

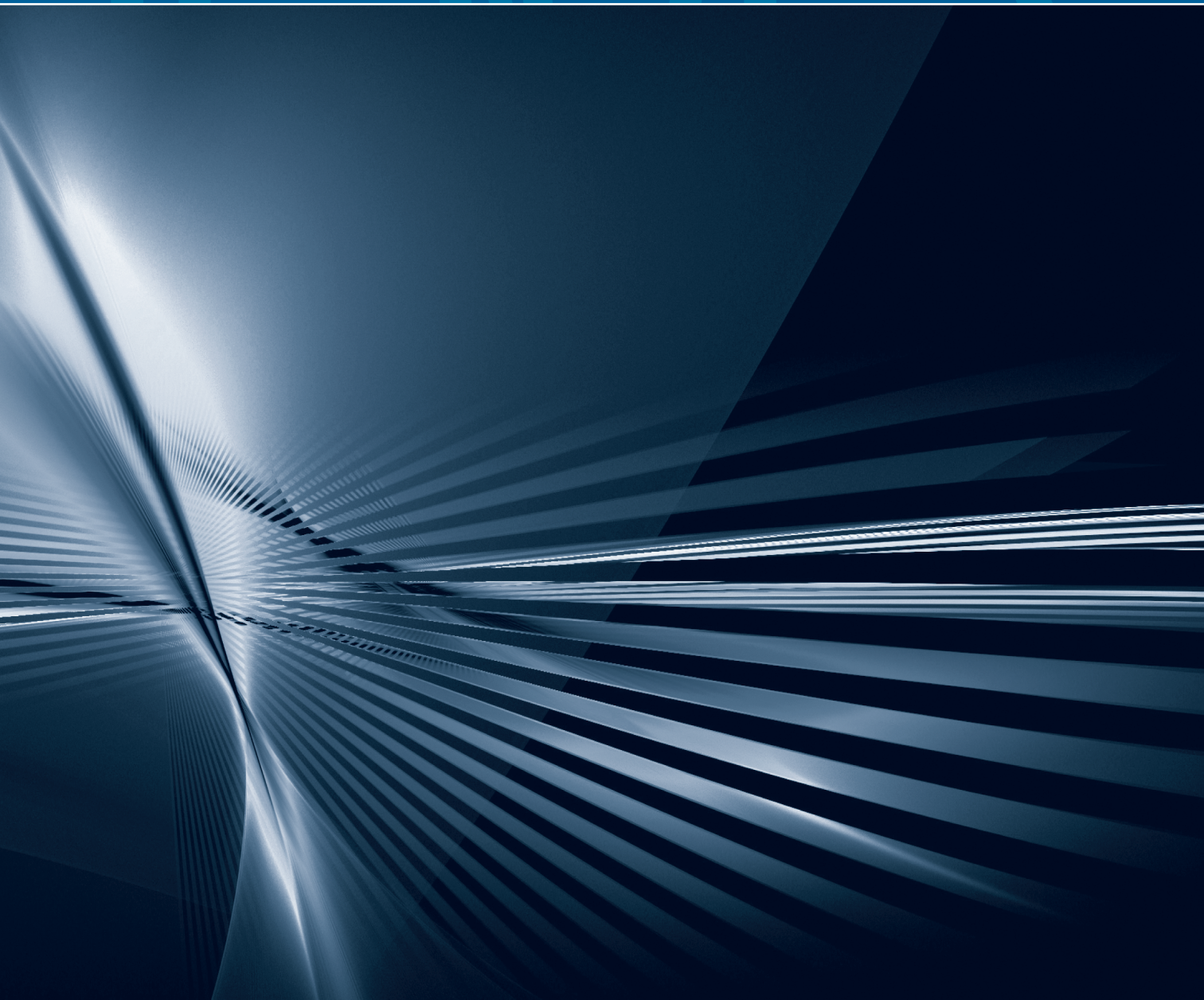
ORGANIZACIJA

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Revija za management, informatiko in kadre

ORGANIZACIJA

Organizacija (Journal of Management, Informatics and Human Resources) is an interdisciplinary peer-reviewed journal which is open to contributions of high quality, from any perspective relevant to the organizational phenomena.

The journal is designed to encourage interest in all matters relating to organizational sciences and is intended to appeal to both the academic and professional community. In particular, journal publishes original articles that advance the empirical, theoretical, and methodological understanding of the theories and concepts of management and organization. The journal welcomes contributions from other scientific disciplines that encourage new conceptualizations in organizational theory and management practice.

We welcome different perspectives of analysis, including the organizations of various sizes and from various branches, units that constitute organizations, and the networks in which organizations are embedded.

Topics are drawn, but not limited to the following areas:

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- human resources management (such as organization & employee development, leadership, value creation through HRM, workplace phenomena etc.);
- managerial and entrepreneurial aspects of education;
- business information systems (such as digital business, decision support systems, business analytics etc.);
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- papers that analyse and seek to improve organizational performance.

Organizacija (Revija za management, informatiko in človeške vire) je interdisciplinarna recenzirana revija, ki objavlja visoko kakovostne prispevke z vseh vidikov, ki so pomembni za organizacijske procese in strukture.

Revija je zasnovana tako, da spodbuja zanimanje za različne vidike v zvezi z organizacijskimi vedami in je namenjena tako akademski kot strokovni skupnosti. Revija objavlja izvirne članke, ki spodbujajo empirično, teoretično in metodološko razumevanje teorij in konceptov managementa in organizacije. Pozdravljamo tudi prispevke iz drugih znanstvenih disciplin, ki spodbujajo nove koncepte v organizacijski teoriji in praksi. Objavljamo članke, ki analizirajo organiziranost z različnih vidikov, so usmerjeni na organizacije različnih velikosti in iz različnih sektorjev, na enote, ki sestavljajo organizacije, in na mreže, v katere so organizacije vpete.

Teme so pokrivajo predvsem naslednja področja:

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- management človeških virov (kot so organizacija in razvoj zaposlenih, vodenje, ustvarjanje vrednosti s pomočjo človeških virov, organizacijski pojavi na delovnem mestu itd.);
- vodstveni in podjetniški vidiki izobraževanja;
- poslovni informacijski sistemi (kot so digitalno poslovanje, sistemi za podporo odločanju, poslovna analitika itd.);
- podjetniški inženiring (npr. organizacijsko oblikovanje, upravljanje poslovnih procesov, paradigme preoblikovanja podjetij itd.);
- članki, ki analizirajo organizacijsko uspešnost in prizadevanja za izboljšanje le-te.

Contents 2/2021

RESEARCH PAPERS	98	Jin-Nan WU, Mengmeng SONG, Joseph C. UGRIN, Lin LIU, Tingting ZHU	Cyberloafing Research 1997-2019: A Citation-based Literature Review
	112	Mehmet ÇETİN, Gulmira SAMENOVA, Filiz TÜRKKAN, Ceylan KARATAŞ	The Role of Daily Affect in Leader- Member Exchange: A Multilevel Investigation in Public Health Administration
	131	Phuong TRAN HUY, Hong Chuong PHAM	Effect of Management Commitment to Service Quality on Car-hailing Drivers' Service Behaviors: The Case of GrabCar in Vietnam
	147	Erik RUŽIĆ, Dragan BENAŽIĆ	The Impact of Internal Knowledge Sharing on Sales Department's Innovativeness and New Product Commercialization
	162	Anton IVASCHENKO, Alfiya R. DIYAZITDINOVA, Tatiana NIKIFOROVA	Optimisation of the Rational Proportion of Intelligent Technologies Application in Service Organisations

Editorial office: University of Maribor, Faculty of Organizational Science, Založba Moderna Organizacija, Kidriceva 55a, 4000 Kranj, Slovenia

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Cyberloafing Research 1997-2019: A Citation-based Literature Review

Jin-Nan WU^{1Φ}, Mengmeng SONG^{1Φ}, Joseph C. UGRIN², Lin LIU³,
Tingting ZHU¹

¹Anhui University of Technology, School of Business, Ma'anshan, Anhui, China; wujinnanseu@aliyun.com (JW), 1500253842@qq.com (MS), 772142722@qq.com (TZ).

²University of Northern Iowa, College of Business Administration, Cedar Falls; USA, joseph.ugrin@uni.edu (corresponding author)

³Anhui University of Technology, School of Management Science and Engineering, Ma'anshan Anhui, China; liulinahut@aliyun.com

Background and purpose: The purpose of this study is to illustrate the evolution of cyberloafing research and identify the important papers in the development of cyberloafing knowledge.

Methodology: We identify a total of 116 research papers from the Web of Science (WOS) database that were published in top journals during 1997-2019. We performed citation analysis, co-citation analysis, and main path analysis to identify the most influential authors, countries, and institutions in the development of cyberloafing research, and graphically map the relationships between them.

Results: Cyberloafing research has progressed through three stages which we coin the emergent stage, the exploration stage, and the burgeoning stage. We also identify the relationships between articles and identify the distinct and significant knowledge streams, 16 influential papers that are seminal or highly sighted, and we identify the authors, institutions, and countries from which the research emerged. Researchers in the United States have produced the most research, followed by China, the United Kingdom, and Australia. The National University of Singapore produced the most research in our sample, and Vivian K. Lim of the National University of Singapore was the most influential author, anchored by her seminal piece on cyberloafing and organizational justice published in 2002.

Conclusion: This study is, to our best knowledge, the first to examine the development of cyberloafing research using evidence-based analysis methods. It depicts the development of the cyberloafing literature and identifies significant streams that researchers can explore in the future. We conclude that future research should incorporate more direct measures of cyberloafing, examine individual consequences caused by too much cyberloafing, such as mental health.

Keywords: *Cyberloafing, Citation analysis, Co-citation analysis, Main path analysis, Visualization*

1 Introduction

The Internet has profoundly influenced and changed the way people live, work, and learn. It has brought about convenience and a new form of communication. In the workplace, it has also created new opportunities for employees

to engage in non-work-related activities and sometimes non-productive activities. The concept of “cyberloafing” was first proposed in the mid-1990s (Kamins, 1995) and is regarded as a type of workplace deviance and asset misuse. However, at that time, the digitization of enterprises in countries around the world, especially in developing countries, was not widespread, and employees’ cyberloaf-

ing behaviors and the potential harm had not yet attracted the attention of researchers. Companies around the world gradually increased their investment in Internet resources in the early 2000s, and as the technology became more widespread in business enterprises, so did the potential for misuse and abuse. The problems caused by employees' misuse and abuse of the Internet started to attract the attention of academia soon after. Lim (2002) defined cyberloafing. She pointed out that cyberloafing involves employees who engage in non-work-related online activities during working hours, such as receiving or sending private emails or browsing the news. Lim (2002) developed a cyberloafing scale, which laid the foundation for future research in the field. Scholars have subsequently refined the definition and measurement of cyberloafing behavior (Anandarajan 2002; Blanchard and Henle 2008), identified antecedents at the individual (Blanchard and Henle 2008; Jia et al. 2013; O'Neill et al. 2014; Vitak et al. 2011) and organizational levels (Andreassen et al. 2014; Garrett and Danziger 2008; Henle and Blanchard 2008; Lim 2002), identified and explored potential outcomes (Coker 2013; Heflin et al. 2017; Meijman and Mulder 1998; Phillips 2006; Stoddart 2016; Syrek et al. 2017; Wu et al. 2018), and explored the effects at mechanisms aimed at controlling and deterring cyberloafing behavior (Ugrin and Pearson, 2013).

Research on cyberloafing has been conducted by scholars from all over the world, including the United States, China, Europe, and the Middle East, suggesting it is a global workplace phenomenon. There is still much to learn about cyberloafing, but researchers have made substantial progress over the last twenty years. Recently, Mercado et al. (2017) performed a meta-analysis to investigate the nomological network of cyberloafing. The results show the nature and valence of these non-work related cyberloafing behaviors. Their findings provide a synopsis of what we know about the antecedents of cyberloafing and provide a starting place for empirically grounded research in the future. However, to the best of our knowledge, no study has been conducted to summarize the influential authors, countries, and institutions engaged in cyberloafing research, or to identify the evolutionary path and important papers that have defined this stream of research over the past two decades. One reason for examining the evolution of the literature is the fact that the number of scientific papers on cyberloafing has become large and is continuously growing. That makes it an optimal topic for bibliometric analysis. Bibliometric analysis is a quantitative technique that can provide a macroscopic overview of large bodies of academic literature. It can be used to map the characteristics and the development of scientific output within a specific field of research and reveal the significant knowledge flows in the citation network (Jia et al., 2018).

This study aims to narrow the gaps in what we already know and define the pathway for future researchers to extend the body of knowledge by using bibliometric analy-

sis. Specifically, social network analysis and visualization software such as CiteSpace, HistCite, and Pajek, were applied to perform social network and visualization analyses on the cooperation among authors, institutions, and countries in the field, and to quantitatively analyze the literature citation network and the main path between author connections in the field. As a result, this study identifies the influential authors, institutions, and countries of origin, and their degree of collaboration. It also reveals the path through which or knowledge about cyberloafing has evolved, which is useful from a historical perspective and from the perspective of researchers looking to extend or branch off from the existing streams. In the end, this study provides scholars with an understanding of the research progress on cyberloafing, and it identifies directions for future research.

2 Article Selection and Methodology

We conducted three literature searches on cyberloafing using information from the Web of Science (WOS). The SCI-EXPANDED (SCI) and SSCI databases served as the main data source to identify relevant articles for analysis. We used a number of subjects and titles in the three literature searches to avoid missing important articles due to the different names used for cyberloafing in the journals. Names for cyberloafing include cyberslacking, workplace internet deviance, and employee internet addiction, amongst other things. As a result, searches included subjects such as "cyberloaf*", "cyberslack*", "personal social media us*", and the titles were set included "personal internet us*", "personal web us*", "internet deviance", "Use in the workplace", "abuse in the workplace", "employee internet abuse", "employee internet addiction" et cetera. Considering that the concept of cyberloafing in the WOS database first appeared in 1997, we set the period for the three literature searches to 1997-2019 (The date of data collection is March 28, 2019). 76, 132, and 42 articles were collected from each literature search, respectively. We removed duplicate articles through manual screening and cross-validation, retaining 116 high-quality articles from the SCI and SSCI for analysis.

These articles are written by 255 authors, include 333 keywords, and 4487 references. They covered a total of 18 disciplines. Among them, psychology, business and economics, computer science, information science, library and information science, and telecommunication are the most common disciplines. Top journals such as *Computers in Human Behavior*, *Cyberpsychology Behavior, Information & Management*, *Behaviour & Information Technology*, *Communications of the ACM*, *Cyberpsychology Behavior and Social Networking*, *Internet Research*, *Journal of Management Information Systems*, *Journal of Applied Psychology*, and the *Journal of Business Ethics* published

the most articles on cyberloafing.

We applied CiteSpace software to conduct visual and social network analysis on the authors, institutions, and countries associated with the 116 articles we identified. We used the HistCite citation analysis software to identify local citation scores (LCS), the number of times an article is cited in the current database. Also, we prepared a chronology of citations using a citation network analysis on the top 30 LCS articles. Finally, we used Pajek software, a sophisticated network analysis tool, to analyze the significant articles in the past 20 years and identify the main path in the relationships between them. We discuss this further below.

3 Visualization Analysis

3.1 Publication distribution

Through analyzing the chronological distribution of cyberloafing articles published from 1997 to 2019, and drawing a trend line on the volume of publications per given year, we can visualize the growth and development of the literature stream. The chronological distribution and the trend line showing the growth in the volume of publications is shown in Figure 1. According to the quadratic polynomial trend line, it can be seen that the trend line has

an upward trend with the growth of the year, which shows that there has been rapid growth in the volume of research, and the growth continues to accelerate. The year 2002 was a turning point where the cyberloafing research left the emergent stage (average of one paper per year) and moved into the exploration stage. From 2002 to 2013, the annual number of publications grew and held steady at approximately four articles per year. After 2014, the average annual number of publications grew to nearly 12 significant articles per year, and we call this the burgeoning stage.

3.2 Author visualization

A total of 255 authors produced the 116 publications in our analysis, of which 226 (88.63%) authors published just one paper. We used Price Law to determine the most productive authors (Price 1963). Price Law is a mathematical formula developed to analyze scientific growth and commonly used to determine the amount of contribution individuals make to a body of work. According to Price Law, the findings suggest that authors publishing two or more papers are productive in this field ($M_p = 0.749 \cdot \sqrt{6} \approx 1.83$). There are 29 productive authors in the cyberloafing field, and the top five most productive authors are Pablo Zoghbi-Manrique-de-Lara (6 articles), Anandarajan (5 articles), Lim (4 articles), and Simmers (3 articles).



Note: The date of data collection is March 28, 2019. The curve is quadratic polynomial trend line of the number of paper published each year.

Figure 1: Annual distribution of cyberloafing papers (1997-2019)

To further demonstrate the characteristics of the author's cooperation network, CiteSpace was used to perform a co-citation analysis according to the name of the author. The thresholds of C, CC, CCV in the first, middle and last three time periods are set to (1, 2, 20), (2, 3, 20), (2, 3, 20) to extract the data, that is, the beginning, middle and end of the data are assigned according to C, CC and CCV, where C represents the lowest citation or occurrence frequency, CC represents the co-occurrence or co-citation frequency of the time slice, and CCV represents the collinear rate or co-citation rate (Li and Chen, 2017). The time slice was set to 1 year, and a map of the knowledge domain

of the scientific cooperation network was drawn (Figure 2). The node in the figure 2 is the author's name, the size of the node represents the number of papers published by the author, the line reflects the strength of the cooperation relationship, and the color of the line represents the time of the first cooperation. The scientific cooperation network in this field has 57 nodes and 40 linkages. The network density is 0.0251, indicating a relatively scattered academic cooperation network. The results show that Lim, Pablo Zoghbi-Manrique-de-Lara, Anandarajan, O'Neill, and Bock have the most significant impact on the citation network in this field.



Figure 2: Author visualization

3.3 Country visualization

Betweenness centrality is an indicator of the status of individuals in a network (Freeman 1977). It can be used as a scientific measurement index to measure the importance of multiple indicators of scientific measurement units. The betweenness centrality of a node (≥ 0.1) indicates that the point is a critical node (Li and Chen, 2017). According to an analysis of authors' countries in CiteSpace, this study finds that American scholars published the most (54, 0.73)¹

, accounting for 46.55% of the total publications; the second is China (10, 0.28) and the United Kingdom (8, 0.12), accounting for 8.62% and 6.90% respectively. Also, the betweenness centrality of Australia (7, 0.2) and Germany (4, 0.11) is higher than or equal to 0.1, indicating those countries play important roles in the scientific cooperation network, albeit to a lesser degree than the United States, China, and United Kingdom respectively.

To analyze the cooperative relationship between the countries in this field further, the CiteSpace software was used to draw the map of the knowledge domain of the na-

¹ The front number is the frequency of occurrence, and the back number is the betweenness centrality of the country.

tional cooperation network (Figure 3). The threshold is set to top 100 per slice, that is, the top 100 countries in each time slice are extracted. The node ring shows the distribution of the number of papers published by the country and the corresponding time. The color of the ring is consistent with the published time, the light color indicates the latest time and the dark color indicates the longer time. The thicker the ring, the more papers will be published at the corresponding time. The line between the two countries represents the cooperative relationship, while the single node indicates that this country has no cooperative relationship with other countries in the field of research.

The color of the line represents the time of the first cooperation between the two countries. The national cooperation network in this field consists of 27 nodes and 27 connections, and the network density is 0.0769. Although the network density is not high, the cooperation between countries is significantly higher than that between authors. Among them, the United States is at the center of the international cooperation network in this field. Scholars from other major countries mainly cooperate with American researchers. China, Australia, and the United Kingdom are significant contributors. Chinese scholars, who are the second most productive, mainly conduct cooperative studies

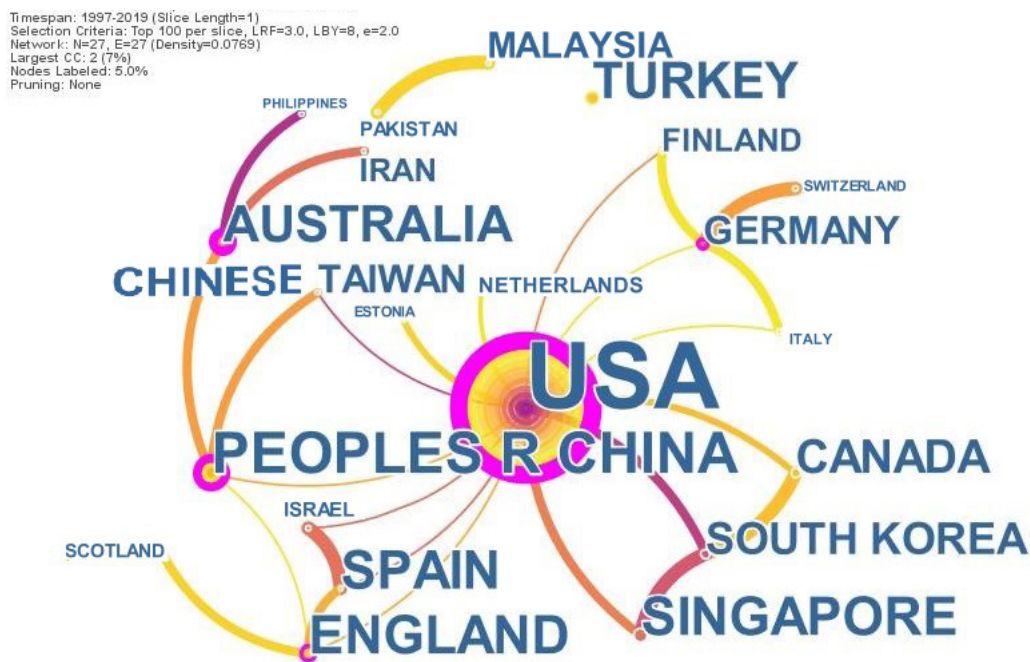


Figure 3: Countries visualization

with scholars from the United States, Australia, the United Kingdom, and Taiwan.

3.4 Institution visualization

We used CiteSpace software to draw a map of the institutional relationships in the knowledge domain and the (c, cc, ccv) thresholds were set to (1,2,20), (1,3,20), (1,3,20). The institutional cooperation network shown in Figure 4 is composed of 163 nodes and 151 connections, and the network density is 0.0114. The most active research institutions in this field are the National University of Singapore (6 articles), Drexel University (5 articles), Universidad Las Palmas (4 articles), Illinois State University (3 arti-

cles), Southern Illinois University Carbondale (3 articles). Research amongst Chinese institutions was widely spread and includes the University of Science and Technology of China, Hefei University of Technology, Renmin University of China, Zhejiang Gongshang University and Anhui University of Technology. There are only 31 nodes in the author's cooperation network that have cooperative relationships, forming seven cooperative research groups, and one group has 14 nodes. These differences in nodes indicate that the research institutions in this field are scattered and there is a lack of highly cohesive academic cooperative groups.

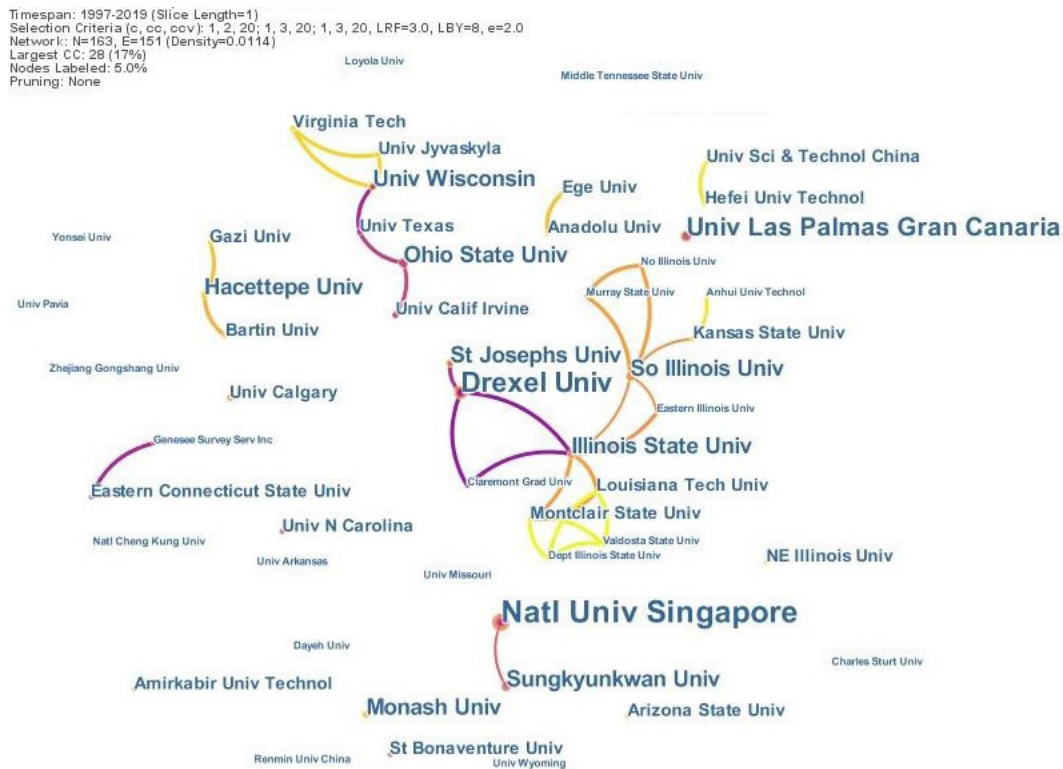


Figure 4: Institution Visualization

4 Main paths

4.1 Citation Network Analysis

Citation network analysis refers to studying the context of knowledge dissemination and the distribution of the characteristics of the citations by analyzing the relationship between article citations. This study selects the top 30 cited articles and uses the HistCite software to generate the chronology of citations². The citations shown in Figure 5 are arranged in chronological order from top to bottom. The size of the ellipse indicates how many times the article has been cited. The number shown in each node indicates the serial number of the article in HistCite. The line with the arrow indicates the citation relationship between nodes. When looking at the direction of the arrow, the citing article points to the cited article. There are a total of 30 nodes and 110 connections in the chronology. The maximum LCS is 56 and the minimum is 7. Among them, nodes 7, 9, 16, 28, 41, 46, and 57 are the core nodes. The articles represented by these nodes are the most cited articles with a high citation frequency. These articles are important for

the transfer of knowledge on cyberloafing. They play critical roles in studying cyberloafing and have been widely cited by other scholars in later research.

Important papers started with LAVOIE and PYCHYL (node 4) and BLOCK (node 5). Lavoie and Pychyl (2001) surveyed North American employees and they found that cyberloafing is related to procrastination and negative emotions. Block (2001) proposed that cyberloafing is a new and unique management challenge caused by new technologies. He analyzed cyberloafing from the perspective of ethics, supervision, loss of productivity, and public policy. Lim (2002) (node 9) formally proposed the concept of cyberloafing, and developed a widely used measurement tool to test the propensity to cyberloaf, and laid a theoretical foundation for subsequent empirical research. Most of the subsequent studies (including Key nodes such as 16, 28, 41, and 43) stem from node 9.

4.2 Main path analysis

Main path analysis is a quantitative method for identifying critical paths and key nodes. It calculates all paths

² We chose 30 articles because if the number of articles involved in the chronology of citations is too large, the graphics would be too complicated, and the overall visualization will be poor. However, if the number of articles involved is too small, it would be difficult to find the knowledge evolution path.

from the starting point to the terminal point. That is, starting from the earliest known reference or literature that does not cite other research, the method calculates all the paths leading to the latest research. The traversal weight of each edge is calculated after the paths are identified. The traversal weight reflects the importance of each citation in

the overall development of the research. This research uses Pajek³, a complex social network analysis tool, to map the main path of knowledge evolution. The visual presentation of the main path makes it easier to highlight the key articles and citation relationships in the research development process.

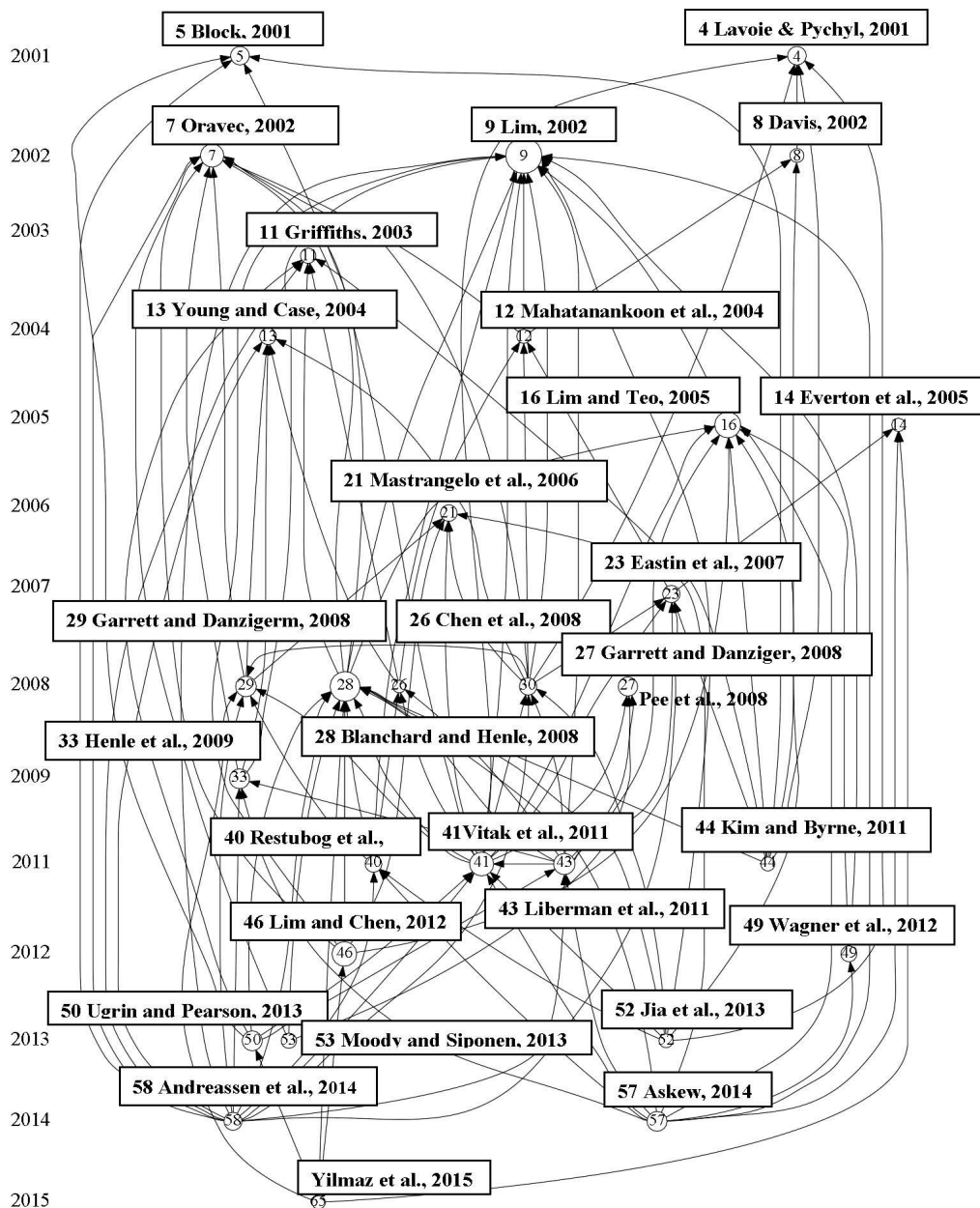


Figure 5: Citation Chronology

³ Batagelj V. & Mrvar A. (2004) discuss Pajek in more detail. Pajek software can be downloaded at: <http://mrvar.fdv.uni-lj.si/pajek/>.

The path counting method (SPC) proposed by Batagelj (2003) was used to calculate the traversal weight of the edges. The global main path graph and regional main path graph are presented in Figure 6 and Figure 7, respectively. Among them, the label of each node is composed of the first author's last name and publication year. The arrow reflects the direction of the knowledge flow, and the thickness of the line reflects the size of the SPC value. The thicker the line, the more significant it is in the main path. Figures 6 and 7 show that, except for the three nodes of Lavoie and Pychyl (2001), Davis et al. (2002) and Oravec (2002), the regional main path is exactly the same as the global main path, indicating that these 16 papers play key roles in the evolution of knowledge in this field.

Table 1 summarizes the 16 articles appearing on both the regional main path and the global main path. These articles constitute the central structure of the network and play essential roles in the flow of knowledge in this field. Among them, Akbulut (No. 79, 93 first author), Anandaraman (No. 6 first author, No. 12 second author), Ugrin (No. 50 first author, No. 104 third author), and Donmez (No. 79 third author, No. 93 second author) appeared twice in the main path. These authors have played important roles in the diffusion of knowledge. As aforementioned, Lim (2002) is a particularly important paper that has played a role in setting the stage for future research, namely through the development of a tool for measuring peoples' propensity to cyberloaf.

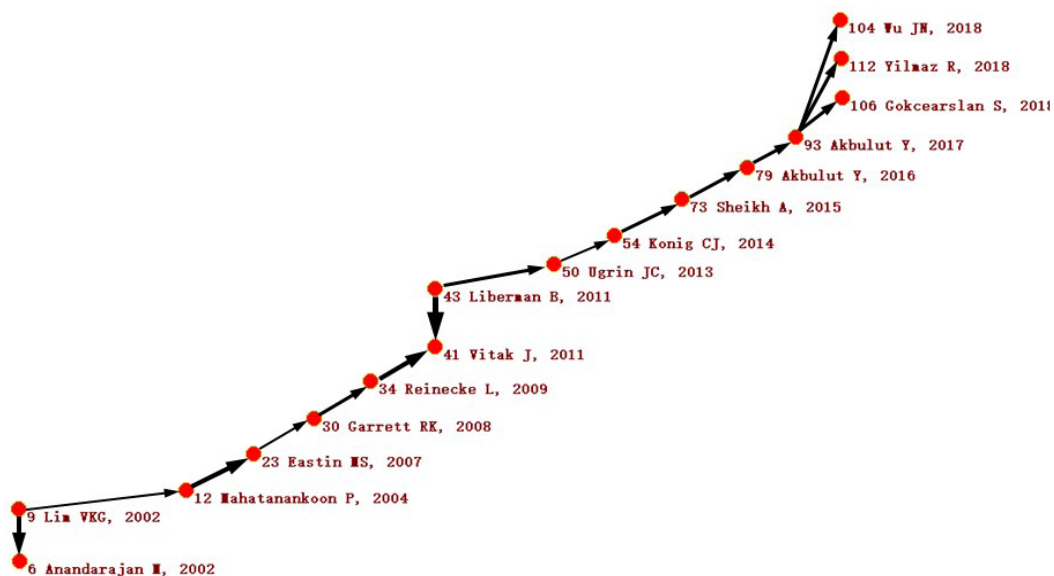


Figure 6: Global main path

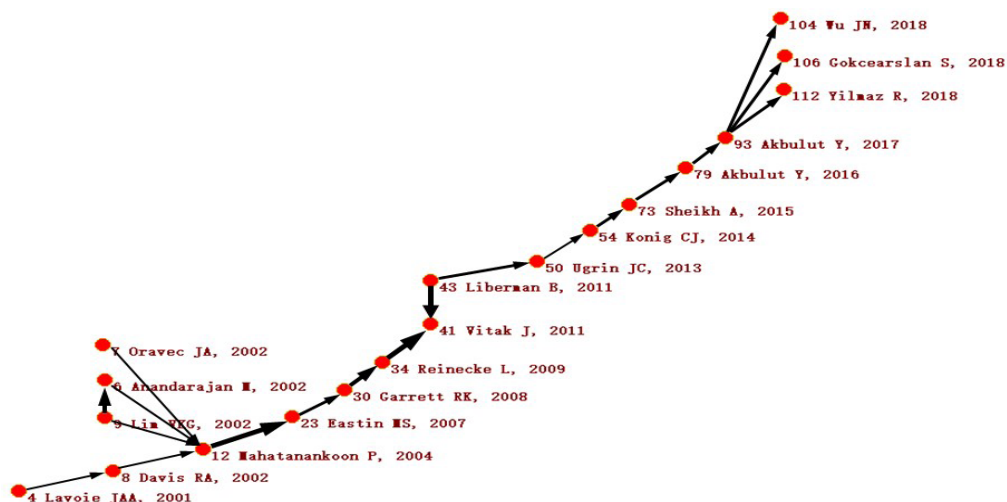


Figure 7: Local main path

Table 1: Important articles appearing on both global (figure 6) and local (figure 7) main paths

No.	Title	First author	Year	LCS	GCS
6	Internet abuse in the workplace	Anandarajan M	2002	6	19
9	The IT way of loafing on the job: cyberloafing, neutralizing and organizational justice	Lim VKG	2002	56	213
12	Development of a measure of personal web usage in the workplace	Mahatanankoon P	2004	9	26
23	Psychology of communication technology use in the workplace	Eastin MS	2007	13	21
30	Disaffection or expected outcomes: Understanding personal Internet use during work	Garrett RK	2008	13	33
34	Games at Work: The Recreational Use of Computer Games During Working Hours	Reinecke L	2009	5	32
41	Personal Internet use at work: Understanding cyberslacking	Vitak J	2011	25	78
43	Employee job attitudes and organizational characteristics as predictors of cyberloafing	Lieberman B	2011	20	42
50	The effects of sanctions and stigmas on cyberloafing	Ugrin JC	2013	17	35
54	Exploring the positive side of personal internet use at work: Does it help in managing the border between work and nonwork?	König CJ	2014	7	11
73	The antecedents of cyberloafing: A case study in an Iranian copper industry	Sheikh A	2015	5	14
79	In search of a measure to investigate cyberloafing in educational settings	Akbulut Y	2016	5	11
93	Cyberloafing and social desirability bias among students and employees	Akbulut Y	2017	3	6
104	Student Cyberloafing In and Out of the Classroom in China and the Relationship with Student Performance	Wu J	2018	0	0
106	Smartphone addiction, cyberloafing, stress and social support among university students: A path analysis	Gokcearslan S	2018	0	0
112	Cyberloafing in IT classrooms: exploring the role of the psycho-social environment in the classroom, attitude to computers and computing courses, motivation and learning strategies	Yilmaz R	2018	0	0

5 Literature Summary

We split the literature into three stages to depict the lifecycle. The three stages are the emergent stage (1997-2001), the exploration stage (2002 – 2013), and the burgeoning stage (2014 – present). The earliest literature tends to be exploratory and examines a wide range of factors. We refer to this as the Emergent stage (1997-2001). Cyberloafing is defined during this stage. Research during the emergent stage takes a high-level view of the content and characteristics of cyberloafing and explores the symptoms and intervention measures. There are four important articles in the stage. The first article appearing in our literature review, Polito (1997), defined cyberloafing, proposed causes and consequences, suggested that such

behavior can be controlled. Lavoie and Pychyl (2001) explored the relationship between cyberloafing and need for entertainment, stress relief, and feelings of negative emotions. Block (2001) has studied the relationship between cyberloafing and perceptions of the legality and morality of engaging in it. Greengard (2000) outlined hidden costs caused by cyberloafing.

The Exploration stage (2002-2013), analyzes cyberloafing as a workplace behavior in more detail, including its causes, benefits and consequences, and control mechanisms. The research is more theoretical and robust. Seminal articles in this stage include Lim (2002), who created a tool for measuring peoples' propensity to cyberloaf, along with Blanchard and Henle (2008) who proposed a structural model of cyberloafing which laid a theoretical

foundation for subsequent empirical research. Blanchard and Henle (2008) and Vitak et al. (2011) identified the antecedents of cyberloafing from the perspective of individual characteristics. They found that males, individuals with controlled personalities, young people, ethnic minorities, and individuals who are proficient at using computers are more likely to engage in cyberloafing behavior than others. Jia (2013) suggested that emotional state affects individual cyberloafing behaviors as individuals who have stable emotions are less likely to cyberloaf than neurotic individuals. Other research finds that employees with negative emotions are more likely to reduce emotional stress through cyberloafing (Moody and Siponen 2013). Vitak et al. (2011) also looked at the effects of job characteristics and found that the creativity of peoples' work affects their propensity to cyberloaf. They found that the simpler peoples' work and the higher the repetition, the more they are to engage in cyberloafing. Studies by Henle and Blanchard (2008), Garrett and Danziger (2010), and Reinecke (2009) have also shown that work stress and work fatigue can affect cyberloafing behavior. That is, employees engage in cyberloafing as a recovery experience when they encounter job stress or fatigue. Blanchard and Henle (2008) also found that the more frequently employees use the Internet while at work, the more likely they are to cyberloaf. Lim(2002), Garrett and Danziger (2010), Reinecke (2009) and Ugrin and Pearson (2013) investigated cyberloafing from the context of organizational justice, social support, and the degree of control, finding that external consequences, social stigmas, and other neutralizing efforts influence peoples' propensity to cyberloaf.

During this exploratory period, most scholars assumed and investigated the adverse effects of cyberloafing. For example, cyberloafing has been found to reduce engagement, waste time and reduce productivity (Griffiths 2011; Liberman et al. 2011). However, Mahatanankoon et al. (2004) believed that employees' cyberloafing does not decrease their work efficiency. A possibility that is explored in later research.

The volume of research on cyberloafing has progressively increased since 2014, and we refer to this most recent state as the Burgeoning stage (2014 to present). The recent research continues to focus on measurement and antecedents (e.g. Akbulut et al. 2016; Sheikh et al. 2015), but two prominent new features have emerged. One is the extension of the research from the organizational context to the educational context, and the other is the positive effects of cyberloafing. Akbulut et al. (2017) compared the differences in the level of cyberloafing between students and employees. Akbulut et al. (2016) developed a measurement tool for cyberloafing among students and compared the differences in the level of cyberloafing between male and female students. Gökçearslan et al. (2018) examined the impact of social support and stressors on the undergraduate student's cyberloafing behavior. Yılmaz and

Yurdugül (2018) studied the influence of college students' attitudes towards computers, psychosocial perceptions, and learning strategies on cyberloafing in the classroom. König and Guardia (2014) explored the positive effects of cyberloafing and found that cyberloafing helps employees manage the blurring of the lines between work and non-work time. Wu et al. (2018) analyzed both the positive and negative effects of cyberloafing on student performance, finding that cyberloafing causes harmful interference to students in the classroom. However, a moderate amount of cyberloafing out of the classroom can have a positive impact on student performance by offering a means for relaxation (Wu et al. 2018).

6 Future research directions

The research on cyberloafing has progressed from early literature that defined the phenomenon, to articulating how people cyberloaf, to looking at why they do it, the benefits and consequences of engaging in it, mechanisms aimed to control it, and cyberloafing in different domains. The most recent branches in figures 6 and 7 look at the effects of cyberloafing on student performance (Wu et al., 2018), smartphone addiction and cyberloafing amongst students (Gokcearslan et al., 2018), and student attitudes and cyberloafing in classrooms (Yilmaz and Yurdugül, 2018). Future research should extend these streams. Wu et al. (2018) recommend that their study can be extended by longitudinal studies that track student performance over time. Gokcearslan et al. (2018) recommend that their study be extended by collecting data from a wide range of students with varying demographics. Yilmaz and Yurdugül (2018) also recommend that their study can be extended by exploring individual differences, including differences in cognitive characteristics, self-efficacy, introversion, et cetera. All three of these studies suggest that future research use more direct measures of cyberloafing. These studies, and the majority of cyberloafing research, tend to use indirect measures such as questionnaires to assess cyberloafing behavior.

The literature would also benefit from more research into the mental health consequences of cyberloafing. Recent research has found that cyberloafing can help employees cope with stress (Stoddart, 2016), but it also consumes employees' cognitive resources (Windeler, Chudoba, and Sundrup, 2017). Research should look at the point in which cyberloafing ceases to become a positive or negative activity and starts to have paradoxical mental health effects on employees or students. A recent study by Wu et al. (2020) demonstrates that social cyberloafing can have both positive and negative effects on employee mental health.

Much of the early research on cyberloafing was performed before mobile Internet devices became as prevalent as they are today. It would be interesting to see people's

reactions to the changing domain. For example, literature has shown that individuals are more likely to cyberloaf when they have access and privacy (Ugrin, Pearson, and Odom, 2007); mobile devices create nearly unlimited access and privacy.

Cyberloafing may be affected by differences across cultures as individuals from different countries may be more or less inclined to use Internet resources for personal purposes when at work or school. Researchers may find models like the Hofstede Model of Cultural Dimensions (Hofstede, Hofstede, and Minkov, 2010) useful for identifying facets of various cultures that might lead to more or less cyberloafing in a particular country. Knowledge about the relationship between culture and cyberloafing could be useful for managers at multi-national corporations with offices and employees all over the world.

Cyberloafing literature would benefit from a better grounding in psychology theory and the integration of various theories. Various aspects of cyberloafing could be explained by theories like Prospect Theory, the Theory of Planned Behavior, Rational Choice Theory, Low Self-Control Theory, Organizational Justice Theory, General Deterrence Theory, and more. An integrated theory that brings the relevant aspects of these theories into one model would be groundbreaking.

7 Limitations and Conclusions

This study examines 116 high-quality papers on cyberloafing behavior indexed by SSCI and SCIE in the WOS database. We used bibliometric analysis to quantitatively analyze the cooperation network, citation network, and main path for more than 20 years of research on cyberloafing. We map the cooperation network, citation chronology and main path of cyberloafing research from 1997 to 2019, and reached the following conclusions. First, research interest in the field of cyberloafing is continuing to rise and is currently in a burgeoning stage. However, a complete theoretical model of cyberloafing has not been formed, and research interest in this field will continue to rise in the future. There are many scholars currently engaged in the research of cyberloafing, but the most influential authors are Lim, PabloZoghbi-Manrique-de-Lara, Anandarajan, and O'Neill. Although there is some cooperation among productive authors, in general, the degree of cooperation is low, and the level of cooperation between scholars across countries could be improved.

Second, the findings show that the United States, China, the United Kingdom, and Australia have a large number of publications and are at the core of the field of cyberloafing. The United States has the most publications, and China ranks second. However, there is still a significant gap between China and the United States.

Third, up to now, the most influential institutions engaged in cyberloafing research include the National

University of Singapore, Drexel University, Las Palmas University, Illinois State University, and Southern Illinois University Carbondale. There is a limited amount of connection between these active institutions, but overall, the institutions' cooperation network density is low, and the cooperative relationship is not close-knit. The existing cooperative research is limited to a few core networks, such as the cooperation network centered on Drexel University, St. Joseph University, and the University of Illinois.

Fourth, by analyzing the citation chronology and the main path of the cyberloafing research network, we conclude that cyberloafing research has evolved through three stages, the emergent stage, the exploration stage, and the burgeoning stage. The research topic has developed from concept definition and measurement, to antecedents and outcomes. Further, the research object has shifted from organizational employees to both employees and students in educational settings. Recent research has begun to focus on the positive effects of cyberloafing on individuals and organizations. However, research in this direction has been controversial, shifting from focusing on the negative effects and the assumption the cyberloafing is inherently bad.

This study makes several contributions to cyberloafing literature. First, this is the first study to rely on bibliometric and visualization techniques to map the development of cyberloafing research. This quantitative methodology can reduce potential biases due to human subjectivity. Second, this study determines influential authors, countries, and institutions in the cyberloafing research and reveals the density and degree of cooperation among authors, countries, and institutions. Third, by conducting a main path analysis, we identify 16 important papers playing critical roles in the development of cyberloafing research. We find that cyberloafing research has evolved through three stages, the emergent, exploration, and burgeoning stages. This finding extends past literature reviews on cyberloafing (Mercado et al., 2017) by shifting to an evolutionary perspective.

This study has a few limitations that are important to mention. First, our analysis covers a selected set of high-quality SCIE and SSCI journals in the WOS database. We assume that these publication sources can reasonably represent cyberloafing research. However, the WOS database cannot guarantee the coverage of all possible cyberloafing publications, which means that we might have missed some papers, particularly those published at conferences. Second, this study divides the development process of cyberloafing research into three stages according to the number of papers published each year and the results of the citation network and main path analysis. That is, the bibliometric approach is not entirely objective, and some amount of human judgment is needed to make the results meaningful. We also notice that it is impossible and sometimes undesirable to completely eliminate human subjectivity from scientific research. Future research is needed to

develop meaningful procedures to keep a suitable balance between objectivity and subjectivity in conducting literature reviews.

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Jin-Nan Wu is a professor of MIS and the Dean of the School of Business at Anhui University of Technology, China. His research focuses on cyberloafing, e-commerce, online consumer behavior, and social and managerial issues of IT. Dr. Wu has published more than 30 articles in *Cyberpsychology Behavior and Social Networking*, *Information Technology & People*, *Industrial Management & Data Systems*, *Electronic Commerce Research*, *Journal of Business Research*, and others.

Mengmeng Song is a postgraduate of Cyberpsychology at Anhui University of Technology, China. Her research focuses on social contagion of cyberloafing.

Joseph C. Ugrin is the Deloitte Professor of Accounting and Head of the Department of Accounting at the University of Northern Iowa, USA. He primarily researches behavioral issues in accounting and information systems and has published research in the area of information systems and technology in journals such as *Computers in Human Behavior*, the *Journal of*

Business Research, *Information Technology & People*, *Communications of the Association for Information Systems*, the *Journal of Information Systems Education* and others.

Lin Liu is a lecturer of Human-computer interaction at Anhui University of Technology, China. Her research focuses on human-computer interaction, online consumer behavior, and social media. She has published more than 10 articles in *Information Technology & People*, *Industrial Management & Data Systems*, *Journal of Business Research*, *Frontiers in Psychology*, *Journal of Electronic Commerce in Organizations* and some MIS conferences such as PACIS and WHICEB.

Tingting Zhu is a lecturer of organizational behavior at Anhui University of Technology, China. Her research focuses on ethics and information technology, and social media use in workplace.

Raziskovanje spletnega postopanja 1997-2019: Analiza literature z vidika citiranja

Ozadje in namen: Namen te študije je ponazoriti razvoj raziskav o spletnem postopanju in opredeliti pomembne prispevke pri razvoju znanja o omenjenem pojavu.

Metodologija: Iz baze podatkov Web of Science (WOS) smo izbrali skupno 116 raziskovalnih člankov, ki so bili objavljeni v najboljših revijah v obdobju 1997–2019. Izvedli smo analizo citiranja, analizo ko-citiranja in analizo glavnih poti, da smo identificirali najvplivnejše avtorje, države in institucije pri razvoju raziskav spletnega postopanja in grafično predstavili odnose med njimi.

Rezultati: Raziskave spletnega postopanja so napredovale skozi tri faze, ki sestavljajo novo nastajajočo, raziskovalno in naraščajočo fazo. Ugotavljali smo tudi razmerja med članki in prepoznavamo ločene in pomembne tokove znanja, 16 vplivnih prispevkov, ki so temeljni ali dobro vidni, ter avtorje, institucije in države, kjer je raziskava nastala. Največ raziskav so opravili raziskovalci v ZDA, sledile so jim Kitajska, Velika Britanija in Avstralija. Nacionalna univerza v Singapurju je opravila največ raziskav v našem vzorcu, Vivian K. Lim iz Singapurske nacionalne univerze pa je bila najvplivnejša avtorica, njen temeljni prispevek o spletnem postopanju in organizacijski pravičnosti, objavljen leta 2002.

Zaključek: Po našem najboljšem vedenju je študija je prva, ki je preučila razvoj raziskav o spletnem postopanju z uporabo metod, ki temeljijo na dokazih. Prikaže razvoj literature o spletnem postopanju in identificira pomembne tokove, ki bi jih raziskovalci lahko proučevali v prihodnosti. Sklepamo, da bi morale prihodnje raziskave ustvariti bolj neposredna merila za spletno postopanje, preučiti posamezne posledice, ki jih povzroči preveč spletnega postopanja, na primer njegov vpliv na mentalno zdravje.

Ključne besede: Spletno postopanje, Analiza citatov, Analiza citiranja, Analiza glavne poti, Vizualizacija

The Role of Daily Affect in Leader-Member Exchange: A Multilevel Investigation in Public Health Administration

Mehmet ÇETİN¹, Gulmira SAMENOVA², Filiz TÜRKKAN²,
Ceylan KARATAŞ²

¹İstanbul Sabahattin Zaim University, Faculty of Business and Management Sciences, İstanbul, Turkey,
mehmet.cetin@izu.edu.tr (corresponding author)

²İstanbul Sabahattin Zaim University, Graduate Education Institute, İstanbul, Turkey, samenova.gulmira@std.izu.edu.tr, turkkan.filiz@std.izu.edu.tr, ceylankaratas88@gmail.com

Background and purpose: Although the critical role of affect in the leader-member relationship has been widely accepted, few studies investigated the impact of within-person affect variations in daily leader-member exchange (LMX) or addressed potential cross-level and intra-individual moderators of this relationship. This study examines the effects of followers' positive and negative affect on their daily LMX in public health care organizations. The moderator roles of emotional labor and trait emotional intelligence were also investigated.

Methodology: A multilevel research design was conducted where daily measures were nested in individuals. Seventy participants working in a government health organization operating in İstanbul responded to daily surveys for five consecutive workdays (350 day-level responses) and a general survey one week after the daily data collection period (70 person-level responses). Hypotheses were tested using Hierarchical Linear Modeling (HLM).

Results: Both positive affect and negative affect were positively related with LMX (day-level), but negative affect had a negative association with LMX on the inter-personal level (when daily scores were averaged across days). Although trait emotional intelligence showed a positive cross-level effect, none of the proposed moderations was significant.

Conclusion: The role of affect in LMX development is critical and has a complex structure. Findings emphasize the importance of multilevel research for understanding the affect-LMX relationship as they demonstrate different pictures in day-level and person-level analysis.

Keywords: Positive affect, Negative affect, Emotional labor, Leader-member exchange, Trait emotional intelligence, Day-level interaction

1 Introduction

The importance of public healthcare organizations in the service sector and the economy has been growing in Turkey since the introduction of the health transformation program in 2003, which brought sound quality and capac-

ity improvements in the public health care system (Bener et al., 2019). Public hospitals constitute the leading service provider role (having the majority of bed capacity) in Turkey's total health care system (Dundar et al., 2010). All over the World, public health organizations have been facing complex and substantial leadership challenges (Shickle et al., 2014). In the public health care context, the extent

of the responsibility and the severity of the outcomes of any possible mistakes are highly critical. In addition, requirements for effective management during intense crises and the demanding nature of the job regarding the regulation of affects in the workplace make affective structures and leader-member relationships crucial for public health administration.

The significance of affect in social exchange and role-making processes has been widely recognized by organizational behavior scientists (Cropanzano et al., 2017a). The term “affect” in organizational behavior studies refers to emotions people experience and transform into work environments while interacting with others (Brief & Weiss, 2002). Favorable emotions like enthusiasm, joy, happiness, etc., comprise positive affect, whereas sadness, fear, shame, and similar feelings form negative affect. Affective events theory (AET) underscores the role of feelings in the formation of employee attitudes and behaviors (Cropanzano et al., 2017a). Like daily affective experiences, affective trait constructs, such as trait EI, can shape organizational outcomes (Li et al., 2018). Thus, a substantial number of organizational studies have scrutinized how affect shapes the interpersonal relationship and the leader-member exchange (LMX) in particular (e.g., Liu et al., 2020).

Among the leadership models investigated in the previous millennium, the LMX theory is undoubtedly one of the most fascinating. In contrast to the idea that a leader behaves equally toward all members, the LMX concept propagates a different nature of the link between a supervisor and all his/her subordinates. It is a complex process determined by long-term as well as momentary intrinsic and extrinsic elements like the personality of the leaders and the followers, their affect, job specification, cultural differences, gender, age, organizational environment, etc. (Nahrgang & Seo, 2016; Hofmans et al., 2019). In previous decades, LMX research has been predominantly focused on leadership constructs such as leader personality and leadership style and their impact on organizational outcomes (Uhl-Bien et al., 2014). Fewer studies have investigated the follower side of the construct. In particular, the scarcity of the research is more noticeable for attempts to explain how state affective phenomena (e.g., positive and negative affect) shape followers’ perception of LMX quality. Therefore, in this paper, various affect phenomena of the followers are tested to reveal their impact on LMX.

Moreover, the LMX quality is not stable and may vary in time (Ellis et al., 2019). Despite the dominance of studies addressing the construct as a stable concept, the central promise and the roots of the LMX are founded on the suggestion that the exchange and relationship between leader and followers are dynamic in nature (Hofmans et al., 2019). One of the primary triggers in LMX quality fluctuations can be the individual affective state or emotions (Liu et al., 2020). How individuals feel may change across

the days, and moods and emotions are strongly tied to interpersonal exchange (Cropanzano et al., 2017b). Studies indicating intra-individual variance in affective states and LMX (Nezlek and Allen, 2006; Hofmans et al., 2019); and cross-level effects of affective constructs on interpersonal exchange in organizations (e.g., Tse et al., 2008) are supportive for the need for addressing day level variations and cross-level effects regarding study variables. The majority of studies on the affect-LMX relationship have considered it as having a static and between-person nature rather than investigating how momentary within-person variance influence the affect-LMX development. Most of the early research on affect and LMX was carried out via single-level models, and few studies have addressed the momentary within-person affect variations in leader-member exchange processes during their daily contacts (e.g., Tse et al., 2018). Thus, the current study may shed some light on the research into this matter. A more significant gap remains in investigating possible daily and person-level interactions among affect constructs and daily LMX. Addressing the aforementioned gaps, the present study analyzes the role and influence mechanisms of various day and person-level affect constructs (positive affect, negative affect, emotional labor, and trait emotional intelligence) on the perception of LMX in the work environment. In particular, the research focuses on investigating how subordinates’ affective states influence their daily LMX and which individual emotional characteristics may regulate this interaction.

The outcomes of daily emotional experiences can vary according to extent and type of the emotion regulation strategy used for managing the internal state or the external expression of emotions (Costakis et al., 2021). The current study adopts Lee and Brotheridge (2011)’s conceptualization of emotional labor (EL) which defines EL as the reconstruction of the emotion (deep acting) or modification of its presentation (surface acting) in three dimensions (dividing the latter into two), not showing the genuine emotions (hiding feelings), changing the display of the sentiment (faking emotions) and modifying the internal emotion (deep acting). How employees regulate the NA and PA they experience during the day can affect their impact on LMX outcomes (Tse et al., 2018).

Along with the day level affect constructs (EL, NA, and PA) that are addressed at the within-person level, the current study also investigated cross-level effects of EI as a person-level affective trait variable. EI describes the capacity, tendencies, and competence to detect, internalize, realize, and finally manage emotions (Mayer & Salovey, 1997). Thus, EI is about knowing or understanding emotions and includes using them in a functional way (regulation and management of emotions), which makes this construct essential for the present study. Among different conceptualizations that have been provided for EI in the literature, ‘ability EI’ (assessing EI as a competence through performance tests) and ‘trait EI’ (assessing EI as

a personality structure through self-reports) approaches are prevalent (see, O'Connor & Little, 2003). Petrides & Furnham (2001) underscore the significance of the measurement method for the operational definition of the concept and suggest a self-report, dispositional measurement approach instead of assessing the performance (ability). In line with the present study aims, following Petrides and Furnham (2001), EI is conceptualized as a trait that describes the behavioral tendencies and self-perceived personal characteristics.

This study aims to contribute to the extant knowledge on the affect-LMX relationship through a multilevel nested research design. Mainly, study aims to investigate the person-level and intra-individual level effects of positive affect (PA) and negative affect (NA) on LMX. The direct (cross-level) effect and moderator effect of trait emotional intelligence (EI) and emotional labor (EL) (hiding, faking, and deep acting) on this association are also examined.

The multilevel investigation of the affective antecedents of daily LMX is critical to study due to several reasons. First, LMX is a determinant for numerous critical employee attitudes, behaviors, and organizational outcomes specially in health care organizations (Shickle et al., 2014; Ürek & Ugurluoğlu, 2019). Thus, the research on the development and antecedents of this concept is precious. Second, despite their importance for organizations, the affective antecedents of LMX remain understudied. The general stream of findings addresses state-affective constructs such as positive and negative affect as consequences of LMX, and the path from affect to LMX is often neglected. Third, addressing the gap above regarding the investigation of LMX as a dynamic structure and including the intra-individual variance in the analysis can enhance the information on the matter. Lastly, the examination of possible dynamics influencing the association between daily affect and LMX can further develop our understanding regarding the nature of the affect-LMX relationship.

Built on the affective events theory, this study aims to address the aforementioned gaps and contribute to extant knowledge on the affect-LMX association through a multilevel research design where intra-individual, inter-individual, and cross-level variations and effects are investigated. This way, the study examines affect as an antecedent of daily LMX and tests cross-level and moderator effects of EI and EL in this relationship. This provides a shift for both the causality in the affect-LMX relationship and the exploration of the day-level and person-level nature of this association. Moreover, this study aims to advance our knowledge of the daily and cross-level dynamics regulating this relationship.

2 Theoretical Framework and Construction of Hypotheses

2.1 Positive and Negative Affect and LMX

Affect can be defined as emotions people show or feel during their interaction with others and during decision-making processes. It can be positive (e.g., pride, enthusiasm, joy) or negative (e.g., fear, distress, sadness). In terms of duration, affect has been considered from two viewpoints: as a trait that reflects basic feelings and is more stable over time, and as a state that is defined as the present mood/emotion that changes within-person over time (Tellegen et al., 1999). Many studies stressed the importance of affect in the development of LMX processes. Consequently, the research interest in the affect-LMX relationship has been growing since 2000 (Tse et al., 2018).

The LMX theory has its roots in Dansereau et al. (1975)'s efforts on the vertical dyad linkages theory. The authors of the theory suggested that dyadic relationships between superiors and subordinates can explain varied relationships in an organization. LMX addressed the change in the quality of the dyadic relationship between the leader and the follower over time. Dienesch & Liden (1986) suggested a multidimensional construct for LMX consisting of perceived contribution, loyalty, and liking. Professional respect was added as the fourth dimension later (Dienesch & Liden, 1986).

LMX is a dyadic relationship where both parts of interaction influence the exchange quality. Initially, the vast majority of the research dedicated to LMX has focused on the leader's characteristics, while follower attributes have attracted organizational behavior scientists in recent decades (Uhl-Bien et al., 2014).

In general, followers expressing positive affect (PA) are expected to develop high-quality LMX, whereas negative affect (NA) is very likely to deteriorate their relationship with leaders (Dulebohn et al., 2012). Because PA reflects the bright side of personal characteristics like enthusiasm, optimism, motivation, and engagement, leaders are likely to support followers with a high PA, and therefore, the relationship between them is expected to have higher quality (Liu et al., 2020). On the other hand, NA is associated with different kinds of negative feelings like fear, hostility, distress, exhaustion, and apathy, which foster an adverse reaction on people, situations, and interactions with others in the surrounding environment, including the workplace (Glasø et al., 2018). Subsequently, the relationship between a subordinate with high NA and his/her supervisor is assumed to be less favorable and less effective (Bernerth et al., 2007).

2.2 Affective Events Theory (AET)

Individuals confront different situations within the work environment, and these conditions impact their emotions and moods (Weiss & Cropanzano, 1996). For instance, positive or negative affect may arise in the relationship between supervisors and subordinates during daily interactions that illustrate the LMX perception. The affective events are not bounded only by organizational incidents but may include extra-work situations that change the emotional state of a person (Ashton-James & Ashkanasy, 2008). Everyday family-related issues, as well as positive events, arouse negative or positive moods within an individual. Unconsciously, individuals transfer emotions inherited in these non-work associated conditions to their job environments and subsequently react to heterogeneous events occurring in the organization through the lens of earlier experienced emotional situations. Such affective events may influence the personal attitudes and behaviors of organizational members as well as their LMX perceptions (Cropanzano et al., 2017b).

A considerable number of the studies that address AET as the foundation of the affect-LMX relationship consider LMX an antecedent of affect and positions LMX experiences as work events. However, LMX can also be regarded as an affect-driven consequence because the theory indicates that employees' behaviors are guided by their emotions. How individuals feel reflects their behaviors and attitudes, which are fundamental elements of LMX. Cropanzano et al. (2017a), using AET for explaining the affect-LMX association, emphasized the importance of affect for the LMX development. They also highlighted the existence of alternative paths and a two-way causality where interactions with the leader shape the affective states and affects influence the LMX nature. In their metanalysis, Tse et al. (2018) demonstrated that LMX had been considered as both an antecedent and a consequence in different studies that are addressing the affect-LMX relationship.

Based on the framework mentioned above and pattern of results regarding LMX and affect, we suggest that day-level affect will influence the fluctuations in subordinates' LMX perception and propose the following hypotheses:

H1: Daily positive affect positively influences the daily LMX perception of the employees.

H2: Daily negative affect negatively influences the daily LMX perception of the employees.

2.3 Emotional Labor, Positive Affect, Negative Affect, and Leader-Member Exchange

Despite the different definitions of emotional labor (EL) in the organizational behavior literature, on a broad-

er sense, it represents the act of showing the socially desired emotions in the service transaction processes (Hochschild, 1983). Interactions between different actors at work (client-officer, leader-subordinate, etc.) are subject to emotional experiences, and how emotions are managed during these interactions define the nature and quality of the EL construct. Two main strategies of EL are discussed in the academic literature: "Deep acting" and "surface acting" which are further divided into subgroups by different authors (Fouquereau et al., 2019).

Surface acting involves emotion simulation by expressing outward appearance like voice tone, gestures, or facial expression. The part of the surface acting when actual feelings are masked and manipulated to show socially expected expression represents the "faking emotions" dimension. When an employee does not show his/her true emotions (and not changing how it appears), it refers to "hiding feelings". Deep acting, in contrast, reflects the aligning of inner feelings by the situation. Sincere emotions, authenticity, or expression of genuine emotion is a way of the employee's natural behavior in various exchange situations (Grandey, 2000).

Different individual attributes, job features as well as organizational characteristics influence the EL strategies of a person. Therefore, affect and LMX may be considered as antecedents of EL. The affective state of an individual may define his/her EL (Lee & Madera, 2019), and high-quality LMX can positively regulate it (Medler-Liraz, 2014). Affective events theory (AET) is one of the most frequently used theories in the research addressing emotional constructs, and it suggests that affective experiences can impact the emotional labor preferences of employees (Lee & Madera, 2019).

EL required in the workplace can have positive or negative effects on employees. Whereas a majority of research stressed the negative influence of EL on subordinates' psychological condition and work performance (Morris & Feldman, 1996; Wang et al., 2019), some studies underlined a positive outcome of EL on job satisfaction as well as on stress level (Xu et al., 2020). In general, extant studies reveal that deep acting promotes largely positive outcomes like job satisfaction, sincerity, or a sense of fulfillment. On the other side, surface acting triggers mainly adverse outcomes such as emotional exhaustion or dissatisfaction (Fouquereau et al., 2019). Moreover, EL strategies mitigate interpersonal processes within an organization, including a leader-member exchange. For instance, when individuals experience negative affect in the workplace, how they express or reflect it is very much related to their EL. If employees use deep acting, their NA would reflect their inner processes and their relationships with their leaders in a less destructive manner. If they engage in hiding or faking their emotions, their NA would create stronger negativity regarding their LMX.

H3: Daily EL moderates the relationship between dai-

ly NA and daily LMX, where deep acting weakens the relationship, hiding feelings and faking emotions strengthen the link.

2.4 Emotional Intelligence, Positive Affect, Negative Affect, and Leader-Member Exchange

There are two main pillars of research and approach in EI literature. One view conceptualizes EI as an ability and assesses it via objective performance tests such as the performance on solving an emotional problem (e.g., Freudenthaler & Neubauer, 2007). Other approach considers EI as a personality trait and measure it with self-report forms on behavioral tendencies, capacities, or personality characteristics (e.g., Petrides, 2009). A discussion on which operational definition or measurement is more valid has been controversial and discussed among scholars. The former approach criticized 'trait EI' as being not distinct from personality variables and suggested 'ability EI' as a better predictor for achievement. The latter conceptualization criticized the 'ability EI' approach for having some flaws and problems and suggested the 'trait approach' to EI as a better alternative. Petrides and Furnham (2001) operationalize these two concepts (trait EI and ability EI) as distinct structures instead of considering them as two different approaches to measure the same variable. They conceptualized trait EI as a composite and distinct personality construct that stands for dispositions and behavioral tendencies regarding emotional characteristics. O'Connor and Little (2003)'s and Warwick and Nettelbeck (2004)'s findings support Petrides and Furnham (2001)'s distinction in the operationalization of ability EI and trait EI as they indicate different patterns of correlations for each variable with cognitive ability and personality constructs. Trait EI can be defined as the ability, and disposition individuals perceive about themselves regarding realizing, understanding, expressing, adapting, and managing emotions effectively (Petrides and Furnham, 2001). In the current study, following Petrides and Furnham (2000, 2001), EI is conceptualized as a personality trait and assessed as a self-report person level (level 2) variable.

Despite the disputes in the social science community about the EI construct and its measurement, this phenomenon is widely applied in the relationship as well as leadership studies. The positive relationship between EI and employee engagement, work performance, job satisfaction, and commitment was demonstrated in different studies (Jordan & Troth, 2011; Li et al., 2018; Wen et al., 2019). EI can impact how individuals' positive or negative affective states during the work processes relate to other outcomes. For instance, EI is shown to intensify the positive affect and decrease the influence of negative affect on organizational citizenship (Miao et al., 2020). Alternative-

ly, people with a positive affective state are expected to regulate their EI more effectively. In contrast, a negative mood may reduce the ability of a person to understand and cope with the emotions of others.

EI is considered as an essential characteristic of leaders as well as followers in leadership research (Dasborough, 2006; Troth et al., 2018; Tse et al., 2018) and, in general, the development of high-quality social exchange between parties. Additionally, LMX has its moderating/mediating effect on EI and job outcomes (Lee et al., 2018; Ardabili, 2020). As EI refers to the capacity to realize and manage one's emotions, employees experiencing negative affect can better adjust and control their feelings to avoid negative interactions or impressions to create better LMX. Based on that assumption, this study proposes a moderating impact of EI on the relationship between NA and LMX.

H4: Trait EI will moderate the relationship between daily NA and daily LMX; as the level of trait EI increases, the negative link between daily NA and daily LMX will be weaker. In other words, daily LMX levels of employees with higher levels of trait EI will be less affected by daily NA.

3 Method

3.1 Participants and Procedure

The data for this research were collected from employees working in an administrative department of the public health organization operating in Istanbul, Turkey. A convenience sampling approach was used. The department is responsible for managing the operational and strategic functions of large-scale public hospital in the European side of Istanbul. The units are divided into three sections such as medical, financial, and administrative services. Personnel working in these units are defined as general administrative services, health services, technical services, and auxiliary services. Participants were informed about the aim and procedure of the research. Anonymity and confidentiality issues regarding the data collection process were underscored. A multilevel research design where daily affect and LMX measures were nested in individuals was used. A general (one-time) survey that contained questions asking information regarding demographics, the measure for assessing trait EI, and a code to match this survey with day-level surveys were given prior to the shorter day-level questionnaires. Two weeks after the collection of the first questionnaire, the participants were asked to fill the short surveys at the same time every afternoon during five consecutive workdays. The daily surveys collected data on LMX, EI, and negative and positive affect (with the matching code). All surveys were hand-collected in envelopes by the authors. 73 employees willingly participated in the first, one-time (second-level) survey. The surveys

(daily and person-level) were matched by a unique personal code produced by the respondents. 70 participants provided usable five consecutive day-level responses and a person a level response each. We used 350 day-level (70 participants x 5 days) and 70 second-level (personal-level)

responses in our analysis (repeated daily measures (days) were nested within individuals). The research model of the study is depicted in figure 1. The mean age of respondents (N= 70) was 35 (min. 23, max. 50), the average tenure of participants was approximately seven (min.1, max.30)

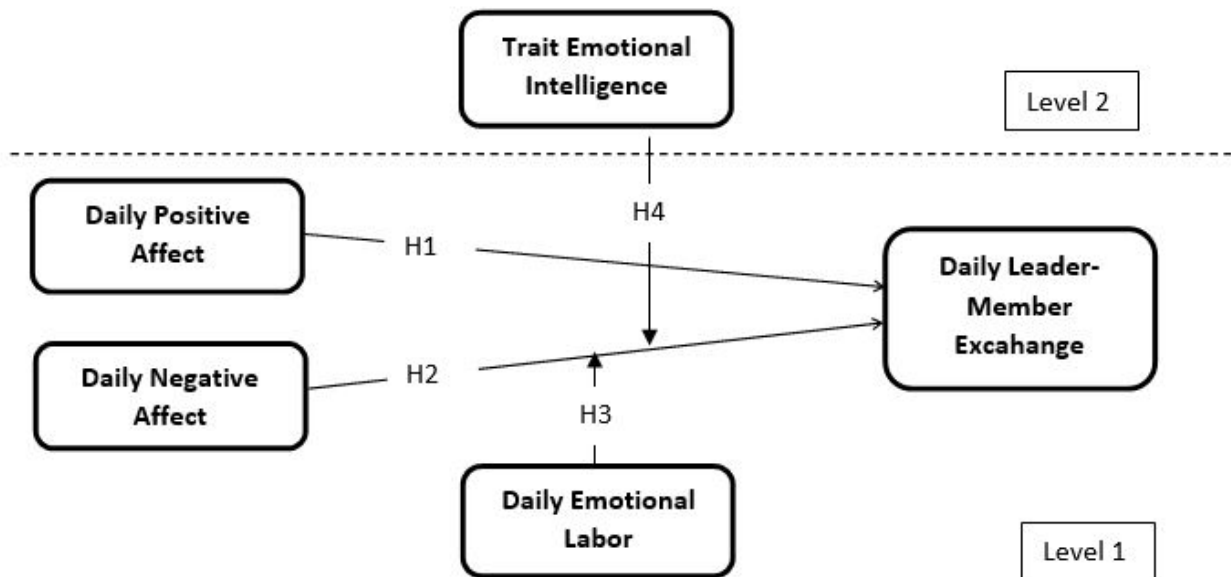


Figure 1: The Research Model of the Study

years, and 69% were female. About 13% had a high school degree, 14% completed vocational school, 41% completed graduate studies, and 32% completed post-graduate studies.

3.2 Measures

We chose the scales to assess the study variables through certain criteria. First, extant studies provided evidence for the reliability and validity of all measures. Second, measures were successfully used in several countries, and they were also validated to Turkish language and context by extant studies. Last, they were consistent and enabling for multilevel analysis. All reliability scores calculated for the scales were acceptable and high as presented under the “analysis and results” title in Table 1. All measures used in the study used a six-point Likert-type scale. All measures except the trait emotional intelligence questionnaire were daily surveys. Day-level scales were adapted (when necessary) with minor changes for capturing daily experiences (e.g., adding “today” or changing present tense to past tense). Original forms and slightly modified forms (for day level usage) are given in the appendix.

Positive and negative affect were measured using the PANAS scale developed by Watson et al. (1988) and validated for Turkey by Gençöz (2000). The original survey contains 20 items to assess NA and PA. Authors often prefer to select some of the items from the scales in daily and longitudinal research designs to keep the daily surveys as short as possible (e.g., Tadić et al., 2015; Tadić Vujčić et al., 2017). Items that are more relevant for the job nature of the sample and items that are more likely to happen on a daily basis with higher within-person variability (e.g., Wichers et al., 2012) are usually selected. Items with the highest factor loadings (e.g., Petrou et al., 2012) or items within a sub-cluster of the concept are also preferred (e.g., Ouyang et al., 2019). A review of the extant studies addressing the daily form of the concept also guides the formation of the structure. Following the aforementioned path, PA items were taken from pleasant activated (high activation) positive affect cluster (Watson & Tellegen, 1985; Barrett & Russell, 1998). Also, one item from each cluster (another classification) of PA (see Egloff et al., 2003), joy (enthusiastic), interest (strong), and activation (active) were taken for representativeness. Unpleasant activated (high activation) negative affect items (“distressed”, “upset”, “nervous”, and “irritated”) were used for assessing NA.

The measure used a six-point scale ranging from “not at all” to “very often”.

EL was assessed using the revised version of the Emotional Labor Scale developed by Brotheridge and Lee (2003) and revised by Lee and Brotheridge (2011) by changing the construct components from “deep acting” and “surface acting” to “deep acting”, “hiding feelings”, and “faking emotions”. This version was tested for the Turkish context by Dursun et al. (2014). The original scale consists of 9 items (3 items for each dimension). Six items of the initial questionnaire (2 items with the highest factor loadings for each dimension) were used for measuring the variable. Each of the three subscales had two items. The sample items from this scale for deep acting is “Today I made an effort to actually feel the emotions that I need to display to others”, for faking emotions “Today I pretended to have emotions that I didn’t really have”; and for hiding feelings “Today I resisted to express my true feelings”. The measure uses a six-point scale ranging from “not at all” to “very often”.

Leader-Member Exchange was assessed using items from the LMX-7 scale that is developed by Scandura and Graen (1984). LMX-7 is a frequently used scale in the multilevel longitudinal analysis. Several studies (e.g., Gutermann et al., 2017) choose to use some of the items of the scale instead of giving all of the items due to feasibility reasons in multilevel studies. Three items with the highest factor loadings in the literature and the validation studies in the Turkish context were chosen from the original seven items (e.g., Joseph et al., 2011; Caliskan, 2015). A sample item from this scale is “How well did your leader understand your job problems and needs today?”. The measure uses a six-point Likert-type scale ranging from “strongly disagree” to “strongly agree”. In the current study, the reliabilities calculated for the measure were between .85 - .89 across measurement days, indicating high reliabilities (Table 1).

The EI levels of the respondents were assessed by utilizing the short form of the Trait Emotional Intelligence

Questionnaire. The complete form (153 items) was developed by Petrides and Furnham (2000, 2001), and the short form (30 items) of the scale (Petrides, 2009) was validated for the Turkish by Deniz et al. (2013). As EI was measured in the person level with a one-time longer questionnaire, we used all 30 items (same as the original). Petrides (2009) and Petrides et al. (2010) provided adequate and high reliability scores (Cronbach’s Alpha) for the short form scale (.69 and .87). Deniz et al. (2013) reported a .81 reliability score for the Turkish form of the scale. The measure adopts a six-point Likert scale ranging from “strongly disagree” to “strongly agree”. The reliability score calculated for the scale in the present study was .85. In addition, we controlled our results for demographic variables; gender, age, education, and tenure.

4 Results

Demographic variables were used as second-level control variables in the current study. 70 respondents provided 350 day level (daily measures of PA, NA, EL, and LMX for five consecutive workdays) and 70 person level responses (EI and demographics). Respondents’ ages were ranging between 23 to 50 (mean=35). Their tenure ranged between 1 to 30. 48 of the 70 respondents were female. 73% completed a university or higher level degree.

We calculated reliability scores for the scales and their sub-dimensions that are used in the study. Within-person reliability may be misleading and tends to be high because of repeated measures. As a solution to this problem, some authors (e.g., Beal & Ghandour, 2011) preferred to measure reliabilities of daily measures for each day the surveys were conducted. Following this approach, we calculated Cronbach’s alpha scores of day-level variables for each measurement day. Reliabilities across days and variables varying from .647 to .924 support the reliability of the day-level measures (Table 1). Besides, the reliability scores for the trait EI scale (person-level) are within the expectable limits.

Table 1: Reliabilities of the measures

Day	LMX	Deep Acting	Faking Emotions	Hiding Feelings	Emotional Labor	Negative Affect	Positive Affect	Trait Emotional Intelligence
1	,857	,860	,924	,778	,860	,737	,843	-
2	,861	,903	,815	,807	,878	,809	,778	-
3	,855	,889	,757	,647	,873	,792	,756	-
4	,882	,859	,754	,734	,870	,801	,712	-
5	,857	,889	,861	,767	,871	,809	,860	-
Total	,861	,879	,751	,824	,870	,792	,802	,851

Note: reliabilities for day-level variables are calculated for each measurement day. Total reliabilities stand for reliabilities calculated for all day-level data (N=350). Trait emotional intelligence is measured for one time (person-level).

4.1 Correlations and Descriptive Statistics

Day-level and person-level correlations and descriptive statistics are presented in Table 2. Standard deviations and correlations were calculated for person-level and day-level separately. Inter-individual correlations (person-level) were calculated by aggregating the five-day scores for each individual. The person-level variable EI was added by matching aggregated scores (across days) and person-level

EI. Intra-individual correlations were calculated via HLM by using the differences in the variance comparing when the level one predictor was included in the model and not included in the model (null model) for explaining the other level-one variable. The aggregated person-level analyses demonstrate that LMX is positively and significantly associated with PA, Deep acting, and trait EI while negatively and significantly linked with NA. Also, EI is significantly and positively related to PA (aggregated across five days).

Table 2: Descriptive statistics and between and within-individual correlations among study variables

	Mean	SDw	SDb	1	2	3	4	5	6	7
1. Leader-Member Exchange	3,60	1,19	,89	1	,002	,149**	-,028	-,218**	,418**	,252*
2. Faking Emotions	2,28	1,13	,93	,052	1	,565**	,699**	,337**	-,077	-,090
3. Deep Acting	2,99	1,32	1,10	,005	,245**	1	,482**	,105	,071	,015
4. Hiding Feelings	2,43	1,19	,98	-,053	,296**	,194**	1	,372**	-,142**	-,208
5. Negative Affect	2,59	1,08	,83	-,040	,122	-,046	,133*	1	-,363**	-,170
6. Positive Affect	4,04	1,10	,83	,322**	-,043	-,022	-,047	-,311**	1	,442**
7. Trait Emotional Intelligence (L2)	4,48	-	,63	-	-	-	-	-	-	1

Note: Correlations above the diagonal depict person-level correlations (means across days, N=70). Correlations below the diagonal show day-level correlations calculated via HLM (N=350). SDw= Within-person standard deviation, SDb= Between-person standard deviation. LMX= Leader-Member Exchange. L2= Level 2

*p<0.05 and **p<0.01

4.2 Analysis

In the current study, repeated daily measures (days) are nested within individuals (see, Nezlek & Plesko, 2003; Xanthopoulou et al., 2008). To test our hypotheses, we utilized Hierarchical Linear Modelling Software (HLM), which is suitable for analyzing nested data. The Hierarchical Linear Modeling approach enables researchers to simultaneously test intra and inter-individual associations.

Before testing our hypotheses using a multilevel analysis design, we investigated if there was a significant intra-individual variance in the daily measured variables of the study. We created null models explaining each daily variable with only intercepts from two levels. The calculation of the percentages of intra-individual variance demonstrated that there was a substantial intra-individual level variance for all day-level variables, justifying and necessitating the multilevel analysis to test our hypotheses. 45% to 61% of the variance in the daily measured constructs was within-individuals (Table 3). Partitioning the variance of day-level variables showed that there is a significant

amount of variation both for intra-individual and inter-individual levels.

4.3 Tests of Hypotheses

Following methodological suggestions in the literature (Peugh & Enders, 2005; Enders & Tofighi, 2007), studies investigating day level repeated data that are nested within-person, adopt group centering approach for the level 1 (day level) variables and grand centering for level 2 (person level) variables (e.g., Ilies et al., 2011; Tadić et al. 2015; Ouyang et al., 2019). Moreover, there is not only one best way for centering in nested models (Nezlek and Allen, 2006). The purpose of the analysis and the research design determine the centering method that should be used in the model. For testing the current study's general hypotheses, we chose to center level 1 variables on the respective person mean (group centered) and level 2 variables on the sample mean (group centered). Group centering level 1 variables allows us to understand the effects

of the variance in how participants felt each day. In other words, this centering approach enables us to investigate the effect of variance in an individual's level of daily affect compared to the mean level of affect the same individual experiences on other days (the mean of the individual across measurement days – not the whole sample) on daily LMX. For instance, an employee may be experiencing higher or lower levels of NA/PA compared to others in general; still, what happens when the employee experienc-

es higher or level NA/PA compared to his/her own average is another question. This approach allows us to see how does employees' LMX change on the days they feel higher NA/PA or lower NA/PA (independent from their variation from the sample). Thus, EL structures and daily affect variables were group-centered, and the person-level variable EI was grand centered. The dependent level-one variable LMX remained uncentered.

Table 3: Partitioning variance components of within-person variables

Variable	Intercept	Within-person variance	Between-person variance	Percent of Within-person variance
Leader-Member Exchange	3.60**	0.64	0.79	45
Positive Affect	4.04**	0.55	0.66	45
Negative Affect	2.59**	0.57	0.61	48
Faking Emotions	2.28**	0.75	0.53	59
Deep Acting	2.99**	1.07	0.69	61
Hiding Feelings	2.43**	0.92	0.76	55

The percent of within-person variance was as computed as $\sigma^2/(\sigma^2 + \tau^2)$.

**p < 0.01.

Hypothesis 1 suggested a positive link between daily PA and LMX, while hypothesis 2 suggested a negative association between daily NA and LMX. Hypothesis 3 predicted that EL moderates the relationship between NA and LMX. To test these hypotheses, a model with only person-level control variables, gender, age, tenure, education, and trait EI was created in the first step (Table 4). EI was entered as grand mean-centered. This model revealed that EI had a significant cross-level main effect on LMX ($B=0.40$, $p<0.05$). None of the demographic control variables had any significant effects on the independent variable. In the second model, we added day-level variables with previous control variables. All day-level variables were group-centered. This way, by eliminating the potential effects of the difference between participants' means, the analysis demonstrated how the day-level intra-person change in the participants' NA, PA, and EL was associated with daily, intra-person changes in the LMX experience. PA significantly predicted LMX in the proposed way ($B=0.43$, $p<0.001$), supporting the first hypothesis of the study. NA also demonstrated a positive and significant association with LMX ($B=0.10$, $p<0.05$) in the opposite direction proposed by hypothesis 2. None of the EL dimensions demonstrated significant direct effects on LMX. In model three, we tested the cross-level moderator effect of EI on PA and NA slopes. Trait EI showed no significant moderator effects. Hypothesis 4 was not supported. For level-one interaction effects (for the third hypothesis that suggests EL as a moderator on the relationship be-

tween NA and LMX), we added product terms of NA and all EL dimensions. We multiplied standardized scores of each variable for creating product terms to avoid possible multicollinearity problems (Aiken & West, 1991); thus we entered them as uncentered (as they were already centered) in the model. The interaction terms indicated no significant moderation. The moderation hypotheses regarding day-level variables were rejected for the intra-individual variance.

Results of correlation analysis demonstrated a negative link between NA and LMX on the aggregated level. Taken together with the results of regression analysis (through within-person variation), employees with higher NA levels (compared to others) have lower levels of LMX while they have higher levels of LMX on the days they feel higher NA (compared to their own NA mean). On the grounds of this pattern of results and research suggesting nonlinear links between NA and LMX (e.g., Hochwarter, 2005), we tested possible curvilinear effects of NA by adding NA square in the model after controlling for NA and second-level variables. U-shaped relationship regarding NA and LMX was not significant. Still, the curve estimation of the quadratic model for NA was significant. We tested whether the relationships regarding NA change when respondents experience high levels and low levels of NA. We created two different files by splitting through the responses lower and higher than the median of NA. For the low NA group, NA did not relate with LMX significantly. For the high NA group, NA was associated negatively and significantly

Table 4: Multilevel estimates for models predicting the daily LMX

	Model 1			Model II			Model III			Model IV		
Variable	Est	SE	T	Est	SE	T	Est	SE	T	Est	SE	t
Intercept	4.76	0.59	8.00**	4.76	0.59	8.00**	4.76	0.59	8.00**	4.73	0.58	8.11**
Trait Emotional Intelligence	0.40	0.16	2.43*	0.40	0.16	2.43*	0.40	0.16	2.43*	0.40	0.16	2.50*
Faking Emotions				-0.04	0.09	-0.49	-0.04	0.09	-0.53	-0.02	0.08	-0.32
Deep Acting				0.05	0.07	0.75	0.05	0.07	0.74	0.05	0.07	0.82
Hiding Feelings				-0.01	0.06	-0.25	0.02	0.06	0.32	0.00	0.07	0.07
Negative Affect				0.10	0.04	2.42*	0.10	0.04	2.21*	0.10	0.04	2.03*
Positive Affect				0.43	0.05	7.72**	0.42	0.05	7.82**	0.44	0.05	7.98**
Trait Emotional Intelligence on Positive Affect slope							-0.06	0.07	-0.88			
Trait Emotional Intelligence on Negative Affect slope							-0.00	0.06	-0.06			
Negative Affect*Faking Emotions										-0.04	0.04	-0.95
Negative Affect*Deep Acting										0.06	0.05	1.18
Negative Affect*Hiding Feelings										0.06	0.06	-1.07

Notes: N=All level 1 variables (except the dependent variable) were group centered relative to the individuals' means. Level 2 variables were entered grand mean. Interaction variables were standardized before multiplication. ** $p < 0.01$, * $p < 0.05$

Table 5: Multilevel estimates for predicting LMX for high NA cluster

Variable	Est	T
Main effects		
Intercept	4.51	8.76**
Faking Emotions	-0.18	-0.89
Deep Acting	0.09	0.05
Hiding Feelings	0.31	1.60
Negative Affect	0.29	-2.16*
Cross Level Interaction Trait Emotional Intelligence effect on		
Intercept	0.53	3.51**
Negative Affect slope	-0.01	-0.11
Level 1 Interaction		
Negative Affect*Faking Emotions	0.06	0.45
Negative Affect*Deep Acting	0.33	2.28*
Negative Affect*Hiding Feelings	-0.36	-2.03*

Note: Analysis conducted in high-level Negative Affect group (responses higher than the median of Negative Affect across the sample). All predictor scores were grand mean centered to include interpersonal variance.

* $p < 0.05$, ** $p < 0.01$.

with LMX. As we split the file through the occasions (not people) we used grand centering for testing the moderator hypotheses regarding the high-level NA group. The results were summarized in Table 5. NA was negatively related to LMX. EI showed no moderator effect on this relationship but had a direct cross-level effect on LMX. Deep acting and hiding feelings significantly moderated the relation-

ship between NA and LMX.

To understand the nature of the moderation, we graphically depicted interaction effects by using one standard deviation above and below the mean for variables. The plots demonstrate that the negative relationship is stronger when participants experienced lower levels of deep acting and higher levels of hiding feelings.

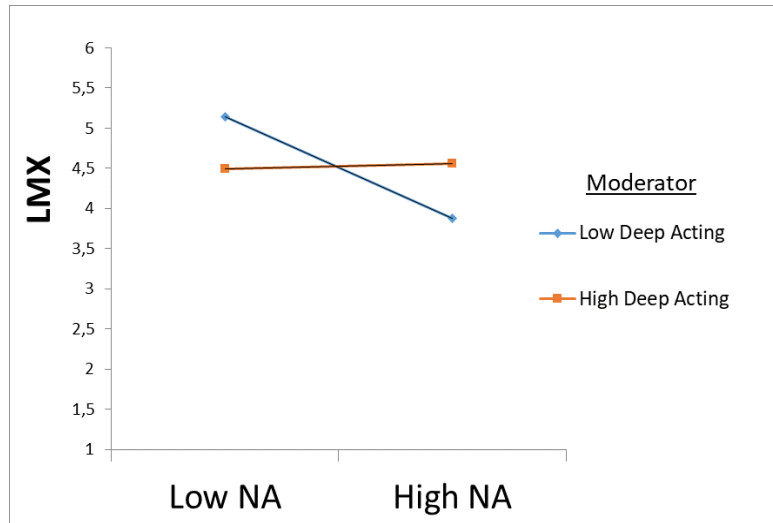


Figure 2: The first level moderating effect of deep acting for high NA sample.

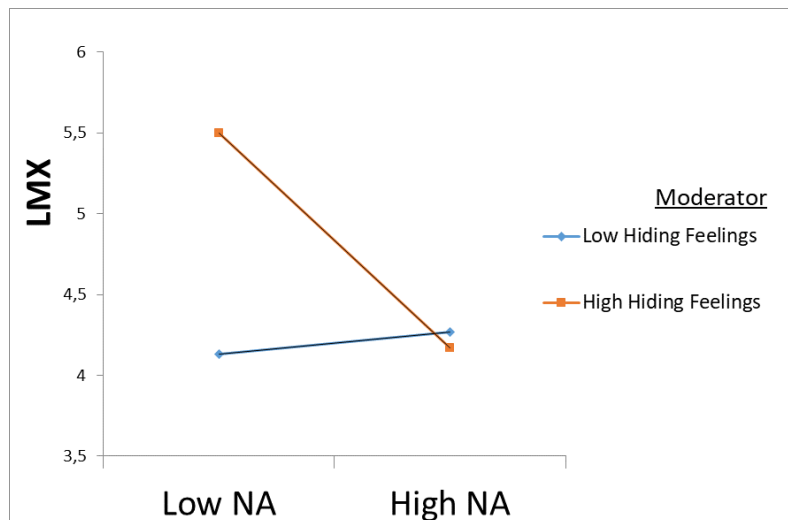


Figure 3: The first level moderating effect of hiding feelings for high NA sample

5 Discussion and Conclusion

5.1 Discussion

This study investigated the association between daily affect and daily LMX and the moderator roles of EI and EL on this relationship. Seventy participants provided 70 person-level data (via a survey assessing demographics and EI) and 350 day level data (through a survey measuring daily forms of NA, PA, EL, and LMX for five consecutive days). Hypotheses were tested in a multilevel setting where the days were nested in employees.

The multilevel analysis results using group-centered level-one variables indicated that both PA and NA were positively related to the dependent variable. This means, on the days employees experienced higher levels of PA and NA, they also perceived higher levels of LMX. In other words, higher levels of daily NA and PA (compared to the mean of individuals' affect level across five days) increased the daily LMX experience. The PA part of these findings supports our propositions and is consistent with the extant literature (e.g., Hochwarter, 2005; Liu et al., 2020). However, the NA part of these findings contrasts with our propositions and most of the present research (e.g., Sniderman et al., 2016). This pattern of findings regarding the NA-LMX association can be explained by the Conservation of Resources Theory (Hobfoll, 2011) as the theory suggests that employees try to seek, increase and sustain resources in demanding situations. On the days employees feel higher NA levels, they seek quality leadership interaction to alter their resources. The study measured affect that can be caused by any life events and towards anything instead of solely assessing affect towards the leader. Employees can use LMX as a coping mechanism (Major & Morganson, 2011) to reduce their NA produced by various factors. Besides, most studies that have addressed the relationship between NA and LMX did not adopt a multilevel within-person research design. Instead, they analyzed the between-person variance addressing the one-time measured general experience of NA and the general perception of LMX. Hence, the current study findings regarding the person-level (aggregated) NA and LMX are consistent with the general stream of findings in the literature (as they indicate a negative association). Moreover, investigation of daily intra-individual relationships between the constructs remains understudied, and findings of such research can provide new perspectives on the matter.

Findings underscore the fact that between-person and intra-person associations may operate in different ways. For instance, an employee may experience high-quality LMX in the days he/she feels comparatively higher affect, regardless of his/her between-person general affect or LMX level. The same person may face low-quality LMX than others when average scores are compared (inter-per-

sonal level). Thus, between-person and intra-person variances can show different outcomes. Using a multilevel approach enabled us to investigate both variances that provide essential insights into how affect is related to LMX. Therefore, we also tested the relationships regarding the between-employee variance. The analysis conducted with the aggregated scores of days for each employee showed a pattern of result that is opposite to the findings gathered through within-person variances (group-mean centering). Employees experience lower levels of LMX in general when they have higher NA levels compared to others (person-level). In contrast, on the within-person level, they have higher levels of LMX on the days they experience higher NA.

Trait EI shows a direct positive cross-level impact on day-level LMX in this study. The employees with higher Trait EI experience significantly higher levels of daily LMX. However, despite its direct effect, Trait EI has no significant influence on the affect-LMX slopes. The extant EI literature either addresses LMX as an antecedent (e.g., Clarke & Mahadi, 2011) or focuses on the leader's EI (e.g., Humphrey, 2012). Therefore, the current study's findings serve as a platform and a call for future research to enlighten the role of followers' EI on the affect-LMX association.

None of the EL constructs demonstrated any significant moderating effects in the preliminary analysis. However, when we tested for high NA and low NA groups separately, deep acting and hiding feelings showed significant moderation between NA and LMX in the proposed way. The independent testing of high and low affect levels may further enhance our understanding of the nature of their influence on the outcomes (e.g., Hochwarter, 2005). We tested the relationship between variables on the days NA was higher than the sample average, and on the days it was lower. The negative relationship was stronger when participants experienced lower levels of deep acting and higher levels of hiding feelings for the high NA sample. These findings align with the existing studies that reported significant links between EL and LMX (e.g., Liden & Maslyn, 1998).

5.2 Theoretical and Practical Implications

This investigation contributes to current literature in several ways. First, the study furthers the knowledge on the affect-LMX relationship by shifting the search of causality by casting affect an antecedent role. It reveals that daily affective states significantly influence daily LMX. This is important to provide a platform and a call for more research to shed light on the affect-to-LMX pathway. Second, the study further elaborates the complex nature of the association between concepts as it demonstrates that

they relate differently on the person and day level. This is critical because the extant knowledge regarding this relationship is dominantly a product of the general stream of findings addressing concepts as static structures and neglecting intra-individual variance. The current study also enhances the information about the affect-LMX link by demonstrating that high and low levels of affect can have different natures of associations with LMX. Moreover, the significance of the moderating roles of EL constructs can also be different in high and low levels of affect.

These findings provide significant managerial implications. Enhancing our knowledge of the antecedents of LMX is crucial for the performance of public health institutions. Recent studies conducted in the Turkish context (e.g., Ürek & Ugurluoğlu, 2019) report findings that associate LMX with positive organizational outcomes in public healthcare organizations. The nature of the job and the workplace can elevate the levels of affect experienced by public health care professionals. Findings of the current study indicate that employees can seek and engage in higher levels of exchange with their leaders on the days they experience higher levels of both positive and negative affect. Leaders should acknowledge that and respond with higher leadership support and involvement. However, employees' general levels of affect act differently whereas positive affect increases LMX on the person-level, and negative affect is reversely related to LMX. Besides, the intensity of negative affect can impact LMX in different ways, and these effects are regulated by EL. When negative affect is high, employees experience lower LMX if they choose to hide their emotions. Contrary, deep acting weakens the adverse association between negative affect and LMX. Therefore, efforts encouraging deep acting can mitigate the undesirable impact of negative affect on LMX. The findings of the present study underscore the HRM practices that address the usage of more positive emotional regulation styles, such as training and development efforts and workplace counseling. Also, strengthening leadership development processes for fostering leadership styles that would provide better LMX quality by including daily emotions such as emphatic leadership (Kock et al., 2019) can serve as a significant HRM policy. Creating a positive climate where employees do not hide their feelings and supporting the psychological capacities of employees for constructive regulation of emotions can alleviate the effects of negative affect on LMX. Given the positive cross-level effects trait EI on daily LMX, investing in the EI capacities and including EI as a selection criterion in recruitment processes can enhance LMX in organizations.

5.3 Limitations and Directions for Future Research

The study data was provided by the employees working in the public health organization in Turkey. Due to

difficulties in data collection for daily multilevel research designs, we could not enlarge our sample to other work settings. Readers should consider this for the generalizability of the findings. In a cross-cultural study (among ten countries), Aycan et al. (2000) presented that managers' assumptions regarding HRM practices and employee characteristics are significantly affected by the culture. The study also revealed that Turkey depicts a highly paternalistic culture that can affect perceptions such as loyalty and malleability, which are essential aspects of LMX development. Thus, the findings of the current should be considered with the cultural characteristics of the sample. Tightly-knit and close relational characteristics build on loyalty and paternalism can strengthen the bonds between leaders and members, fostering the crossover or effects of daily affect on LMX.

All the variables analyzed in this research were assessed through self-rating measures. Although using group-centered forms of these variables eliminated the between-person variance, self-rating may create biases, especially for grand-mean centered forms of the variables. Despite two week-gap between the person-level general questionnaire and the first day-level questionnaire, all day-level measures were given daily together. As the scale was kept very short and daily research designs are demanding for respondents, we did not separate the daily measures (for each variable) or give them at different times during the days. This can create suspicions for common method bias. For that reason, we conducted Harman's single factor test. When daily measures were allowed to factor freely, they explained 68% of the variance, and when they were forced to factor under one factor, they could only explain 27% of the variance. One factor structure explaining less than 50% (threshold) of the variance indicates no problems regarding common method bias (Eichhorn, 2014).

The study data was collected from one unit; therefore, team-level variances could not be reflected in our research design. For further studies, three-level research designs including organizational units may enhance our knowledge of the relationship between affect and LMX.

5.4 Conclusion

The investigation of LMX in public healthcare organizations is crucial because LMX serves as a significant predictor for several organizational and individual outcomes. The affective pathway to LMX is significant and complex. Affect relates to LMX differently at intra-individual and inter-individual levels. Besides, high and low affect levels can demonstrate different patterns of associations with LMX when the affective moderators are included in the model. The findings of the current study underscore the sophisticated nature of the affect-LMX relationship and the significance of further research on the matter.

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Mehmet Çetin, PhD in organizational behavior. Currently works as an academician and the vice manager of the Graduate Education Institute in Istanbul Sabahattin Zaim University. He has ten years of academic experience. He also has worked as a strategic management consultant. His primary research areas are leadership, wellbeing, workplace spirituality, organizational culture, proactive behavior, and workplace loneliness.

Gulmira Samenova, PhD candidate at Istanbul Sabahattin Zaim University. She has extensive practical knowledge in the business and management of trade companies. Her areas of interest include leadership, HRM, marketing management, and business processes in agricultural enterprises.

Filiz Türkkan, PhD candidate, continues her education at Istanbul Sabahattin Zaim University Business Administration Doctorate Program. She currently works as a Branch Manager in Küçükçekmece District Health Directorate. She produces academic work on management and organization, organizational behavior, public health, and quality management.

Ceylan Karataş, PhD student, continues her education at Istanbul Sabahattin Zaim University Business Administration Doctorate Program. She works as the Deputy Manager of Administrative and Financial Services at a city Hospital. She conducts research on organizational behavior, public health, management, and organization.

Vloga vsakodnevnega vpliva na izmenjavo med vodjo in timom v javnih zdravstvenih zavodih

Ozadje in namen: Čeprav je ključna vloga vplivov v odnosih med vodjem in člani tima (Leader Member Exchange – KMX) splošno znana, je le malo študij raziskovalo vpliv dnevnih sprememb znotraj posameznih članov tima na vsakodnevno izmenjavo med vodjo in timom (LMX) ali obravnavalo morebitne posamezne moderatorje tega vpliva. Študija je preučuje pozitivne in negativne vplive članov tima na njihov dnevni LMX v javnih zdravstvenih organizacijah. Raziskovali smo tudi moderatorsko vlogo čustvene inteligence.

Metodologija: Izvedena je bila večstopenjsko zasnovana raziskava, kjer je 70 udeležencev, ki delajo v javni zdravstveni organizaciji v Istanbulu, pet zaporednih delovnih dni vsak dan izpolnilo dnevni vprašalnik (350 odzivov na dnevni ravni), in splošni vprašalnik en teden po obdobju vsakodnevne zbiranja podatkov (70 odzivov na ravni posameznika). Hipoteze smo preverjali z uporabo hierarhičnega linearnega modeliranja (HLM).

Rezultati: Pozitivni in negativni vpliv sta bila pozitivno povezana z LMX (dnevna raven), negativni učinek pa je imel negativno povezavo z LMX na medosebni ravni (tedensko povprečje rezultatov po dnevih). Čeprav je čustvena inteligenca lastnosti pokazala vpliv učinek na več nivojih, nobena od predpostavljenih posrednih povezav ni bila statistično pomembna.

Zaključek: Vloga dnevnega vpliva LMX je ključnega pomena in ima zapleteno strukturo. Ugotovitve poudarjajo pomen večstopenjskih raziskav za razumevanje razmerja vpliv-LMX, saj prikazujejo različne slike po dnevih in po posameznikih.

Ključne besede: Čustveno delo, Izmenjava med vodjo in timom, Čustvena inteligenca, Dnevna interakcija

Appendix A: Leader Member Exchange Questionnaire - Scandura and Graen (1984)

The original items (3 of the total 7)

Instructions: This questionnaire contains items that ask you to describe your relationship with either your leader or one of your subordinates. For each of the items, indicate the degree to which you think the item is true for you by circling one of the responses that appear below the item.

1. How well does your leader (follower) understand your job problems and needs?
2. How well does your leader (follower) recognize your potential?
3. How would you characterize your working relationship with your leader (follower)?

Slightly Modified (for day level use) Versions Used in the Study (modifications are in italics):

Instructions: This questionnaire contains items that ask you to describe your relationship with your leader. For each of the items, indicate the degree to which you think the item is true for you by circling one of the responses that appear below the item. *Please consider your relationship with your leader today (not in general).*

1. How well *did* your leader understand your job problems and needs *today*?
2. How well *did* your leader recognize your potential *today*?
3. How would you characterize your working relationship with your leader *today*?

Appendix B: Emotional Labor Questionnaire – Lee & Brotheridge (2011)

The original items:

1. Pretend to have emotions that I don't really have
2. Show emotions that are expected rather than what I feel
3. Really try to feel the emotions I have to show as part of my job
4. Make an effort to actually feel the emotions that I need to display to others
5. Hide my true feelings about a situation
6. Resist expressing my true feelings

Slightly Modified (for day level use) Versions Used in the Study (modifications are in italics):

1. *Today* I pretended to have emotions that I *didn't* really have
2. *Today* I showed emotions that are expected rather than what I feel
3. *Today* I really tried to feel the emotions I have to show as part of my job
4. *Today* I made an effort to actually feel the emotions that I need to display to others
5. *Today* I hid my true feelings about a situation
6. *Today* I resisted expressing my true feelings

Appendix C: Positive Affect Negative Affect Scale - PANAS – Watson et al. (1988)

Just the wording in the instructions was modified to ask the frequency regarding today.

1. Distressed
2. Upset
3. Enthusiastic
4. Nervous
5. Irritated
6. Strong
7. Active

Appendix D: Trait Emotional Intelligence Questionnaire- TEIQue-SF – (Person level) Petrides & Furnham (2001), Petrides (2009)

Just the wording in the instructions was modified to ask the frequency regarding today.

1. Expressing my emotions with words is not a problem for me.
2. I often find it difficult to see things from another person's viewpoint.
3. On the whole, I'm a highly motivated person.
4. I usually find it difficult to regulate my emotions.
5. I generally don't find life enjoyable.
6. I can deal effectively with people.
7. I tend to change my mind frequently.
8. Many times, I can't figure out what emotion I'm feeling.
9. I feel that I have a number of good qualities.
10. I often find it difficult to stand up for my rights.
11. I'm usually able to influence the way other people feel.
12. On the whole, I have a gloomy perspective on most things.
13. Those close to me often complain that I don't treat them right.
14. I often find it difficult to adjust my life according to the circumstances.
15. On the whole, I'm able to deal with stress.
16. I often find it difficult to show my affection to those close to me.
17. I'm normally able to "get into someone's shoes" and experience their emotions.
18. I normally find it difficult to keep myself motivated.
19. I'm usually able to find ways to control my emotions when I want to.
20. On the whole, I'm pleased with my life.
21. I would describe myself as a good negotiator.
22. I tend to get involved in things I later wish I could get out of.
23. I often pause and think about my feelings.
24. I believe I'm full of personal strengths.
25. I tend to "back down" even if I know I'm right.
26. I don't seem to have any power at all over other people's feelings.
27. I generally believe that things will work out fine in my life.
28. I find it difficult to bond well even with those close to me.
29. Generally, I'm able to adapt to new environments.
30. Others admire me for being relaxed.

Effect of Management Commitment to Service Quality on Car-hailing Drivers' Service Behaviors: The Case of GrabCar in Vietnam

Phuong TRAN HUY, Hong Chuong PHAM

National Economics University, Hanoi, Vietnam, phuongth@neu.edu.vn; chuongph@neu.edu.vn

Background and Purpose: Management Commitment to Service Quality (MSCQ) has been found to positively predict employee's service quality and service behaviors in different service industries. In the context of sharing economy, the relationship between company and service providers is different from traditional employment relationship. For car-hailing service, drivers are mainly classified as contractors rather than employees. It is, therefore, necessary to understand whether MSCQ influences drivers' service quality in a car-hailing context.

Design/Methodology/Approach: Data were collected from 214 GrabCar drivers in Vietnam using online and offline survey. Partial Least Squares Structural Equation Modeling (PLS-SEM) was used for data analysis.

Results: The findings suggest that three dimensions of MCSQ, namely reward system, technology support and organizational support exert significant direct impact on drivers' service behaviors. In addition, job involvement plays an intermediary role in the relationship between MCSQ and service behaviors.

Conclusion: This study expands previous research on MCSQ to the car-hailing service and confirms the role of job involvement as an important mechanism to improve service quality provided by drivers. Due to the characteristics of the company-service providers' relationship in the sharing economy, the mechanisms through which MCSQ influences providers' service performance need to be investigated in further details.

Keywords: *Management commitment to service quality (MCSQ), Service behaviors, Job involvement, Car-hailing, Sharing economy, Vietnam.*

1 Introduction

In the context of sharing economy, a number of businesses have emerged and proliferated (Peticca-Harris et al., 2018). In transportation, car-hailing service companies such as Uber, Lyft and Zipcar have expanded and gained significant market share throughout the world. Ride-sharing or Car-hailing typically refers to hire services where a passenger books for a ride using an online/ mobile platform. This type of sharing can happen when a driver shares his private vehicle with a passenger in a more open taxi-like system (Amey et al., 2011). By 2017, Uber was in use in 507 cities throughout the world and has an estimated

market value of over \$68 billion (Çetin, 2017). In China, Didi Chuxing (DiDi), have been successful in the transportation market, overtaking Uber's four billion rides in 2017 (Zuo, et al., 2019). In other markets, Transport Network Companies (TNCs) such as GrabCar and Go-jek have also achieved remarkable market growth (Hamenda, 2019).

The focus of the current study is on car-hailing service, namely GrabCar, provided by Grab Inc in Vietnam. Formerly known as MyTeksi and GrabTaxi, Grab is a Singapore based ride-sharing company. The company was originally founded in Malaysia and later moved its headquarters to Singapore. Grab is an app-based service provider that offers ride-hailing, ride-sharing, and logistics

services through its app. It now operates in the Southeast Asian countries of Singapore, Malaysia, Indonesia, Philippines, Vietnam, Thailand, Myanmar, Cambodia and Japan. Grab has been operating in Vietnam since 2014 with the original name Grabtaxi. Current transportation services include GrabCar, GrabTaxi and GrabBike. According to ABI research (2019), Grab dominates the car-hailing market in Vietnam with about 73% market share, 5 times more than that of its closest rival. In 2019, it is estimated that Grab has attracted about 135,000 drivers, more than 50,000 of whom are car drivers.

Despite its high potential, car-hailing services are not without problems, with service quality being the most prominent (Rayle, et al., 2016). Rayle et al. (2016) concerned that poor service quality may result because riders cannot compare information on price or service quality before choosing a vehicle. Yang et al. (2017) indicated that low industry expertise, lack of professional training, and loose obligations with the sharing service organizers are among the sources for low quality service provided by TNCs. Both Katz (2015) and Zuo et al. (2019) seemed to agree that, it is the business model, in which TNCs such as Uber have no employment relationship with direct service providers (drivers), and no financial stake in any particular transaction that cause service problems.

Because service quality is the most critical success factor for service (Frei, 2008), TNCs have find ways to provide better services to their customers. However, because of the loose nature of the relationship between TNCs and drivers, managing the ride service quality provided by contracted drivers is a challenging tasks (Shokoohyar, Sobhani, and Nargesi, 2020). The current study aims to address the following research questions: (a) "What should online platforms do to improve service quality offered to customers by their drivers?" and (b) "Through what channels do management' actions influence drivers' service delivery?"

The current study proposes that a TNC's management commitment to service quality (MCSQ) would influence car-hailing driver's service, despite the striking difference between car-hailing and traditional employment context. In addition, unlike in traditional employment context, where organizational commitment may act as a mediator of the relationship between firm commitment to service quality and provided service, this paper advocates that in the car-hailing context, job involvement would mediate the above relationship.

The contribution of this paper is threefold. First, while service quality has already attracted plentiful research interests, Priporas et al. (2017) and Zuo et al. (2019) proposed that empirical research about service quality in the sharing economy context in general, and online car-hailing industry, in particular, are still scarce. Furthermore, most extant studies examined the dimensions of service quality or investigated it as an antecedent of consumer

satisfaction (Ahrholdt, et al. 2017; Priporas et al., 2017; An et al., 2019). To date, little research investigates the antecedents of service quality in the sharing economy. In addition, while many studies observe service quality from the users' perspective (Dias et al., 2017; Ju et al., 2018; Priporas et al., 2017), few studies take the perspective of the direct service providers. Extant studies that focus on the supply side of car-hailing service mostly focus on factors that influence drivers' supply of service such as fare policy (Shokoohyar, 2018) or socio-economics factors and transportation infrastructures (Shokoohyar, Sobhani and Sobhani, 2020). This research takes a different focus by investigating service quality provided by car-hailing drivers.

Second, while the impact of management commitment to service quality on service performance has been investigated in the universal organizational context (Ashill et al., 2008; Babakus et al. 2003; Kim et al., 2009), few research focus on the sharing economy context in general and car-hailing service in particular. In addition, Lin et al., (2020) argued that because the determinants of workers' performance in the sharing economy have been scarce, more research attention to explore the driving mechanism of such workers' performance is needed. Similarly, Gleim et al. (2019) acknowledged a clear gap in our understanding of the perceptions and work outcomes of sharing economy workers and emphasize the importance of addressing this gap as the sharing economy continues to grow.

Third, this research explores the mediating impact of job involvement on the relationship between MCSQ and service performance. In the car-hailing context, because of the usually temporary and short term, non-employment relationship between TNCs and their direct service providers (Yang et al., 2017; Karn & Hutson, 2019) we expect that organizational commitment would not act as an intermediary variable of the MCSQ-service performance linkage. Peticca-Harris, et al. (2018) studied the motivations and experiences of Uber drivers in Canada. Data collected from 31 drivers, divided into part-time, full-time non-professional and full time professional group, indicate that drivers do not think about a long-term future with Uber. Instead, the drivers reported that driving for Uber is a temporary solution. Specifically, part-time drivers consider working for Uber as a part-time job for some extra income, while looking for more attractive future opportunities elsewhere. They also regard "driver" as an unwanted occupation and they prefer Uber because it is easier to quit Uber than traditional taxi. Full-time non-professional drivers do not regard driving as an occupational choice, yet they have to drive to make ends meet, showing some extent of continuance commitment to the company. Finally, while full-time professional drivers accept driving as their profession, they only opt for Uber for flexibility and potentially better income in comparison with traditional taxi companies. In a recent study, Lin et al. (2020) proposed that because of the flexibility that allows drivers to work

for multiple online platforms simultaneously, commitment should not be viewed from organizational perspective. Instead, they advocated the use of career commitment, which refers to the “relative strength of an individual’s identification with and involvement” with car-hailing sector in the sharing economy. The current study, examines job involvement of car-hailing drivers as a possible mechanism to deliver the impact of MSCQ on service quality.

2 Literature review

2.1 Management commitment to service quality

Extant literature has confirmed the role of managerial practices in fostering service behaviors among service workers (Kandampully & Menguc, 2000; Ueno, 2008). Managerial practices that contribute to excellent service quality can be conceptualized as management commitment to service quality (Babakus et al., 2003; Karatepe & Karadas, 2012; Rod & Ashill, 2010). Babakus et al. (2003, p. 275) defined management commitment to service quality (MCSQ) as “employees’ appraisal of an organization’s commitment to nurture, develop, support, and reward its employees to achieve service excellence”. Previous research suggested that MCSQ comprises practices such as training, empowerment and reward (Babakus et al., 2003), service technology, supportive management and servant leadership (Ashill et al., 2008), customer service orientation (Rod and Ashill, 2010), and organizational support (Kim et al., 2009). MCSQ has been found to positively predict employee’s service recovery performance and service behaviors in different service industries including banking (Babakus, et al., 2003), hospitality (Karatepe & Karadas, 2012), healthcare (Rod & Ashill, 2010), and public service (Ashill et al. 2008). In the context of car-hailing, because the drivers are mainly classified as contractors rather than employees (Rosenblat & Stark, 2016; Rosenblat, et al., 2017), they have total autonomy in their work, receive no service training and do not report to a particular leader. Therefore, MCSQ in this context should not include training, leadership and empowerment. In the current study, MCSQ includes service performance-based reward system, service technology and perceived organizational support.

2.2 Job involvement

Job involvement refers to the degree to which individuals psychologically identify with their present job (Kanungo, 1982). According to Kanungo (1982), job involvement and work involvement are different constructs. While job involvement focuses on one’s identification with the cur-

rent job and is influenced by the extent to which the current job can satisfy present needs, work involvement refers to the value of work in an individual’s entire life and is a function of past experience. Because car-hailing drivers do not regard the car-hailing job as a career or a long term commitment (Karn & Hutson, 2019), and most of them have worked in other jobs (Valente, Patrus, & Guimarães, 2019), this study focuses on job involvement of GrabCar drivers.

Research provides evidences to support the desirability of job involvement in the workplace. For example, people with high job involvement tend to develop strong tie with their jobs and are willing invest “personal resources” in their current job (Dimitriades, 2007; Kanungo, 1982). On the other hand, studies have found that employees with a low degree of job involvement tend to lose focus on their job (Hogan et al., 2013), and are less imaginative and open to new concepts (Abdallah et al., 2016).

3 Theoretical framework and hypotheses

3.1 Impact of management commitment on service quality and service behavior

Reward system

The impact of organizational reward on service performance has been well documented in the literature. Parasuraman (1987) argued that in order to distinguish a firm’s services from others, rewarding innovative thinking, outstanding service behaviors, and excellence in service delivery is vital. Similarly, Yavas et al. (2003) proposed that reward is not only important in fostering excellent service but also crucial in motivating direct service providers to solve service complaints.

In ride-hailing service, TNCs implement positive and punitive reward systems toward direct service providers. For instance, Uber offers rewards to its drivers if they achieve a pre-specified number of trips per week (Shokoo-hyar, 2018). In addition, Uber introduces reward program such as Uber Pro which offers such benefit as priority pickups, supports on the road, and family benefit based on numbers of trips and rider ratings (Uber, 2020). Similar reward programs have been applied by Grab who bases driver benefits on monthly rides, completion rate and star rating (Grab, 2019). On the other hand, car hailing companies also offer punitive reward program. For example, ride-hail companies require a driver to maintain a minimum rating, completion rate and driver timeout. Drivers are penalized if they go below the required completion rate. If a driver excessively ignores or cancels booking requests, they

Table 1: Summary of MCSQ studies

Study	MSCQ practices	Dependent variable	Mediator	Sample
Kandampully and Menguc (2000)	Quality control practices; quality measurement practices; and service maintenance practices	Service quality	None	Service firms
Babakus et al. (2003)	Training, empowerment, and rewards	Service recovery performance	Affective commitment Job satisfaction	Frontline bank employees
Yavas, Karatepe, Avci, and Tekinkus (2003)	Service orientation, reward, training, empowerment, and teamwork	Service recovery performance	None	Frontline bank employees
Lee, Barker, and Kandampully (2003)	Technology support	Service quality		Hotel managers
Ashill, Rod, and Carruthers (2008)	Training, empowerment, rewards, supportive management, servant leadership, and service technology.	Service recovery performance and turnover intentions.	Job satisfaction and organizational commitment	Public sector service frontline employees
Kim, Tavitiyaman, and Kim (2009)	Organizational support, rewards, empowerment, and training	Service behaviors	Job satisfaction	Hotel employees
Rod and Ashill (2010)	Reward, training, empowerment, and service orientation.	Service recovery performance	Organizational commitment.	Frontline hospital employees
Karatepe and Karadas (2010)	Training, empowerment, and rewards	Service recovery performance and extra-role customer service	Job embeddedness	Frontline hotel employees

are locked out of the platform for a temporary period of time. Drivers with passenger complaints and low star ratings are also flagged and suspended (Grab, 2019). While many TNCs use riders' rating to base their reward system, drivers complain that they are not aware of what influence their ratings (Rosenblat & Stark, 2016), and are doubtful about the link between ratings and benefits (Rosenblat et al., 2017). Ashill et al. (2008) advocated that if direct service providers believe that rewards systems and policies truly reflect commitment to service quality by management, they tend to engage themselves in service quality efforts. Thus, we can conclude that in order to improve service performance, reward structure should be perceived by drivers to be contingent upon service performance.

H1a: Service performance-based reward system is positively linked with service behaviors of car-hailing drivers

Service technology support

Service technology may aid service workers in providing better service to customers by optimizing pro-

cess, making procedures accurate and efficient, removing time-consuming routine tasks and reducing human errors (Ashill et al., 2008; Lee et al., 2003). In car hailing service, TNCs provide drivers with technological support in the form of rudimentary dispatching and navigation through the company-provided mobile apps. According to Karn and Hutson (2019), while the app-based system is considered reliable, issues such as difficulty with driver-passenger meet-up due to GPS failures, or billing problems that neither the driver nor rider could resolve through the app's functions may reduce service performance. Thus, we can expect that the availability of technology service support will enable the drivers to focus on delivery transportation service. Based on the above arguments, it is hypothesized that:

H1b: Service technology support is positively linked with service behaviors of car-hailing drivers

Perceived Organizational support

Organizational support refers to an individual's per-

ception that the organization is concerned about their success and well-being (Eisenberger et al., 1986). Organizational support has been a strong predictor of service performance (Ashill et al., 2008; Kim et al., 2009; Susskind et al., 2000). Ashill et al. (2008) argued that, based on the norm of reciprocity, service employees who receive support from their organization are likely to exert more efforts on their job in return. Susskind et al. (2000) indicated that organizational support is of great importance when dealing with service complaints. Because POS reflects workers' assessment of self-value by the hiring organization (Al-balawi et al., 2019), service workers who receive support in such situations tend to build trust with the organization, which in turn, influence service efforts. In the context of car-hailing, support received by the drivers from the sharing platforms is one important area of interest. Karn and Hutson (2019) found that drivers receive little or no support in many aspects of work including vehicle ownership and maintenance, expenses tracking and deductions, and business finances. Karn and Hutson (2019) proposed that these lack of support influence drivers socially, behaviorally, financially, and emotionally. Shokoohyar (2018) also indicated that operational costs and lack of job security are the main concerns of drivers and suggested that providing more supportive incentive contract to compensate drivers' operational costs can improve drivers job satisfaction. Thus, we can expect that organizational support will foster efforts in service behaviors.

H1c: Perceived Organizational Support is positively linked with service behaviors of car-hailing drivers

3.2 The impact of MCSQ on job involvement

Reward system

Kanungo (1982, p.342) defined job involvement as "the degree that an individual psychologically identifies with his or her present job", and suggested that because job involvement concerns the present job, it is influenced by how much the present job can satisfy current needs. In car-hailing scenario, Standing et al. (2019) suggested that income, being independent, and lack of job opportunities are the main reasons to provide service. Valente et al. (2019) found that the main reason for becoming a car-hailing driver is to solve unemployment issues and to generate more income, rather than to make an adjustment to the market or a to search for more flexible and complementary type of work. Because reward structure that is contingent upon service performance can satisfy the current needs of generating income, it is expected to be positively linked with job involvement.

H2a: Service performance-based reward system positively influences a driver's job involvement

Service technology support

Technology support can help service employees carry out their job duties successfully. It frees the employees of routine repetitive tasks that may frustrate the employees. With the help of technology, the service workers can devote their time to deliver excellent service to the customers (Lytle et al., 1998). Technology support also makes the jobs less demanding and taxing by reducing job stress. Therefore, technology is expected to positively linked with job involvement. It is hypothesized that:

H2b: Service technology support positively influences a driver's job involvement

Perceived organizational support

Researchers contended that the work environment has a significant impact on job involvement (Lawler & Hall, 1970; Lawler, 1992). Lambert and Paoline (2012) suggested that positive aspects of work environment such as organizational support, can reduce job stress and make the job more enjoyable, thereby increases job involvement. In addition, when employees perceive that the organization is supportive and concerned about their success and well-being, they may consider it as a signal from the organization that it respects and values the jobs that they are doing. Organizational support may also contribute toward the fulfillment of "socio-emotional needs" of employees (Rhoades & Eisenberger, 2002). Being successful and valued increases the likelihood that a person will identify with his or her job. In addition, fulfillment of needs also contributes to the feeling of attachment with the job. Therefore, it is hypothesized that:

H2c: Perceived organizational support positively influences a driver's job involvement

3.3 The mediating role of job involvement

Job involvement is identified as a predictor of important work outcomes, such as organizational commitment, job satisfaction, increased work effort, job performance, and organizational citizenship behaviors (Chen & Chiu, 2009; Diefendorff, Brown, Kamin, & Lord, 2002). Wood (1974) suggested that job involvement results from intrinsic motivation and therefore, is likely to be linked to job performance that provides intrinsic rewards. Abhari et al. (2019) study collaborative innovation in the sharing economy and found that beside extrinsic motivation such as financial gain, intrinsic motivation such as enjoyment and altruism are important determinants of engagement in social product development projects. Lin et al. (2020) research food delivery workers in the sharing economy

and found that enjoyment attached with the job was an important work value perceived by these workers. In addition, they found a positive relationship between drivers' work centrality and work engagement, which in turn, foster positive work behaviors. Thus it can be expected that, in the context of sharing economy, job involvement is an important determinant of positive job outcomes among participants. Furthermore, the mediating impact of job in-

volvement on the relationship between job characteristics and job performance has been confirmed in other contextual settings (Chen & Chiu, 2009; Mrayyan & Al-Faouri, 2008). Following these above argument, it is hypothesized that:

H3a-c: Job involvement mediates the relationship between reward system, service technology and perceived organizational support and service performance.

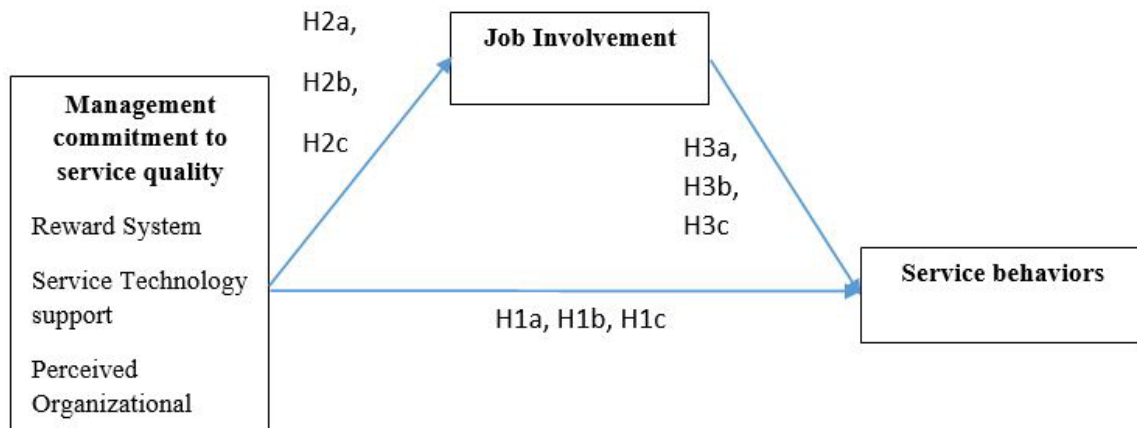


Figure 1: Research model

4 Method

4.1 Data collection

Preliminary interviews with 10 drivers were conducted by the author during 30-minute rides with Grab to understand the characteristics of the relationship between drivers and the TNC, the availability of technological support and job involvement of the drivers. Information obtained from interviews were used to develop questionnaires for a subsequent quantitative survey.

Quantitative data were collected via survey based on convenient sampling and snowball techniques due to unavailability of drivers' information. Questionnaires in paper-based or QR-coded versions were administered to Grab drivers by our research collaborators during their rides with Grab. Then, the drivers were requested to introduce other fellow drivers who are driving for Grab. Based on this information, we contacted other drivers and sent the QR-coded/online versions of the questionnaires. These drivers may choose whether to participate in the research. Out of 450 questionnaires sent, 214 have been filled by Grab drivers and were used for data analysis.

4.2 Measure

All items are measured on a 5-point Likert scale ranging from 1. Strongly disagree to 5. Strongly agree, unless stated otherwise.

Service performance-based Reward system: respondents are asked to evaluate the degree to which reward are based on performance at Grab Vietnam. Three items used by Ashill et al. (2008) were adopted to measure employee reward. A sample item is "My income depends on the quality of service I deliver".

Service Technology Support: Drivers are requested to rate the extent to which technology support is offered by the company. This scale was measured using a four-item scale used by Ashill et al. (2008). The items include: "Grab has the necessary technology support to serve my customers effectively".

Perceived organizational support (POS): The drivers are asked to provide their self-perception of the support offered to them by Grab company. Eight items selected from the 16-item SPOS scale developed by Eisenberger et al. (1986) were used to measure POS in car-hailing background. Uses of shorter version was suggested by Rhoades and Eisenberger (2002) as acceptable. Shorter version of the scale has been used by Hameed et al. (2019). The items

include “Grab is willing to help me when I need a special favor”.

Job involvement: This variable measures the extent to which a driver is identified with their driving jobs. The 10-item scale developed by Kanungo (1982) was adopted in this research. These items include: “The most important things that happen to me involve my present job” and “I live, eat and breathe my job”.

Service behavior (SB): This variable measures the drivers’ delivery of service to the customers. Five items adapted from Zhang et al. (2019) were used to measure service behavior. One sample item was “I provide transportation services according to the job responsibilities prescribed by Grab”. The scale items are presented in the Appendix.

5 Results

5.1 Sample description

Among 214 drivers, 210 are men and only 4 are women. The average age of the drivers is 32.4 years. On average, the drivers have been in partnership with Grab for two and a half years. About 75% of the drivers bought a car to drive for Grab while the remaining 25% used their under-utilized cars. Also, more than two-thirds of the respondents are working full-time as drivers. More than half of the respondents also drive for other ride-hailing platforms.

Table 2: Respondent profile

Variable	Frequency	Percentage
Gender of driver		
Men	210	98.1%
Women	4	1.9%
Age of driver		
From 18 to 25	64	29.9%
From 26 to 35	75	35.1%
From 36 to 45	41	19.2%
Above 46	34	15.8%
Year of working with Grab		
Less than 1 year	101	47.2%
From one to 3 years	74	34.6%
More than 3 years	39	18.2%
Type of vehicle		
Under utilized	156	72.9%
Newly bought	58	27.1%
Multiple TNCs		
Drive only for Grab	93	43.5%
Drive for other TNCs	121	56.5%

5.2 Validity and reliability

Before testing the hypotheses, we check the reliability and validity of the research variables. As indicated in figure 1, all indicators showed significant loading values on their specified construct, and the standardized loadings ranged from .54 to .89 (t values = 7.093 to 39.77; $p < .001$). For reliability and convergence validity, Composite Reliability (CR) of all latent variables were calculated and compared to the threshold value of .7. The average variance extracted

(AVE) for all variables should also exceed the threshold value of .5 (Hair, Black, Babin, and Anderson, 2010).

For discriminant validity, the square roots of the all AVE scores should be higher than the correlation coefficients between the constructs (Fornell & Larcker, 1981). Furthermore, Heterotrait-monotrait (HTMT) ratios must be smaller than 0.8. The figures shown in Table 3 and the fact that the highest HTMT ratio is 0.639 confirm the reliability and validity of the constructs.

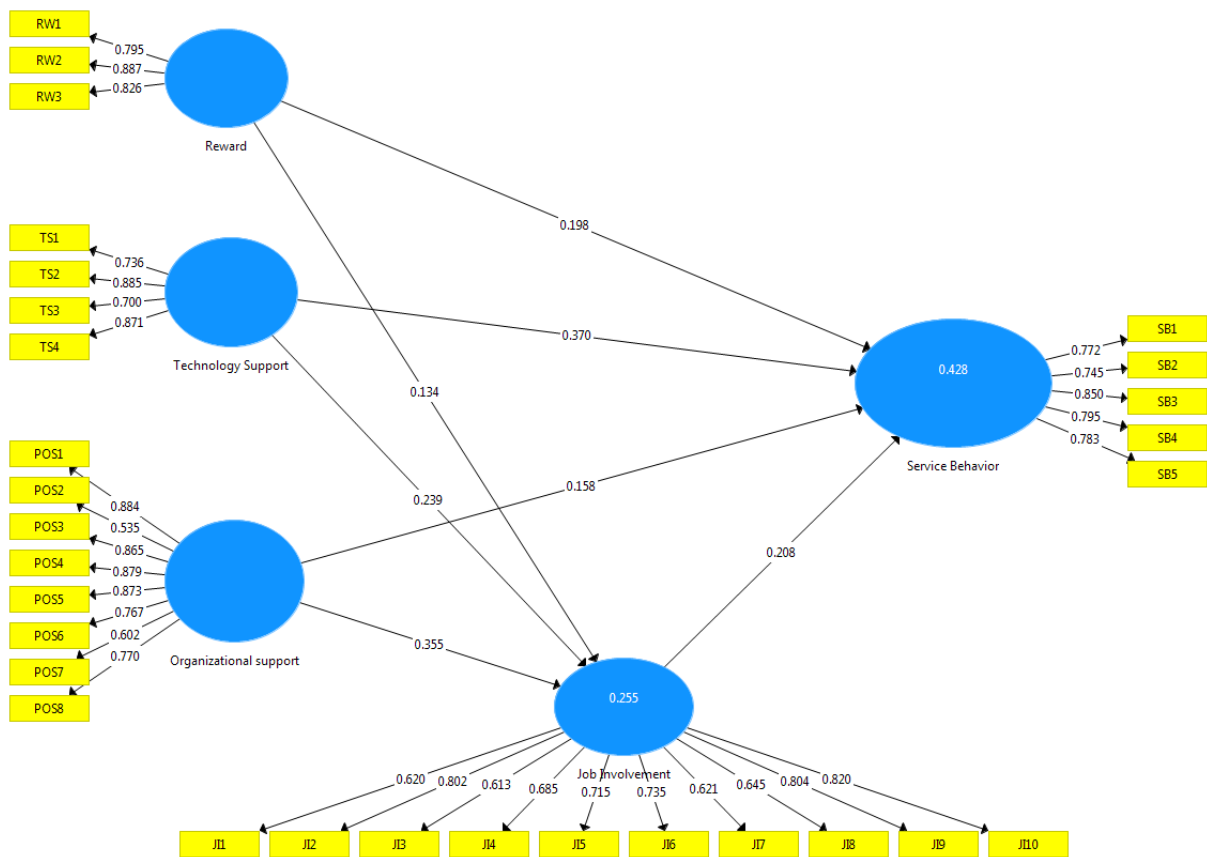


Figure 2: Factor loadings

Table 3: Correlations, reliability and validity of the constructs

Variable	1	2	3	4	5	α	C.R	AVE
Job Involvement	.710					.891	.91	.504
Organizational support	.404	.782				.905	.925	.612
Reward	.291	.136	.837			.785	.875	.701
Service Behavior	.458	.318	.447	.790		.849	.892	.624
Technology Support	.346	.131	.452	.552	.802	.816	.877	.643

Note: CR: composite reliability; AVE: average variance extracted; α : Cronbach's alpha. Square-root of AVE for each construct in bold.

Common method bias

The Harman's one factor test is used to examine the potential problem of common method variance. All items were entered into EFA which is forced to produce one factor. The result suggested that the factor accounts for only 21.25% of the total variance. Therefore, common method bias does not pose a significant problem in this study.

5.3 Hypothesis testing

Hypotheses H1a to H1c concern the direct impact of management commitment to service quality on car-hailing drivers' service behaviors. Specifically, reward, technology support and organizational support are each expected to positively and significantly predict service behaviors. These hypotheses were tested based on the significance of

the structural path coefficients. As indicated in Table 4, the path coefficients from reward ($\beta=.198$, $p<.05$), technology support ($\beta=.370$, $p<.001$) and organizational support ($\beta=.158$, $p<.05$) are all positive and significant. Therefore, hypotheses from H1a to H1c are supported.

Table 4 showed that the path coefficients from reward, technology support and organizational support to Job involvement are all positive and significant, supporting hypotheses H2a to H2c.

Table 4: Direct effects of management commitment to service quality on service behavior and job involvement

Direct effect	Service behavior	Job Involvement
Reward	.198*	.124*
Technology support	.370***	.239**
Organizational support	.158*	.355***

Note: CR: composite reliability; AVE: average variance extracted; α : Cronbach's alpha. Square-root of AVE for each construct in bold.

Hypotheses H3a to H3c suggest that Job involvement mediates the relationship between three dimensions of MCSQ and Service behaviors. To test the hypotheses, the 4 steps suggested by Baron and Kenny (1986) are followed. The conditions for mediation need to be checked before making conclusion. The first two conditions for mediation are that the independent variables must be significantly associated with the mediator (job involvement) and the

dependent variable (service behaviors). These conditions have been satisfied with the support of Hypothesis H1a to H1c and H2a to H2c. The third condition was also met when the mediator significantly influences the dependent variable ($\beta=.208$, $p<.05$). The indirect effects of reward, technology support and organizational support on service behaviors via job involvement are indicated in Table 5. The data provide support for H3b and H3c but not for H3a.

Table 5: Indirect effect of MCSQ on service behaviors via job involvement

Indirect effect	Coefficient	t	p value
Reward -> Job Involvement -> Service behaviors	.028	1.485	.138
Technology support -> Job Involvement -> Service behaviors	.050	1.978	.049
Organizational support -> Job Involvement -> Service behaviors	.074	2.302	.022

6 Discussion and contribution

6.1 Discussion

This study aims to investigate the impacts of MCSQ on service behaviors among GrabCar drivers. Because of the generally agreed non-employment relationship between Transportation Network Companies and their drivers, it is important to understand how these TNCs can improve service quality by influencing their drivers.

The result showed that reward is associated with service behaviors among car-hailing drivers. Specifically, the impact of management commitment to service quality, manifesting in the reward system that is contingent upon service delivery, is positively influence the delivery of service as expected by the TNCs. In the car-hailing context, income is among the primary reasons for individuals to become a driver (Standing et al., 2019; Valente et al., 2019).

If the drivers perceive that their income is directly linked with their service delivery, they are likely to devote more effort in providing excellent service. The results are in line with the findings of previous research in the car-hailing context. Fielbaum and Tirachini (2020) found that wage level and the transparency in wage determination are the top two predictors of job satisfaction among ride-hailing drivers in Chile. On the other hand, inadequate pay and perceived pay injustice are among the causes for drivers' dissatisfaction (Karn & Hutson, 2019).

The availability of technology support has been found to be an important determinant of service behavior among car-hailing drivers. Because Car-hailing service is a technology-based transportation service, the role of technology support is paramount. Technology helps connect the drivers and passengers, calculate fares and locate the best possible routes. However, despite the overall utility of the app, problems usually arise due to GPS failure or slow update. In addition, drivers report that they did not receive

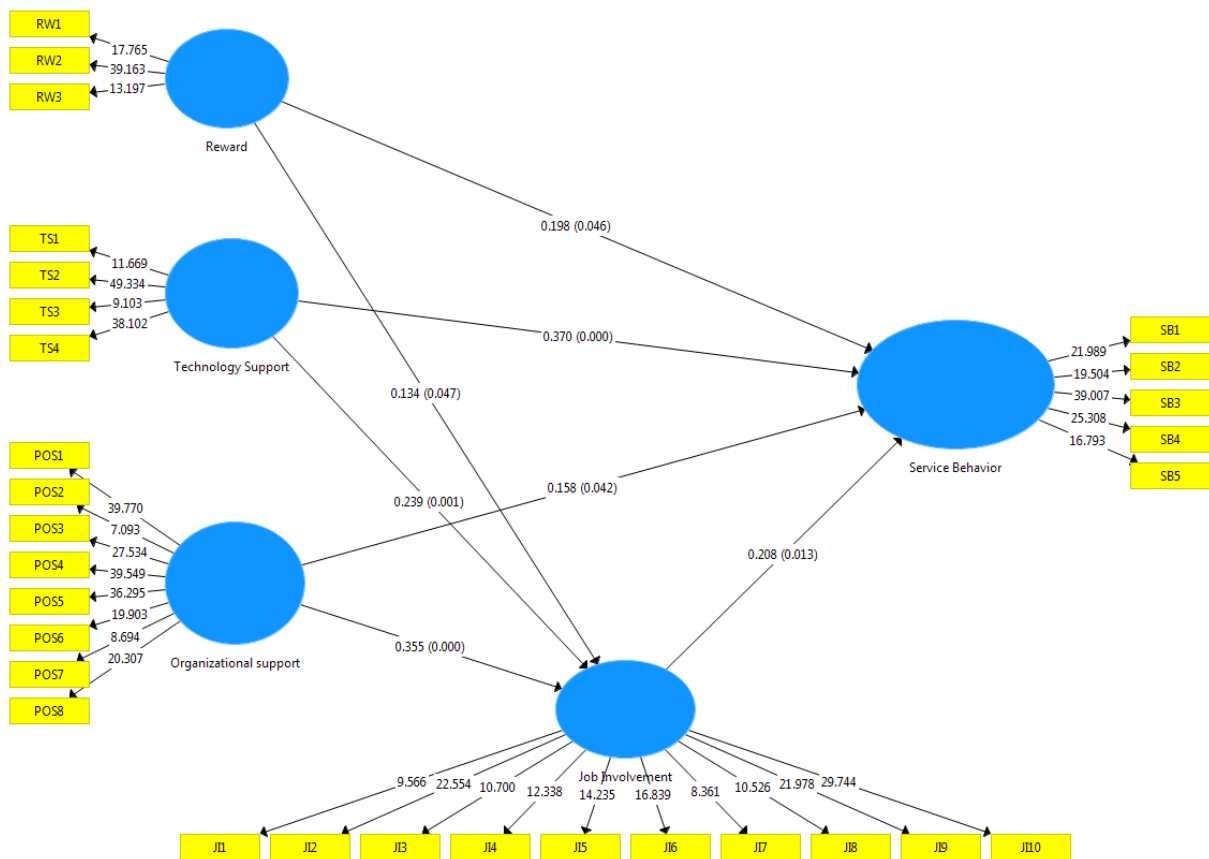


Figure 3: Path coefficients and p-value

much support in dealing with customers beyond the scope of the app (Rosenblat et al., 2017). Other studies highlight the role of trip characteristics, weather conditions, and socioeconomic and demographic factors on car-hailing service accessibility, as well as, service performance indicators such as pick-up waiting time, trip duration, and fare increase (Shokoohyar, Sobhani, & Sobhani, 2020; Shokoohyar, Sobhani, & Nargesi, 2020). The findings emphasize the importance of technology support in regulating supply of car-hailing service in order to improve service performance.

Despite the loose relationship between TNCs and drivers, this study suggests that organizational support is a crucial factor in fostering service delivery among drivers. In the context of sharing economy, Liu et al. (2020) found that organizational support, in the forms of psychological contract fulfillment, directly influences gig workers' task performance. Similarly, Gleim et al. (2019) reported that organizational trust is an important predictor of job outcome status and satisfaction among sharing economy workers. Furunes and Mkono (2019) also pointed out that lack of organizational support is the main challenges for

food-delivery workers, especially in case of service failure.

Job involvement refers to the personal identification with the current job. Factors that make the job more interesting and enjoyable and those that reduces obstacles and strains in doing the job are expected to increase job involvement. The findings add to previous evidences regarding the antecedents of job involvement in sharing economy context. Fielbaum and Tirachini (2020) indicate that "enjoy driving" was an important predictor of car-hailing drivers' job satisfaction, second only to flexibility.

Job involvement partially mediates the impact of perceived organizational support and technology support on service behaviors. Individuals with high job involvement tend to find the satisfaction of needs in the job. Delivery excellence service is an important mechanism to satisfy both current and long-term needs. Although reward is significantly related to both job involvement and service behaviors, and job involvement affects service behaviors, the indirect effect of reward on service behavior is not significant. A possible explanation lies in that job involvement refers to the degree to which the person places the

job at the center of his life. Wood (1974) suggested that job involvement results from intrinsic motivation and therefore, is likely to be linked to factors that provides intrinsic rewards. Lin et al. (2020) also concluded that although many workers in the sharing economy aim for earning quick money, it is often their obligation norm rather than the monetary benefits which determine their career commitment. Therefore, although extrinsic reward may have impact on job involvement, other characteristics of the job and the job-environment may contribute much more to job involvement.

6.2 Theoretical contributions

The current research concerns the relationship between MCSQ and direct service providers' service delivery in a sharing economy context. While previous research explores the impact of MCSQ in traditional employment settings, few looks to test these impacts in a non-traditional employment context such as car-hailing service. This study suggests that MCSQ can exert positive influence on frontline employees in other service industries.

Second, the current study is one of the few attempts to investigate the mediating role of job involvement in the relationships between MCSQ and service behaviors. Other research examines the mediation role of organizational commitment on the above linkage. The nature of the relationship between TNCs and their drivers undermines the mediating role of such variables as organizational commitment. Because independence and flexibility distinguishes car-hailing service from other transportation services, the role of job involvement in service quality may be of greater interests than organizational commitment.

6.3 Practical Implications

In order to motivate drivers to improve service quality, which, in turn lead to customer satisfaction and profit, Grab can take several courses of action as follows. First, upgrading the platform and software to enhance the transparency of the rating system and allow drivers' participation in the performance evaluation process may enhance the perception that the reward system is contingent upon service performance. Currently, although many platforms use rider's rating to measure service quality, many drivers do not believe such ratings influence their incomes. Second, technology support should be improved in order to assist the drivers in dealing with service issues and to prevent service failure. The need to contact call centers or filling paperwork could reduce the attractiveness of this form of work and cause role strain or job stress, which eventually reduce service performance. Finally, providing other kind of support such as family oriented support, service training, and insurance could enhance the drivers' involvement

in the job. Highly involved drivers are likely to provide excellent service.

7 Conclusions and limitations

7.1 Conclusions

This study expands previous research on MCSQ from traditional service industries to the context of sharing economy. In car-hailing context, the direct service providers are responsible for the delivery of high quality service to end users and receive performance feedback from end users via the form of star-ratings (Grab, 2019). The end-users are in fact, evaluate the quality of service delivered by drivers rather the quality of service provided by Transport Network Companies. TNCs, in turn, influence service quality by adopting reward and punitive policies based on star-ratings (Shokoohyar, 2018). Although, customers do not directly rate a TNC's service, it is likely that they will switch to a TNC's competitors if they constantly receive poor service from drivers associated with this TNC. Therefore, TNCs should encourage their drivers to improve their service quality. In addition, because TNCs are competing for the service of drivers, they need provide support for their drivers.

This research reveals that by showing their commitment to service quality, TNCs can influence service quality provided by their affiliated drivers. Furthermore, due to the loosely tied nature of the relationship between a TNC and its drivers, providing long-term career, enhancing organizational commitment and creating loyalty are not appropriate. By fostering job involvement among drivers via various forms of technological and psychological support, TNCs could help drivers in improving service quality. Our results can provide insights for future research about service quality in other services in the sharing economy context.

7.2 Limitations and directions for future research

The current study seeks to expand current understanding of MCSQ's influence on service behaviors to sharing economy context. However, the findings of this research only focuses on car-hailing service, thus the generalizability of the results is limited. Future research may seek to advance the focus to other sharing economy business models.

Cross-sectional design and single data source are the second limitation of the current research. Because job involvement refers to a state of psychological identification with work, observing it at one point in time may not capture the influence of MSCQ on job involvement overtime.

Future research may adopt a longitudinal research design to avoid this limitation. In addition, although there has been no severe effect of common method bias in the current paper, it would be desirable to collect data from multiple sources such as management of TNCs, peer drivers, and riders in order to yield more robust results.

The current study investigates the mediating role of job involvement in the MSCQ-service behaviors linkage. Because literature has suggested that people participate in the sharing economy for both extrinsic and intrinsic motivation, exploring other mechanisms that transfers the impact of sharing platform management practices on participants' behaviors is, therefore, require further research attentions.

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Phuong Tran Huy is an assistant professor who currently works at Faculty of Human Resource Economics and Management, National Economics University, Hanoi Vietnam. Phuong holds a Ph.D. degree in management from Kobe University, Hyogo, Japan. Phuong does research in Organizational Behavior, Human Resources Management and Labor Economics. Phuong's current project is "High performance work system in Vietnam".

Hong Chuong Pham is an Associate Professor, who has been working for more than 30 years at the National Economics University (NEU) in Vietnam as a lecturer in Tourism and Hospitality Management. Chuong has authored and co-authored numerous papers in Tourism Economics, Tourism and Hospitality Management and Tourism Development.

Vpliv zavezanosti vodstva k kakovosti storitev na vedenje voznikov pri storitvah vožnje: primer GrabCar v Vietnamu

Ozadje in namen: Znano je, da zavezanost vodstva h kakovosti storitev (Management Commitment to Service Quality - MSCQ) pozitivno vpliva na kakovost storitev in ravnanje zaposlenih v različnih storitvenih panogah. V kontekstu ekonomije delitve se odnos med podjetjem in ponudniki storitev razlikuje od tradicionalnega delovnega razmerja. Pri storitvah vožnje so vozniki v glavnem izvajalci in ne kot zaposleni. Zato je treba razumeti, ali MSCQ vpliva na kakovost v kontekstu storitve vožnje.

Metodologija: Anketirali smo 214 voznikov GrabCar v Vietnamu z uporabo spletne in klasične ankete. Za analizo podatkov je bilo uporabljeno modeliranje strukturnih enačb z delnimi najmanjšimi kvadrati (PLS-SEM).

Rezultati: Ugotovitve kažejo, da tri razsežnosti MCSQ, in sicer sistem nagrajevanja, tehnološka podpora in organizacijska podpora, močno vplivajo na vedenje voznikov pri storitvah. Poleg tega ima zaposlitev posredni vpliv v razmerju med MCSQ in vedenjem voznikov.

Zaključek: Ta študija razširja prejšnje raziskave o MCSQ na storitev vožnje in potrjuje vlogo zaposlitve kot pomembnega mehanizma za izboljšanje kakovosti storitev, ki jih zagotavljajo vozniki. Zaradi značilnosti odnosa med podjetjem in ponudniki storitev v ekonomiji delitve je treba podrobneje preučiti mehanizme s katerimi MCSQ vpliva na kvaliteto storitev ponudnikov.

Ključne besede: Zavezanost vodstva kakovosti storitev (MCSQ), Storitveno vedenje, Zaposlitev, Storitev vožnje, Ekonomija delitve, Vietnam.

Appendix

Service-based reward system

1. I receive positive recognition from Grab when I excel in serving customers.
2. Grab has financial incentives for service excellence.
3. My income depends on the quality of service I deliver.

Service technology support

1. Grab has the necessary technology support to serve my customers effectively.
2. Grab has 'state of the art' technology to enhance our service quality.
3. Grab allocates a significant amount of money on technology to support my efforts to deliver effective service.
4. Grab works hard to make our systems and processes more customer friendly.

Perceived organizational support

1. Grab values my contribution to its well-being.
2. Grab fails to appreciate any extra effort from me. (Reverse)
3. Grab would ignore any complaint from me. (Reverse)
4. Grab really cares about my well-being.
5. Even if I did the best job possible, Grab would fail to notice. (Reverse)
6. Grab cares about my general satisfaction at work.
7. Grab shows very little concern for me. (Reverse)
8. The organization takes pride in my accomplishments at work

Job involvement

1. The most important things that happen to me involve my present job.
2. To me, my job is only a small part of who I am. (Reverse)
3. I am very much involved personally in my job.
4. I live, eat and breathe my job.
5. Most of my interests are centered around my job.
6. I have very strong ties with my present job which would be very difficult to break.
7. Usually I feel detached from my job. (Reverse)
8. Most of my personal life goals are job-oriented.
9. I consider my job to be very central to my life.
10. I like to be really involved in my job most of the time.

Service behavior

1. I provide transportation services according to the job responsibilities prescribed by Grab
2. I am familiar with the service procedures of different car-hailing requests.
3. I can independently fulfill responsibilities to customers as specified in my job description.
4. I can satisfy the needs of customers with pleasure in my duties.
5. I have the good manners as a driver with neat and professional appearance.

The Impact of Internal Knowledge Sharing on Sales Department's Innovativeness and New Product Commercialization

Erik RUŽIĆ, Dragan BENAZIĆ

Juraj Dobrila University of Pula, Faculty of Economics and Tourism "Dr. Mijo Mirković", Pula, Croatia,
erik.ruzic@unipu.hr, dragan.benazic@unipu.hr

Background and Purpose: Innovativeness and new product commercialization are highly important for companies. Therefore, a deep understanding of the impact of all potentially influential drivers of success is critical. The purpose of the paper is to explore the impact of internal knowledge sharing on new product selling and sales innovativeness as well as the impact of empowerment on internal knowledge sharing and, indirectly, on new product selling and sales innovativeness.

Design/Methodology/Approach: The research encompassed 101 salespeople working at the top 1000 value added creators in Croatia. The questionnaire was developed and adapted using four scales, to assess internal knowledge sharing, new product selling, sales innovativeness, and empowerment. The data was analyzed by using the PLS-SEM method to examine the relationships between constructs.

Results: As evidenced by the survey results, internal knowledge sharing positively impacts new product selling and sales department's innovativeness, and empowerment is positively linked to internal knowledge sharing and, indirectly, to new product selling and sales department's innovativeness.

Conclusion: Managers should underpin different activities in order to enhance empowerment and internal knowledge sharing with the aim to affect companies' performance in commercialization of a new product and sales department's innovativeness. Future research could include moderator variables between the empowerment construct and the internal knowledge sharing construct and deepen the insight into the type of information shared, the dynamics of sharing and the barriers in the process, and other factors that positively affect knowledge sharing.

Keywords: *New product selling, Sales department's innovativeness, Internal knowledge sharing, Empowerment, Salespeople.*

1 Introduction

Although the failure rate of new products is high, intense global competition and demanding customers put pressure on companies and force them to launch new products (Sharma & Sagar, 2017). However, 40 to 90% of all new products fail in the marketplace, causing a substantial financial loss to companies (Borgh & Schepers, 2017). Yet at the same time, newly launched products and services

generate the highest revenues for companies (Petrariu et al., 2013). As a result, despite all obstacles and high potential losses, market circumstances and potential revenues push companies to develop new products. An important stage in the new product development process is the last phase, commercialization, and although successful new product selling is one of the most important missions of a company (Ahearne, et al., 2010), it is also one of the most challenging tasks for salespeople. In fact, they are

not prone to selling a new product; they prefer selling the existing ones (Wieseke et al., 2007).

On the other hand, in a world full of similar and easy-to-copy products and services, innovativeness may be a differentiation tool (Healy et al., 2018) for salespeople and a source of competitive advantage. Innovativeness can work well within the sales department and is especially important when a new product is brought to the market and salespeople undertake the challenging task of selling it. In fact, innovativeness within a department is seen as a work environment that encourages employees' innovative behavior within the department itself (Matsuo, 2005).

In order to improve and facilitate the commercialization phase (i.e. new product selling) and to enhance salespeople's creativity and flexibility (i.e. sales innovativeness), it becomes important to investigate the impact of a potentially significant driver of success. In fact, new product selling could be positively affected by knowledge sharing among salespeople as well as between sales force and other departments. Moreover, this openness and readiness to share information could have the potential to foster creativity and flexibility which, in turn, positively impact innovativeness within a sales department.

Lastly, an environment in which employees and managers share power and the organizational culture encourages such sharing, (i.e. employees are empowered) can create an environment of openness and of people willing to share knowledge across the organization. And by doing this, indirectly and/or in synergy, it could lead to better innovation and facilitate new product selling.

The main aim of the study is to investigate the impact of internal knowledge sharing on new product selling and sales department's innovativeness as well as the impact of empowerment on internal knowledge sharing and, indirectly, on new product selling and sales innovativeness in an emerging and small market context such as Croatia. In fact, innovations have proven to be an important contributor to competitiveness and economic growth of countries (Petrariu et al., 2013). Moreover, previous studies (Švarc & Dabić, 2019) pointed out many weaknesses in technology transfers and innovation efforts in the Republic of Croatia, whose R&D intensity (i.e. expenditure on R&D as a percentage of GDP) is only 0.97%.

There is a large body of research on internal knowledge sharing, empowerment, new product selling (Wieseke et al., 2007; Sharma & Sagar, 2017; Hohenberg & Hahn, 2018) and on the innovation topic conducted in less developed countries (Central and Eastern Europe) and in emerging innovation systems (Petrariu et al., 2013; Stojčić et al., 2018; Stojčić, 2020). However, to the best of authors' knowledge, there is little evidence on the linkages between these constructs among salespeople in the specific context of an emerging market. Hence, the present research will fill this gap.

Sales people were chosen to be the focus of this study

because of their role as boundary spanners and because of their critical importance in the last phase of the new product development process (i.e. commercialization).

Following the introduction, Section 2 provides the literature review and outlines the development of the hypotheses. Section 3 presents the methodology. Section 4 describes the empirical data and analysis, the measurement model and the structural model. Section 5 discusses the empirical results and implications. Finally, Section 6 provides the concluding remarks, limitations and directions for further research.

2 Literature Review and Hypothesis Development

2.1 Internal Knowledge Sharing, New Product Selling and Sales Department's Innovativeness

In today's ultra-competitive environment, knowledge is seen as a strategic resource whose transfer, if performed well, provides multiple benefits to companies, such as gaining competitive advantage (Hume & Hume, 2015), strengthening entrepreneurial orientation (DeClerq, et al., 2013), and avoiding mistakes and redundancy (Rafiq & Ahmed, 2006). Moreover, it affects organizational performance and effectiveness (Kim & Lee, 2006), reduces time to market (Rafiq & Ahmed, 2006), and strengthens a company's ability to meet customer needs (Kim & Lee, 2006).

In fact, many authors pointed out the positive effects of cross-functional integration and information sharing on achieving new product success (Arfi et al., 2019).

Furthermore, studies showed the importance of knowledge sharing in NPD processes, within the sales department and between sales and other departments (van den Berg et al., 2014) due to first-hand information and insights into customer requirements gained by sales staff. Crawford and DiBenedetto (2011) pointed out that information collected from the marketplace is an important source of information in the problem-solving process (in relation to the new product) and Matsuo (2018) saw salespeople as the central unit of interaction among different stakeholders. While Sharma and Sagar (2017) highlighted their crucial role once the product is launched, Ahearne et al. (2010) emphasized the unique position of salespeople in generating knowledge due to their regular interactions with customers. Although these interactions are under threat due to technology and social media which negatively impact the opportunities for direct interactivity between salesforce and potential customers Sharma and Sagar (2017), they were referred to as "knowledge brokers" by Verbeke and Masih (2020). The quality of such interactions is especially important in the commercialization phase. In fact, it is in

this phase that salespeople often encounter resistance and their role as the primary source of information is to overcome resistance and facilitate the adoption of the product.

Moreover, it was suggested (Ahearne et al., 2010) that salespeople can adjust their planning and behavior based on the knowledge and insights acquired and might even be innovative (if allowed). Zhou and Li (2009) emphasized that internal knowledge exchange is more relevant for radical innovation than external knowledge acquisition if the organizational knowledge base is broad (the opposite applies if the knowledge base is deep). Tsai (2001) pointed out that better knowledge access by an organizational unit, through knowledge exchange and transfer, affects its innovation and performance. A positive relationship between knowledge sharing and performance as well as between knowledge sharing and innovation was confirmed by different studies (Wang, & Wang, 2012; Yiu et al., 2020). Moreover, Caloghirou et al. (2004) highlighted that readiness for knowledge exchange and internal ability to recognize and exploit external knowledge improve innovative performance. Yiu et al. (2020) showed that service-oriented companies have higher innovation performance thanks to their learning from partner relationships.

Matsuo (2005) in his study highlighted the need for knowledge management systems in order to enable information sharing among salespeople and throughout the entire organization. Hohenberg and Hahn (2018) in their study pointed out that internalized new product selling motivation is crucial for performance. Borgh and Schepers (2017) highlighted the need for appropriate information sharing by a sales manager with the sales force once a new product is launched. However, knowledge management, as well as the NPD process (Helmy et al., 2019), generates costs, so it must be related to economic benefits (either revenue growth or decreased costs) or competitive advantage for the firm in order to be adopted. Van den Berg et al. (2014) argued that in today's knowledge-based economy, knowledge development and transfer within the company act as a booster for sales performance and strongly motivate salespeople to new product selling, which in the end influences sales and overall success as well. On the other hand, Haas et al. (2007) suggested that in some cases the salesforce may be overwhelmed by knowledge sharing, which negatively affects the success of new product selling. Tang and Marinova (2020) pointed out the mixed evidence regarding the effects of knowledge sharing in NPD processes.

Mulyana et al. (2019) stated that new products and services, as well as new ways of their promotion and distribution, will represent the crucial factors for companies' success, therefore marketing innovation is seen as a vital strategic orientation. According to Hendar et al. (2018), marketing innovativeness is crucial for performance.

Studies conducted in various European countries have shown different challenges in the innovation process. Ac-

cording to Švarc and Dabić (2019), the development of post-socialist economies depends on their ability to generate and exploit innovation and their ability to transfer knowledge from scientific institutions to companies. Moreover, Švarc and Dabić (2019) highlighted that in Croatia, as a typical transition country with a specific transition process (socialism to capitalism) in comparison to other EU member states, technology transfer happens slowly. Prokop and Stejskal (2017), in their study based on CIS data and conducted in Germany, Portugal, Bulgaria and Slovenia, highlighted that companies put the impetus on gaining information from various partners and documents and use it to innovate. Furthermore, Prokop and Stejskal (2017) analyzed the impact of soft knowledge infrastructure and HRST (Human Resources in Science and Technology) on the economic development of EU 28 economies in 2012 and of CEE economies between 2002 and 2012. The study showed that CEE countries were less effective than the rest of EU countries in using selected determinants of economic development. Stojčić et al. (2018), in their study conducted in Croatia, discussed different impacts of creativity in the innovation process. Hohenberg and Hahn (2018) stated that research on salesforce related factors during the commercialization phase is relatively scarce.

In the light of the above, and with the aim of broadening the knowledge of the yet insufficiently explored links between the described constructs among salespeople in the specific context of an emerging market, we hypothesize:

Hypothesis 1: Internal knowledge sharing is positively related to new product selling.

Hypothesis 2: Internal knowledge sharing is positively related to sales department's innovativeness.

2.2 Empowerment and Internal Knowledge Sharing

Despite the above-mentioned importance of knowledge transfer, there are a number of knowledge exchange barriers to consider in the attempt to improve internal sharing (Haas et al., 2007). Different sources (i.e. barriers), such as knowledge transferring tools, provider, receiver and context, were found threatening the cross-functional knowledge sharing during the NPD process (Hunag et al., 2008). DeClerq et al. (2013) mentioned that despite the many benefits of internal knowledge sharing, it is challenging when it occurs between different organizational functions as is the case in NPD process which involves a large number of employees (Crawford & DiBenedetto, 2011).

Researchers noted the key role of motivation in the process of knowledge sharing (Gressgard, 2015). Moreover, the motivation for knowledge sharing derives from the individual's beliefs and from the organization's factors

(shared values, norms, practices) that shape the individual's beliefs (Bock et al., 2005).

Furthermore, it was pointed out that knowledge sharing within organizations depends on the employee's individual behavior (Bock et al., 2005) and ability to share (Gressgard, 2015). Kim & Lee (2006) in their study on the three elements of organizational culture (i.e. vision and goals, trust, and social networks) pointed out that social networks positively impact employee knowledge-sharing capabilities. Similarly, Mu et al. (2016) argued that besides knowledge generation, a networking ability is required too. Chen et al. (2014) in their study on knowledge sharing in virtual community showed that trust positively affects the intention to share knowledge and that high altruism makes stronger the relationship between trust and knowledge sharing. Moreover, DeClerq et al. (2013) found that trust and goal congruence (between different functions) result in more internal knowledge sharing. Hume & Hume (2015) argued that for KM to be successful, trust, personal relevance and personnel satisfaction are needed.

Besides, authors Bock et al. (2005, p. 88) pointed out that individuals are not prone to share knowledge; in fact, sharing knowledge is more an exception than a rule within organizations. In their study on barriers in cross-functional knowledge sharing during the NPD process, Huang et al. (2008) highlighted that the use of appropriate strategies (processual and classical) can reduce these barriers and by doing this reduce the related costs. Hohenberg and Hahn (2018) stressed that new product selling bonuses can enhance the relationship between salespeople's performance predisposition and new product financial performance, but weaken the relationship between salespeople's learning predisposition and new product financial performance. Moreover, they showed that a periodic review strengthens the relationship between salespeople's learning predisposition and new product financial performance. Wang et al. (2014) pointed out that evaluation and evaluation with reward have positive impact on knowledge sharing. They also stated that knowledge sharing is influenced by the interaction between evaluation plus reward and conscientiousness, neuroticism and openness to experience. Sharma and Sagar (2017) pointed out that salespeople when selling new products often face, among others, inefficient information flow, so sales managers should effectively create and spread knowledge about the new product.

Gressgard (2015) in his study on motivational and organizational factors affecting knowledge sharing highlighted empowerment as an important intrinsic motivation factor of knowledge exchange.

Empowerment has been defined in many different ways. Conger & Kanungo (1988, p. 473) defined empowering as a managerial strategy or technique that strengthens self-determination need or self-efficacy belief of employees and makes them feel more powerful. The employee's empowered „state of mind“ may (Rafiq & Ahmed, 2006)

consequently lead to positive work behavior (Abbasi et al., 2020). Empowerment is also seen as a multifaceted motivational factor which can lead to altruistic behavior such as knowledge sharing (Wang et al., 2019). Kang et al. (2017) in their study showed that positive and proactive knowledge sharing behavior occurs as a consequence of knowledge management system user empowerment.

As mentioned above, empowerment is multifaceted and according to Spreitzer (1995), psychological empowerment construct merits a special critical inquiry. Spreitzer (1995) pointed out that psychological empowerment refers to the individual state of strong motivation, sense of authority and ability to perform job duties. It is in fact an active motivational orientation and it motivates people in their performance while executing different proactive tasks (Kang et al., 2017). Abbasi et al. (2020) highlighted that psychological empowerment mediates the relationship between high performance work system and knowledge sharing behavior. Al-Omari et al. (2020) in their study pointed out the positive linkages between employee empowerment and overall company performance and customer satisfaction. Grošelj et al. (2020) suggested that psychological empowerment moderates the relationship between leadership and innovative work behavior. Kang et al. (2017) considered the positive impact of psychological empowerment on different outcomes, such as effectiveness. According to Spreitzer (1995), two consequences of empowerment are effectiveness and innovative behavior. Arfi et al. (2019) examined a case in which empowering employees, among other changes in management style, facilitated knowledge exchange and firm's open innovation and performance. Furthermore, Helmy et al. (2019) pointed out that knowledge sharing mediates the relationship between the dimension of psychological empowerment (competence, impact, self-determination) and innovative work behavior. Lastly, Kang et al. (2017) stated that there has been little research investigating what motivators impact proactive knowledge sharing.

For a deeper understanding of the influence of empowerment on knowledge sharing and its indirect effects on new product selling and innovativeness of salesforce, we posit the following hypotheses:

Hypothesis 3: Empowerment is positively related to internal knowledge sharing.

H3a: Empowerment is positively related to new product selling through internal knowledge sharing

H3b: Empowerment is positively related to sales department's innovativeness through internal knowledge sharing

3 Methodology

3.1 Measurement Scales

The data for the present research was taken from a broader study conducted among salespeople in Croatia. The questionnaire was developed using scales validated in previous research and tested by the respective authors. The measurement items used to assess Internal Knowledge were the ones developed by DeClerq et al. (2013) (7 items). In the questions related to Internal Knowledge Sharing, respondents were asked to provide their attitudes toward the relationship and collaboration between their commercial function and technically oriented functions. The Sales Department's Innovativeness level was measured using the scales developed by Matsuo (2005) (6 items), while for the assessment of the New product selling attitudes we used the van den Berg et al. (2014) scales (3 items). The measurement items used to measure Empowerment were the ones developed and tested by Spreitzer (1995) (12 items). All the scales were translated into Croatian language by an expert linguist and demographic questions were added. Respondents were asked to rate all the statements using

the 7-point Likert scale (1-strongly disagree to 7-strongly agree). The data for quantitative research was collected in April and May of 2015.

3.2 Sample

The research on the impact of internal knowledge sharing on new product selling and sales innovation and the impact of empowerment on internal knowledge sharing was conducted on a sample of 101 key informants. The key informants were sales staff working at different levels in businesses operating in different sectors. The key informants were identified from a secondary source of information, i.e. a publication issued by a business magazine listing the top 1000 value added creators in the Republic of Croatia. The research was conducted using a highly structured questionnaire sent to organizations randomly selected from the above-mentioned list. The questionnaire was sent via email asking for it to be forwarded to salespeople at different levels within the organization. The sample structure regarding gender, age, level of education and years of sales experience of the key informants is shown in Table 1.

Table 1: The sample structure

Category	(%)
Gender	
M	35.7
F	64.3
Age	
< 26 years	0.9
26-35 years	19.8
36-45 years	41.6
46-55 years	24.8
> 56 years	12.9
Educational Background	
High School Graduate	19.8
Junior College Degree	63.4
University Degree	16.8
MSc/PhD	7
Experience in Sales	
< 5 years	26.8
6 - 10	27.5
11-15	12.7
> 15	33

Source: Authors, n=101

Since the questioning method was used and all the questions in the questionnaire were answered by the same key informants (common source), there was a possibility of common method variance. Therefore, when designing the questionnaire, several procedural and statistical remedies according to Podsakoff et al. (2003) were applied to avoid the common method variance issue. The key informants were guaranteed anonymity and the instructions emphasized that there were no right or wrong answers. Furthermore, questions relating to individual constructs were neatly divided by subheadings. In terms of the statistical techniques used, the Harman's single-factor test was conducted by performing an unrotated exploratory factor analysis. According to the test performed, all indicator variables resulted in one general factor accounting for 42.46% of the total variance in all variables, which is less than 50%, suggesting that common method variance would not be a major concern in this study. In addition, a confirmatory factor analysis was conducted, according to which all indicator variables were combined in one latent variable. The specified single-factor model was a poor fit to the data (RMSEA = 0.20, CFI = 0.458; <0.90, TLI = 0.414; <0.90 and SRMR = 0.15; <0.08), thus further supporting a low likelihood of common method bias in this study. In the sections below, the psychometric properties of the measurement scales are tested, followed by an analysis of the structural model in relation to the proposed research hypotheses.

4 Research Results

4.1 Measurement Model Analysis

Before testing the hypotheses, we assessed the internal consistency reliability and the convergent and discrimi-

nant validity of the measurement scales. Data was analyzed using the PLS-SEM method instead of the traditional CB-SEM analysis, because it offers greater flexibility regarding non-compliance under the assumption of normal variable distribution and because the PLS method gives better results in case of small sample sizes. Moreover, the PLS method is more appropriate when the research is primarily aimed at determining the predictive ability of endogenous constructs (Hair et al., 2012, Hair et al., 2014), rather than for studies whose primary focus is theory testing. Data was analyzed using SmartPLS 3.2.8. software (Ringle et al., 2015). The descriptive statistics of all items included in the analysis are reported in Table 2. The bootstrapping method with 5,000 subsamples, as recommended by Hair et al. (2019, p. 149), was used to evaluate the measurement scales and, subsequently, to analyze the structural models. All measurement models are specified as reflective measurement models – Mode A (Hair et al., 2019, p. 46) - based on previous research using the same measurement scales. Table 1 shows item outer loadings, CR and AVE indicators. The EMP6 (I have mastered the skills necessary for my job.), EMP7 (I have significant autonomy in determining how I do my job.), EMP8 (I can decide on my own how to go about doing my work.) and EMP9 (I have considerable opportunity for independence and freedom in how I do my job.) variables of the construct Empowerment were excluded from the analysis because their factor loadings ranged from 0.4 to 0.6, and their exclusion led to an increase in Composite Reliability (CR) and Average Variance Extracted (AVE) above the threshold values of 0.8 and 0.5, respectively.

Table 2: Descriptive statistics

ITEM	ITEM -code	Mean	Median	Standard Deviation	Excess Kurtosis	Skewness
EMPOWERMENT						
The work I do is very important to me.	EMP1	6.030	6.000	1.222	5.429	-2.105
My job activities are personally meaningful to me.	EMP2	6.099	6.000	1.058	5.494	-2.086
The work I do is meaningful to me.	EMP3	5.812	6.000	1.175	3.522	-1.634
I am confident about my ability to do my job.	EMP4	6.287	6.000	0.825	15.741	-2.842
I am self-assured about my capabilities to perform my work activities.	EMP5	6.307	6.000	0.817	16.192	-2.835
I have mastered the skills necessary for my job.	EMP6	6.109	6.000	0.866	10.937	-2.255
I have significant autonomy in determining how I do my job.	EMP7	5.822	6.000	1.214	4.227	-1.809

Table 2: Descriptive statistics (continues)

I can decide on my own how to go about doing my work.	EMP8	5.337	6.000	1.307	1.333	-1.162
I have considerable opportunity for independence and freedom in how I do my job.	EMP9	5.149	5.000	1.360	1.068	-1.065
My impact on what happens in my department is large.	EMP10	4.832	5.000	1.548	-0.194	-0.753
I have a great deal of control over what happens in my department.	EMP11	5.317	6.000	1.495	1.275	-1.298
I have significant influence on what happens in my department.	EMP12	4.842	5.000	1.565	0.133	-0.881
SALES DEPARTMENT'S INNOVATIVENESS						
Our ability to function creatively is respected by the leadership.	SALINN-OV1	4.980	6.000	1.528	0.659	-1.165
Creativity is encouraged here.	SALINN-OV2	4.614	5.000	1.688	-0.408	-0.826
Around here, people are allowed to try to solve the same problems in different ways.	SALINN-OV3	4.762	5.000	1.517	0.217	-1.023
This organization can be described as flexible and continually adapting to change.	SALINN-OV4	4.723	5.000	1.672	-0.554	-0.712
This organization is open and responsive to change.	SALINN-OV5	4.733	5.000	1.515	-0.487	-0.576
The reward system here encourages innovation.	SALINN-OV6	4.119	4.000	1.831	-1.331	-0.227
NEW PRODUCT SELLING						
I like to present my customers with our most innovative products.	NPS1	5.881	6.000	1.065	3.769	-1.506
I like selling products that need me to explain in great detail just what is new and exciting about them.	NPS2	5.752	6.000	1.121	1.877	-1.338
I like to visit new accounts where I have to present what my company is selling.	NPS3	5.624	6.000	1.319	1.369	-1.193
INTERNAL KNOWLEDGE SHARING						
There is close interaction and collaboration between people in the two functions.	IKS1	5.129	5.000	1.355	0.870	-1.014
There is open communication between people in the two functions.	IKS2	5.129	6.000	1.433	0.855	-1.153
There is high level of knowledge sharing between people in the two functions.	IKS3	4.822	5.000	1.485	-0.031	-0.829
People in the two functions have great dialogues with each other.	IKS4	4.941	5.000	1.326	0.912	-0.949
People in the two functions regularly communicate with each other.	IKS5	5.129	5.000	1.376	1.343	-1.161
People in the two functions provide each other with a lot of feedback.	IKS6	4.792	5.000	1.430	0.368	-0.801
There is a lot of two-way communication between people in the two functions.	IKS7	4.891	5.000	1.421	0.543	-1.004

Source: Authors' own calculation

As shown in Table 3 below, all investigated constructs had satisfactory Cronbach's alpha, Composite Reliability (CR) and Average Variance Extracted (AVE) values. Cronbach's alpha and CR coefficients ranged between 0.8 and 0.96 and they all exceeded the recommended cut-off of 0.8. Besides, all of the AVE scores were above 0.5, ranging from 0.53 to 0.80. According to the below data, all the constructs showed an acceptable level of internal consistency reliability and convergent validity.

The cross-loading analysis as well as the Fornell-Larcker criterion (1981) and the Heterotrait-Monotrait (HTMT) ratio confidence intervals were used to assess the discriminant validity. The results of the cross-loading analysis showed that the outer loadings were high on their respective constructs, but low on all other constructs. The Fornell-Larcker criterion and the HTMT ratio are shown in Table 4.

Table 3: Internal consistency reliability and convergent validity

Construct/Item	Original Sample (O)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Internal Knowledge Sharing						
IKS1 <- IKS	0.895*	0.024	37.033	0.95	0.96	0.80
IKS2 <- IKS	0.927*	0.016	58.983			
IKS3 <- IKS	0.889*	0.032	28.031			
IKS4 <- IKS	0.898*	0.029	30.504			
IKS5 <- IKS	0.887*	0.031	28.771			
IKS6 <- IKS	0.888*	0.030	29.941			
IKS7 <- IKS	0.874*	0.038	23.089			
New Product Selling						
NPS1 <- NPS	0.896*	0.056	15.977	0.87	0.92	0.79
NPS2 <- NPS	0.899*	0.061	14.675			
NPS3 <- NPS	0.879*	0.069	12.643			
Sales Department's Innovativeness						
SALINNOV1 <- SALINNOV	0.894*	0.023	38.698	0.92	0.94	0.73
SALINNOV2 <- SALINNOV	0.902*	0.022	40.177			
SALINNOV3 <- SALINNOV	0.822*	0.046	17.790			
SALINNOV4 <- SALINNOV	0.883*	0.031	28.491			
SALINNOV5 <- SALINNOV	0.884*	0.030	29.910			
SALINNOV6 <- SALINNOV	0.736*	0.060	12.222			

Table 3: Internal consistency reliability and convergent validity (continues)

Empowerment						
EMP1 <- EMP	0.786*	0.062	12.681	0.87	0.89	0.53
EMP2 <- EMP	0.752*	0.086	8.785			
EMP3 <- EMP	0.870*	0.047	18.597			
EMP4 <- EMP	0.614*	0.194	3.170			
EMP5 <- EMP	0.600*	0.200	3.001			
EMP10 <- EMP	0.693*	0.104	6.634			
EMP11 <- EMP	0.750*	0.079	9.526			
EMP12 <- EMP	0.697*	0.109	6.411			

* p<0.05

Source: Authors' own calculation

Table 4: Fornell-Larcker criterion and HTMT ratio*

	Fornell–Larcker criterion **				HTMT ratio (95% bias corrected interval)		
	EMP	IKS	NPS	SALINNOV	EMP	IKS	NPS
EMP	0,725						
IKS	0.555	0.894			0.569 (0.376-0.737)		
NPS	0.514	0.343	0.891		0.579 (0.424-0.724)	0.364 (0.139-0.603)	
SALINNOV	0.648	0.633	0.396	0.856	0.695 (0.551-0.792)	0.664 (0.518-0.781)	0.430 (0.251-0.593)

*EMP – Empowerment, IKS – Internal Knowledge Sharing, NPS – New Product Selling, SALINNOV – Sales Department's Innovativeness

** Construct correlation matrix with the square root of the AVE on the diagonal in bold

Source: Authors' own calculation

According to the data presented in Table 4, the Fornell-Larcker criterion was met and the square root of the AVE for each construct was greater than the correlation between the construct and all other constructs. The HTMT values between constructs were all below 0.85, indicating that none of the HTMT confidence interval bias-corrected values included the value of 1. All the above data suggest satisfactory discriminant validity of the measurement scales. The next section provides an analysis of the structural model.

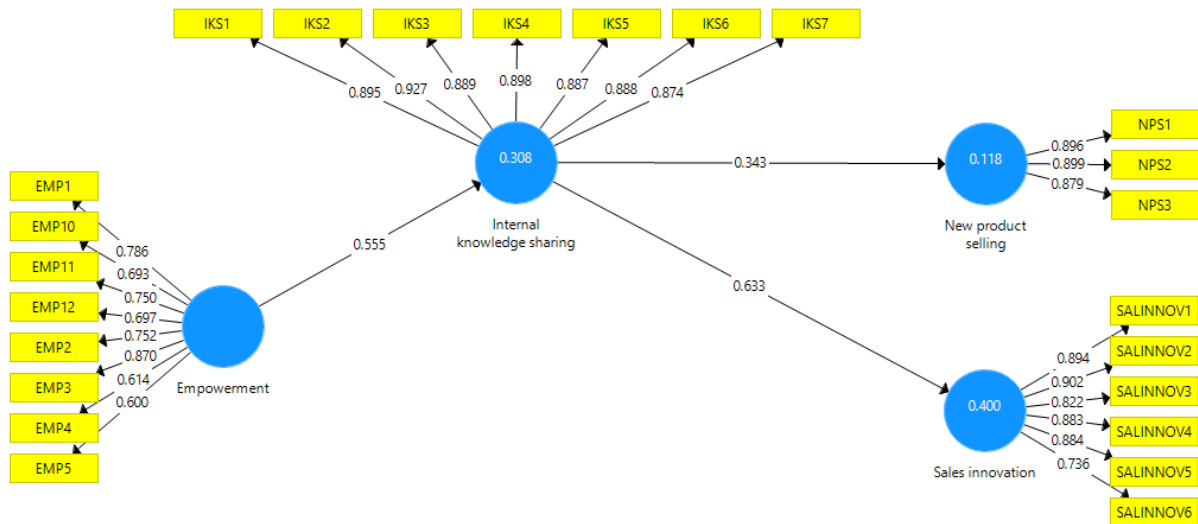
4.2 Structural Model Analysis

This research is based on the assumption of a positive impact of Empowerment through Internal Knowledge Sharing on New Product Development and Sales Innovation (Figure 1).

A VIF test was used to check for multicollinearity among endogenous constructs. The VIF for each pair of endogenous constructs was below the threshold of 5, so it

could be concluded that multicollinearity among endogenous constructs would not be a major concern in this study. The results of the structural model analysis are illustrated in Table 5.

The results of the structural model analysis supported all the proposed hypotheses. Direct effects were analyzed within the framework of the model. In this respect, Empowerment (EMP) had a statistically significant positive direct effect on Internal Knowledge Sharing (IKS) (H1: $\beta=0.555$; $t=7.192$; $p<0.05$), which in return had a positive direct effect on New Product Selling (NPS) (H3: $\beta=0.343$; $t=3.106$; $p<0.05$) and Sales Department's Innovativeness (SALINNOV) (H4: $\beta=0.633$; $t=10.209$; $p<0.05$). Likewise, two statistically significant positive indirect effects were found, namely Empowerment through Internal Knowledge Sharing positively affects Sales Department's Innovativeness ($\beta_{\text{indirect}}=0.351$; $t=5.095$, $p<0.05$) and New Product Selling ($\beta_{\text{indirect}}=0.351$; $t=5.095$, $p<0.05$). The effect size of the construct Empowerment was moderate, it explained 31% of Internal Knowledge Sharing construct variance



Source: Authors

Figure 1: Structural model

Table 5: Direct and indirect effects

Hypothesis	Original Sample (O)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	95% bias corrected interval	R ²	f ²	Hypothesis Acceptance
Direct and Total Effects							
H1: Internal Knowledge Sharing ->New Product Selling	0.343*	0.110	3.106	0.124-0.539	0.12	0.13	Accepted
H2: Internal Knowledge Sharing ->Sales Department's Innovativeness	0.633*	0.062	10.209	0.488-0.745	0.40	0.67	Accepted
H3: Empowerment ->Internal Knowledge Sharing	0.555*	0.077	7.192	0.373-0.687	0.31	0.44	Accepted
Indirect Effects							
H3a: Empowerment -> Internal Knowledge Sharing -> Sales Department's Innovativeness	0.351*	0.069	5.095	0.208-0.475			Accepted
H3b: Empowerment -> Internal Knowledge Sharing – New Product Selling	0.190*	0.083	2.279	0.049-0.356			Accepted

* p < 0.05

Source: Authors' own calculation

($R^2=0.31$), while Internal Knowledge Sharing explained 12% of variance in the endogenous construct of New Product Selling ($R^2=0.12$) and its effect size was moderate i.e. explained 40% of variance in Sales Innovation ($R^2=0.40$). In terms of the effect size, according to Cohen (1988) there was a large effect size ($f^2=0.44$) of the construct of Empowerment on Internal Knowledge Sharing and a medium ($f^2=0.13$) effect size of Internal Knowledge Sharing on New Product Selling, whereas the effect size of the latter construct on Sales Innovation was strong ($f^2=0.67$). The predictive relevance of the model was examined using the blindfolding procedure. All Q² values were greater than 0, thus providing support for the model's predictive relevance in respect of all endogenous constructs. The next section discusses in more detail the theoretical and practical implications of the research findings.

5 Discussion and Implications

The present study has revealed that internal knowledge sharing is positively linked with new product selling and sales department's innovativeness. The research results are in line with Tsai (2001), Wang and Wang, (2012) and Yiu et al. (2020); namely, they argued about the impact of knowledge sharing on innovation and performance. These links were confirmed within the sales department (i.e. among salespeople). Our research can be added to Prokop and Stejskal's study (2017), as it shows that sharing of the knowledge acquired in the marketplace between sales and technical department in the specific context of Croatian economy can bring innovation (in sales) and enhance new product selling. Moreover, the proven positive effect of empowerment on internal knowledge sharing and, indirectly, on new product selling and sales innovativeness is in line with the research conducted by Kang et al. (2017), who pointed out the positive impact of empowerment on proactive tasks, and with van den Berg et al. (2014) study focusing on the role of knowledge transfer on performance and new product selling.

A number of practical implications arise from this study. As stated above, regular knowledge sharing improves the final stage of the NPD process and positively affects the innovativeness of sales department. Based on this evidence, top management and sales management should jointly adopt appropriate internal knowledge practices, develop an internal knowledge sharing system and undertake different activities in order to facilitate and encourage knowledge sharing, such as developing an appropriate organizational culture, rewarding knowledge sharing, or conducting internal marketing activities. Salespeople get first-hand feedback from customers, so it is important to enable and encourage sharing of such valuable information, especially with the technical department. Shared information may allow faster response to customer needs. Managers should empower knowledge system users and

encourage (i.e. empower) knowledge exchange between employees while selling new product, with the aim of fostering creativity and flexibility among them and bettering the process.

However, this striving can be a challenge as well; there is a number of different obstacles to overcome in the knowledge sharing enhancement efforts.

Attitudes, beliefs and motivation are important drivers for knowledge sharing and according to the present study, empowered people are more prone to share knowledge. Accordingly, sales managers should allow discretion which can be formalized (documents, procedures) or implied (organizational culture) and encouraged through training and personal (i.e. managers') example, meaning that by doing this they'll impact employee's knowledge-sharing behavior. Finally, empowerment will lead to better product selling and more creativity and flexibility among salespeople. These outcomes will positively impact the company's overall performance and contribute to the national economy. Therefore, salespeople should be empowered, but according to past studies (Sharma & Sagar, 2017; Homburg & Hahn, 2018), effective knowledge transfer from sales managers to their sales teams and an appropriate financial policy framework (i.e. bonuses) should be in place as well.

The present study contributes to the body of knowledge with new insights on the topic from the sales department's perspective. In fact, while previous research has shown the effects of empowerment and internal knowledge sharing in different settings and the effects of these factors with different outcomes (Al-Omari et al., 2020; Yiu et al., 2020), the links between empowerment and internal knowledge sharing as well as between these constructs and new product selling and sales innovativeness have not been investigated in salespeople in a specific emerging market context. Because of the specific role of salespeople in the commercialization phase and the need for innovation within the sales department itself, many companies struggle with their sales force. Sales personnel as boundary spanners collect a large amount of information and play a crucial role in product commercialization. With the aim of addressing the above gap, we conducted the current research. This study's findings corroborate previous research, but also contribute to the literature by highlighting the relevant links in the specific sales and economic context.

6 Conclusions, Limitations and Future Research

Innovations are crucial both for companies and for national economies. Companies should innovate due to intense competition and customer expectancy and governments should innovate for the sake of their country's economic growth. But there are a number of challenges on this path and all the steps and specificities should be

examined in order to better this process. Our research dealt with the last stage of the process - new product selling and the innovativeness of people who sell the products. In fact, in this process, employees, especially those who are in direct contact with potential customers, play an important role. Their innovativeness and efforts can be particularly valuable when the product faces the market for the first time (i.e. in the commercialization phase). Salespeople's role has already been recognized as important, but at the same time a number of issues faced by companies dealing with salesforce selling new product have been pointed out. Despite the above-mentioned importance of innovation, different challenges have been identified in the context of an emerging market economy. Lastly, because of a number of similar products on the market, creativity and flexibility are important for salespeople and they should as well be boosted. Based on the study's evidence, this outcome can be influenced by knowledge sharing and empowerment, while knowledge sharing can be affected by adequate empowerment of salespeople.

The present findings may help companies in their striving to avoid losses and launch products more successfully. Moreover, the addressed process characterized by high investment and failure rates could be improved by the joint efforts of practitioners and scientists. The present study has some limitations that may serve as the basis for future research. A larger study sample with an appropriate structure of businesses in terms of size and sector would provide more valid and more reliable research findings and a better generalization of the results. Moreover, since in the larger portion of the sample only one salesperson per company was surveyed due to time and cost limitations, involving more employees at different levels in the sales team of an organization, i.e. the use of the triangulation method, would yield more accurate results.

Furthermore, due to the sample size, the authors did not check the unobserved heterogeneity that may reduce the accuracy of the conclusions of the study in case of different segments - groups of key informants.

The study was conducted on cross-sectional data i.e. it lacks an analysis of the observed phenomena from a dynamic perspective, which should be covered by future research in order to obtain a better insight into the causal relationships among the investigated constructs.

The knowledge gained within this study could be broadened in future research by including some moderating variables between the Empowerment and the Internal Knowledge Sharing constructs, such as organizational culture of the company, job satisfaction, personality traits of salespeople, selling style, sales staff motivation, job burn-out syndrome.

In addition, it would be useful if future research encompassed the types of information shared between managers, salesforce and other employees, and the impact of such information on sales process innovation and new product development.

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Erik Ružić, PhD, is an Associate Professor at the Faculty of Economics and Tourism "Dr. Mijo Mirković" in Pula, Croatia. His main fields of interest are sales management, personal selling and internal marketing. He used to work as a sales manager and has professional experience in different managerial positions.

Dragan Benazić, PhD, is an Associate Professor at the the Faculty of Economics and Tourism "Dr. Mijo Mirković" in Pula, Croatia. He is author and co-author of numerous scientific articles. His research is focused on the fields of marketing research, price management and services marketing.

Vpliv interne izmenjave znanja na inovativnost oddelka prodaje in komercializacijo izdelkov

Ozadje in namen: Inovativnost in trženje novih izdelkov sta za podjetja zelo pomembni. Zato je dobro razumevanje vpliva vseh potencialno vplivnih dejavnikov uspeha ključnega pomena. Namen prispevka je raziskati vpliv notranje izmenjave znanja na prodajo novih izdelkov in prodajno inovativnost ter vpliv opolnomočenja na notranjo izmenjavo znanja in posredno na prodajo novih izdelkov in prodajno inovativnost.

Oblikovanje / metodologija / pristop: Raziskava je zajela 101 prodajalca, ki so delali pri enem od 1000 podjetij z najboljšo dodano vrednostjo na Hrvaškem. Vprašalnik je bil razvit in prilagojen s štirimi lestvicami za oceno notranje izmenjave znanja, prodaje novih izdelkov, prodajne inovativnosti in opolnomočenja. Podatki so bili analizirani z uporabo metode PLS-SEM za preučevanje povezav med konstrukti.

Rezultati: Notranja izmenjava znanja pozitivno vpliva na inovativnost oddelka za prodajo in prodajo novih izdelkov, opolnomočenje pa je pozitivno povezano z notranjo izmenjavo znanja in posredno z inovativnostjo oddelka za prodajo in prodajo novih izdelkov.

Zaključek: Menedžerji bi morali podpirati različne dejavnosti, da bi okrepili opolnomočenje in notranjo izmenjavo znanja, da bi vplivali na uspešnost podjetij pri komercializaciji novega izdelka in inovativnosti oddelka prodaje. Prihodnje raziskave bi lahko vključevale moderatorske spremenljivke med konstruktom opolnomočenja in konstruktom notranje izmenjave znanja ter poglobile vpogled v vrsto izmenjanih informacij, dinamiko izmenjave in ovire v procesu ter druge dejavnike, ki pozitivno vplivajo na izmenjavo znanja.

Ključne besede: *Prodaja novih izdelkov, Inovativnost prodajnega oddelka, Notranja izmenjava znanja, Opolnomočenje, Prodajalci*

Optimisation of the rational proportion of intelligent technologies application in service organisations

Anton IVASCHENKO¹, Alfiya R. DIYAZITDINOVA²,
Tatiana NIKIFOROVA¹

¹ Samara State Technical University, Samara, Russia, anton.ivashenko@gmail.com, kolesnikova.t.v.163@gmail.com

² Povolzhskiy State University of Telecommunications and Informatics, Samara, Russia, dijazitdinova@mail.ru

Background and Purpose: The growing role and involvement of Artificial Intelligence in modern digital enterprises leads to a considerable reduction of personnel and reorientation of the remaining staff to new responsibilities. However, in many areas like services and support the total elimination of the employed human resources still remains impossible. It is proposed to study the organisational problem of finding the optimal proportion of computer agents and human actors in the mixed collaborative environment.

Methods: Using the technology of semantic and statistical analysis, we developed an original model of computer agents' and human actors' cooperative interaction and an optimization method, which is novel in considering the focus of the executors while calculating the compliance indicators.

Results: The problem was studied by an example of service desk automation. Considering the semantics of the problem domain in the form of ontology introduces the logic for better distribution and automation of tasks.

Conclusion: In a modern digital enterprise there exists and can be estimated a rational balance between the computer agents and human actors, which becomes a significant indicator of its performance. In general, human actors are preferable for processing unpredictable events in real time, while agents are better at the modelling and simulation.

Keywords: Service organisations automation, Artificial intelligence, Human resources, Decision-making support.

1 Introduction

Current trends in the automation of modern organisational management require the widespread introduction of artificial intelligence. According to the strategy of total digitalisation, human resources should be replaced by robots capable of performing business processes with higher efficiency and lower costs. In this context, the robots are not only machines but also computer agents with autonomous behaviour that interact in the virtual world and provide self-organisation. Intelligent solutions of this kind stimulate high expectations.

At the same time, their implementation in practice remains challenging. In most business cases it is impossible

to completely replace humans by programmes. Sometimes it is hard to formalise all the options of the business process and maintain possible changes; more often, the personnel remain, as they can provide greater adaptability. Therefore, in most real applications both humans and algorithms are involved.

Human and robotic computer-simulated executors need to interact and cooperate in real time under the continuous pressure of incoming data and on-going events, and require sophisticated coordination. People require additional training for acting in vastly automated spaces; algorithms need extra configuration to consider the possible influence of the human factor. In early applications, e.g. production line automation, attempts were made to bound and minimise interaction by physical borders. In modern

organisations this is impracticable.

Thereby a new problem appeared of looking for the best balance of artificial and human intelligence, considering the specifics of certain business cases. It seems reasonable to completely replace the human executors in production and provide their maximum utilisation in services, but it is not so simple. Hence, when larger processes involve automation, the remaining personnel start looking for new functions and change their professional skillset, adapting it to the changing world. This process can either enhance the business or damage it. In this paper the problem is studied and solved for a common business case of service desk automation, which has often raised the question: "What is the best proportion of human and robot operators in an organisation?"

This paper originally brings up the question of the necessity and sufficiency of the application of artificial intelligence to practice. The most relevant papers in this area are devoted to the problems of efficient substitution of human resources with robots and improving the computer-human interaction. The authors propose for consideration an idea of the reasonable involvement of artificial intelligence based on the analysis of business processes specifics. Compared to the previous publications, new results of AI and HR balancing studied by an example of the service desk automation are presented.

2 State of the art

Artificial intelligence is currently becoming one of the most promising areas for discussion and research in the modern world of digitalisation (Patel et al., 2000). By implementing these concepts, traditional enterprises are turning into digitally minded organisations along the path of innovative transformation. A digital enterprise is an organisation that uses information technology as a competitive advantage in all areas of its business: manufacturing, business processes, marketing, and customer interaction. The product itself, offered by such an enterprise to the market, also becomes digital.

Recent developments in the field of artificial intelligence (AI) and augmented reality provide great opportunities in various areas of modern economics and business (One Internet, 2016). The most significant results are being achieved in the field of data visualisation and decision-making support, aimed at developing existing applications with new capabilities for data collection, processing and management. Cognitive computing (Kelly, 2015), the foundation of artificial intelligence, implies the simulation of human brain activity, which allows the machines to process information, learn about the world and analyse events like people do, perhaps even more productively.

New trends in project management (Grzeszczyk, 2018)

consider the influence of intelligent information systems, AI in decision-making support and new information and communication technologies. Mixed intelligence systems are applied for project evaluation, taking into account the current state of knowledge in the field of project management. The possible ways of considering the opportunities of artificial intelligence for pragmatic applications are presented in (Bentley et al., 2018).

Existing models of intelligent technologies implementation in deep cooperation with human employees introduce the concept of the computer agent – an avatar with a pre-programmed profile, actions and communication (Rosen, 2018). In the context of this paper, the term software agent can also be used as a synonym. Computer agents are involved in collaborative problem solving by sharing knowledge and understanding, organising the group work and monitoring the progress, taking actions to solve the problem, and providing constructive feedback to group members.

The introduction of AI capabilities in business leads to a limitation in the same type of operations that are amenable to simple algorithms. This results in a reduction of the number of employees engaged in non-creative and formalised work. Despite the success of such solutions in corporate applications, the problem of the interaction of people and robots in the common information space of an enterprise is still challenging. The interaction of AI and HR intelligence is identified as mixed intelligence, and the environment in which they interact is combined. The results of a survey by (Grace et al., 2018) predict that AI will outperform humans in many activities that require both technical skills and creativity. A solution to bridge the gap between AI and human-robot interaction is proposed in (Khandelwal et al., 2017). The related ethical problems are overviewed in (Hagendorff, 2020).

The existing approaches to the application of intelligent technologies to improve the staffing of modern organisations typically suggest applying AI in the area of HR management. Certainly, introducing intelligent systems for decision-making support in this area can significantly improve the efficiency and quality of projects staffing and management, recruitment and people development (Ivaschenko et al., 2019; Simonova et al., 2016).

For example, the possible applications of Big Data technologies in enterprise HR management are widely discussed in recent literature (Zang et al., 2015; Barman et al., 2015). The challenge is in the use of multiple data sources to improve practices in training, recruitment, performance analysis and motivation. Big Data in HR sets out to evaluate and improve practices including talent acquisition, development, retention, and overall organisational performance.

An interesting approach to the application of the AI concept in human communities is introduced in (Letouze et al., 2018). It is proposed to design future human sys-

tems based on the principles of interaction and Big Data technologies.

The strengths and weaknesses of human and machine collaboration are reviewed in (Wilson et al., 2018). This paper is close to the topic studied here. In particular, it states that there is no reason to fear that robots will replace all human employees. This research involved 1500 firms in a range of industries and shows that the biggest performance improvements come when humans and smart machines work together, enhancing each other's strengths. When people and AI agents cooperate, the business processes need to be redesigned. As a result, in addition to the implementation of innovative AI technologies, provision should always be made for the development of employees in using the computer-human interfaces and changing their mindset.

This new sphere is called a collaborative intelligence (Kragic et al., 2018; Baratta 2015). Despite the recommendation to build a cooperative IT solution based on the organisation of efficient interaction of robots and humans, no technical methodology is proposed on how to calculate the optimal rate and transfer it to the design of the business process.

Collaborative robots are deeply studied in Industry 4.0 (Djuric et al., 2016; Teixeira et al., 2018). The active application of automation and robotics requires a realistic sense of the best time and place for their use. In the framework of this theory, collaborative robots specifically designed for direct interaction with humans are introduced; a collaborative workspace where robots and humans can perform tasks simultaneously and safely; and collaborative operations in which purpose-designed robots can work safely together with humans. Yet the problems being solved have still always been limited to providing comfortable physical interaction, leaving the challenges of functional co-working unaddressed.

The rapid increase in the share of artificial intelligence in human-computer interaction complicates the search for a solution to the optimal interaction of AI with the employees. A managerial decision should solve two problems: what is the best ratio of AI and people in a mixed interaction, and what are the optimum areas of application of these solutions, taking into account the human factor. The solution of the AI and HR proportion and involvement in the business processes of a digital company needs to be built on the principles of management by conditions (Ivaschenko et al., 2015, 2019, 2020).

As a result, the user is put inside the "loop" of computer-human interaction (Holzinger, 2014, 2016), which requires the user interfaces context and focus to be seen as dependent. The system should interlink all related data sets (e.g., images, text, measured values, scans) and offer visual scenes. It is proposed to involve the decision maker in the process of data processing and visualisation by means of continuously interacting with the system, which

helps to optimise the learning behaviour of both humans and algorithms.

The introduction of AI requires additional efforts to provide modified and improved business processes (Simek et al., 2019; Halaska et al., 2018). An orientation to the specifics of the executors is provided by the subject-oriented approach for business processes management (S-BPM), which conceives a process as a collaboration of multiple subjects organised via structured communication (Fleischmann et al., 2013, 2015). These models enable the synchronisation of computer agents and human actors. But they still remain oriented to primarily human decision-making, which becomes insufficient in the case of the predominance of robots over the human operators.

In addition, the principle of decentralised decisions means the ability of a cyber-physical system to make decisions on its own and to perform tasks as autonomously as possible. The simulation and modelling of models of multi-agent technology (Wooldridge, 2002; Gorodetskii, 2012) allow the implementation of such autonomous behaviour by software and thus provide the effect of self-organisation.

To coordinate computer agents and human actors on a semantic level, the mechanism of knowledge description in the form of ontologies can be used (Pouchard et al., 2000; De Nicola et al., 2009). Ontology represents the semantic network, combining concepts, attributes, relations and rules that describe the situation from a predefined point of view. The functioning of the organisation staff is highly influenced by the human factor, that is to say that people perceive different situations differently, although, for a certain problem domain, the employees tend to agree on a similar perception and understanding. Due to this fact, problem domain ontologies are treated as impersonal and objective. The ontologies of computer agents can be formally predefined and used to specify the definite and explicit logic of their behaviour.

One of the potential problem domains that require optimisation of the proportion of intelligent technologies applied is service desk automation. Its process involves online collaboration and the provision of IT services to customers. Ensuring the constant high quality of IT services and customer or user satisfaction is implemented based on the approach (Axelos, 2019; England, 2008) described by the IT Infrastructure Library (ITIL). It focuses on the achievement of goals, the analysis of key performance indicators, as well as the resources spent on achieving goals. ITIL includes a set of documents used for the practical implementation of IT Service Management (ITSM) approaches, which will include the basic processes that support and provide IT services. Service management is implemented by IT providers by using the optimal combination of people, processes and information technology.

In the structure of ITIL and ITSM processes, the service desk plays an important role, carrying out accounting,

registration of tasks, solution and tracking of issues. Next, we will consider the flow of tasks received from users and their processing in the service desk system. Tasks arrive on the service desk at random times and form a task queue. Then, the tasks go to a group of specialists who take them out of the line independently, so we cannot uniquely identify a specific executor. All personnel from the working group are interchangeable.

3 The formal model

The following formal model is based on an ontological approach that allows the definition of the semantics of any object x_n by a knowledge descriptor:

$$\omega(x_n, t_n) = \{\{\tau_{n,l}, w_{n,l}\}, \{p(x_{n'}), t_n\}\}, \quad (1)$$

where $\tau_{n,l}$ is a tag (keyword), $w_{n,l}$ its weight,

$p(x_{n'})$ defines the relation to another descriptor $x_{n'}$,

t_n – the time of the descriptor's applicability.

Concepts relate to the objects, weighted tags correspond to the attributes, and their dependencies are described by relationships. The basic rule required in this context determines the criterion of proximity. Objects x_n and $x_{n'}$ are ontologically close when

$$P(\omega(x_n, t_n), \omega(x_{n'}, t_{n'})) = \sum_{n,l} \left| w_{n,l} - \sum_{n',l'} w_{n',l'} \cdot \delta(\tau_{n,l} = \tau_{n',l'}) \right| + \sum_{n',l'} \left| w_{n',l'} - \sum_{n,l} w_{n,l} \cdot \delta(\tau_{n,l} = \tau_{n',l'}) \right| \leq \Delta W, \quad (2)$$

where ΔW is an allowable level of semantic deviation,

$$\delta(x) = \begin{cases} 1, & x \geq 0; \\ 0, & x < 0. \end{cases}$$

Let us study the combined environment of a digital enterprise that contains both human actors $a_i, i = 1..N_a$ and computer agents $b_j, j = 1..N_b$. N_a and N_b represent the number of actors and agents respectively. Both actors and agents have corresponding knowledge descriptors: $\omega(a_i)$ and $\omega(b_j)$.

A typical service desk implements standardised business processes according to which actors and agents need to perform certain tasks d_k or actions at specified moments. Therefore the work process can be formulated by a scenario:

$$\varepsilon_r = \left\{ s_k(d_k, t_k, \Delta t_k, \omega(d_k, t_k), t_k^0) \right\}, \quad (3)$$

where $\omega(d_k, t_k)$ – is the requirement for the executor,

t_k – time for the task to start,

t_k^0 – task appearance time, $t_k^0 \leq t_k$,

Δt_k – its normative duration.

For similar operations, specified template scenarios for the generation of new states for every new order can be used.

To start a task an appropriate executor should be available and be assigned to it. An assignment event for the actor a_i is specified as

$$q'_{k,i} = q'_{k,i}(d_k, a_i, t'_{k,i}, \Delta t_{k,i}, \omega(a_i, t_i^a)), \quad (4)$$

where the sequence of descriptors $\omega(a_i, t_i^a)$ describes how the actor's focus changes with time.

An assignment event for the agent b_j is specified correspondingly:

$$q''_{k,j} = q''_{k,j}(d_k, b_j, t''_{k,j}, \Delta t_{k,j}, \omega(b_j, t_j^b)), \quad (5)$$

The process of task flow distribution between the agents and actors in real time is characterised by the following average indicators:

- processing time;
- downtime or waiting time (idle time when waiting for assignment and start);
- the number of failures.

In problem domains like service desk automation the process of tasks execution involves multiple negotiations with the consumer and is performed in real time. Therefore the difference between the processing time by computer agents or human actors does not differ. When processing the task flow, the system goal is to minimise the number of execution failures and the task processing timeout.

Using the introduced indicators, we reduce the process of determining the optimal percentage ratio of agents and actors to solving the optimisation problem of discrete programming that includes the following objective functions.

Minimum waiting time (downtime):

$$T = \sum_k \sum_i \sum_j s_k \cdot (q'_{k,i} \cdot (t'_{k,i} - t_k^0) + q''_{k,j} \cdot (t''_{k,j} - t_k^0)) \rightarrow \min., \quad (6)$$

Minimum number of failures:

$$F = \sum_k \sum_i \sum_j s_k \cdot (1 - q'_{k,i}) \cdot (1 - q''_{k,j}) \rightarrow 0. \quad (7)$$

The proposed model has the following main assumptions and limitations.

1. The application of intelligent technologies in the modern organisation is concerned with the reduction of personnel and reorientation of the remaining staff to new responsibilities. Therefore, during the time of AI implementation, agents and actors are considered interchangeable.

2. The quality of tasks being performed by human actors is not compared to the quality of computer agents. If the task is carried out by any executor on time and with acceptable quality it is treated as successfully done. Otherwise it is treated as "rejected".

3. The difference between the normative duration of task execution by a human employee or robot, as well as the difference in cost, is not taken into account here. These parameters are influenced by the number of frequently repeated typical tasks. Computer agents are preferable for typical tasks, and human executors react better to unique occasional events. Therefore the problem of costs and time optimisation remains outside the scope of this study.

4. We consider that the efficiency characteristics of the computer agents and human actors are constant and do not change over time, and the number of tasks that need to be processed also remains unchanged.

4 Method

The solution of the problem (6, 7) is formulated as a set of assignment events $\{q'_{k,i}\} \cup \{q''_{k,j}\}$. In order to process the

incoming event flow of tasks $\{s_k\}$, the system should provide available resources of a certain type (agents or actors) at the required moments of time. The main problem is that we can neither attract additional employees when needed nor keep additional staff in reserve.

Therefore the proposed method contains three main stages: agents/actors ratio optimisation, compliance analysis and assignment. The generalised schema of the method is presented in Fig. 1. This method can be implemented using either standard software for simulation and analysis or a specifically designed software solution.

The first stage is to determine the quantitative ratio of agents and actors for efficient processing of the flow of incoming tasks. In the case of low knowledge about the real amount and types of tasks, event flows are simulated.

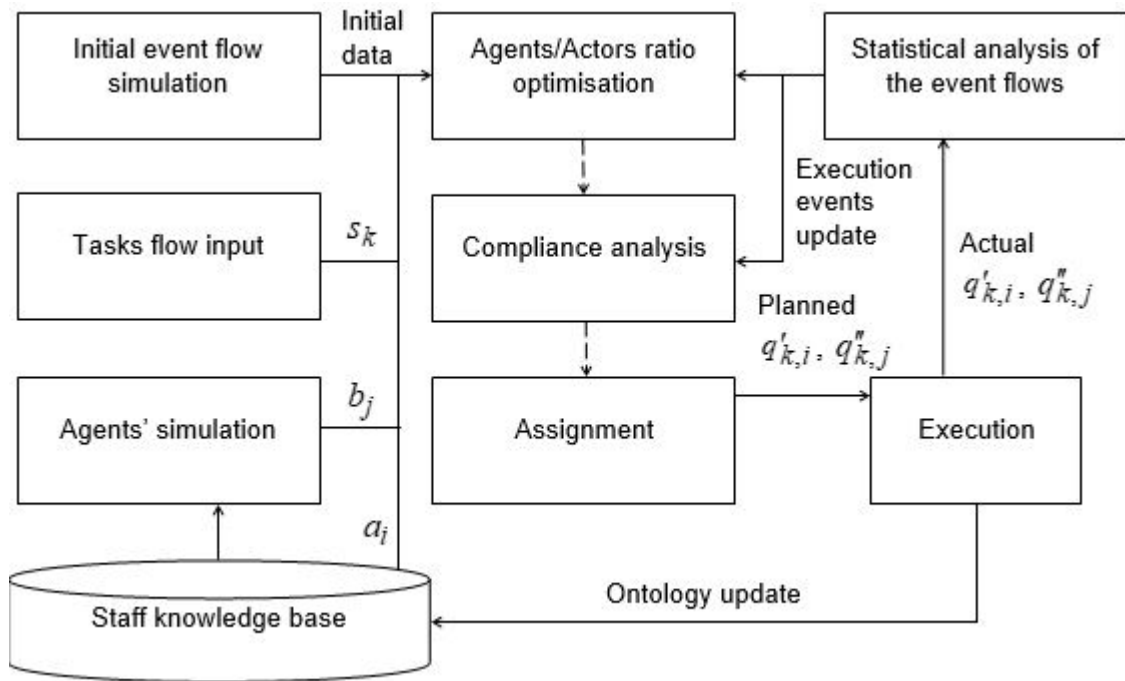


Figure 1: The method of optimisation of the rational proportion of intelligent technologies application

The first stage is to determine the quantitative ratio of agents and actors for efficient processing of the flow of incoming tasks. In the case of low knowledge about the real amount and types of tasks, event flows are simulated.

As a starting point, we consider an option with the number of actors $N_a = 1$, and the proportion $N_b / (N_a + N_b) = 100\%$, which corresponds to the complete execution of tasks by people, without the use of

automated robotic systems.

Next, we consider the option in which the number of agents is $N_b = 1$. It corresponds to fully automatic processing of incoming tasks. With this distribution, the waiting time for tasks in the queue is reduced, but the number of failures has the potential to increase, since the agents are able to perform poorly formalised tasks.

To determine the point at which both objective func-

tions are minimal, we use the gradient descent method with step splitting. The geometric interpretation of the method is that at each step we move along the anti-gradient vector, reduced by γ times, determining the direction of optimisation. Based on this data, a balance graph is constructed, which displays the intersection point of two functions, which corresponds to the optimal percentage ratio of agents and actors.

Compliance analysis is performed to improve the quality of the matching of the incoming tasks to the most appropriate executors. In order to provide on-time processing of incoming tasks, agents and actors need to be assigned correspondingly. Considering their autonomous behaviour and self-organisation, this should be done indirectly by attracting their attention at required moments. The result is described by the following compliance indicator:

$$R_a = \sum_k \sum_i (s_k \cdot q'_{k,i} \cdot P(\omega(d_k, t_k), \omega(a_i, t_i^a))) \cdot \delta(t'_{k,i} \leq t_k < t'_{k,i} + \xi) \cdot \delta(t_i^a \leq t'_{k,i} < t_{i+1}^a) \rightarrow \max, \quad (8)$$

where t_i^a – focus time (time of actor changing his/her interest represented by semantic descriptor);

$t'_{k,i}$ – assignment time, $t_k^0 \leq t'_{k,i} \leq t_k$.

Compliance indicator (5) allows the main correlations between the event flows of tasks and assignment to agents or actors to be determined. Compared to the high dynamics

of $\omega(a_i, t_i^a)$ being forced by changes of the actors' interest, the focus of each agent $\omega(b_j, t_j^b)$ does not change with time.

The compliance indicator for agents represents their impact:

$$R_b = \sum_k \sum_j (s_k \cdot q''_{k,j} \cdot P(\omega(d_k, t_k), \omega(b_j, t_j^b))) \cdot \delta(t''_{k,j} \leq t_k < t''_{k,j} + \xi) \cdot \delta(t_j^b \leq t''_{k,j} < t_{j+1}^b) \rightarrow \max. \quad (9)$$

Considering the limited number of tasks, statements (8) and (9) are in contradiction. To maximise the number of agents, the statement (8) should be targeted first, then the number of skipped tasks is reduced and assigned to corresponding human actors by attracting their interest.

Such an approach provides an efficient proportion of computer agents and human actors in the mixed intelligence. In general, human actors turn out to be preferable for processing unpredictable events in real time, while AI agents are better at simulating multiple versions of possible situations to predict, analyse, compare and optimise.

Assignment is the last stage of the method that generates the planned flows of $\{q'_{k,i}\} \cup \{q''_{k,j}\}$. The tasks are not assigned declaratively, but proactively taken out from the common queue by agents and actors according to their preferences. Actors pick out the tasks for execution themselves, while the agents are assigned automatically.

Based on the execution history, the knowledge base is updated in automatic mode. The staff knowledge base is

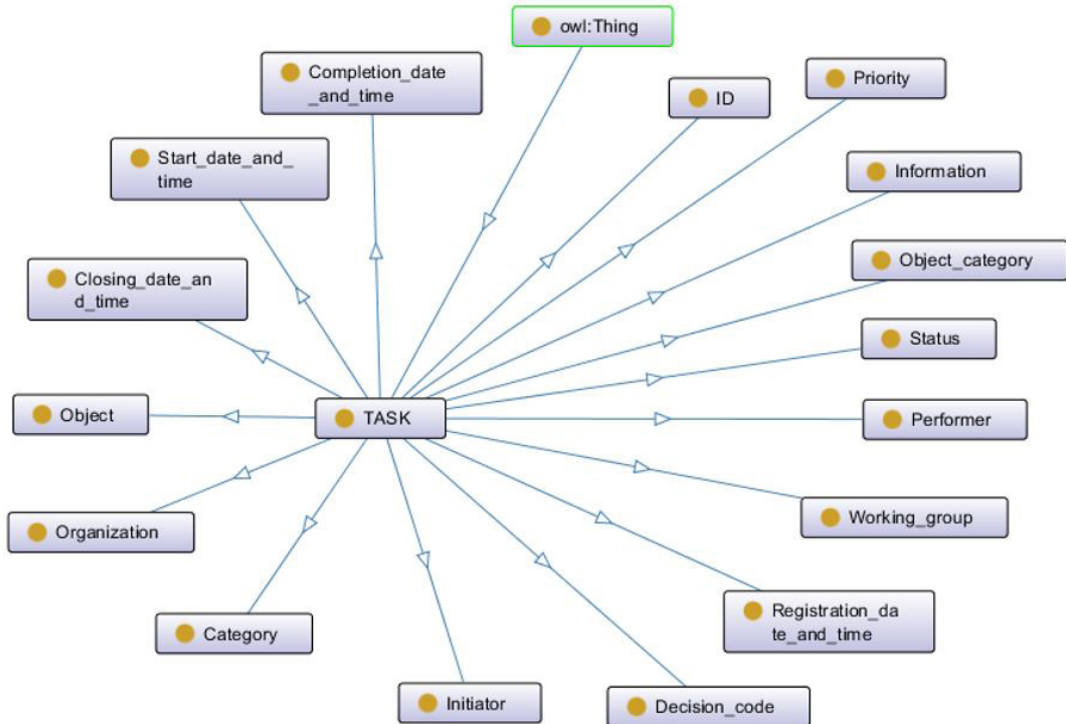


Figure 2: Task ontology

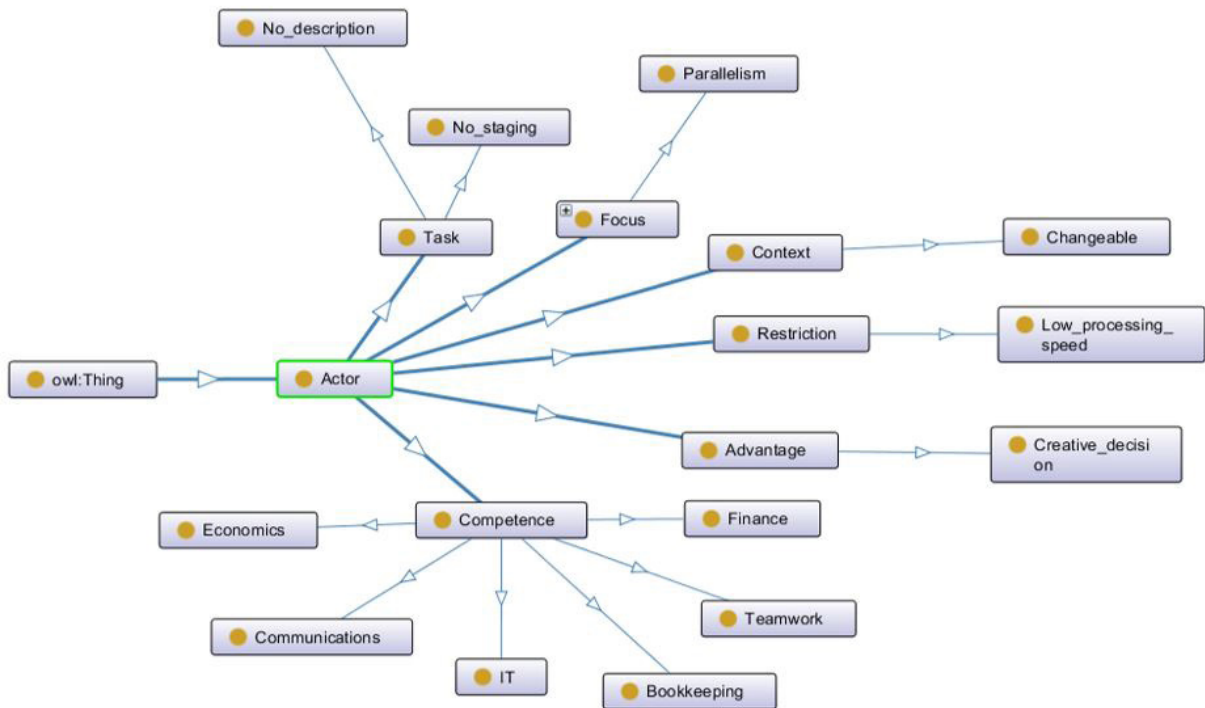


Figure 3: Actor ontology

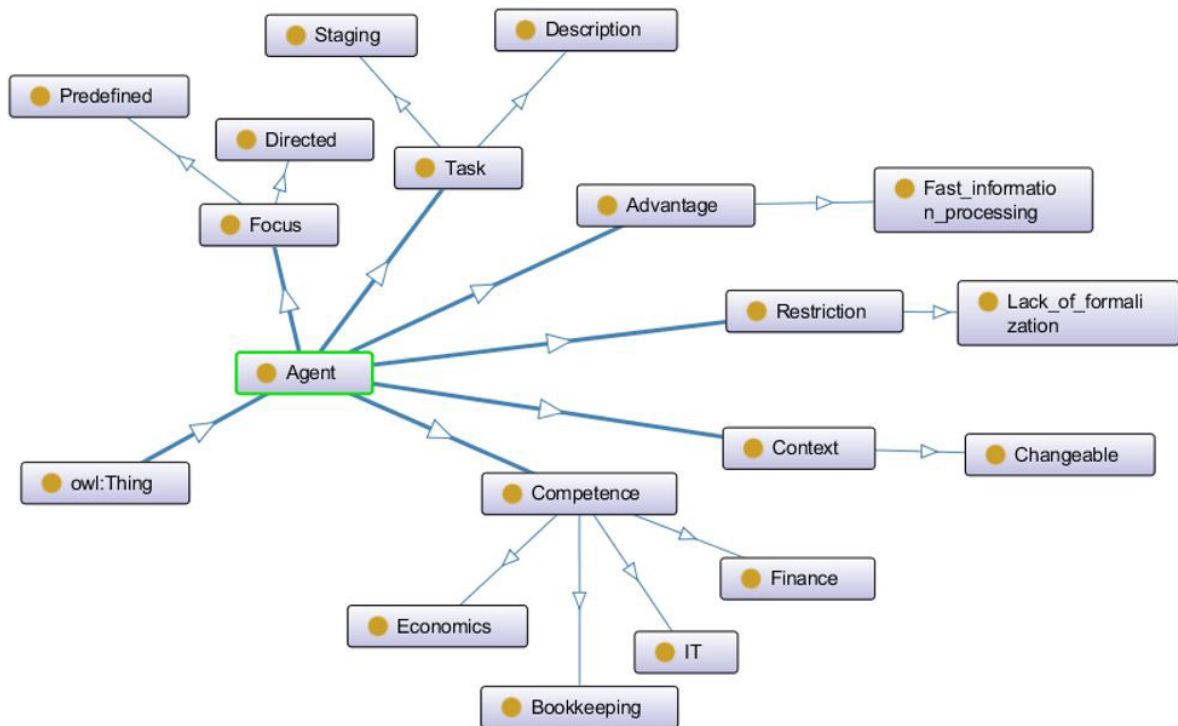


Figure 4: Agent ontology

used to simulate the agents of new types and data processing at the optimisation stage.

Considering the features of agents and actors, as well as the difference in the criteria for interaction and task processing, the staff knowledge base is combined from the ontologies of the task (see Fig. 2), the actor (see Fig. 3) and the agent (see Fig. 4). They present the main concepts in the form of a semantic model of RDF data and are visualised by OntoGraf – a conceptual map, which can be equated to a semantic network, since it has a network structure, the ability to specify the type of connection, uses words at the vertices, and has multiple connections between the concepts. The model visualisation is presented using Protégé: a local, freely distributed Java program designed to build (create, edit and view) ontologies of the application area.

The developed ontologies are necessary to introduce the hierarchical structure of the criteria for fulfilling tasks, which makes it possible to determine the relationships, differences and similarities between the ontologies of tasks and their executors.

5 Service desk case studies

The problem of AI and HR balancing was studied by an example of service desk automation. We have taken a dataset of 648 real calls that require service tasks generation and processing during a fixed period of time. The data was taken from the real service desk centre of an IT company and contains support requests. The call flow was divided into three types: Information request, Providing access, and Closing access.

According to the model and problem statement introduced above, the system goal is to minimise the number of execution failures and the task processing timeout. For the initial calculations, the averaged parameters of the speed of processing calls, the number and time of downtime for agents and actors were determined. These parameters were analysed using the statistical analysis software package STATISTICA by StatSoft. More details about the analysis are presented in the appendix.

According to the method introduced, for $N_a = 1$ the failure rate was zero, but the downtime increased by 1.9

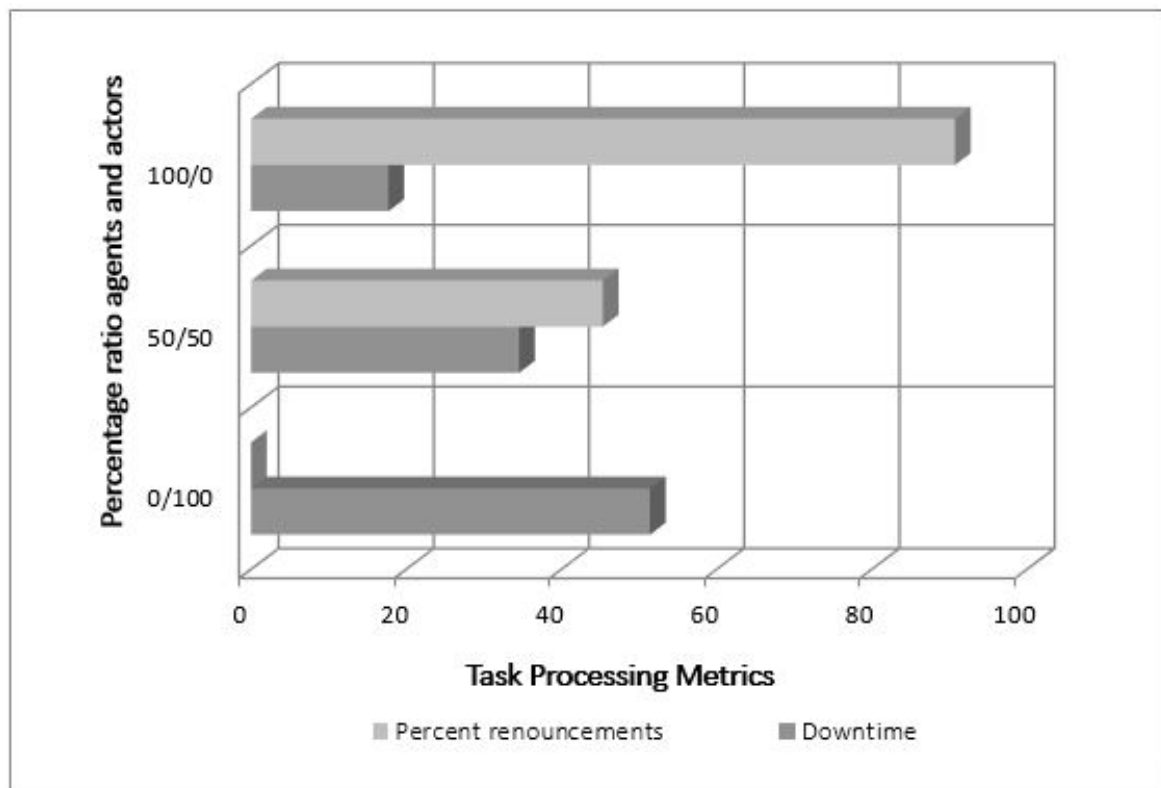


Figure 5: Dependency of tasks processing metrics for different agents/actors ratio

times compared to the initial values obtained. For $N_b = 0$ the waiting time for tasks in the queue was reduced by 1.4 times, but the number of failures reached 90 tasks due to renouncements and showed a tendency to increase, since the agents were able to perform poorly formalised tasks. An option was also considered in which the number of agents and actors was equally divided. Based on the calculations made, a graph was built (see Fig. 5). The graph

shows how the performance indicator changes depending on the percentage of agents and actors for the objective functions introduced.

Based on the data obtained by the gradient descent method for two objective functions, a balance graph was constructed (see Fig. 6), which displays the intersection point of two functions, which corresponds to the optimal percentage ratio of agents and actors.

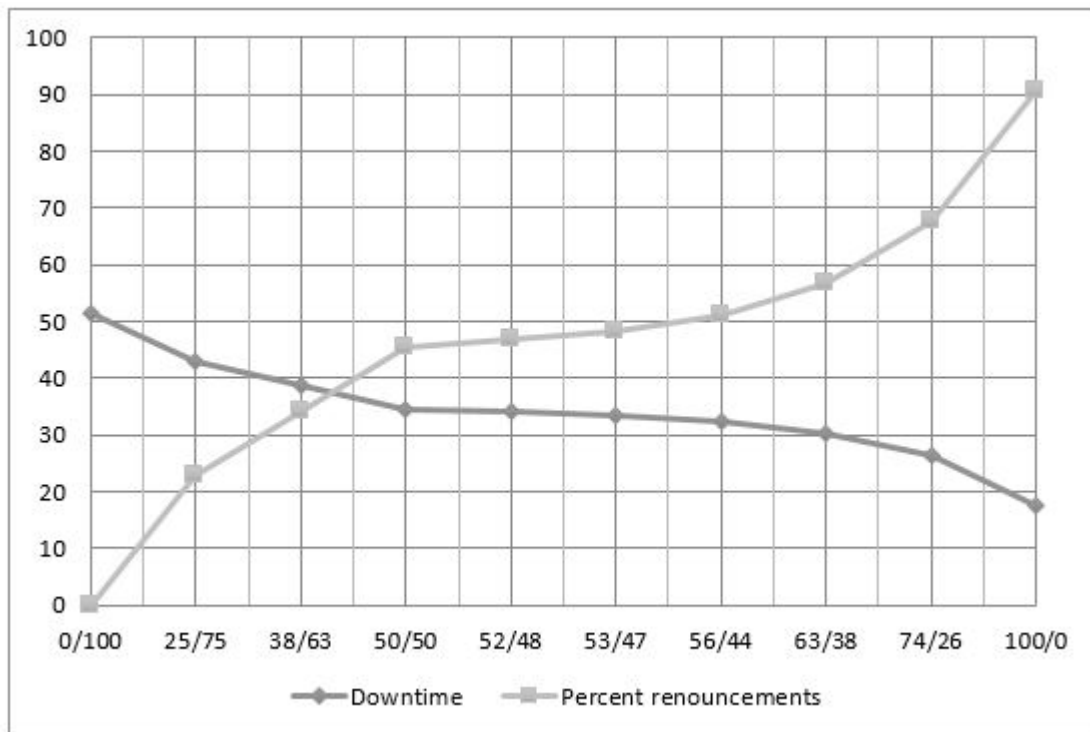


Figure 6: Dependency of failures on waiting time

6 Conclusion

Analysis and testing of AI and HR balancing in theory and practice gives a new idea for organisational management to look for the optimal percentage ratio of computer agents and human actors. Herewith, while solving this problem, the main objective should be changed from the total or maximum possible replacement of executors by software and robots to a rational combination of artificial and human executors, targeting their maximum cooperation.

Therefore in a modern digital enterprise there exists and can be estimated a rational proportion of computer agents and human actors, which becomes a significant indicator of their performance. This parameter varies with

time depending on the business requirements. In general, human actors are preferable for processing unpredictable events in real time, while agents are better at the modelling and simulation of multiple possible situations for forecasting, analysis, comparison, and optimisation.

The results of the performed analysis of service desk automation applying a rational proportion of intelligent technologies helped to formulate the main differences and features of the subjects of mixed intelligence, presented in Table 1. This conclusion may be of interest to the developers of modern AI solutions based on multi-agent technologies and network organisational structures.

The actors have the prospect of a deeper and more creative execution of tasks. At the same time, in mixed teams, dealing with a rapid change in context, the advantage will be on the side of the agents. Considering the theory of or-

organisational management and the influence of the human factor, the approaches to stimulating agents and actors should be different. The actors need to understand the benefits of their involvement and the impossibility of their total replacement by agents. The agents should provide stable and reliable services and be able to cooperate with the actors to develop new business opportunities. To reduce the amount of waiting time specifically for the actors, it is necessary to attract their attention to urgent tasks in the necessary steps of the business processes.

As presented in this paper, the complete replacement of personnel leads to a lack of adaptability, while the introduction of additional artificial intelligence gives new opportunities and advantages. Besides, the employees of modern companies need to decide nowadays what area of their impact will be the most beneficial and adopt training paths and development strategies accordingly.

Table 1: Features of mixed intelligence subjects

Criterion	Computer agent	Human actor
Time	Model time	Real time
Reality	Able to simulate multiple versions of scene	Capable of acting in real scene or a few forecast scenes
Focus	Rigid and predefined	Flexible, changing under the influence of interest
Role	Reliable and predictable	Highly qualified and motivated
Context influence	No	Considerable
Problem statement	Formalised	Lacking
Limitations	Unable to solve unique and poorly formalised tasks	Low productivity
Strengths	High performance	High adaptability
Switching between tasks	Needs study time	Low study time

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Anton Ivaschenko, professor, PhD (2004) in mathematical modeling, DSc (2012) in management in social and economic systems is a Head of the Computer Science Department of Samara State Technical University. His areas of research include modeling of complex systems in digital economy and social media, intelligent and multi-agent systems.

Alfiya R. Diyazitdinova, PhD (2004) in management in social and economic systems, associate professor at the Applied Informatics Department of Povolzhskiy State University of Telecommunications and Informatics. Her areas of research include IT design and management and automated decision-making support.

Tatiyana Nikiforova is a PhD student at Samara State Technical University, earned her Engineer of Information Systems and Technologies degree in 2015. Her research interests include modeling, business analysis, digital economy and data analysis.

Optimizacija racionalnega deleža inteligentnih tehnologij: Uporaba v storitvenih organizacijah

Ozadje in namen: Naraščajoča vloga in vključenost umetne inteligence v sodobna digitalizirana podjetja vodi do znatnega zmanjšanja števila zaposlenih in preusmeritve dela osebja na nove zadolžitve. Vendar pa na številnih področjih, kot so storitve in podpora, popolna odprava zaposlenih človeških virov še vedno ni mogoča. Predlaga se proučitev organizacijskega problema iskanja optimalnega deleža računalniških agentov in človeških akterjev v mešanem sodelovalnem okolju.

Načrtovanje / metodologija / pristop: Z uporabo tehnike semantične in statistične analize smo razvili izvirni model sodelovalne interakcije računalniških agentov in človeških akterjev ter metodo optimizacije, ki je nova pri proučevanju osredotočenosti izvajalcev pri izračunu kazalnikov skladnosti.

Rezultati: Problem smo preučili na primeru avtomatizacije servisne službe. Upoštevanje semantike problemske domene v obliki ontologije uvaja logiko za boljšo porazdelitev in avtomatizacijo nalog.

Zaključki: V sodobnem digitaliziranem podjetju obstaja in je mogoče oceniti racionalno ravnoesje med računalniškimi agenti in človeškimi akterji, kar postane pomemben pokazatelj njegove uspešnosti. Na splošno so človeški igralci boljši za obdelavo nepredvidljivih dogodkov v realnem času, medtem ko so agenti boljši pri modeliranju in simulaciji.

Ključne besede: Avtomatizacija storitvenih organizacij, Umetna inteligenca, Človeški viri, Podpora odločanju

Appendix

This appendix contains additional information describing the data studied as an example of service desk automation. The dataset contains 648 real calls that require the generation and processing of service tasks during a fixed period of time.

From the total number of requests, the ratio processed by agents and actors is presented in Fig. 7. 74% of 648 calls were performed by agents, the remaining 26% by actors. Fig. 8 describes the distribution of call categories.

Below are presented the main metrics for processing

the requests, depending on the executor. The waiting time for tasks execution is presented in the “Boxplot by Group” chart in Fig. 9. The graph shows that the actors (group 1) have a higher idle time than the agents (group 2). The standard deviation is in the range from half an hour to 3 hours. This is due to the fact that the queue of tasks is analysed unevenly by the actors, confirming that the focus of the actor is discrete and constantly changing. For group 2, the standard deviation does not exceed a couple of minutes, which suggests that the tasks for the agents are distributed at a speed that does not allow queuing.

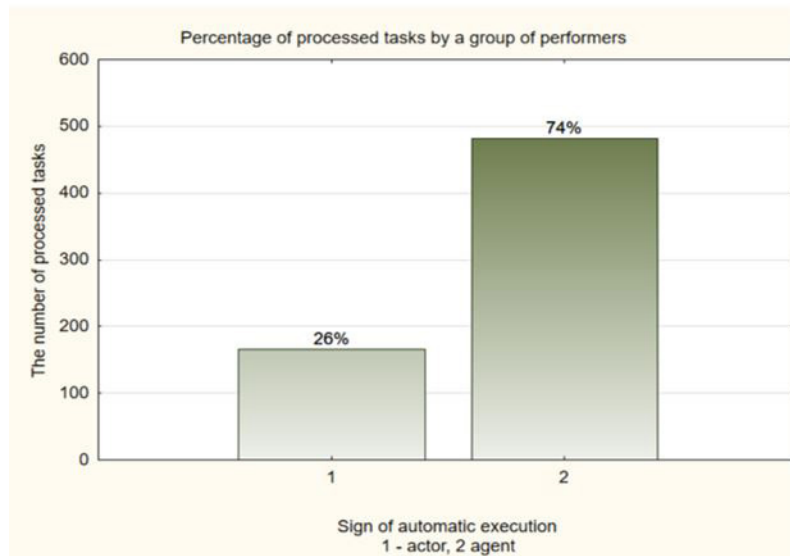


Figure 7: Tasks processed by actors and agents

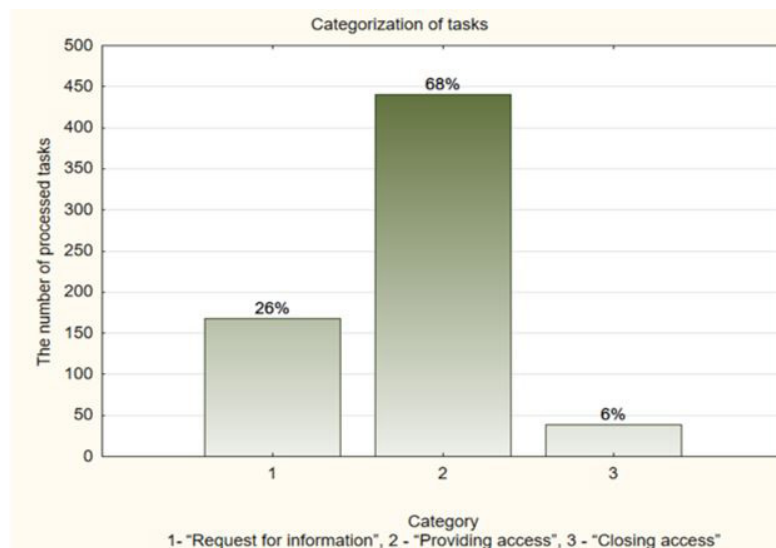


Figure 8: Processed tasks by category

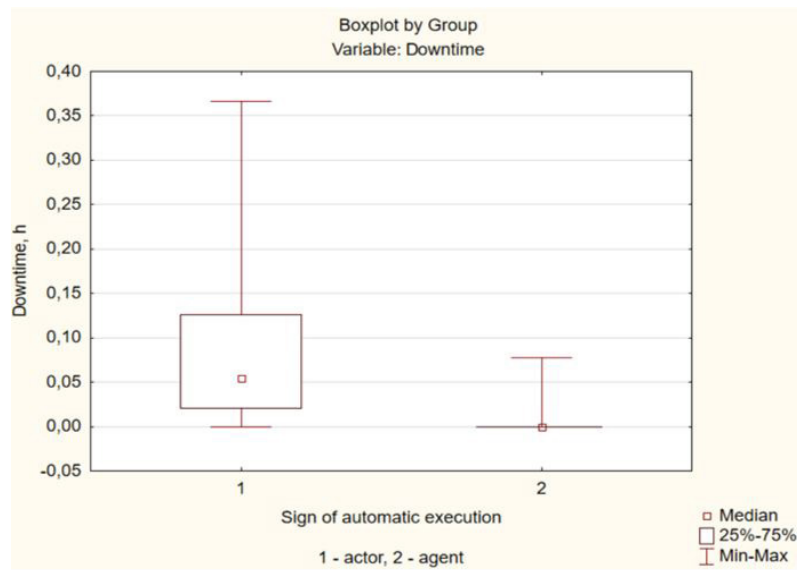


Figure 9: Task waiting time depending on the type of executor

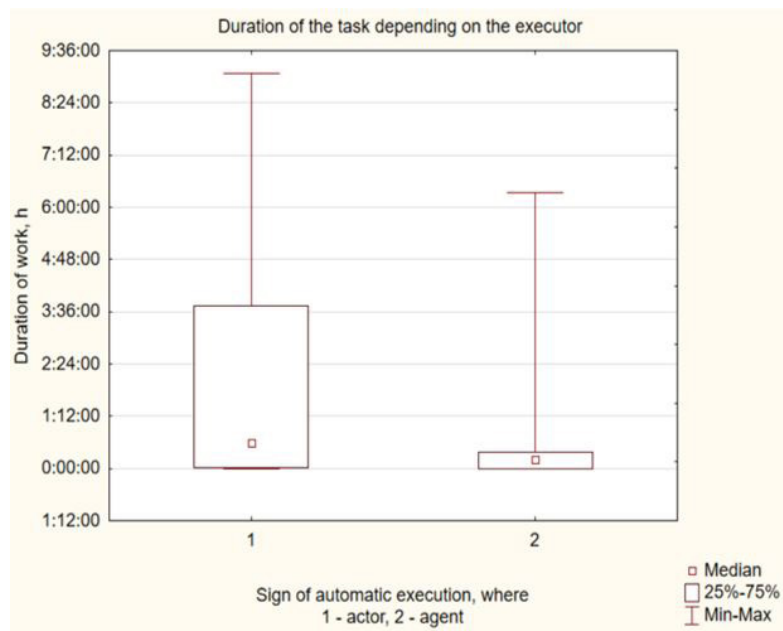


Figure 10: Task duration depending on the executor

Fig. 10 shows that the processing time of tasks is significantly higher for the group 2 agents than for the group 1 actors. For approximately 75% of the tasks performed by group 2, the processing time does not exceed an hour, while for group 1 this time is up to 3.5 hours. The maximum values for both groups are at a considerable distance from the median, which indicates the emergence of tasks that require significant time for both the agents and the actors.

Based on the average processing time of calls in relation to the number, the average speed of processing calls for the agents and the actors was determined. For an agent it was approximately 3 calls per hour, for an actor approximately 0.3 calls per hour. At the same time, the number of responses from the agent was 67, which corresponds to 14% of the total number of processed requests for the period.

Let us evaluate the difference between the two independent samples by the level of the sign of automatic execution (dependence on the executor) using the Mann–Whitney U-test (see Table 2).

The differences are statistically significant at a high level, the indicator $p < 0.05$, i.e. the downtime ($U = 22088.0$) and duration of work ($U = 19692.0$) of the actors is higher than the agents. These results can be logically explained, since the automation and digitalisation were initially designed to optimise and intensify human labour. With the current distribution of tasks, one agent becomes equal to

three actors in terms of performance.

As a result of one-factor analysis for the variable duration of tasks, a dependence on the category was revealed, illustrated by Table 3.

ANOVA analysis of variance was used to determine the differences of execution time spent by the actors for each category of tasks (see Fig. 11). The actors have no failures as they are able to process any task. The tasks of category 1 take longer for successful processing than other categories. Agents have no differences in the average processing time for the tasks of various categories (see Fig. 12).

Table 2: Mann–Whitney U test for the groups of actors and agents

Variable	Rank Sum for Actors	Rank Sum for Agents	U	Z	Z adjusted	Valid N Actors	Valid N Agents
Downtime	71 785	138 491	22 088	8.613	9.479	166	482
Work duration	61 319	106 012	19 692	7.821	7.969	163	415

Table 3: Univariate tests of significance for tasks duration

Effect	SS	Degree of freedom	MS	F
Intercept	0.295	1	0.295	80.461
Category	0.495	2	0.248	67.594
Error	2.106	575	0.0037	

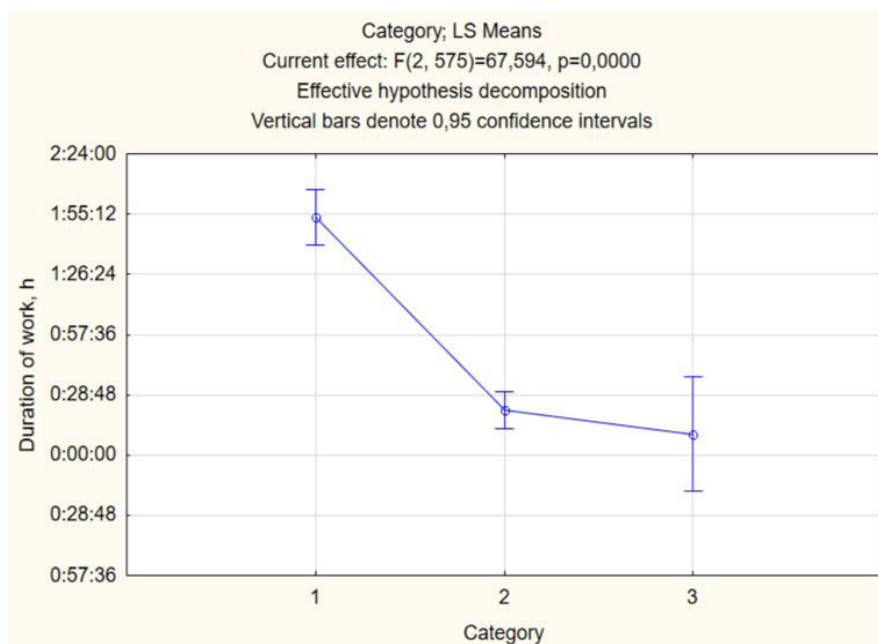


Figure 11: Dependency of tasks processing time by actors on the category

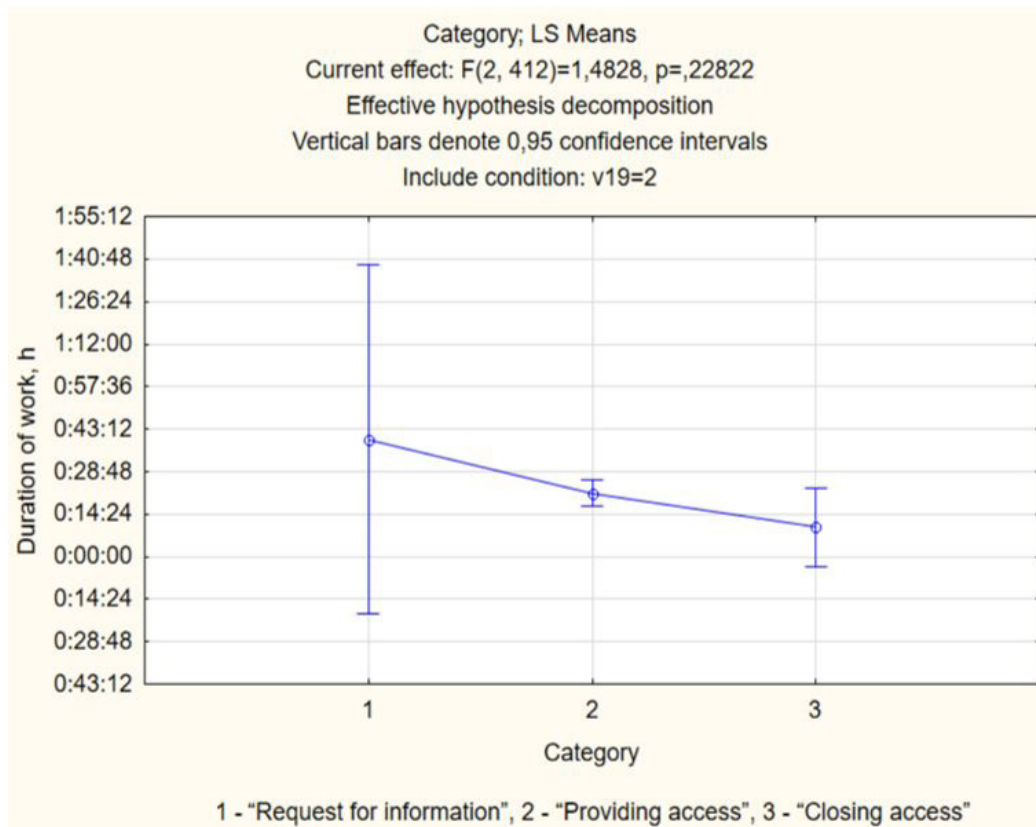


Figure 12: Dependency of tasks processing time by agents on the category

Table 4: Mann–Whitney U test for agents by successfully processed tasks and failures

Variable	Rank Sum Group 1 Processed	Rank Sum Group 2 Failures	U	Z	p-value	Z adjusted	p-value	Valid N Group 1 Processed	Valid N Group 2 Failures
Category	100 633	14 807	12 529	1.24	0.215	2.62	0.009	413	67

For computer agents, statistically significant differences were established between the number of failures and the number of successfully completed tasks by calculating the Mann–Whitney U-test (see Table 4). Despite the high failure rate (14%) in the amount of 67 requests in group 2, successfully completed tasks still prevail (413 in group 1). At the same time, the efficiency of agents in the direction of reducing the number of failures should be improved.

The results of the statistical analysis showed that, despite the fact that the majority of tasks are processed by agents, and the processing time and waiting time for the agents are less than for the actors, the number of refusals for the agents is greater. This is confirmed by the “Boxplot by Group” plots. The agents are only effective in certain categories of tasks. The actors work less efficiently, but

are more stable in solving any type of problem. This conclusion was obtained using the Mann–Whitney U test and ANOVA analysis.

AUTHOR GUIDELINES / NAVODILA AVTORJEM

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Članek naj bo razčlenjen v oštevilčena poglavja. Naslovi članka, poglavij in podpoglavij naj bodo napisani z malimi črkami, da so razvidne kratice. Slike in tabele v elektronski obliki vključite kar v besedilo. Besedilu so lahko priložene slike in/ali tabele na papirju v obliki pripravljeni za preslikavo. V tem primeru naj bo vsaka slika na posebnem listu, oštevilčene naj bodo z arabskimi številkami, v besedilu naj bo označeno, kam približno je treba uvrstiti sliko: na tem mestu naj bo številka slike/tabele in njen podnapis. Slike bomo praviloma pomanjšali in jih vstavili v članek. Upoštevajte, da morajo biti oznake in besedila na vseh slikah dovolj velika, da bodo čitljiva tudi pri velikosti slike, kot bo objavljena v reviji. Vse slike naj bodo črno-bele z belim ozadjem; barvnih slik v tiskani verziji revije ne moremo objaviti, barve so vidne le v spletni verziji.

Članki morajo biti pred objavo v Organizaciji lektorirani. Končno verzijo mora lektorirati naravni govorci oz. lektor s primerljivim znanjem angleščine.

Podrobna navodila avtorjem za pisanje in oblikovanje člankov so na <http://sciendo.com/journal/orga> - for Authors.

Predložene prispevke pregledata in ocenita najmanj dva recenzenta. Na osnovi mnenj in predlogov recenzentov uredniški odbor ali urednik sprejmejo prispevek, zahtevajo manjše ali večje popravke in dopolnitve ali ga zavrnejo. Če urednik oziroma recenzenti predlagajo večje popravke, se dopolnjeni prispevek praviloma pošlje v ponovno recenzijo.

Članke za objavo lahko predložite preko spletnega mesta <http://organizacija.fov.uni-mb.si>. Za nadaljnje informacije in pojasnila se lahko obrnete na uredništvo Organizacije (organizacija@um.si ali joze.zupancic@um.si).

Naslov uredništva:

Univerza v Mariboru,
Fakulteta za organizacijske vede
Kidričeva cesta 55a
4000 Kranj
Faks: 04-2374-299
Tel.: 04-2374-245

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CONTENTS - 2/2021

Jin-Nan WU, Mengmeng SONG, Joseph C. UGRIN, Lin LIU, Tingting ZHU Cyberloafing Research 1997-2019: A Citation-based Literature Review	98
Mehmet ÇETİN, Gulmira SAMENOVA, Filiz TÜRKKAN, Ceylan KARATAŞ The Role of Daily Affect in Leader-Member Exchange: A Multilevel Investigation in Public Health Administration	112
Phuong TRAN HUY, Hong Chuong PHAM Effect of Management Commitment to Service Quality on Car-hailing Drivers' Service Behaviors: The Case of GrabCar in Vietnam	131
Erik RUŽIĆ, Dragan BENAŽIĆ The Impact of Internal Knowledge Sharing on Sales Department's Innovativeness and New Product Commercialization	147
Anton IVASCHENKO, Alfiya R. DIYAZITDINOVA, Tatiyana NIKIFOROVA Optimisation of the Rational Proportion of Intelligent Technologies Application in Service Organisations	162