method for corporate training that meets these requirements by focusing on providing self-paced, bite-sized content and just-in-time training (Loh, 2021).

Microlearning is a modern approach to learning and development that addresses the growing fragmentation of information sources and units utilized for learning. It is instrumental in fast-moving businesses (Govender and Madden, 2020). The efficacy of microlearning is contingent upon adult learners' acceptance and utilization of the technology. Hence, it is imperative to ascertain the determinants that impact the implementation of microlearning in businesses.

The significance of microlearning has grown in different sectors because of its capacity to improve learning effectiveness, adaptability, and involvement. In the fast-paced technology sector, microlearning allows employees to quickly grasp new tools and software updates, maintaining their competitive edge (Kapp and Defelice, 2018). For example, microlearning is advantageous for healthcare personnel as it enables them to remain up-to-date with the most recent medical treatments and patient care practices. This is essential for guaranteeing the provision of high-quality service (Sharma, 2019). In the finance industry, microlearning facilitates comprehension of intricate rules and compliance obligations, enabling personnel to adhere to ever-changing legal norms (Keegan, 2002). Retail workers apply microlearning to rapidly acquire knowledge about novel products and customer care strategies, hence augmenting customer contentment and sales proficiency (Bersin, 2018). Microlearning is a scalable and efficient method for continuously improving the skills of employees. It is an essential instrument for preserving the

competency and adaptability of the workforce in various industries, including the telecommunications industry.

It is apparent that microlearning is essential in the worldwide telecommunications business because it effectively tackles the fast-paced technical improvements, regulatory changes, and the constant need for skill enhancement. In order to remain competitive, telecom workers must rapidly acquire new information as the business progresses with advancements such as 5G, IoT, and cloud computing (Deloitte, 2020a). Microlearning is a method of learning that provides employees with brief and targeted content. This allows them to acquire and apply new concepts rapidly without interrupting their work. It helps them stay adaptable in a fast-paced setting (Bersin, 2018). Moreover, the telecommunications business is frequently characterized by a workforce that is spread out across several geographical locations. Microlearning promotes uniform and easily available training across various geographical areas, allowing employees to remain in sync with business norms and procedures (Keegan, 2002). This strategy not only improves the ability to remember information and increases the level of involvement of employees, but also decreases the expenses and duration of training, ultimately leading to higher levels of productivity and innovation in the sector.

In Vietnam, the telecommunications industry is considered one of the fastest growing industries and dispersed in market scope. The Vietnamese government has invested heavily in communications infrastructure. For example, Vietnam has deployed 3G, 4G and 5G networks to provide high-speed Internet and digital utilities to people and businesses. This has facilitated the development of online services, e-commerce and mobile applications. Vietnam has experienced a communications revolution with the explosive spread of mobile communications and the Internet. The number of mobile phone subscribers and internet users has increased significantly, showing that the digital gap between Vietnam and developed countries has been significantly narrowed (Ministry of Information and Communication, 2020). As Vietnam continues to expand its digital economy, the demand for up-to-date skills in areas such as 5G technology, cybersecurity, and digital services is accelerating (Deloitte, 2020b). This fast-paced environment requires telecom companies to ensure their employees are continuously learning and adapting to new technologies and market demands.

The telecommunications industry contributes significantly to Vietnam's economic growth by creating many job opportunities, promoting related industries, and creating a business environment that encourages creativity and entrepreneurship. The telecommunications industry is crucial for connecting people, businesses, and organizations globally. It has also significantly contributed to the advancement of information and communication technology. However, in these two recent years, the impact of the global economic recession and unpredictable developments have significantly reduced the potential and growth prospects of Vietnam's

telecommunications industry. In addition, according to a survey conducted by Vietnam Report from May to June 2023, most companies and industry experts do not expect significant growth of the entire information technology and telecommunications industry (Vietnam National Innovation Center, 2023). In such a context, the demand for employee training in telecommunication companies is becoming more essential to equip employees with up-to-date skills and knowledge to gain the competitive advantages. In other words, the application of microlearning is a good option. Microlearning, with its focus on delivering small, easily digestible chunks of information, is particularly well-suited to this industry. It allows employees to learn and apply new skills quickly, which is crucial in an industry, where staying ahead of technological trends can provide a competitive edge (Bersin, 2018; Uğur and Turan, 2018). Moreover, the high turnover rates and the need for continuous professional development in the telecommunications sector highlight the importance of flexible and efficient training methods (Statista, 2021). Implementing microlearning can also address the logistical challenges of training a geographically dispersed workforce, as it enables on-the-go learning accessible via mobile devices, aligning with the industry's digital nature. By adopting microlearning, it is expected that Vietnamese telecommunication companies can enhance employee engagement, reduce training costs, and ensure their workforce remains skilled and competitive.

Previous studies have used different theories and models to examine the acceptance of technology in various digital learning contexts, such as the Theory of Planned Behavior (TPB) Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), the Diffusion of Innovations Theory (Lee et al., 2011; Lin et al., 2019; Chu and Chen, 2016; Hadadgar et al., 2006; Cheng, 2019; Younes and Shlapy, 2020; Alassafi, 2022). Although many theories have been used in previous studies to investigate the adoption of new technology, there are limited studies that use UTAUT to investigate microlearning adoption, particularly in an emerging country like Vietnam. In this regard, the present study applied the UTAUT to examine microlearning adoption in the Vietnamese telecommunications industry context. We aim to evaluate whether factors in the UTAUT model including performance expectancy, effort expectancy, social influence, facilitating conditions, affect the intention to use microlearning of employees in the Vietnamese telecommunication companies. Furthermore, we extended the UTAUT model with the management support as our assumption is that managers might influence the intention of employees to adopt microlearning system at work. Our main research question focuses on how management support and UTAUT model variables affect the intention to use microlearning in the Vietnamese telecommunications industry. Thus, the remainder of this paper discusses the theoretical background, methodology, findings, and discussions. Finally, some theoretical and practical implications are presented in the conclusion.

2. Theoretical background

This section presents the concept of microlearning and related theories and models that serve as the background for our study.

2.1. Microlearning

Microlearning encompasses several brief learning activities that involve microcontents (Hug, 2007). Additionally, it can be described as compact learning modules that are concentrated and typically last from one to ten minutes. These modules are accessible on various devices (Shail, 2019). Microlearning training contents are supplied in small, easily digestible portions accessible at any location and time (Puah et al., 2022).

Microlearning enables adult learners to continue their learning beyond the confines of a physical classroom setting. By mitigating information overload and complexity, individuals can incorporate their acquired knowledge into their everyday tasks (Govender and Madden, 2020). Microlearning has gained popularity in professional development across various areas, including retail banking (Govender and Madden, 2020), journalism (Lee, 2021), scientific education (Fagerstrøm, 2017), engineering (Zheng et al., 2019), and programming skills (Skalka and Drlik, 2020; Alshammari, 2024). Particularly, during the COVID-19 pandemic and post-pandemic context, microlearning has become more widely applied in training than ever before (Chamorro-Atalaya et al., 2024).

2.2. Unified Theory of Acceptance and Use of Technology (UTAUT)

Several studies have used the Theory of Planned Behavior (TPB) or Technology Acceptance Model (TAM) to examine the intention to use microlearning in different contexts.

In TPB, three main variables that predict an individual's behavioral intention are attitude (beliefs about a behavior), subjective norms (beliefs about others' attitudes toward a behavior), and perceived behavioral control. These factors have been confirmed to be good predictors of behavioral intention in many contexts, particularly e-learning adoption. Meanwhile, in TAM, two factors that are believed to determine the intention to use a technology include perceived usefulness (PU) and perceived ease of use (PEOU).

For example, Chikhi and Guettaf (2023) used TAM to explore English as a Foreign Language (EFL) teachers' views and students' attitudes towards the use of TikTok as a form of microlearning. They found that PU and PEOU are critical factors influencing EFL students' acceptance of TikTok. Similarly, Lamimi et al. (2024) used TAM and collected responses from 153 master students to investigate the educational

value of TikTok and its potential for microlearning. These authors insisted that PU, PEOU, attitudes, and content richness positively influence the intention to use TikTok as a learning tool. Furthermore, in a study of microlearning for librarians' training in Tanzania, Isibika et al. (2023) also confirmed that the positive influence of PU and PEOU on the acceptance of microlearning strengthens the relevance of adopting microlearning as a didactic technology for librarians' training.

Some studies extended the TAM model with other factors to examine the use of microlearning. Wang et al. (2023) integrated TAM and task-technology-fit (TTF) theory to conduct an empirical analysis of user satisfaction and continuance intention to adopt microlearning. These authors confirmed that PU, PEOU, and TTF significantly influenced the use of microlearning and contributed to 78.2% of the variance in user satisfaction. Notably, Puah et al. (2021) used the Decomposed Theory of Planned Behavior to explain working adults' intentions to use microlearning in Singapore. They included TAM variables and other variables such as resource facilitating conditions, technology-facilitating conditions, and self-efficacy into TPB to investigate microlearning adoption.

Previous studies have explored the adoption of microlearning in the banking industry. It is observed that previous studies have investigated microlearning adoption in the banking industry (Govender and Madden, 2020) as well as in various other sectors, including fashion, semiconductor, software, and pharmaceutical (Fagerstrom et al., 2017). Two commonly used models in these studies on microlearning adoption are the Theory of Planned Behavior (TPB) and the Technology Acceptance Model (TAM). Although these models have shown their appropriateness to explain the behavioral intention of individuals when choosing microlearning system, several factors have not yet been addressed, such as the facilitation of the organization or managers, the influence of relevant others. In this sense, the unified theory of acceptance and use of technology (UTAUT) might be considered an option for the theoretical framework.

The unified theory of acceptance and use of technology (UTAUT) is a technology acceptance model formulated by Venkatesh et al. (2003). The UTAUT aims to explain user intention to use an information system and subsequent usage behavior. The theory holds four fundamental constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions.

The UTAUT model was developed by reviewing and consolidating the constructs of eight models that earlier research had employed to explain information systems usage behavior. They are the theory of reasoned action, technology acceptance model, motivational model, theory of planned behavior, a combined approach of planned behavior and technology acceptance model, model of personal computer use, diffusion of innovations theory, and social cognitive theory). Subsequent validation by Venkatesh et al. (2003) of UTAUT in a longitudinal study found it to account for

70% of the variance in Behavioural Intention to Use (BI) and about 50% in actual use (Venkatesh et al., 2003). However, few studies used the UTAUT model to investigate microlearning adoption and focused on the telecommunications industry. Thus, we employed UTAUT in the present study due to its high predictability of individuals' behavioral intentions and aimed to test its applicability in a new context of the telecommunications industry.

3. Proposed framework and hypothesis development

This section explains our proposed framework and hypotheses. In the present study, we applied the UTAUT model to examine microlearning adoption. However, we added management support into the UTAUT model, assuming managers might influence the employees when they consider using microlearning. Thus, we developed some hypotheses as follows.

3.1. Performance expectancy

Performance Expectancy (PE) is the degree to which the user expects that using the system will help them to attain achievements in performing a particular job. PE was confirmed by Venkatesh et al. (2003) as the most crucial exploratory factor in the UTAUT model (Venkatesh et al., 2003). PE refers to the end-user's perceptions of the benefits, such as improving performance and increasing efficiency, that could be achieved through e-learning technology.

Previous studies insisted that PE has a positive impact on the intention to use e-learning (Alrawashdeh and Al-Mahadeen, 2014; Indriati and Agustina, 2018; Siregar et al., 2022). For example, Alrawashdeh and Al-Mahadeen (2014) confirmed that PE positively influences employees' acceptance of web-based training systems in Jordan's public sector. Similarly, Wang (2016) proved that PE has a direct and positive impact on employees acceptance to use e-learning systems in Taiwan's public sector. Sayginer (2023) applied the UTAUT model in a study with 313 Turkish students and found that PE significantly influenced their acceptance of cloud-based virtual platforms, particularly during the COVID-19 pandemic. Moreover, recent studies also confirm the positive impact of PE on user intention in various professional training contexts, such as mobile learning in Jordan (Faqih, 2022), pharmacovigilance training in 97 countries (Hegerius et al., 2020)

From the above arguments, we hypothesized the positive relationship between performance expectancy and intention to use microlearning in the present study.

H1: Performance expectancy (PE) positively influences the intention to use microlearning (IU).

3.2. Effort expectancy

Effort expectancy (EE) is the degree of ease linked to the use of the system (Venkatesh et al., 2003). EE is a good predictor of intention to utilize e-learning technologies. Many studies have confirmed that EE positively affects the intention to use e-learning technologies (Kayali and Alaaraj, 2020).

For example, Bellaaj et al. (2015) investigated the continued use of the e-learning system at the University of Tabuk in Saudia Arabia, then confirmed that for students who have Internet experience, the impact of EE on continued intention to use the e-learning system decreases. Faqih (2022) also tested the impact of EE on the adoption of mobile learning technology with a sample of 202 students in Jordan and found that EE is the third most influential factor in an extended UTAUT model. Similar results about the positive relationship between EE and intention to use e-learning systems were found in several studies such as Wang (2016), Alshehri et al. (2019), Salloum and Shaalan (2019). Therefore, we formulated the second hypothesis:

H2: Effort expectancy (EE) positively influences the intention to use micro-learning (IU).

3.3. Social influence

Social influence (SI) is defined by Venkatesh et al. (2003) as the degree to which an individual perceives that other people think they should use the technology-based system (Venkatesh et al., 2003). However, previous studies of e-learning adoption have shown contradictory results about the influence of SI on user intention. For example, Welch et al. (2020) found that SI positively influences the adoption of mobile learning by employees working in a science museum group. Sayginer (2023) also supported the positive impact of SI on Turkish students' acceptance of cloud-based virtual platforms during COVID-19 pandemic. Furthermore, Alshehri et al. (2019) insisted that SI strongly affects students' intention to use the Blackboard system in Saudi tertiary. Several studies in both Western and Eastern contexts share similar positive results, such as Puah et al. (2021), Mahande and Malago (2019), Alrawashdeh and Al-Mahadeen (2014), Sharma et al. (2024).

Meanwhile, Abbad (2021), in his study on students' usage of e-learning systems, discovered that SI does not influence the intention to use the system (e.g., Moodle) of students at a public university in Jordan.

Nevertheless, in this study, we assumed that SI has a positive impact on the intention to use microlearning. Thus, the following hypothesis was initiated.

H3: Social influence (SI) positively influences the intention to use micro-learning (IU).

3.4. Management support

Management support (MS) is defined by Purnomo et al. (2013) as the encouragement of a user's management, the allocation of resources, and assistance for instructional development. In another view, Facteau et al. (1995) concerned MS with learners' perception and belief that managers offer them chances and reinforcement to acquire new knowledge, skills, and attitudes via participating in continuous learning and development. Managers and supervisors motivate their staff to embrace self-directed Internet learning and facilitate staff perception of web-based training.

Noticeably, Walker and Johnson (2008) concluded that the acceptance of e-learning systems was predicted by MS to be one of the main factors. Santosa and Nugroho (2016) also confirmed the critical role of MS in successful e-learning implementation. Similarly, Ali and Magalhaes (2008) highlighted that the lack of MS is one of the barriers to e-learning system adoption in a study of 11 largest companies in Kuwait. Furthermore, Purnomo and Nastiti (2019) in a survey of e-learning acceptance in the Indonesian banking industry, insisted that MS was positively related to both PU and PEOU. Thus, MS had an important influence on e-learning adoption (Purnomo and Nastiti, 2019).

Based on the above discussion, we developed the following hypothesis:

H4: Management support (MS) positively influences the intention to use microlearning (IU).

3.5. Facilitating conditions

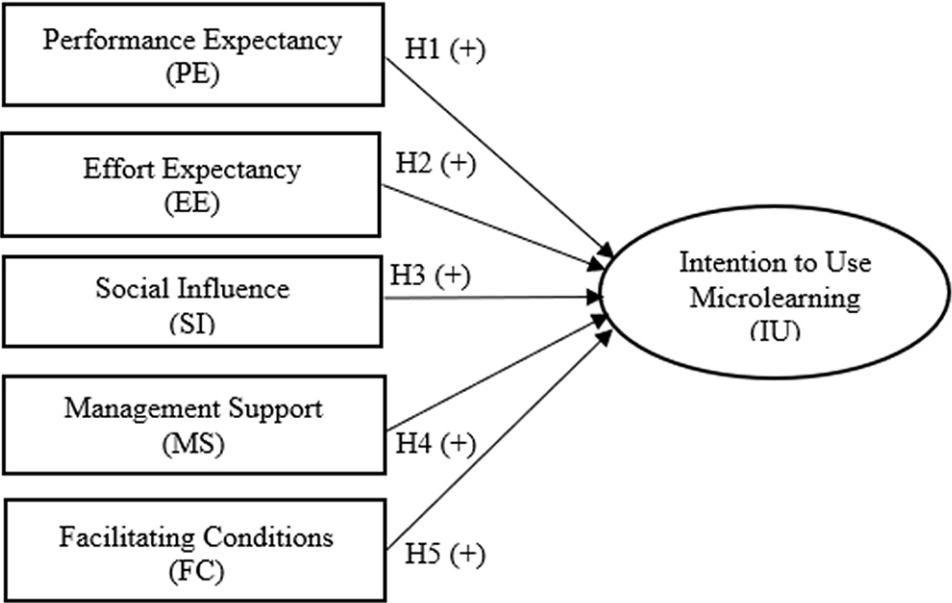
According to Venkatesh et al. (2003), facilitating conditions (FC) is the extent to which an individual perceives the organizational and technical infrastructure's ability to provide support for the information system (Venkatesh et al., 2003). Furthermore, FC has been confirmed in studies on e-learning adoption to influence the behavioral intention positively to use the system (Abbad, 2021; Welch and Nichol, 2020; Gunasinghe et al., 2019). In particular, Kocaleva et al. (2015), in a study with teaching staff in European countries, discovered that FC is one of the two strongest factors that determine the acceptance of e-learning. Moreover, Malanga et al. (2022) proved that FC significantly affects the intention to use a learning management system in a study with 1237 students in Brazil during the COVID-19 pandemic. In other words, previous studies in different countries have strongly confirmed the positive influence of FC on e-learning acceptance.

Similarly, we also hypothesized the positive impact of FC on the intention to use microlearning in this study. Therefore, hypothesis 5 was formulated as follows.

H5: Facilitating conditions (FC) positively influence the intention to use microlearning (IU).

Figure 1 below summarizes the hypotheses in our study.

Figure 1: Proposed research framework



Source: Author’s construction

4. Methodology

In this section, we describe the measurements adopted and adapted for our study. Furthermore, the sampling methods and the data collection process are thoroughly explained.

4.1. Measurements

In the present study, we adopted the measurements of previous studies that have used UTAUT as the founding theory and research framework. Five constructs in the UTAUT model were adopted from Venkatesh et al. (2003), including Performance Expectancy (3 items), Effort Expectancy (3 items), Social Influence (3 items), and Facilitating Conditions (4 items), Intention to Use (3 items) (Venkatesh et al., 2003). In addition, the Management Support construct has four items and was adapted from Lee et al. (2014).

4.2. Sampling and data collection process

The population of our study includes employees who are working in the Vietnamese telecommunication industry. We chose to study the telecommunication industry for two reasons. Firstly, Vietnamese telecommunication is one of the fastest-growing industries in Vietnam. Secondly, the telecommunication industry creates a lot of jobs for Vietnamese people. As of 2020, nearly 80 thousand people were working in this industry (Ministry of Information and Communication, 2021). Employees in this industry must update their knowledge and skills regularly, particularly when the digital transformation trend is affecting all types of businesses. Thirdly, the telecommunication industry should adapt very quickly to respond to the Industrial Revolution 4.0 while the working sites of employees are scattered. Traditional learning in the brick-and-mortar learning environment is costlier for telecommunication companies. Thus, microlearning has been adopted in large telecommunication companies in recent years.

In the present study, we conducted a self-administered survey to collect data. We approached the three biggest telecommunication companies in Vietnam and asked for help distributing our online questionnaire. The human resource departments of these companies helped us to spread our questionnaire to all employees working for their companies. After two months, we collected 349 valid questionnaire responses.

5. Findings and discussions

This section provides the results of our data analysis. It includes the reliability and validity test of the measurements, and hypothesis testing results.

5.1. Preliminary testing

Data were analyzed using SPSS version 22 to identify the sample characteristics. As shown in Table 1 below, more male (58.7%) than female (41.3%) employees participated in our survey. This is attributed to the fact that job vacancies in the Vietnamese telecommunication industry are mainly occupied by men. Regarding the age of respondents, most of them are young and middle-aged, accounting for 96.6% of the total sample. Moreover, nearly half of our sample has more than ten years of working experience. Table 1 below shows the details of the sample profile.

Table 1: Sample characteristics (n = 349)

Characteristic	Frequency	Percent (%)
Gender		
Male	205	58.7
Female	144	41.3
Age		
18-29 years old	65	18.6
30-39 years old	166	47.6
40-49 years old	106	30.4
50-60 years old	12	3.4
Working Experience		
Less than 3 years	58	16.6
From 3 to 5 years	66	18.9
From 6 to 10 years	57	16.3
Over 10 years	168	48.1

Source: Authors' calculation

The reliability of measurements was checked in SmartPLS version 4.0 using several criteria, including Cronbach's alpha, item outer loadings, and composite reliability (CR). Table 2 shows the results.

Table 2: Reliability, validity, convergence of the measurements

Constructs	Items	Loadings	VIF	Cronbach's alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Performance Expectancy (PE)	PE1	0.774	1.361	0.760	0.862	0.677
	PE2	0.847	1.759			
	PE3	0.846	1.698			
Effort Expectancy (EE)	EE1	0.745	1.476	0.737	0.827	0.618
	EE2	0.697	1.643			
	EE3	0.902	1.374			
Social Influence (SI)	SI1	0.695	1.374	0.745	0.851	0.657
	SI2	0.833	1.529			
	SI3	0.891	1.711			
Management Support (MS)	MS1	0.790	1.763	0.825	0.882	0.651
	MS2	0.840	1.646			
	MS3	0.779	1.720			
	MS4	0.817	1.910			

Constructs	Items	Loadings	VIF	Cronbach's alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Facilitating Conditions (FC)	FC1	0.677	1.839	0.797	0.849	0.586
	FC2	0.708	1.447			
	FC3	0.867	1.657			
	FC4	0.797	1.587			
Intention to Use Microlearning (IU)	IU1	0.820	1.538	0.753	0.859	0.670
	IU2	0.773	1.414			
	IU3	0.861	1.679			

Note: AVE = Average Variance Extracted, CR = Composite Reliability, VIF = Value Inflation Factor
Suggested value: Cronbach's alpha ≥ 0.7 ; Outer loadings ≥ 0.5 ; VIF < 5 ; CR ≥ 0.7 ; AVE ≥ 0.5
Source: Authors' calculation

All items in the six measurement constructs have met the cut-off values for outer loadings, VIF (Hair et al., 2014). Furthermore, Cronbach's alpha values of six constructs range from 0.760 to 0.825. Meanwhile, composite reliability (CR) and average variance extracted (AVE) values are higher than 0.8, which are higher than the accepted values of 0.7 (Hair et al., 2014). As a result, the reliability and validity of six measurement constructs were obtained.

In addition, the discriminant validity was checked using the Fornell-Larcker criterion test results. Table 3 shows the details of the Fornell-Larcker criterion test.

Table 3: Fornell-Larcker criterion test

	EE	FC	IU	MS	PE	SI
EE	0.786					
FC	0.331	0.766				
IU	0.205	0.174	0.819			
MS	-0.083	0.173	0.194	0.807		
PE	0.324	0.256	0.293	0.396	0.823	
SI	0.379	0.191	0.211	0.176	0.475	0.811

Source: Authors' calculation

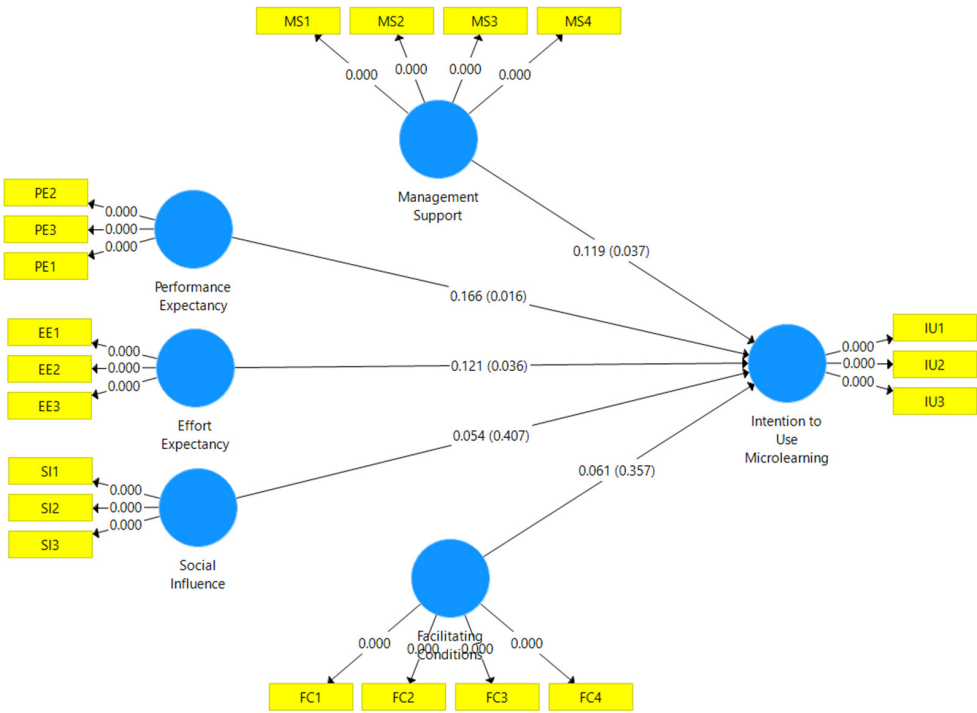
According to Fornell and Larcker (1981) and Hair et al. (2013), discriminant validity is satisfactory when the square root of AVE for each endogenous variable is greater than the latent variable correlations (Fornell and Larcker, 1981; Hair et al., 2013). We determined the discriminant validity of each construct

by comparing the square root of each AVE in the diagonal to the correlation coefficients (off-diagonal) in the relevant rows and columns. As shown in Table 3, the square root of the AVE ranges from 0.786 to 0.823 for all constructs. It exceeds all correlation coefficients found in the vertical and horizontal related cells. Thus, discriminant validity among the constructs in this study is established.

5.2. Hypotheses testing and discussions

We ran the PLS-SEM analysis in SmartPLS software version 4.0 to test the hypotheses in this study. Results were presented in Figure 2 and Table 4 below.

Figure 2: Structural equation modeling analysis result



Source: Authors' calculation

Table 4: Hypothesis testing result

Hypothesis	Relationship	β	Standard Deviation (STDEV)	T Statistics ($ O/STDEV $)	P Values	Result
H1	PE → IU	0.166	0.069	2.415	0.016	Accepted
H2	EE → IU	0.121	0.058	2.093	0.036	Accepted
H3	SI → IU	0.054	0.065	0.829	0.407	Rejected
H4	MS → IU	0.119	0.057	2.092	0.037	Accepted
H5	FC → IU	0.061	0.065	0.932	0.357	Rejected

Note: β = beta coefficient; STDEV = Standard Deviation
Suggested value: P value ≥ 0.05 : Reject the hypothesis; P value < 0.05 : Accept the hypothesis
Source: Authors' calculation

Table 4 reveals that two out of five proposed hypotheses, H3 and H5, were rejected. The remaining hypotheses (H1, H2, and H4) were accepted. The findings of our study are discussed as follows.

Firstly, performance expectancy ($\beta_1 = 0.166, p = 0.016 < 0.05$) was the most important factor that affects the intention to use microlearning of employees in Vietnamese telecommunication companies, followed by effort expectancy ($\beta_2 = 0.121, p = 0.036 < 0.05$). Our finding is in line with the studies of Gunasinghe et al. (2019), Abbad (2021), and Welch et al. (2020). This finding can be attributed to the demographic factors of our respondents. Most individuals fall within the age range of 30 to 49 years and have over five years of work experience. Thus, they are very acquainted with the company and tend to make their choice of using the system based on logical thinking toward efficiency increase and performance improvement rather than just trying something new and innovative. Moreover, EE ranks after PE which affects the IU of employees in the surveyed telecommunication companies. We might explain this finding based on the fact that middle-aged employees in our survey still prefer a microlearning system that is easy enough to use with user-friendly interface.

Secondly, our study confirmed that management support ($\beta_4 = 0.119, p = 0.037 < 0.05$) positively influences the intention to use microlearning. This finding is congruent with previous studies on e-learning, such as those by Walker and Johnson (2008), Lee et al. (2012), and Welch et al. (2020). It is undeniable that microlearning system is still new for many employees in the Vietnamese telecommunications industry. Thus, the support of management in encouraging the use of the system plays a critical role. Meanwhile, organizational learning requires the full commitment of employees. Fostering a culture of learning also creates an inclusive and positive workplace, reduces employee turnover, and increases employee satisfaction due to

promotions and recognition of their own abilities. Organizations that implement learning activities report employee engagement and retention rates that are 30% higher than other organizations (Indriati and Agustina, 2018). In addition, organizational learning enables teams to adapt to change more easily by instilling a mindset of continuous improvement, encouraging shared ownership of projects and shared accountability for project results. Previous results in Vietnam have not addressed the role of managers in promoting microlearning adoption. Thus, the present study contributes to the existing literature with evidence of microlearning and management in a new context.

Thirdly, there is not enough statistical evidence to confirm the positive impact of social influence ($\beta_3 = 0.054$, $p = 0.407 > 0.05$). Regarding the impact of the social influence factor, our finding is similar to Abbad (2021), but opposite to Welch et al. (2020), and Yakubu and Dasuki (2019). This finding is explained by the fact that our respondents are adults who are mature enough to make their own life decisions. Thus, the influence of relatives or references do not affect them. Moreover, the choice of using microlearning is not a big decision for adults so they may not need to seek advice from others to use the system.

Fourthly, it was found that facilitating conditions ($\beta_5 = 0.061$, $p = 0.357 > 0.05$) do not influence the intention to use microlearning of telecommunication employees. This finding in our study is different from other studies in the e-learning adoption context, such as Welch et al. (2020) in a museum, Abbad (2021) in the higher education sector, and Abdou and Jasimuddin (2020) in the banking industry. Our finding can be attributed to the telecommunication industry's high tech nature, ensuring the infrastructure for microlearning remains in good condition. Furthermore, telecommunication employees are very familiar with the technology. As a result, they may not consider facilitating conditions as crucial for adopting a new learning method, such as microlearning.

6. Implications and conclusion

In this study, the UTAUT model was applied to examine factors affecting the intention to use microlearning in Vietnamese telecommunication companies. Our findings have both theoretical contributions and practical implications.

In terms of theory, this study validates the applicability of the UTAUT model within the context of an emerging country, specifically in the telecommunications industry. The present study fills the existing literature gap with empirical research in the Vietnamese telecommunications industry. Moreover, we also explore how management support affects the employees' intention to use microlearning in conjunction with other UTAUT model variables. In previous research, the simultaneous influence of UTAUT factors and management support on e-learning or

microlearning adoption was not appropriately addressed. Therefore, this integrative research model that we proposed in the present study is our new contribution to the existing literature. Our findings reveal more insights into the behaviors of employees when choosing microlearning which might bring more contribution to management theory, particularly the issue related to human resource development.

In terms of practice, it is suggested that corporate managers should pay more attention to some factors that drive employees' adoption of microlearning. Notably, performance expectancy was found in this study as the most important factor that affects employees' microlearning adoption. Thus, companies demonstrate how microlearning effectively enhances job-specific skills and knowledge. This can be achieved by using case studies, testimonials, and concrete evidence of measurable performance enhancements. When employees perceive the immediate advantages of microlearning in their job responsibilities, their inclination to actively participate in and embrace these resources escalates substantially. Therefore, it is implied in this study that the e-learning system should be designed in an attractive and user-friendly way to save time for learners. The contents of microlearning courses should also concentrate on upskilling so that learners can perceive the gains in their performance after studying.

In addition, this study also confirmed the positive relationship between management support and employees' microlearning adoption. The functions of organizational culture and leadership are crucial in this context. When leaders and peers support and actively engage in microlearning activities, it fosters a favorable social atmosphere that motivates others to do the same. Providing recognition and rewards to employees who participate in microlearning can strengthen its significance and promote greater adoption (Venkatesh et al., 2012). As a result, managers in telecommunication companies should showcase and motivate employees to use microlearning. Encouragement can be regularly enforced by words and deeds. Moreover, a policy should be developed to assess employee participation in the microlearning system and connect their learning and development progress to work performance evaluation.

Furthermore, this study found that facilitating conditions do not have a statistically significant impact on employees' intention to use microlearning. However, previous studies have proved the positive relationship among these variables. Thus, to a certain extent, we still suggest that managers in telecommunication companies take into consideration the critical role of facilitating conditions. It is imperative for companies to guarantee that employees are provided with essential resources, like dependable internet connections, appropriate devices, and technical assistance. Incorporating microlearning platforms into current learning management systems (LMS) can simplify access and improve the overall user experience.

This study has some limitations. A small sample size might lead to potential bias in explaining the findings. Thus, we suggest that future research might expand

the sample size to achieve a higher explanation possibility. Further research should include other industries to have a cross-sector analysis of the intention of microlearning adoption and its actual use. Moreover, our research model focused mainly on the direct impact of elements in the UTAUT model on the intention to use microlearning. Therefore, we omitted the demographic factors in the proposed model. Future research might extend our research model by adding moderators and mediators to have insights into employees' adoption of microlearning.

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Primjena proširenog UTAUT modela za ispitivanje usvajanja mikroučenja: empirijska studija vijetnamskih telekomunikacijskih tvrtki

Bui Quang Tuyen¹, Phuong Mai Nguyen²

Sažetak

U ovom se radu proširuje model UTAUT kako bi se ispitalo usvajanje mikroučenja u vijetnamskoj telekomunikacijskoj industriji. Provedena je samostalna anketa za prikupljanje podataka triju najvećih telekomunikacijskih tvrtki u Vijetnamu. Nakon dva mjeseca dobili smo 349 valjanih odgovora na upitnik. Analiza modeliranja strukturnih jednadžbi (SEM) provedena je u SmartPLS-u kako bi se testirale predložene hipoteze. Rezultati našeg istraživanja otkrili su da je očekivani učinak najvažniji čimbenik koji određuje namjeru zaposlenika da koriste sustav za mikroučenje. Osim toga, očekivani napor i podrška menadžmenta pozitivno utječu na namjeru korištenja sustava. Međutim, društveni utjecaj i olakšavajući uvjeti statistički ne utječu na namjeru korištenja mikroučenja. Naši nalazi sugeriraju da bi korporativni menadžeri trebali posvetiti više pozornosti dizajnu sustava za e-učenje kako bi se mikroučenje integriralo u različite platforme s ciljem da se zaposlenicima olakša pristup sustavu. Nadalje, menadžeri bi trebali primjerom promovirati zaposlenike za usvajanje mikroučenja.

Ključne riječi: usvajanje mikroučenja, telekomunikacijska industrija, jedinstvena teorija prihvatanja i korištenja tehnologije (UTAUT), Vietnam

JEL klasifikacija: I20, M12, M15, L96

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Appendix

Table A.1: Measurement items

Constructs	Code	Item description
Performance Expectancy (PE)	PE1	I find microlearning useful in my learning
	PE2	Using microlearning enables me to accomplish learning activities more quickly
	PE3	Using microlearning increases my learning productivity
Effort Expectancy (EE)	EE1	My interaction with microlearning is clear and understandable
	EE2	Learning to use microlearning is easy for me
	EE3	I am skillful at using microlearning
Social Influence (SI)	SI1	People who are important to me think that I should use microlearning
	SI2	My colleagues think that I should use microlearning
	SI3	In general, my company has supported the use of microlearning
Management Support (MS)	MS1	My manager encourages me to upgrade my capabilities by using microlearning
	MS2	My manager suggests relevant content to me on microlearning
	MS3	My manager supports and encourages me to refer microlearning for my work
	MS4	My manager cares about how I use microlearning
Facilitating Conditions (FC)	FC1	I have enough resources to use microlearning
	FC2	I have the knowledge necessary to use microlearning
	FC3	Microlearning is compatible with other systems I use
	FC4	Microlearning in my company is available for assistance with users' difficulties
Intention to Use Microlearning (IU)	IU1	I will use microlearning in the future
	IU2	I plan to use microlearning as soon as possible
	IU3	I would recommend microlearning to my colleagues

Source: Authors adapted from previous studies

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*Authors are kindly requested
to read carefully the Guidelines
amended with detailed methodological instructions*

GUIDELINES FOR AUTHORS

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----- (1994) “Exploiting cross Section Variation for Unit Root Inference in Dynamic Data”, *Economics Letters*, Vol. 44, No. 1-2, pp. 9–19.

----- (1996a) “Empirics for Economic Growth and Convergence”, *European Economic Review*, Vol. 40, No. 6, pp. 951–958.

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- *Ključne riječi*
- *JEL klasifikacija.*

Iza toga slijedi glavni dio rada podijeljen u odlomke:

- *Uvod*
- *Pregled literature*
- *Metodologija/metoda/model/koncepcija analize* (treće poglavlje)
- *Empirijski podaci (dokumentacijska podloga) i analiza* (četvrto poglavlje)
- *Rezultati i diskusija* (peto poglavlje)
- *Zaključci* (šesto poglavlje).

(2) Sadržaj pojedinih dijelova prezentirane građe:

a. Sažetak – ispisuje se u 100-250 riječi, a obvezno treba sadržavati:

- utvrđeni cilj istraživanja,
- metodu/model/koncepciju analize,
- glavni rezultat istraživanja (analize),
- temeljni zaključak istraživanja.

Sažetak se ne smije pisati u odlomcima!

b. Ključne riječi – moraju odražavati suštinu sadržaja rada, a navodi se do pet takvih riječi.

c. JEL klasifikacija – autor svoju temu mora razvrstati sukladno kodu časopisa The Journal of Economic Literature (JEL).

d. Uvod – sadrži definiranje problema i predmeta istraživanja s pozivom na recentnu literaturu odnosno rezultate istraživanja. Taj se dio može istaknuti i

u posebnom, tj. 2., poglavlju kao *Literature review*. Pri kraju uvodnog dijela treba utvrditi radnu pretpostavku (hipotezu) istraživanja o kojoj se treba očitovati (kasnije) na početku poglavlja *Zaključak*. *Uvod* treba završiti s naznakom organizacije teksta.

- e. **Pregled literature** – prethodi istraživačkom dijelu, a pruža čitateljima pregled referentne literature s ključnim točkama dosadašnjih spoznaja temeljenih na relevantnim rezultatima aktualnih istraživanja. Pregled literature ne smije biti taksativno navođenje prethodnog znanstvenog doprinosa, već autori trebaju izvršiti sintezu dosadašnjih istraživanja kako bi dokazali opravdanost teorijskog i empirijskog doprinosa vlastitog rada.
- f. **Metodologija/Metoda/Model/Koncepcija** – obično se prezentira u trećem poglavlju; metoda/model/koncepcija analize mora biti transparentno istaknuta radi eventualnog ponavljanja testiranja rezultata od strane zainteresiranih istraživača (to je jedno od temeljnih pravila znanstvene metodologije).
- g. **Empirijski podaci i analiza** – sadržavaju dokumentacijsku podlogu i rezultate empirijske analize. Potrebno je opisati i prikazati uzorak podataka korišten u analizi te prezentirati i objasniti statistička te ekonometrijska obilježja dobivenih rezultata uz tumačenje njihova ekonomskog sadržaja.
- h. **Rezultati i rasprava** – autor objašnjava rezultate, osobito njihovo ekonomsko značenje i poruke. U ovom dijelu očekuje se argumentacija znanstvenog doprinosa, povezivanje rezultata rada s rezultatima te zaključcima dosadašnjih empirijskih istraživanja te preporuke za promjene javnih i drugih politika.
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(3) Literatura – navesti samo one naslove (izvore) koji su korišteni u tekstu!

TABLICE dolaze unutar teksta. Svi podaci u tablici stavljaju se u redove i kolone odvojene jednostrukim tankim linijama. Svaka kolona sadrži naziv i uključuje numeričku jedinicu koja se odnosi na cijelu kolonu. Tako se za višecifrene brojeve rabe jedan ili dva broja, a u nazivu za određenu kolonu označuju se numeričke jedinice u tisućama, milijunima i sl. Tablice se numeriraju u kontinuitetu arapskim brojevima (Tablica 1, Tablica 2, itd.), a pored broja i naziva, moraju imati i izvor podataka.

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- tisuće, milijuni i sl. odvajaju se zarezmom: 2,000; 250,000; 3,555,284 i sl.; milijarde se označavaju s bn (billion); decimalni brojevi odvajaju se točkom: 2.32; 0.35 i sl.

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----- (1996a) “Empirics for Economic Growth and Convergence”, *European Economic Review*, Vol. 40, No. 6, pp. 951–958.

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