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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.

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- članki, ki analizirajo organizacijsko uspešnost in prizadevanja za izboljšanje le-te.

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In Memoriam

There recently passed away the esteemed fellow scientist and teacher Dr Jožef Ovsenik. We have lost a distinguished professor, a tireless researcher of organization and management, well known and respected at home and abroad. We knew him as a man who, despite more than forty years of disability, was full of creative spirit.

Dr Jožef Ovsenik was born 85 years ago in the village Predoslje near Kranj in Slovenia. After high school in Kranj, he enrolled at the Faculty of Economics, University of Ljubljana, where he graduated and obtained his master's degree under the mentorship of Prof Filip Lipovec, and received his PhD from the Faculty of Organizational Sciences, University of Maribor, under the mentorship of Prof Zdravko Kaltnekar. After graduation, he took a job at the Productivity Institute in Ljubljana at the invitation of its then-director. Later, at the invitation of its management, he got a job at the College of Work Organization as a senior lecturer. He participated in the process of transforming the College into the Faculty of Organizational Sciences at the University of Maribor.

In 1980, he suffered a stroke, leaving him 100 percent disabled. The stroke, however, did not paralyze him. He actively continued his in-depth pioneering research of the philosophy and theory of organization. Regardless of his disability, his bibliography, mostly scientific articles and monographs, comprises over a hundred published works. His final monograph entitled Planetary Awakening, where he actualizes the issue of organizational thought and suggests the challenges of further evolution of life is about to be published. All his work reflects the belief that organization is a complex system—something he understood at the highest level, while analytically unravelling the importance of small details.

Dr. Jožef Ovsenik was a philosopher of organizational theory. He studied human work and organisation, phenomena that, he believed, form an interwoven, coherent whole. He analysed relationships and interpreted the meaning of a relationship-based organisation. He stressed that the Cartesian paradigm has economically and socially disastrous consequences for human life in the ecosystem. He was challenged by the scientific insight into the algorithm of how humans reflect on their action. He defined the concept of human work through seven theses and interpreted it in terms of how humans reflect on their behaviour in the process of action. His philosophical interpretation of the dimension of human action led him to the question of the concept of self-organisation. He further reflected on the promotion of creativity by using the sinusoidal model of human action. Thus, he was oriented towards the study of new horizons of human and organisational sciences in the context of a new holistic paradigm, or a new human science.

His research affirmed a new understanding of organization in the direction of a tri-valent recognition of awareness with triple points of convergence. These require the modernization of an organization by way of a developing awareness of how it operates as well as a creative and ongoing exploration of this phenomenon, with the aim of preventing the crises brought on by modern times. He pointed out that organizational theory of the second half of the 20th century narrows our understanding of organizations and focuses primarily on the organization as a group of people established to achieve common goals and on the internal organizational structure of positions of power. In the current crisis, which is leading the world to zero economic growth, he drew attention to the problem of awareness, a factor still permeated by 17th-century Cartesian thought. The exploration of mentally active human awareness in relation to the principle of the all-embracing organization present throughout the living world suggests possible growth towards perfecting the organization as a creative subject, supported by Aurobind's Alternative Hypothesis with Involution.

Dr. Ovsenik was constantly engaged by human relationships as exemplifying the basis of an organization that brings holistic success - not only at the level of profit, but also at the level of personal and professional growth. He saw the nature of human work in a whole new way; namely, he claimed that the focus of human activity is obviously far more intense in areas that are intellectual, spiritual and non-material than in those involving the mere physical processing of objects of work.

Undoubtedly, Dr Jožef Ovsenik was an in-depth scientist and Slovenia's first philosopher of organizational theory.

The Faculty of Organizational Sciences has more than 60 years of tradition in research in the field of organizational sciences. Outstanding researchers and personalities contributed to the rich development and study, where Dr Jožef Ovsenik occupies a unique and lasting place of honor.

Few researchers on the field of organization and management at the University of Maribor had the honour of knowing Dr. Jožef Ovsenik and of personally experiencing his greatness. As for me, I will never forget our personal discussions during breaks at the Conferences of Organizational Sciences in Portorož: he steered me to think about forms of work and the role of man in situations that at the time sounded unimaginable, visionary. Many of these "visionary" solutions have since been verified and are nowadays taken as common coin. But when Dr Ovsenik first presented his reflections, such thinking concerning crises and uncertainties was unprecedented. Now he has bequeathed his thoughts and ideas to other researchers who are working to develop them for the progress and wellbeing of future generations.

Prof Dr Iztok Podbregar, Dean

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The FunCaps Framework: Reconceptualizing Operational Alignment

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Background and purpose: Operational alignment, the alignment between business processes (BPs) and information systems (ISs), is a well-acknowledged requirement for improving business efficiency. However, a lack of sound foundation for the practical implementation of operational alignment remains in the existing literature. This is, in part, because previously developed coarse-grained strategic alignment models for operational alignment have overlooked the differences between strategic and operational levels of alignment. Additionally, while some studies have recognized these differences, they remain limited. This is partly due to their negligence of the IS's socio-technical nature or their focus on identifying the social antecedents and their effect on operational alignment, without considering how ISs meet the business requirements in achieving operational alignment. To overcome this potential lack of applicability, the purpose of this paper is to determine the right level of abstraction for describing BPs and ISs and reconceptualizing operational alignment.
Methodology: This paper conducts empirical research using a grounded theory (GT), centering on semi-structured interviews with 28 experts involved in the Iranian top public universities. Data were analyzed by using MAXQDA software.
Results: The resulting FunCaps framework specifies the required combinations of BP functions and IS capabilities for operational alignment.
Conclusion: FunCaps reconceptualizes operational alignment based on operational planning and reciprocal integration and establishes the broader picture by considering an IS as a socio-technical system.

Keywords: *Operational alignment, information system, business process, socio-technical system, grounded theory*

1 Introduction

In the study of information system (IS), it is essential to move from silo to system thinking to achieve ISs and business alignment and improve business efficiency. The IS was considered a separate department of a business, before the 1970s, that did not share the same priorities, goals, or tools with the other departments (Luftman et al. 2017). As a result, the IS department operated as an individual business entity and was viewed solely as a cost for the business (Kappelman et al. 2019). As long as the functions of IS were only maintenance and processing of the records and documents, the silo thinking did not lead to major challenges (Karpovsky and Galliers 2015). However, challenges emerge when competition increases, and as such, efficiency becomes vital for the business. Businesses must move from silo thinking to systems thinking (Bagheri et al. 2019) to improve business efficiency. Systems thinking is a holistic approach focused on how the departments

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in a business and their constituents work together efficiently over time. As a result, system thinking necessitates the alignment of business and ISs, as the business constituents, at both strategic and operational levels (Hinkelmann et al. 2016).

To achieve business-IS alignment, we need to realize alignment at both strategic and operational levels. Strategic alignment refers to aligning IS strategies with business strategies and helps meet future IS needs of the business (Levstek et al. 2018). Operational alignment investigates the alignment of ISs with the business by ensuring the effectiveness and efficiency of ISs in supporting daily business operations (Zhou et al. 2018). Additionally, while strategic alignment focuses on "What should be done?" (Henderson and Venkatraman 1993), operational alignment is rooted in answering "How to perform activities?" (Gerow et al. 2016). As such, alignment is not achieved unless it is realized at both strategic and operational levels (Renaud et al. 2016).

Business-IS alignment, at both levels (strategic and operational), has been a main concern of the information technology (IT) leaders since 1984 (Kappelman et al. 2018). Similarly, CIOs at top public universities (TPUs) in Iran remain concerned about the alignment of IS and business process (BP) (hereafter operational alignment). TPUs are leading universities in developing IT/IS capabilities. Despite CIOs' desire for the practical implementation of the existing models and frameworks at TPUs, they are limited in efficient and effective achievement of operational alignment. Therefore, operational alignment remains an open problem for the CIOs at the TPUs.

The concern in achieving operational alignment relates to (1) adaptation of the approaches in strategic alignment for operational alignment and (2) limitations of existing approaches specific for achieving operational alignment. Firstly, while the strategic level is coarse-grained, the operational level is fine-grained. Therefore, in the adaptation of alignment approaches at the strategic level, high-level strategic concepts must be converted into precise, well-defined, and low-level operational concepts. Secondly, although only a handful of the extensive previous studies on business-IS alignment have considered the differences between strategic and operational levels of alignment (Malshe et al. 2017), they remain limited in their applicability to operational alignment. The existing approaches that have used modeling languages (MLs) to link models in BPs and software systems (SSs) (e.g., Aversano et al. 2016; Li et al. 2015; Kraiem et al. 2014) should be improved for achieving operational alignment. Because these studies do not consider SS as a socio-technical system, and yet IS, not considered by MLs, is a sociotechnical system. The remainder of the handful of approaches that have considered the differences between strategic and operational alignment are limited because they do not consider how ISs meet business requirements in achieving operational alignment. Instead, they are focused on identifying social antecedents (e.g., communication) and their effect on the operational alignment (e.g., Wagner et al. 2014; Zhou et al. 2018; Bagheri et al. 2019). The right abstraction level must be used to identify what to include and what to exclude in achieving operational alignment in order to address the limitations of the existing approaches. Abstraction is the process in which some features are chosen to be presented while some are rejected (Kaul et al. 2017). The right level of abstraction, here, means that abstraction must (1) consider the differences between the strategic and operational levels of alignment and translate high-level strategic concepts into low-level operational concepts, (2) consider IS as a socio-technical system, and (3) consider how ISs meet business requirements.

The issues mentioned above necessitate further research to determine:

Research Question: What is the right level of abstraction to describe BPs and ISs for achieving operational alignment?

Here, we used Grounded theory (GT) as a bottom-up approach to scrutinize operational alignment. GT starts from fine-grained elements and classifies them to form coarse-grained dimensions. As a result, using GT, we will achieve a higher-level abstraction without missing lower-level details and elicit the socio-technical aspect of operational alignment.

This paper is organized as follows: Section 2 describes the approaches used in the previous research on business-IS alignment and the research gap. Section 3 explains the use of GT as a research method. Section 4 presents the results of the analysis and coding of the data. Section 5 positions the results of this research in the relevant literature and integrates the results with related model. And, Section 6 discusses the limitations of the study and presents some suggestions for future studies.

2 Literature review

Business-IS alignment is an extensively studied topic (Zhou et al. 2018). This section reviews the approaches in the previous literature on business-IS alignment and their research gap.

2.1 Approaches used in the previous research on business-IS alignment

The approaches used in the existing studies are categorized into two main categories: (1) approaches that aim to achieve strategic alignment and (2) approaches that aim to achieve operational alignment. We explained selected studies on two main categories in Appendix A.

2.2 Research gap

2.2.1 Approaches at the strategic level

Challenges in existing approaches at the strategic level of alignment are rooted in the level of planning and the direction of integration (Grover and Lyytinen 2015). Existing literature at the strategic level is based on strategic planning, while the realization of operational alignment is contingent upon operational planning (Malshe et al. 2017). Strategic planning aims to answer the questions: "Where does the organization want to be in the future?" and "How will organizational vision, mission, and objectives be reached?". In contrast, operational planning supports strategic planning to meet organizational goals (Schwarz et al. 2010). In terms of the direction of integration, the direction of integration in strategic alignment is sequential or reciprocal, while the direction of integration in operational alignment is reciprocal (Rahimi et al. 2016). Sequential integration is one-way planning of business; in other words, IS focuses primarily on providing business support. Reciprocal integration refers to two-way planning with a reciprocal and interdependent relationship between business and IS, where IS plays a role in supporting and influencing business (Teo and King 1997). To achieve operational alignment, we must consider the (1) distinctions between the two levels of planning (strategic and operational) and (2) reciprocal integration.

Our detailed literature review on business-IS alignment at the strategic level showed that proposed models and frameworks are influenced by the strategic level of planning and place a low priority on the reciprocal integration between BPs and ISs. Concerning strategic planning, these models demonstrate the required actions to achieve strategic alignment. These actions are based on long-term objectives dependent on fluctuating environmental conditions and various internal organizational factors (Bergeron et al. 2004). Therefore, models and frameworks at the strategic level are high-level concepts, and not generalizable to operational alignment, based on operational planning and short-term objectives. In terms of reciprocal integration, the models and frameworks for strategic alignment place a low priority on the interplay between BPs and ISs, which is a higher priority for achieving alignment at the operational level (Renaud et al. 2016). According to Pantazi and Georgopoulos (2006), operational alignment is based on a two-way relationship and reciprocal integration, which means that ISs not only facilitate and support the successful implementation of BPs but also increase the agility and flexibility of BPs in conformity with the environmental dynamic. In summary, both the development of ISs based on BPs and the fulfilment of BPs according to ISs, play a crucial role in operational alignment (Trang et al. 2021). However, most of the existing models and frameworks do not take the differences between strategic and operational planning, and the reciprocal integration between BPs and ISs, into account and, therefore, there remains a need for further investigation to realize operational alignment (Kotusev, 2020).

2.2.2 Approaches at the operational level

Existing literature at the operational level used one of two approaches: (1) using MLs to link models in BPs and SSs, and (2) focusing on identifying social antecedents and their effect on operational alignment. Studies using MLs to link models in BPs and SSs (e.g., Aversano et al. 2016; Li et al. 2015; Kraiem et al. 2014; Frankova et al. 2011) are commonly based on two fundamentally limiting premises: their focus is limited to SS, and they mainly draw from Strategic Alignment Model (SAM).

The limited focus of previous studies of operational alignment implementation on SS gives rise to challenges for implementing their outcomes. The majority of existing ML approaches have taken up operational alignment by linking models in BP with SS instead of with ISs. Bostrom and Heinen (1977) argue that an IS consists of two interactive parts, namely, technical and social subsystems, where the technical subsystem includes technology, artifacts, processes, tasks, procedures, and physical environment, and the social subsystem comprises elements such as structure and people (with their viewpoints, behaviours, and relationships) (Bostrom and Heinen 1977). According to the socio-technical system (STS) theory, although technical and social subsystems are closely interrelated, they are intrinsically distinct. Technical subsystems aim to attain specified performance parameters. Social subsystems, however, are dependent on humans with unpredictable behaviours. Technical subsystems traditionally dominate the investigation of systems and focus on the technical aspect of SSs without considering the social aspects. Yet, in contrast to SS, IS is a socio-technical system (Walker et al. 2008). Thus, the emerging approaches using MLs should consider IS as a socio-technical system to improve their applicability in achieving operational alignment.

Besides, most ML approaches build on SAM. According to Renaud et al. (2016), SAM is grounded in assumptions that are recognized as no longer valid and hence must be updated by reconceptualizing its dimensions. Others have challenged Henderson and Venkatraman's (1993) valuable model (i.e., SAM) due to its three possible major shortcomings depending on (1) the true nature of organizational strategy, (2) the performativity of the model, and (3) managerial rationality and redundancy of organizational members (Renaud et al. 2016). The first challenge is that SAM takes a managerial and top-down approach in which IS strategy or business strategy is intended exclusively for an elite group within the organization (Renaud et al. 2016). SAM does not emphasize the importance of the stream of Strategy as Practice (SaP). SaP defines strategy as some-

thing for which actors are responsible and is not simply the content or the action plan resulting from a decision. Instead, SaP breaks away from conventional literature on the strategy that focuses primarily on top managers and challenges the notion that only one elite group within an organization can act strategically (Renaud et al. 2016). Secondly, SAM is an abstract "black box" that may not reflect its corresponding environmental complexity. As a result, SAM might overlook the organizational reality, and managers might face difficulty in effectively appropriating its dimensions (Avison et al. 2004). Renaud et al. (2016) later also pinpointed that due to SAM's high level of abstraction, it might lack an approximate representation of practical reality. Finally, SAM's is virtually designed exclusively for top managers. This model presumes that if the managers follow the model's rational prescriptions, organizational performance should improve (but often does not) (Renaud et al. 2016). Moreover, SAM emphasizes the technical aspect and underestimates the importance of the social aspect of the IS because of its theoretical abstractions. Interestingly, at the time of the SAM model's initial proposal, an IS was hardly considered a socio-technical system (Renaud et al. 2016). Today, however, studies find that ISs, users, and organizations are intrinsically embedded and interrelated since each of them shapes the others. Hence, emerging approaches need to consider SaP, low level of abstraction, and, similar to the abovementioned, consider IS as a socio-technical system to address the limitations of SAM and improve the applicability of MLs for achieving operational alignment.

Finally, the studies of operational alignment that focus on social antecedents overlook the need for a multi-dimensional understanding of operational alignment and how the ISs meet business requirements. Firstly, alignment must be assessed with a multi-dimensional model (Hanson et al. 2011). Our assessment of the existing literature, focused on identifying social antecedents and their effect on operational alignment (e.g., Wagner et al. 2014; Zhou et al. 2018; Bagheri et al. 2019), shows that these studies are particularly focused on the social antecedents and did not consider the other antecedents (i.e., dimensions) of operational alignment. Additionally, these studies consider how social antecedents affect operational alignment, regardless of how ISs meet business requirements. Therefore, there is a need for approaches that not only consider operational alignment as a multi-dimensional concept but also emphasize how ISs meet the business requirements in achieving operational alignment.

Consequently, the discussed shortcomings of the two fundamental premises of ML approaches and approaches considering only the social antecedents result in limitations in their applicability for achieving operational alignment. In this study, we posit that the underlying rationale for these limitations stems from the conceptualization of operational alignment and empirical methodology. Given the research gap mentioned above, we use a bottom-up approach to reconceptualize operational alignment, where elements and dimensions of operational alignment are explored, and the reality and practice at the operational level are different from that of the strategic level.

3 Research methodology

3.1 Grounded Theory and approaches

In this study, we used GT to determine the right level of abstraction for describing BPs and ISs in achieving operational alignment. GT is a qualitative research methodology, which transcends survey and content analysis techniques by using conceptualization (Lings and Lundell 2005). GT is based on a bottom-up approach and focuses on answering questions like "What is going on in an area of research?" by generating formal or substantive theory (Corbin and Strauss 2008). Although GT has been initially used in social studies, it is also a useful method for a wide range of IS field topics (Wiesche et al. 2017). There are two main reasons for selecting GT as the most appropriate research methodology for conducting this study. Firstly, GT has a high capacity for exploring and interpreting complex and multifaceted phenomena (Corbin and Strauss 2008), such as operational alignment with multiple dimensions and elements. Secondly, this research considers an IS to be a socio-technical system. GT enables the disentanglement of the social processes underlying human interactions (Glaser and Holton 2007) and, therefore, is best suited for studying issues with a socio-technical nature.

We used an emergent approach in this study. The emergent approach is flexible and unstructured. In the case that the previous studies are insufficient, the emergent approach extracts a theory from the data rather than imposing a theory on the data (Glaser and Holton 2007). We used the emergent approach for two main reasons. Firstly, this approach is instrumental in constructing a novel perspective on a well-known area (Stern 1994), which was our research goal. Secondly, the emergent approach is suitable where the work is not driven by a hypothesis up-front and the goal of the study is to establish a conceptual framework grounded in data (Glaser and Holton 2004). In this research, we did not predefine assumptions; we investigated participants' main concerns in operational alignment to discover how they can be resolved. Here, we used the emergent approach to obtain a new perspective on operational alignment and establish a conceptual framework grounded in data.

3.2 The empirical context

We conducted this study at top public universities (TPUs) in Iran for the following reasons. First and foremost, TPUs have a long-standing need for operational alignment

and CIOs are concerned about operational alignment. Secondly, TPUs meet the foundational requirements for operational alignment investigation and implementation as (1) TPUs are leaders among universities in the Middle East in developing IT/IS capabilities and (2) TPUs widely use ISs at various levels and have effective BP management. Departments of BPs and ISs at TPUs are separate, with each having independent plans and responsibilities. As a result, TPUs not only have the need for operational alignment but also meet the foundational requirements for the implementation of operational alignment. Therefore, exploration of the elements and dimensions for appropriate actualization of operational alignment is facilitated at TPUs.

3.3 Sampling and data collection

To carry out this study, we targeted experts in the field of business-IS alignment. Initially, we contacted a few experts familiar with business-IS alignment via email and phone to seek their consent for participation. To identify more qualified experts, we employed snowball sampling, which is a method of expanding the sample by asking one informant or participant to recommend others for interviewing (Stern 1994). Furthermore, due to (1) business-IS alignment being multifaceted (different antecedents related to different fields) and (2) data triangulation being necessary in qualitative research (Corbin and Strauss 2008), we selected the experts from different fields (i. e., IS, BP, and operational alignment) and groups. We categorized experts into either academic researchers or managers and senior experts (i.e., policymakers in both IS and BP). The managers and senior experts are individuals who have responsibilities in five different sectors at the TPUs (1) learning, (2) administrative and financial affairs, (3) planning and development resources, (4) research, and (5) the cultural, social, and student area.

The most appropriate data collection method in GT is semi-structured interviewing (Glaser and Holton 2007), which we employed in the present study. Based on theoretical sampling in GT, we performed 28 semi-structured, in-depth interviews. Theoretical sampling is non-probable, purposive, and subject to the researchers' judgment (Glaser and Hon 2005). The basic approach of theoretical sampling is to identify the new groups or subgroups that should be chosen for the next stage of data collection (Glaser 2008) to fill the emergent gaps in the theory during the coding process (Glaser and Holton 2004).

3.4 Data analysis

We analyzed data using the coding process of the emergent approach based on substantive coding (open and selective) and theoretical coding. Substantive and theoretical coding are not distinct stages in the interpretation process; rather, they are different ways to work with the textual data that the researchers may dislocate or integrate. The interpretation process begins with open coding and uses selective and theoretical coding during the final steps of analysis.

In terms of tool support, we used MAXQDA 10, a powerful computer-assisted qualitative data analysis software (Schonfelder 2011), to analyze and manage the GT-required steps.

4 Results

4.1 Open coding

During the open coding step, we extracted open codes and concepts. At first, we obtained 321 open codes. Then, we categorized open codes by their similarities and differences. We extracted and organized 106 concepts by domain: 45 concepts in the BP domain and 61 concepts in the IS domain.

4.2 Selective coding

We filtered, separated, unified, and regulated the resulted concepts from open coding during the selective coding step. This was achieved by reducing the initial number of codes to an explanatory framework of high-level categories (i.e., dimensions). We selected dimension names based on in vivo code matching that uses the interviewees' statements to ensure close support of the findings by the data. In addition, the name of a dimension was selected to connect the related or similar concepts. The dimensions, therefore, have higher conceptual strength than concepts because they link many of the concepts. Using selective coding, we categorized the 45 concepts identified in the BP domain into 11 dimensions and categorized 61 concepts in the IS domain into four dimensions. We describe each dimension obtained from selective coding in BP and IS domains in the following two sections. Hereafter, concepts are referred to as the "elements", or constituents, of their respective identified dimension.

4.2.1 Dimensions in the BP domain

The dimensions in the BP domain consist of the development of ISs to support each of the BP functions. BP functions are learning management, research management, strategic management, quality management, student services management, social and cultural management, communication management, assets management, human resource management (HRM), financial resource management, and information and communication technology (ICT) management. In the interest of conciseness, only

one of the dimensions in the BP domain is explained here, described by a selected quotation from the interviewees.

Dimension BP1: Development of ISs to support learning management. In response to questions about the compatibility of ISs with BPs, most respondents argued that it would not be possible to develop ISs without considering ISs in supporting the key learning management processes at the university (e. g., Expert E6).

From their perspective, the use of ISs in the administrative and teaching services, learning planning, admission, learning assessment, and termination of study would improve services at the TPUs and provide the TPUs with adequate information for refining the decision outcomes concerning learning management.

The development of a comprehensive learning program is dependent on the presence of activities such as the management of learning units, the planning of learning activities and documentation, and the modification of learning regulations. In addition, ISs are instrumental in providing essential information for the fulfilment of these activities. (Expert E6)

4.2.2 Dimensions in the IS domain

Dimensions derived from selective coding in the IS domain include the development of BPs commensurate with the IS capabilities, namely strategic, management, knowledge-based, and operational capabilities. For brevity, only one of the dimensions in the IS domain is explained here and described by a selected quotation from the interviewees.

Dimension IS1: Development of BP commensurate with the strategic capabilities of IS. The majority of experts argue that university processes should be designed by utilizing the IS's strategic capabilities to create and improve strategic benefits (e. g., Expert E4).

Strategic capabilities allow environmental assessments and analysis of the business for identifying long-term strategic goals. For instance, collecting and processing various student data could identify a more effective and individualized student learning processes. Strategic capabilities include flexible and diverse internal and external resources that would enable change, as well as timely availability of information to analyze environmental opportunities and threats for the business and the strengths and weaknesses of the business.

In my opinion, the sustainable and competitive advantage of the university is contingent upon improving the design of the educational services to use the capabilities of the IS for reducing the current service costs and enhancing service provisions. Further, we all know that university processes are continually changing due to environmental changes, and therefore, the flexibility of the ISs supports our ability to respond to these changing processes. (Expert E4)

4.3 Theoretical coding

To develop the theoretical framework, we defined the main categories extracted from the coding steps and their relationships based on Glaser's type family. The type family presents the main categories and their relationships based on their types, forms, kinds, and styles (Glaser 2008). In this regard, first, based on related literature, we identified the types of BP functions of the extracted dimensions in the BP domain (Section 4.3.1) and the types of IS capabilities of obtained dimensions in the IS domain (Section 4.3.2). Then, we reviewed all the memos generated throughout the study to relate and enrich the main categories in the presented framework (Section 4.3.3).

4.3.1 Types of BP functions

We categorized the BP functions in our study based on previous literature (Porter and Millar 1985; Bucher et al. 2009; Boguslauskas and Kvedaraviciene 2009). After we reviewed the open codes, concepts (elements), and categories (dimensions) several times, we grouped BP functions into two main types: primary and support. The primary functions are defined as functions that focus on developing products, distributing them, and offering after-sale services on products. In contrast, the support functions are defined as functions that provide inputs and infrastructure that enable the primary functions (Porter and Millar 1985).

In comparison, management functions, business functions, and support functions are value-adding functions defined by Bucher et al. (2009) that can be paralleled to the Porter and Millar's categorization of primary and support functions. In this categorization, management functions comprise all fundamental management activities dealing with an organization's development, design, leadership, and control. Business functions are defined as functions that represent the actual execution of all market-side operations, focused on the immediate creation of consumer value. And finally, support functions are defined as functions that involve the infrastructure provision and internal services production, required for efficient and effective execution of the processes. Therefore, the primary functions defined by Porter and Miller (1985) are virtually the management and business functions as described by Bucher et al. (2009) because both management and business functions are focused on product development directly or indirectly. Specifically, while management functions indirectly contribute to consumer value, business functions are directly involved in this process as well as the development of the product, market-sided activities, and after-sale services. The support functions in the study of Bucher et al. (2009) are, in turn, equivalent to the support functions in the study of Porter and Miller (1985) because by both definitions, these are the functions that provide inputs and

support the infrastructures for implementation of other functions.

Finally, business functions can be categorized into core and non-core functions. Core business functions relate most directly to the basic business of the organization and represent the key organizational activities (Boguslauskas and Kvedaraviciene 2009). Therefore, core business functions are the critical business operation activities that an organization is founded on, and these functions are the main source of organizational profits and success. In comparison, non-core business functions exist only to facilitate the business (Weerakkody et al. 2003).

Thus, based on the discussed categorizations above (Porter and Millar 1985; Bucher et al. 2009; Boguslauskas and Kvedaraviciene 2009), in our study, the types of BP functions are primary and support functions, where primary functions consist of management functions, core business functions, and non-core business functions. Appendix B shows the different types of BP functions.

4.3.2 Types of IS capabilities

We categorized the IS capabilities in our study based on a four-level pyramid of ISs (O'Brien 2000) and STS theory (Bostrom and Heinen 1977). Regarding the four-level pyramid of ISs, this model identifies several ISs and links their capabilities to the four organizational levels: strategic, management, knowledge, and operational. In our study, we similarly described IS capabilities based on these four levels. ISs at the strategic level focus on strategic issues and long-term trends. The ISs at the management level monitor, control, and make decisions to show how the organization is performing. ISs at the knowledge level create, distribute, and share knowledge. And the ISs at the operational level record initial activities and transactions of organizations.

The STS theory considers an IS as a socio-technical system consisting of social and technical subsystems (Bostrom and Heinen 1977) with four interacting components: (1) actor, (2) structure, (3) task, and (4) technology (Lyytinen and Newman 2008). (1) Actors are the entities (individuals, organizations, consumers, policymakers, etc.) who make decisions and are involved in processes by performing different roles. (2) The structure includes both the normative aspect, that is, values, norms, and general role expectations, and the behavioural aspect, that is, the patterns of behaviour as actors communicate, exercise authority, or work. The structure covers one or more of three systems: the authority system, the workflow system, and the communication system. The authority system shows the required regulations, standards, and rules for facilitating tasks. The workflow system is related to standardization for tasks. And the communication system refers to norms and patterns of behaviour in communication. (3) The task component elucidates how the work gets done within the organization. (4) Technology denotes technical infrastructure required, including network, hardware, and software (Lyytinen and Newman 2008). The interaction of the components is the actor doing (creating or performing) tasks associated with (producing or using) technology and connecting to (creating or under) a specific structure.

Following the abovementioned studies (O'Brien 2000; Bostrom and Heinen 1977; Lyytinen and Newman 2008), we described types of IS capabilities based on four levels of ISs. We considered ISs at each level as a socio-technical system with its own components. Appendix C shows the different types of IS capabilities.

4.3.3 Relating BP functions and IS capabilities: FunCaps framework

We reconceptualized operational alignment based on the main categories and their relationship in a novel "Functions and Capabilities (FunCaps) framework" to show the combinations of BP functions and IS capabilities that need to be aligned to achieve operational alignment. We studied the open codes, concepts, dimensions, and types of BP functions and IS capabilities several times to identify the main categories (the types of BP functions and IS capabilities) and their relationships. The main categories and their relationships surfaced to achieve the alignment between BP functions (primary and support) and IS capabilities (strategic, management, knowledge-based, and operational). These main categories detect the conceptual relations that connect all higher-level dimensions and all elements and dimensions derived in the coding process refer to them. Finally, based on the main categories and their relationships, we reconceptualized operational alignment as shown in Figure 1.

The FunCaps framework provides a visual framework to determine the combinations of BP functions and IS capabilities that need to be aligned to achieve operational alignment (Figure 1). For instance, for alignment of core business functions and IS capabilities, learning management and research management need to be aligned with all four types of IS capabilities (strategic capabilities, management capabilities, knowledge-based capabilities, and operational capabilities).

5 Discussion and integration with existing frameworks

5.1 Positioning the findings in foundational business-IS alignment terminologies

We positioned our findings based on the four fundamental considerations of business-IS alignment that other

researchers have reached a consensus on, despite the differences in terminology used for business-IS alignment. Alignment has been discussed since 1970s (Renaud et al. 2016), and different researchers have described alignment with terms such as integration, fit, bridge, harmony, and linkage (Avison et al. 2004). The diversity in the terminology used for definition and exploration of alignment highlights the time-dependent understanding of alignment in the field. However, most researchers acknowledge business-IS alignment as a continuous process involving four fundamental considerations: (1) integration level (Henderson and Venkatraman 1993), (2) integration direction (Teo and King 1997), (3) the perspective of fit (Venkatraman 1989), and (4) categories of misfit (Strong and Volkoff 2010). Table 1 illustrates a summary of the positioning of our findings in the abovementioned foundational considerations.

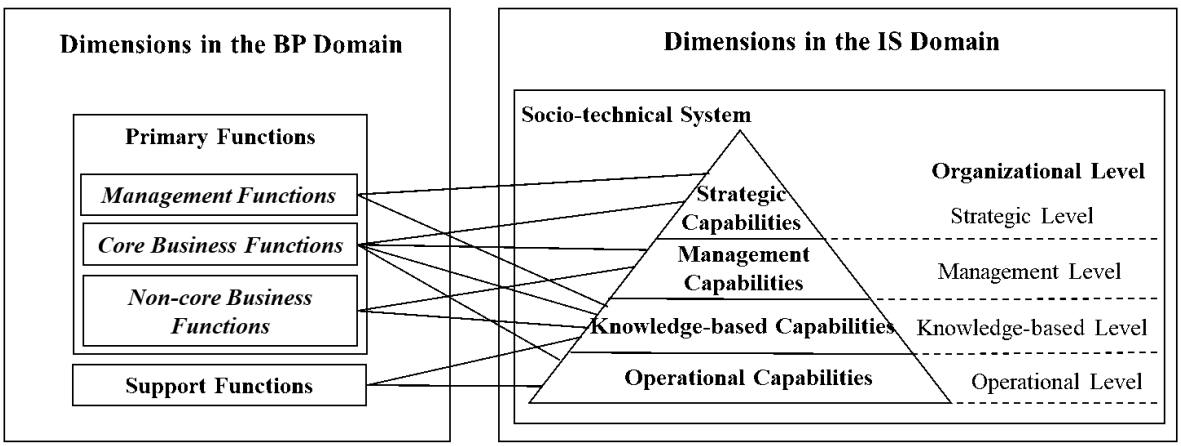


Figure 1: The FunCaps framework for operational alignment

In comparison to SAM, the FunCaps framework aims to actualize and reconceptualize operational alignment to overcome the limitations of SAM. The FunCaps framework and SAM capture the alignment between processes and infrastructures for business and IS domains. However, the FunCaps framework goes further than SAM by opening up the operational integration boxes and their relationships in SAM and addressing three of SAM's shortcomings. Firstly, FunCaps framework, unlike SAM, emphasizes the importance of Strategy as Practice (SaP) by describing the types of IS capabilities based on a four-level pyramid of ISs (O'Brien 2000). Each level is considered a socio-technical system, where strategy at each level is not considered solely as an action plan developed by the top business management. Instead, in this socio-technical system, actors at all four levels of the pyramid are responsible for strategy.

Secondly, FunCaps is fine-grained and, hence, shows the practical reality of the organization. This framework visualizes and reconceptualizes operational alignment based on low level, precise, and well-defined operational concepts. As such, FunCaps provides a useful way for policy makers, managers, and senior IS experts to adopt its dimensions and elements in both BP and IS domains. Thirdly, FunCaps considers an IS as a socio-technical system and describes IS capabilities based on its components (actor, structure, task, and technology). The mutual interaction between these components, in turn, results in creating and modifying IS capabilities. Figure 3 shows the integration of the FunCaps framework and SAM.

6 Conclusion and future research

Achievement of Operational alignment has been a key challenge for organizations in recent decades (Kappelman et al. 2019) due to the limitations of existing models and frameworks. Operational alignment enables organizations to not only make the BPs implementation feasible but also to increase the utilization of ISs. In addition, it helps the ISs to be business-centered and to adjust the requirements for developing BPs (Tallon et al. 2016). Multiple models and frameworks exist in the field of business-IS alignment. In practice, however, they have not been effective for the realization of operational alignment due to three major limitations. Firstly, most existing models are coarse-grained as they focus on the strategic level of alignment. These models do not consider the discrepancies between the two

Table 1: Positioning the findings in foundational considerations of business-IS alignment

Reference	Foundational considerations		Description	This paper
Henderson and Venkatraman (1993)	Integration level	Strategic	The link between the business strategies and IS strategies, reflecting the external components of the business	
		Operational	The link between business infrastructures and processes, and IS infrastructures and processes, dealing with internal components of the business	*
Teo and King (1997)	Integration direction	Administrative	Development of business and IS, based on separate planning	
		Sequential	One-way planning process and IS, focused primarily on providing support for business	
		Reciprocal	Two-way planning process and IS, playing a role in both supporting and influencing business	*
		Full integration	Concurrent development of business and IS in the same integration planning process	
Venkatraman (1989)	Perspective of fit	Moderation	Conceptualizing alignment as the interaction between two variables (e.g., strategic orientation and strategic IS management), and studying their interactional effect on firm performance	
		Mediation	Considering alignment as an intervening variable between antecedent variables such as strategic orientation and consequent variables such as firm performance	
		Matching	Defining alignment as a match between the two variables	*
		Covariation	Adopting a conceptualization based on the internal consistency among a set of underlying related variables	
		Profile deviation	Assuming an ideal profile exists, i.e., ideal values of variables are the values of high performers	
		Gestalt	Conceptualizing alignment as frequently recurring clusters of attributes	
Strong Volkoff (2010)	Categories of misfit	Functionality	Occurring when BP executions, using the enterprise system (ES), lead to reduced efficiency or effectiveness	*
		Data	Resulting from data quality issues (such as inaccuracy) caused by data or data characteristics stored in, or needed by, the ES	
		Usability	Occurring when the required interactions with the ES for task execution are cumbersome or confusing	
		Role	Arising from inconsistencies between the roles in the ES and the available skills	
		Control	Stemming from excessive or insufficient controls within the ES-embedded controls	
		Culture	Resulting from contradictions between ES requirements and organizational norms	

levels of alignment (strategic and operational). Secondly, existing studies neglect the socio-technical nature of the IS. Thirdly, previous studies are focused on identifying social antecedents and their effect on operational alignment without considering how ISs meet business requirements in achieving operational alignment. This research determined the right level of abstraction to describe BPs and ISs for achieving operational alignment and address the current discussed gaps in the existing studies. We adopted GT as a bottom-up approach to reconceptualize operational alignment and used an adaptive approach in the description of BPs and ISs instead of confirming or imposing a theory on business-IS alignment. The result was the FunCaps framework. This framework considers differences between strategic and operational alignment and reconceptualizes operational alignment based on oper-

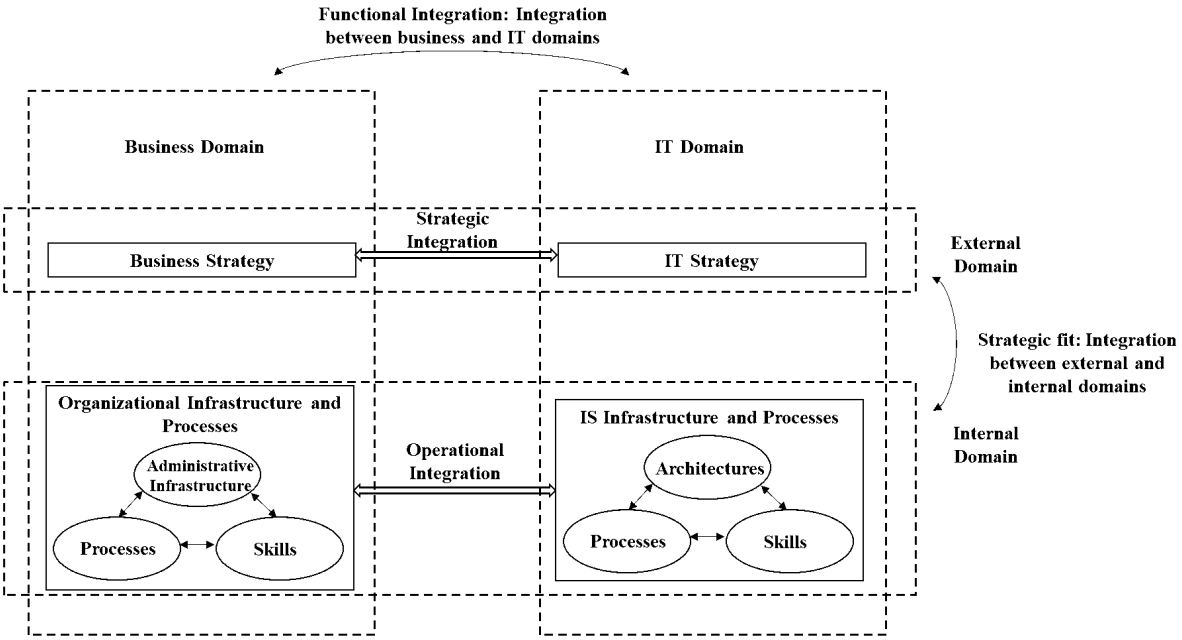
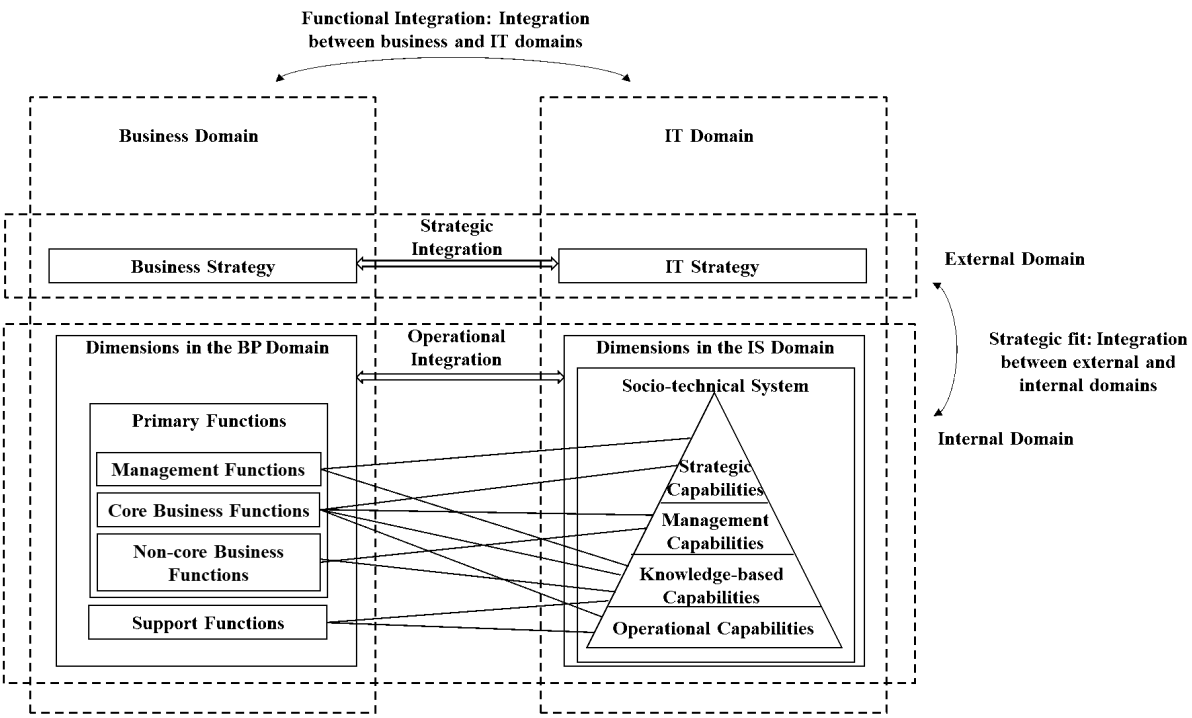


Figure 2: SAM (From Henderson and Venkatraman 1993)



Legend: lines betweeen dimensions mean alignment

Figure 3: The integration of FunCaps framework and SAM

ational planning and reciprocal integration. Thus, FunCaps is a fine-grained framework that translates high-level, strategic concepts into low level, precise, and well-defined operational concepts. (i.e., BP functions and IS capabilities). FunCaps, in addition, establishes the broader picture of the operational alignment by considering an IS to be a socio-technical system.

This study has three main limitations that can offer opportunities for future studies in this area. The first is the focus of TPUs in Iran. Broader research at educational institutions in other countries can add to the number of experts and enhance the results of the research. The second limitation is the neglect of the other two levels of alignment (strategic and tactical). Future studies might identify the dimensions and elements of alignment at all levels and provide a model for achieving business-IS alignment at all three levels. The third limitation arises from the focus on STS theory. To describe the types of IS capabilities and situate them in STS theory, we did not explicitly assess the interaction of components (actor, structure, task, and technology) in this study. Future studies can further explore this socio-technical approach toward operational alignment for both BP and IS domains and consider the interaction between the components.

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Ogrodje FunCaps: rekonceptualizacija operativne uskladitve

Ozadje in namen: Operativna uskladitev, uskladitev poslovnih procesov (BP) in informacijskih sistemov (IS), je dobro znana zahteva za izboljšanje poslovne učinkovitosti. Vendar se v obstoječi literaturi kaže pomanjkanje trdnih temeljev za praktično izvajanje operativne uskladitve. Deloma zato, ker so predhodno razviti grobozrnati modeli strateške uskladitve za operativno usklajevanje spregledali razlike med strateško in operativno ravnjo usklajenosti. Nekatere študije so ugotovile te razlike, vendar jih niso poglobljeno proučile. To je lahko deloma posledica zanemarjanja družbeno-tehnične narave IS, kot tudi njihove osredotočenosti na prepoznavanje socialnega ozadja in njegovega učinka na operativno usklajenost, ne da bi upoštevali, kako IS izpolnjujejo poslovne zahteve pri doseganju operativne usklajenosti. Da bi premagali to morebitno pomanjkanje uporabnosti, je namen tega prispevka določiti pravo raven abstrakcije za predstavitev poslovnih procesov in IS ter ponovno konceptualizacijo operativne uskladitve.
Metodologija: Izvedli smo empirično raziskavo z uporabo utemeljene teorije (Grounded theory – GT)T). Izvedli smo polstrukturirane intervjuje z 28 strokovnjaki z vrhunskih iranskih javnih univerz. Podatke smo analizirali s programsko opremo MAXQDA.
Rezultati: Predlagano- ogrodje FunCaps določa zahtevane kombinacije funkcij BP in zmogljivosti IS za operativno uskladitev.
Zaključki: FunCaps rekonceptualizira operativne usklajenosti na podlagi operativnega načrtovanja in vzajemne integracije, katere prednost je, da vzpostavi širšo sliko z obravnavanjem IS kot socio-tehničnega sistema.

Ključne besede: *Operativna uskladitev, Informacijski sistem, Poslovni proces, Družbeno-tehnični sistem, Utemeljena teorija*

Appendix A: Literature review on business-IS alignment

We categorize approaches on business-IS alignment into two main categories: (1) approaches that aim to achieve strategic alignment and (2) approaches that aim to achieve operational alignment.

A.1. Approaches focusing on strategic alignment

Studies that aim to achieve strategic alignment can be categorized into studies that emphasize three main aspects: (1) social and structural, (2) technical, and (3) socio-technical (Table A.1).

Table 2: A.1. Selected studies on strategic alignment

Aspect	Key concept	Reference
Social	Flexibility of organizational structure (data processing procedures, delegation of authority, and segregation of departments) to manage organizational changes	Lester & Parnell (2002)
	Top management team's (TMT) trust in chief information officer (CIO), CIO's trust in TMT, shared language, and shared understanding of the role of IT.	Preston & Karahanna (2009)
	Management styles, culture of innovation and risk-taking among staff, beliefs and shared values among staff, partnership, cooperation and trustworthiness among them	Cram (2012)
	Communication, senior management support, the participation of research and development managers in the development of strategies, and interdisciplinary support by IS and business during the development of IS	Alsudiri et al. (2013)
Technical	Standards available in the field of IT to create a common language among the departments and provide interdisciplinary information sharing.	Henderson & Venkatraman (1993)
	Integration of IT architecture and infrastructure	Sledgianowski et al. (2006)
Socio-technical	Decision style of senior management, fluctuations of management tenure, the way the applications are developed, the complexity of management tasks, and the physical location of IS managers	Pyburn (1983)
	Transparency and perception of the mission, objectives and priorities of the organization, effective communication, IS managers' involvement in the process of planning, and their realistic expectations of IS	Lederer & Mendelow (1989)
	Communication, governance, skill, sourcing, IT professionals, and project.	Tarafdar & Qrunfleh (2009)
	Strategic alignment maturity based on six dimensions: communication, competency and value measurements, governance, participation, scope and architecture, and skill.	Luftman (2003)
	Intellectual and social alignment	Reich & Benbasat (2000)

A.2. Approaches focusing on operational alignment

Existing literature focused on the operational level of alignment either have used modeling languages (MLs) to link models in BPs and software systems (SSs) or have focused on identifying the social antecedents and their effect on operational alignment (Table A.2).

Table 3: A.2. Selected studies on modeling langauges

Category	Focus				Reference
Modeling Languages	Aligning BR (Business Requirements) and BP (Business Processes)	BR	BP	SS	
		GRL	BPMN	-	Li et al. (2015)
		MAP	BPMN	-	Kraiem et al. (2014)
		i*	BPMN	-	Sousa and Julio (2014)
		Tropos	BPEL	-	Frankova et al. (2011)
	Aligning BR and SS (Software Systems)	BMM	-	SoaML	Han et al. (2009)
		Tropos	-	Tropos	Gehlert et al. (2008)
		UML	-	UML	Wan-Kadir and Loucopoulos (2004)
	Aligning BP and SS		UML	UML	Aversano et al. (2016)
		-	BPMN & e3 value	UML	DeCastro et al. (2011
		-	BPMN	SoaML	Elvesater et al. (2010)
		-	BPMN	UML	Cibran (2009),
	Aligning BR, BP and SS	i*	UML	UML	Doumi et al. (2013)
Social antecedents	Social capital (cognitive linkage, structural linkage, and relational linkage)				Wagner et al. (2014)
	Shared competence between business and IS departments				Zhou et al. (2018)
	Shared understanding between business and IS by overcoming seven user-related elicitations problems: (1) communication flaws between the project team and customer, (2) terminological problems, (3) weak knowledge of application domain, (4) stakeholders with difficulties in separating requirements from previously known solution design, (5) incomplete and hidden requirements, (6) missing traceability, and (7) inconsistent requirements.				Bagheri et al. (2019)

Appendix B: Types of BP functions

Table 4: B.1. Types of BP functions

BP function	Element of BP function	Type of BP Function	
Strategic management	▪ Strategy compilation ▪ Strategy implementation ▪ Strategy assessment	Management functions	Primary functions
Quality management	▪ Process management ▪ Project management ▪ Performance measurement		
Learning management	▪ Learning planning ▪ Planning for admissions ▪ Planning administrative and teaching services ▪ Learning assessment ▪ Admitting a study	Core business functions	
Research management	▪ Research policy ▪ Research services ▪ Research achievements ▪ Technology transfer		
Student services management	▪ Plan student services ▪ Provide student services ▪ Monitor and evaluate student services ▪ Terminate student services	Non-core business functions	
Social and cultural management	▪ Provide cultural and social planning ▪ Provide cultural and social services & products ▪ Provide cultural and social facilities ▪ Monitor cultural and social services		
Communication management	▪ Public relations ▪ Interactions with community ▪ International university interactions ▪ Provide out-of-school services		
Assets management	▪ Physical resources management ▪ Goods and services management	Support functions	
Financial resource management	▪ Resource and financial expenses planning ▪ Collection and distribution of financial credits ▪ Payment of expenses ▪ Financial monitoring		
HRM	▪ Providing human resources planning ▪ Hiring, supplying and selecting human resources ▪ Developing HR's skills ▪ Providing facilities and benefits for human resources ▪ Providing safety and health of human resources ▪ Transferring and retiring human resources		
ICT management	▪ ICT planning ▪ Communication and networks management ▪ Information and data management ▪ Information and communication security management ▪ Software and systems management ▪ Software and hardware support		

Appendix C: Types of IS capabilities

Table 5: C.1. Types of IS capabilities based on Socio-Technical System (STS) theory

IS capability	Element of IS capability	Type of IS capability		
Strategic level of ISs ▪ Strategic capabilities	▪ Top business management ▪ IS management	Actor		Social subsystem
	▪ Commitment to the strategic use of IS should be considered by the top business management. ▪ Expectation of IS capabilities by top business management should be realistic. ▪ The top business management awareness of the contribution of IS to business goals should be raised. ▪ The top business management awareness of the quality and quantity of IS-based service should be raised. ▪ Business missions and objectives should be reflected in the IS plan. ▪ The horizon of the planning in business and IS should be similar. ▪ Allocating IS resources should be delegated to IS management. ▪ The culture of the organization should be built on innovation and change-readiness.	Authority system	Structure	
	Setting up proper standards for ISs to enable the following: ▪ Adaptation of diversified internal and external IS resources (network, hardware, software, data, and people), which are adjusted according to the business goals ▪ Flexibility of ISs ▪ Integration of ISs	Workflow system		
	▪ Creating common norms and patterns of behavior among IS strategic committee members	Communication system		
	▪ Analyzing the environmental opportunities and threats and the business strengths and weaknesses ▪ Creating sustainable competitive advantage	Task		Technical subsystem
	▪ Expert System (ES) ▪ Executive Support System (ESS)	Technology		
Management level of ISs ▪ Management capabilities	▪ BP management ▪ IS management	Actor		Social subsystem
	▪ Knowledge of IS-based services should be acquired by BP management. ▪ Support of IS activities should be considered by BP management. ▪ Logical decision-making style should be adopted by BP and IS management. ▪ Participatory management should be adopted by BP and IS management. ▪ Perspective of BP and IS management should be compatible with BP requirements.	Authority system	Structure	
	▪ Setting up proper standards for IS projects investment based on the business projects	Workflow system		
	▪ Defining common language between BP and IS managements	Communication system		
	▪ Planning IS projects/resources based on BP requirements ▪ Organizing IS projects/resources based on BP requirements ▪ Coordinating IS projects/resources based on BP requirements ▪ Decision making in IS projects/resources based on BP requirements ▪ Measuring the performance of IS projects/resources based on BP requirements	Task		Technical subsystem
	▪ Decision Support System (DSS) ▪ Management Information System (MIS)	Technology		

Table 5: C.1. Types of IS capabilities based on Socio-Technical System (STS) theory (coninues)

IS capability	Element of IS capability	Type of IS capability		
Knowledge level of ISs ▪ Knowledge-based capabilities	▪ Knowledge workers	Actor		Social subsystem
	▪ Close bilateral cooperation should be in place for knowledge workers in BP and IS departments. ▪ Mutual trust and common values should be perceived between knowledge workers in BP and IS departments. ▪ Participatory programs should be frequently and formally held between knowledge workers in BP and IS departments. ▪ Job rotation should be available between BP and IS departments.	Authority system	Structure	
	Setting up proper standards for ▪ Interdepartmental interactions between BP and IS departments ▪ Interdepartmental reporting between BP and IS departments	Workflow system		
	▪ Establishing an informal communications network between IS and BP departments.	Communication system		
	▪ Knowledge creation and gathering ▪ Knowledge assessment ▪ Knowledge sharing and dissemination ▪ Knowledge contextualization ▪ Knowledge application	Task		Technical subsystem
	▪ Knowledge Work System (KWS) ▪ Group Collaboration System (GCS)s ▪ Office System (OS)	Technology		
Operational level of IS ▪ Operational capabilities	▪ Organizational workers	Actor		Social subsystem
	Information in the IS infrastructure should be: ▪ Transparent ▪ Accessible ▪ Accurate ▪ Reliable ▪ Up-to-date	Authority system	Structure	
	▪ Recording of daily activities and transactions ▪ Using historical data on activities in organization ▪ Monitoring the performance of internal processes and relations with the external environment	Task		Technical subsystem
	▪ Office Automation System (OAS) ▪ Transaction Processing System (TPS)	Technology		

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Are we Ready to Use Microchip Implants? An International Cross-sectional Study

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Background and purpose: Despite their clear relevance to human life, microchip implants are still widely viewed as negative, threatening our privacy and raising growing concerns about our health. This paper aims to investigate the important factors influencing people's perception of microchip implants and their willingness to use them for different purposes.
Methodology: The cross-sectional study was conducted in three European countries and the data were analysed using the group Structural Equation Modeling approach. Only complete answers to the online survey questionnaire items were used representing a convenience sample of 804 respondents.
Results: The results show that perceived ease of use, usefulness and perceived trust are significant predictors of intention to use microchip implants. Perceived trust is influenced by privacy and technology safety. Concerns about painful procedures and other health concerns reduce the perceived usefulness of microchip implants. Apart from the predictor health concerns, the results were similar in all countries.
Conclusion: Based on the presented results, researchers interested in investigating the actual use of microchip implants can establish a solid foundation for their research. The results may assist policy makers in developing the regulations to ensure the safe use of microchip implants and allow for a higher level of security. As a follow-up, investigation of changes in the acceptance of microchip implants following the threat of a global pandemic is proposed.

Keywords: *Microchip implant, Near field communication, Behavioural intentions, Structural equation model, Technology acceptance model*

1 Introduction

Changes in industry opened the door to a variety of emerging technologies, such as wearable Internet, cooperating to coordinating machines (Internet of Things), technologies implanted in the human body, and others. These innovative technologies are capable of helping in unpredictable critical situations that occur anywhere in the world, for example digital tracking of patients and identifying their contacts.

Another successful example are mobile or wearable devices based on Radio Frequency Identification (RFID) that use electromagnetic fields to transmit data. Although these devices are revolutionizing healthcare and medicine (Virkki et al., 2017), they are still vulnerable to loss and theft. RFID microchip implants (MI) do not have these shortcomings. MIs are widely used for healthcare applications such as monitoring (Basham, 2014), enhancement medical devices, and other therapeutic purposes (K. Michael

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& Michael, 2013). In addition to healthcare applications, MIs have also been shown to be effective in minimizing errors and personally identifiable medical information (Mohamed, 2020). These novel approaches could make a positive contribution by enhancing the security and safety of people in extreme situations (Sarwar et al., 2019). On the other hand, MI could pose some health risks (e.g., rejection, allergic reaction) or threats to privacy and security (Rodriguez, 2019).

The research on MI adoption found in the literature focuses on either students (Smith, 2008), specific age groups (Achille et al., 2012), small business owners (K. Michael et al., 2017), or even a population with various disabilities (Mohamed, 2020). In this paper, we aim to identify and explore the factors that influence the population's intentions to use MIs. The MI under consideration is a passive NFC RFID device which does not require power supply and can be read only from a short distance. To the best of our knowledge, research on the adoption of MIs from the users' perspective has not been performed on a wider basis and reported in the literature. Based on a prior pilot study (Werber et al., 2018), an international cross-sectional study was conducted in four European countries.

The main contribution of this paper is a model of the factors that influence end-user's behavioural intention to use MIs, followed by the analysis of the relationships between the constructs of the research model and the analysis of national differences in behavioural intention to use MIs.

2 Literature review

The general use of RFID has been researched for almost two decades. In recent years, we have witnessed a breakthrough in the use of RFID in healthcare and medicine (Virkki et al., 2017). Whereas active RFID tags require a power source, passive tags draw their energy from the radio wave of an RFID reader, so no power is needed (Gaffney & Gopini, 2020). One of the applications of RFID technology is Near Field Communication (NFC) microchips that can be implanted in the human body. These MIs come inside a glass tube and can be read only from a short distance.

MIs have also been used in healthcare for prosthetic, monitoring, and enhancement medical devices, to combat diseases such as epilepsy, Parkinson's disease and severe depression (K. Michael & Michael, 2013), and to impair cancer cells (Lai et al., 2016). The use of MIs helps to minimize errors in the collection of important medical information (Mohamed, 2020). In addition to use in health care, there are reports of actual cases where MIs have been used to support intervention in natural disasters (Sarwar et al., 2019).

2.1 Technology acceptance

Various methods have been used to research the acceptance of RFID technology and MIs in particular. The Technology Acceptance Model (TAM) is widely used to determine the level of technology acceptance. TAM model anticipates two basic factors that influence the behavioural intention to use technology: perceived usefulness and perceived ease of use (Davis, 1989). Researchers have used other approaches to determine the intention for use new technologies. Katz & Rice (2009) defined their own scales to determine the potential for RFID use in healthcare, whereas some authors also identified age as an important predictor of technology use (Gauttier, 2019).

2.2 Microchip implant acceptance

Due to their specifics, the willingness to use MIs depends not only on perceived usefulness and perceived ease of use, but also on other factors mainly related to health and privacy issues. When implanting a foreign object in the human body, health is always the first consideration. Despite the increasing popularity of MI, the potential health risks have not been adequately researched to ensure the safety of its use. Various problems have been cited in the literature, ranging from the risks of movement in the body, possible effect on emotional behaviour, allergies, effect on the nervous system, and pain during the insertion of the MI (Fram et al., 2020). According to Albrecht (2010), MIs could potentially lead to malignancies, whereas Lai et al. (2016) have found the possibility of treating cancer cells with MIs. However, most of this research is based on microchips for animals, while there is limited evidence on the safety of MI in humans (Fram et al., 2020).

The first specific study of RFID adoption in healthcare from an end-user perspective found that physical placement (without actual insertion into the body) did not appear to raise public concern, with the exception of a small minority (Katz & Rice, 2009). Public interest in RFID was strongest for emergency intervention services. Research on the acceptance of MIs showed that they were treated positively (Smith, 2008), and the acceptance of MIs for life-saving purposes was highest (Rotter et al., 2008).

In addition, studies have found that the willingness to adopt MIs is slowly increasing (Perakslis et al., 2014), although the perception of MIs as secure technology varies according by country of residence and generational factors (Perakslis & Michael, 2012). Carr (2020) believes that MIs can be a solution to reduce contacts and risks after pandemic outbreaks. MIs have been used for various non-therapeutic purposes, initially for personal interest only (K. Michael & Michael, 2013), but more recently in the workplace, for example to access a secured workstation (Fram et al., 2020). According to K. Michael et al.

(2017), there are numerous reasons for rejecting MIs for employee identification, where data protection and security reasons certainly cannot be ignored (Rodriguez, 2019). Chipping employees in the workplace raises even more ethical issues and challenges (Gauttier, 2019). The situation during pandemics has shown, how quickly privacy rights can disappear when confronted with health and safety concerns and therefore it is crucial to draft the employee microchipping legislation (Turner, 2020).

2.3 Structural equation modelling

Structural equation modelling approach is mainly used to test the hypotheses in the technology acceptance model (Beaujean, 2014). The minimum sample size for performing SEM has been discussed several times. Proposals range from 150 to 400 when there are three or more measured items per latent variable (Hair et al., 2019) or 250 to avoid rejection of the model due to the combination of rules for fit indices (Hu & Bentler, 1999).

Schumacker & Lomax (2010) propose the analysis performed according to the standard two-stage approach at SEM, the first step being the validation of the measurement model. The Confirmatory Factor Analysis (CFA) is performed to determine how well the measured items reflect the theoretical latent variables and to examine the construct validity of the measurement model, which is examined through convergent validity and discriminant validity. When examining convergent validity, one needs to examine that the estimates of standardized factor loadings do not exceed 0.5 (or even 0.7), Composite Reliability (CR) for each latent variable exceeds 0.7, and Average Variance Extracted (AVE) for each latent variable exceeds 0.5 (Koufteros, 1999).

In a second step, SEM is used to test the structural relationships between the latent variables. The unstandardized B and standardized path coefficients β (relationships between the latent variables), z-values (ratio of β to its standard error), and the significance level are calculated. For each endogenous latent variable, a coefficient of determination (R^2) is calculated, representing the percentage of the explained variance of the variable by the set of its predictors.

The overall fit of the measurement and structural model are assessed based on a set of fit indices:

- The value of the comparative fit index (CFI) should be at least 0.9 to indicate adequate model fit (Koufteros, 1999).
- The root mean square error of approximation (RMSEA) value should be below 0.06 (Teo & Zhou, 2014), or between 0.06 and 0.08 to be interpreted as mediocre (MacCallum et al., 1996).
- The standardised root mean square residual (SRMR) should be less than 0.05, however values as high as 0.08 are deemed acceptable (Hu & Bentler, 1999).
- Some goodness-of-fit (GFI) indices are affected by the complexity of the model (e.g., CFI, but not RMSEA) (Cheung & Rensvold, 2002). Therefore, generally accepted criterion (e.g., CFI = 0.90) in complex models should be judged with caution.

Multigroup Confirmatory Factor Analysis (MG-CFA) and multigroup Structural Equation Modelling (MG-SEM) is then used to complement the general two-step procedure when we have multiple groups. Using MG-CFA and MG-SEM we can assess the measurement invariance (MInv), concerning the comparison of the same measurement model in different groups, and compare the effects or constructs' means across groups, which concerns the analysis of the moderating role of a categorical variable that forms groups in a specified SEM (Miceli & Brabaranelli, 2016).

Before making meaningful comparisons of survey results across groups, researchers should ensure that respondents from different groups have ascribed similar meaning to survey items (Cheung & Lau, 2011). MInv assesses the psychometric equivalence of a construct across groups or over time (Putnick & Bornstein, 2016), while measurement noninvariance suggests that a construct has a different structure and/or meaning to different groups. MInv is usually tested using configural invariance, weak invariance, and strong invariance, sometimes these are followed by strict invariance (Beaujean, 2014).

The configural invariance tests whether the model configuration (all constructs have the same pattern of free and fixed parameters) is the same among all groups in a multigroup context (Putnick & Bornstein, 2016). For weak invariance, the item loadings must be the same across groups, for strong invariance the intercepts of indicators must be the same across groups, while for strict invariance also error variances must be constrained to be equal across groups.

The results for each invariance test are explained by the change of several alternative fit indices (AFI) since χ^2 tends to be oversensitive to small, unimportant deviations from a perfect model in large samples (Chen, 2007). Change in CFI (ΔCFI), SRMR (ΔSRMR), and RMSEA (ΔRMSEA) were used to assess model fit. Cheung & Rensvold (2002) proposed the use of a criterion of -0.01 change in CFI of two nested models. Whereas Chen (2007) suggested that a criterion of a -0.01 for ΔCFI is paired with ΔRMSEA of 0.015 and SRMR of 0.030 (for metric invariance) or 0.015 (for scalar or residual invariance).

The rules of thumb for AFI and ΔAFI might not generalize to the wide range of SEMs encountered in practice, models with only negligible mis-specifications should not be rejected, and researchers should not rely on a single rule-of-thumb cut-off for any (Δ)AFI (Jorgensen et al., 2018). Traditionally, configural invariance is assessed by evaluating the overall fit of the configural model, whereas (Jorgensen et al., 2018) proposed a permutation test, espe-

cially when evaluating configural invariance with small to moderate sample sizes. As pointed out by Jorgensen et al. (2018) configural models frequently do not fit the data perfectly, but the use of the permutation test of configural invariance can prevent inflated type I errors when the model fits only approximately well. The idea of the permutation test is that the variable of group membership is randomly shuffled (several times) and the model is fitted to that data. In the permutation test, the proportion of the statistics (e.g. χ^2, CFI, RMSEA) that are more extreme than the observed statistics (of the original model), is calculated. This is a one-tailed p-value that approximates the probability of obtaining statistics under investigation (e.g. χ^2), as poor as the observed one, if the invariance across all groups holds true. If $p<\alpha$, H0 has to be rejected. The permutation test could be applied for both badness of fit measures (e.g. χ^2, RMSEA,...) or goodness of fit indices (e.g. CFI) (see e.g. Jorgensen et al. (2018) for further information).

3 Methods

On the basis of previous studies (e.g. M. G. Michael & Michael, 2010; Perakslis et al., 2014), we constructed a model of factors influencing the behavioural intentions to use MIs based on TAM, as shown in Figure 1. The extended model based on TAM adopts the components of TAM: Perceived Ease of Use (PEU), Perceived Usefulness (PU), and Behavioural Intention to Use (BIU). We added constructs of personal factors to the basic model of TAM: Perceived Trust (PT), Privacy Right (PR), Privacy Threat (PTh) and Health Concerns (HC). Three predictor variables have been added to the model: Age, Technology Safety, and Painful Procedure.

The items of basic TAM constructs were defined according to previous research:

- Perceived Ease of Use (PEU): Items availability, and multifunctionality were adopted from the original TAM model (Davis, 1989), whereas the items on the option to be lost or stolen were included on the basis of the pilot study (Werber et al., 2018).
- Perceived Usefulness (PU): In addition to five items adopted from (Katz & Rice, 2009), the items on organ donation information and saving lives under different conditions were added based on the pilot study (Werber et al., 2018).
- Behavioural Intention to Use (BIU): Based on the pilot study, items considered intention to use for healthcare purposes, for identification purposes, for shopping and payment, and for everyday use at home. The intention to use in case GPS positioning and tracking was not possible was added. Age was included as a predictor variable to BIU construct based on previous research on the influence of age on the adoption of new technologies (Gauttier, 2019).
- Additional constructs of personal factors were constructed on the basis of earlier research as follows:
- Health Concerns (HC): HC concerns refer to possible health risks of MI derived from previous research (e.g. Albrecht, 2010). The variable Painful Procedure (PP) was adopted based on the basis of claims that pain or damage is associated with the insertion of MI (M. G. Michael & Michael, 2010).
- Perceived Trust (PT): Items concerning the perceived trust that the state and other institutions will ensure security have been derived from (Smith, 2008). The variable Technology Safety (TS) associated with PT has been adopted as a predictor variable in PT construct from (Perakslis et al., 2014).
- Privacy Right (PR): Items concerning the level of privacy were adopted from Lockton & Rosenberg (2005).
- Privacy Threat (PTh): The construct was included in the model on the basis of previous research (Bansal et al., 2015), assuming that it has a negative impact on the perceived right to privacy.

Items of HC, PP, PT, PR, PTh, TS and PEU, were measured on a 5-point scale of agreement ("strongly disagree" to "strongly agree"), whereas the items of PU were measured on a 5-point scale of acceptability ("very bad idea" to "very good idea"). Five items on BIU were measured with yes/no options.

To study the relationships among our constructs, nine hypotheses presented in Table 1 were postulated. In addition, positive or negative impacts between constructs are depicted.

The relationships among constructs, together with the type of the relationship (positive or negative), are presented in Figure 1 as a proposed MI acceptance model.

To test the hypotheses of the proposed structural model, we updated the pre-developed questionnaire (Werber et al., 2018). Two scales on Privacy Right and Privacy Threat (Katz & Rice, 2009) and an item on Technology safety (Perakslis et al., 2014) were added.

3.1 Data collection

The convenience sampling approach was utilized in MIs acceptance research. Respondents were invited to participate in an online survey through various channels, ranging from the researcher's social networks to media posts. The survey was conducted in 2016 and 2017 in four countries: Slovenia, the Czech Republic, Poland, and Croatia. The introduction to the survey, included the description that the research was about passive NFC RFID microchip implants that do not require power supply and

Table 1: Research hypotheses and their relationships

Research hypotheses	Relationship	Type
H1: Privacy threat will have a significant positive effect on privacy right	PTh → PR	Positive
H2: Privacy right will have a significant negative effect on perceived trust	PR → PT	Negative
H3: Technology safety will have a significant positive effect on perceived trust	TS → PT	Positive
H4: Painful procedure will have a significant positive effect on health concerns	PP → HC	Positive
H5: Health concerns will have a significant negative effect on perceived usefulness	HC → PU	Negative
H6a: Perceived ease of use will have a significant positive effect on perceived usefulness	PEU → PU	Positive
H6b: Perceived ease of use will have a significant positive effect on behavioural intention to use	PEU → BIU	Positive
H7a: Perceived Trust will have a significant positive effect on perceived usefulness	PT → PU	Positive
H7b: Perceived Trust will have a significant positive effect on behavioural intention to use	PT → BIU	Positive
H8: Perceived usefulness will have a significant positive effect on behavioural intention to use	PU → BIU	Positive
H9: Age will have a significant negative effect on behavioural intention to use	Age → BIU	Negative

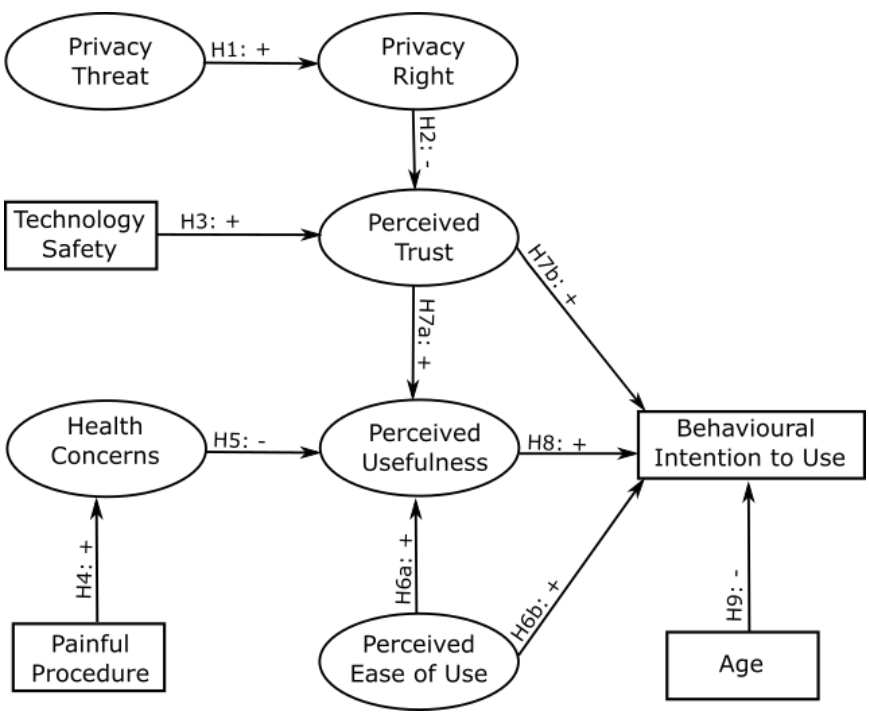

Figure 1: The proposed acceptance model for behavioural intentions to use microchip implant

can be read only from a short distance. Possible uses of MIs were also listed.

The questionnaire was distributed to a convenience sample of the general population. Only complete answers to the questionnaire items were used, namely 250 (31.1%) from Slovenia, 339 (42.2%) from the Czech Republic, and 215 (26.7%) from Poland. The Croatian subsample (146) was excluded from the analyses due to the minimal sample size requirements for structural equation modeling (SEM).

3.2 Statistical methods

The measurement model shown in Figure 1 describes the relationships between the observed measured items and the unobserved latent variables. The data obtained from the survey were analysed using the SEM approach.

The analysis was performed according to the standard two-stage approach at SEM (Schumacker & Lomax, 2010), the first step being the validation of the measurement model, whereas in the second step, structural relationships between latent variables were tested. The overall fit of the measurement and structural model were assessed based on a set of fit indices. MG-CFA and MG-SEM were used to complement the general two-step procedure due to the multiple groups representing samples from three countries.

All analyses, CFA, MInv, and SEM, were performed with the R-package lavaan (Rosseel, 2014) and semTools (Jorgensen et al., 2020). In the following section, the results are presented according to the described analysis procedure.

4 Results

In this section the results of 804 responses with complete answers to the items included in the research model (88.16% of 912 responses) are presented. The sample consists of 51.56% women and 48.44% men, detailed distribution according to countries is presented in Table 2.

The majority of respondents are employed (67.75%) or students (20.88%). The status of respondents according to countries is presented in Table 3.

The mean age of the respondents is 37.5 years with standard deviation 13.91 years. The age distribution according to countries is presented in Table 4.

Table 2: Gender distribution according to country

	Men	Women
Slovenia	40.96%	59.04%
the Czech Republic	47.49%	52.51%
Poland	58.69%	41.31%

Table 3: Status of respondents according to country

	Student	Employed	Unemployed	Retired
Slovenia	33.73%	53.82%	5.62%	6.83%
the Czech Republic	20.48%	68.25%	3.26%	8.01%
Poland	6.54%	83.18%	5.14%	5.14%

Table 4: Descriptive statistics (means (M) and standard deviations (SD)) for age of respondents according to country

	M	SD
Slovenia	35.7	11.8
the Czech Republic	38.0	14.2
Poland	38.7	11.8

4.1 Descriptive statistics of the questionnaire items

The percentages of respondents who are willing to insert a MI for different usages are shown in Table 5. The highest percentage of the respondents (47.76%) would insert an MI for health care purposes and the lowest percentage of the respondents (20.65%) would have MI for shopping and payment. The variable "number of MI uses" was calculated as the sum of five dichotomous variables on different MI uses and its mean value was 1.53 and SD = 1.85 (Table 6).

Descriptive statistics for 25 continuous variables included in the research model are presented in Table 6. On average, the highest agreement among respondents was in the case of PR construct for the variables discussing the right to control your information (M = 4.50,SD = 0.73), and that no one should be able to collect or disclose your personal information without your consent (M = 4.46,SD = 0.83). On average, the largest disagreement is obtained for the statement about the security and protection of human rights (M = 2.53,SD = 1.23).

4.2 Measurement model evaluation

Construct validity aims to determine how well a set of measured items reflects the theoretical latent variable they are designed to measure. Construct validity is examined with the evaluation of convergent validity and discriminant validity.

Convergent validity

First, the initial overall measurement model (M1), disregarding the countries was evaluated. The results of measurement model development and the fit indices are presented in Table 7. The item PEU3 (λ= 0.441) was removed from the model, due to its standard loading below 0.5.

Standardized factor loadings for items in the (final) overall model (M2) exceed a threshold of 0.5 for convergent validity. In addition, 86% (18) of them exceed even a stricter threshold of 0.7.

The AVE for six constructs exceeds a threshold of 0.5 for convergent validity (Table 8). The AVE for PEU is slightly below 0.5 (AVE = 0.47), but its CR is higher than 0.6 (CR = 0.73) the convergent validity of the construct is still adequate (Fornell & Larcker, 1981). The obtained results prove the convergent validity for the set of latent variables and corresponding items in the measurement model, therefore all included items are significantly related to the specified latent variable.

Discriminant validity

The discriminant validity of the M2 (overall) measurement model was examined through the comparison of the square root of AVE of each latent variable to the correlations between the latent variables (Table 8). The correlations among the constructs (and three measured variables included in the structural model) are given in the right panel of Table 8, where the diagonal elements correspond to the values of the square root of AVE. The values of the square root of AVE for each construct surpass the corresponding correlations between constructs. Therefore, discriminant validity can be inferred for all latent variables.

Internal consistency of the questionnaire was assessed to determine the extent to which the measured items within the construct were related to each other. Cronbach's alpha coefficients (Table 8) for six constructs ranged from 0.79 to 0.92 indicating high internal reliability (Hair et al.,

Table 5: Willingness to insert microchip implant (N=804)

Would you insert MI:	PPR[a]
...for health care purposes (identification, storage of medical data, information on organ donations, etc.)?	47.76%
...for identification purposes (ID card, passport, driving license, etc.)?	31.22%
...for shopping and payment purposes (debit cards, credit cards, profit cards, etc.)?	20.65%
...for everyday use at home (unlocking of house or apartment, car, computer, mobile phone, etc.)?	22.76%
...if you had been assured that GPS tracking and positioning would not be possible?	30.60%

[a]PPR – Percentages of positive responses

Table 6: Descriptive statistics with means (M) and standard deviations (SD) of items for model constructs (N = 804)

Construct	Questionnaire item	M	SD
Privacy Right (PR)	No one should be able to gather or disclose your personal information without your consent. (PR1)	4.46	0.83
	People should have the right to control their personal information. (PR2)	4.50	0.73
Privacy Threat (PTh)	Organizations and agencies ask you for too much personal information. (PTh1)	3.93	0.94
	The present use of computers is an actual threat to personal privacy in the country. (PTh2)	3.69	1.02
	I am concerned about threats to my privacy in the country today. (PTh3)	3.49	1.11
Technology safety (TS)	MIs technology is safe enough to be used in humans. (TS1)	2.66	1.01
Health Concerns (HC)	MIs can be threatening to my health because of the possibility of movement in my body. (HC1)	2.94	1.08
	MIs may affect my emotional behaviour (control of human behaviour, etc.). (HC2)	2.70	1.18
	MIs can be threatening to my health because of possible allergies. (HC3)	3.29	1.09
	MIs can be threatening to my health because of their impact on the nervous system. (HC4)	3.06	1.11
Painful Procdure (PP)	Implanting MI is a painful procedure.	2.84	1.02
Perceived Trust (PT)	The state will ensure the security and the protection of human rights (security of identity documents, passport, identity theft, tracking via GPS, no records should be archived without the consent of the person observed). (PT1)	2.53	1.23
	Banks will provide security (payment, discretion of operation, transactions, etc.). (PT2)	2.68	1.22
	The healthcare system will provide security (personal data, medical data, information on treatments, organ donation, etc.). (PT3)	3.05	1.26
Perceived Usefulness (PU)	MIs could be used for		
	- monitoring the health of the user. (PU1)	3.71	1.04
	- warning about potential health problems or complications. (PU2)	3.80	1.02
	- storing a user's medical info to be used in an emergency. (PU3)	3.80	1.02
	- personalized health info. (PU4)	3.39	1.15
	- storing information about organ donation. (PU5)	3.43	1.14
	- saving life (e.g. unconsciousness, cardiac pacemaker, insulin dispenser). (PU6)	3.85	1.00
Perceived Ease of Use (PEU)	MIs are always available. (PEU1)	3.55	0.99
	MIs cannot be lost. (PEU2)	3.78	0.96
	MIs cannot be stolen (high-security protection). (PEU3)	3.08	1.18
	MIs can integrate multiple functions at the same time. (PEU4)	4.01	0.80
Behavioural Intention to Use (BIU)	Number of different subcutaneous microchip uses.	1.53	1.85

Table 7: Results of measurement model development and model fit indices

Model	χ^2	*df*	*CFI*	*SRMR*	*RMSEA 90% CI*
M1 – initial overall model	1010.560	194	0.916	0.052	0.072
M2 – overall model with removed PEU3	863.804	174	0.927	0.049	0.070
Final model (M2) for each country					
MSI –Slovenia	339.061	174	0.950	0.052	0.062
MCZ - Czech Republic	589.404	174	0.877	0.067	0.084
MPO - Poland	359.205	174	0.940	0.051	0.070

Table 8: Cronbach's Alpha, Composite reliability (CR), average variance extracted (AVE), square root of AVE on the diagonal (marked in grey) and correlations among constructs

	Correlations												
	Cronbach's Alpha	CR	AVE	PR	PTh	TS	PP	HC	PT	PU	PEU	Age	BIU
PR	0.858	0.862	0.758	0.871									
PTh	0.793	0.797	0.568	0.464	0.754								
TS[a]	/	/	/	-0.049	-0.206	/							
PP[a]	/	/	/	-0.014	0.032	-0.154	/						
HC	0.838	0.855	0.597	0.098	0.278	-0.503	0.466	0.773					
PT	0.877	0.877	0.706	-0.111	-0.274	0.384	-0.004	-0.310	0.840				
PU	0.921	0.921	0.660	0.030	-0.152	0.394	-0.090	-0.391	0.577	0.813			
PEU	0.614	0.727	0.474	0.175	-0.056	0.276	-0.155	-0.315	0.406	0.509	0.689		
Age[a]	/	/	/	0.002	-0.001	-0.046	0.038	0.131	-0.142	-0.174	-0.026	/	
BIU[a]	/	/	/	-0.086	-0.238	0.368	-0.074	-0.391	0.541	0.471	0.334	-0.140	/

[a]Measured variables TS, PP, Age, and BIU are included into the table only to compare square root of AVE of a construct with correlations to other constructs and measured variables. Cronbach's Alpha, CR, and AVE are not applicable for measured variables.

2019). The coefficient for PEU is slightly lower but still acceptable (Cronbach's alpha = 0.61).

The overall model fit

The overall fit of the final measurement model (M2) was assessed based on a set of commonly used fit indices (Table 7). The χ^2 was 863.81 with 174 degrees of freedom. Both, CFI and SRMR indicate a good model fit (CFI = 0.927 SRMR = 0.049). RMSEA is equal to 0.070 and the upper bound of RMSEA 90% confidence interval (0.066,0.075) is lower than 0.08 suggesting a good model fit (MacCallum et al., 1996). According to the set of the calculated fit indices, we conclude that the measurement model fits the sample data well.

We tested whether our final model fits each country's subsample. The model fits all of the subgroups well, with SRMR values from 0.051 to 0.67, RMSEAs of 0.062 to 0.084, CFIs of 0.88 to 0.95 (see Table 7). When examined separately, the M2 fits each subgroup well. Therefore, we can proceed with testing measurement invariance across groups.

4.3 Multiple-group analyses: testing measurement invariance across countries

The measurement invariance tests are performed using the hierarchical ordering of nested models (Putnick & Bornstein, 2016) starting with the evaluation of the configural invariance and following by weak, strong, and strict

invariance. The results of the model fits are shown in Table 9.

Test of configural invariance

A permutation test, based on 1000 repetitions, revealed no evidence against the null hypothesis of configural invariance using either χ^2 (p = 0.557), CFI (p = 0.721), SRMR (p=0.375) or RMSEA (p = 0.557) and its 90% confidence interval (p = 0.557 for the lower bound and upper bound as criterion). This indicates that configural invariance is supported.

Test of weak invariance

To test for weak invariance, the factor loadings were constrained to be equal across groups. Because the weak invariance model (M4) is nested within the baseline configural model (M3), a χ^2 difference test was performed. Since χ^2-test of two nested models is oversensitive to small, unimportant deviation from a perfect model in a large sample (Chen, 2007; Cheung & Rensvold, 2002), we report the differences in alternative fit indices (ΔAFI). ΔCFI (-0.002), ΔREMSA (-0.001 , and ΔSRMR (0.002) between the configural and weak models (Table 9).

Test of strong invariance

To test for strong invariance, in addition to factor loadings also intercepts were constrained to be equal across groups. The ΔAFIs of strong invariance model (M5) according to M4 were as follows: ΔCFI (0.020), EMSA (0.006), and ΔSRMR (0.006). Since ΔCFI is above the prescribed level, there is some evidence that the intercepts are not completely invariant across the three considered groups. When intercept of measured item PT3 was freely estimated accros groups, the partial strong variance (model M5a) was established.

However, there was a significant CFI difference (ΔCFI = -0.026) between the partial strong model and the strict model (M6). These results suggest a greater lack of fit when constraining also error variances to be invariant across groups. Since partial strong measurement invariance was supported, we can proceed to the evaluation of the structural model (Putnick & Bornstein, 2016).

Table 9: Testing measurement invariance across countries

Model (Model comparison)	χ^2 ($\Delta\chi^2$)	*df*	*CFI* *(ΔCFI)*	*SRMR* *(ΔSRMR)*	*RMSEA* *(ΔRMSEA)*	*RMSEA* *90% CI*
M3 - configural invariance	1287.67	522	0.922	0.056	0.074	0.069; 0.079
M4 - weak invariance (M3)	1330.32 (42.7)	552 (30)	0.920 (-0.002)	0.058 (0.002)	0.073 (-0.001)	0.068; 0.078
M5 – strong invariance (M4)	1563.50 (233.2)	582 (30)	0.900 (-0.020)	0.064 (0.006)	0.079 (0.006)	0.075; 0.084
M5a – strong partial invariance (M3)	1446.28 (116.0)	580 (28)	0.911 (-0.009)	0.062 (0.004)	0.075 (0.002)	0.070; 0.079
M6 - strict invariance (M5a)	1742.68 (296.4)	622 (42)	0.885 (-0.026)	0.064 (0.002)	0.082 (0.007)	0.077; 0.087

4.4 Testing structural model

After assessing the model fit of the overall measurement model and its partial strong invariance, a structural model was evaluated. According to the research model (Figure 1), four measured variables and 11 structural paths were added to the six constructs described in the previous section and in accordance with the proposed hypotheses. First, the overall model was evaluated.

Examining the overall structural model

The overall structural model (SM1) fit was good. The following criteria were determined: χ^2=1548.63, df=264, CFI=0.88, and RMSEA=0.078 (90% CI; 0.074,0.082). Since the main aim of this research is group comparison,

the detailed results of the overall model are not presented here.

Although the research hypotheses were supported in the overall model, it is not clear whether these hypotheses hold across different countries. For example, would the impact of health concerns on perceived usefulness remain significant for all three countries? To determine whether the structural relationships are invariant, it is essential to establish a structural model invariance.

Measurement invariance of the structural model

The fit of the partial strong invariance model (SM1) (Table 10) was good: χ^2=2426.11, df=822, CFI=0.86, and RMSEA=0.083 (90% CI; 0.079,0.087). The fit of the structural model (SM2), where also structural coefficients were constrained to be equal across groups, was as follows: χ^2=2480.64, df=872, CFI=0.85, and RMSEA=0.083 (90% CI; 0.079,0.087). The χ^2-test (p=0.0001) of the two nested models suggests that models SM1 and SM2 are significantly different, meaning that some paths vary across groups.

To determine whether the structural paths are invariant across three groups, the individual structural coefficients were successively restricted to be equal across three groups and nested models were compared. More precisely, model SM1 and a model in which a particular path coefficient of interest was specified as invariant were compared at a time (Table 10). Since we are comparing three groups, such an approach ensures that the χ^2 difference test has 2 degrees of freedom, whereby any observed χ^2 differences greater than 5.99 being statistically significant at a 5% significance level.

Results of model comparisons are presented in Table 10. The following paths were found to be different across groups at 5% significance level:

- PTh → PR (SM1a),
- PP → HC (SM1d),
- HC → PU (SM1e),
- PT → PU (SM1h).

Those coefficients were freely estimated across groups in the final model (SM3).

4.5 Results of the final structural model

The fit of the final model (Table 10) was good: χ^2=2441.77, df=864, CFI=0.85, and RMSEA=0.084 (90% CI; 0.079,0.086). Table 11 shows the results for the unstandardized coefficients (B), standardized coefficients (β) and corresponding z-values, which reflect the relationships among the latent variables in terms of magnitude and statistical significance. Due to relatively large number of tests, the adjusted p-values using false discovery rate method (Benjamini & Hochberg, 1995) were calculated. A graphical overview of the (un)confirmed hypotheses is shown in Figure 2. For each endogenous construct the coefficient of determination (R^2) was also calculated (Table 12).

The theory of TAM suggests that there are positive effects of PEU and PU on BIU (in this case H6b and H8). The results confirmed that both hypotheses are confirmed in all three countries at a 5% significance level and that the structural coefficients do not differ statistically significantly across countries. We found that all constructs together explain 30.6% of the total variance of BIU in Poland, 33.5% in Slovenia, and 26.0% in the Czech Republic.

Another relationship that is usually predicted in TAM applications is the positive impact of PEU on PU. In our model, this relationship is described by hypothesis H6a, which is confirmed at a 5% significance level in all three countries (and the magnitude does not differ statistically significantly across countries).

Four constructs and three external variables were added to the original TAM model, as shown in Figure 1. Hypothesis H1, which indicates a positive impact of PTh on PR was confirmed in all three countries, although the magnitude of the impact is different. The effect of PTh on PR was significantly stronger in Slovenia (β=0.568) and the weakest in the Czech Republic (β=0.394).

The same magnitude of negative impact of PR to PT (H2) was confirmed in all three countries. The negative impact of age on the BIU (H9) was not confirmed in any country.

The constructs with a positive impact on the basic components of TAM are HC and PT, where HC impact PU (H5), whereas PT impacts PU and BIU (H7a, H7b). Two hypotheses (H7a, H7b) were confirmed in all three countries, but the magnitudes of the effects differ. Hypothesis H5 was not confirmed in the Czech Republic.

The variable PU has two significant predictors (HC and PT) that can explain between 31.4% and 47.0% of its total variance in Poland and the Czech Republic, respectively.

The positive impact of the PP external variable on HC was proposed with hypothesis H4 and confirmed in all three countries. The magnitude of the effect was highest for the Poles (β=0.596) and lowest for the Czechs (β=0.347). Similarly, the same positive impact of the external variable TS on PT (H3) was confirmed in all three countries. The two predictors of PT (PR and TS) explain at least 15.3% of the total variance of H3.

Table 10: Testing measurement invariance of structural coefficients across countries

Structural model (SM) (Model comparison)	χ^2 ($\Delta\chi^2$)	*df*	*p*	*CFI* (*ΔCFI*)	*SRMR* (*ΔSRMR*)	*RMSEA* (*ΔRMSEA*)	*RMSEA* *90% CI*
SM1 – partial strong invariance	2426.11	850	/	0.854	0.127	0.083	0.079; 0.087
SM2 – structural coefficients (SM2)	2480.64 (54.33)	872 (22)	0.0001	0.851 (-0.003)	0.131 (0.004)	0.083 (0.000)	0.079; 0.087
Constrained individual paths to be equal across groups:							
SM1a: PTh -> PR (SM1)	2432.87 (6.76)	852 (2)	0.0340	0.854 (0.000)	0.127 (0.000)	0.083 (0.000)	0.079; 0.087
SM1b: PR -> PT (SM1)	2427.69 (1.56)	852 (2)	0.4589	0.853 (-0.001)	0.129 (0.002)	0.083 (0.000)	0.079; 0.087
SM1c: TS -> PT (SM1)	2426.60 (0.49)	852 (2)	0.7815	0.854 (0.000)	0.127 (0.000)	0.083 (0.000)	0.079; 0.087
SM1d: PP -> HC (SM1)	2435.13 (9.02)	852 (2)	0.0110	0.853 (-0.001)	0.128 (0.001)	0.083 (0.000)	0.079; 0.087
SM1e: HC -> PU (SM1)	2439.56 (13.45)	852 (2)	0.0012	0.853 (-0.001)	0.128 (0.001)	0.083 (0.000)	0.080; 0.087
SM1f: PEU -> PU (SM1)	2426.13 (0.02)	852 (2)	0.9890	0.854 (0.000)	0.127 (0.000)	0.084 (0.001)	0.079; 0.087
SM1g: PEU -> BIU (SM1)	2426.23 (13.45)	852 (2)	0.9413	0.854 (0.000)	0.127 (0.000)	0.083 (0.000)	0.079; 0.087
SM1h: PT -> PU (SM1)	2439.66 (13.55)	852 (2)	0.0011	0.853 (-0.001)	0.129 (0.002)	0.083 (0.000)	0.080; 0.087
SM1i: PT -> BIU (SM1)	2431.96 (5.85)	852 (2)	0.0536	0.854 (0.000)	0.129 (0.002)	0.083 (0.000)	0.079; 0.087
SM1j: PU -> BIU (SM1)	2427.39 (1.28)	852 (2)	0.5276	0.854 (0.000)	0.129 (0.002)	0.083 (0.000)	0.079; 0.087
SM1k: Age -> BIU (SM1)	2431.09 (4.98)	852 (2)	0.0830	0.854 (0.000)	0.127 (0.000)	0.083 (0.000)	0.079; 0.087
SM3 – final model (SM1)	2441.77 (15.66)	864 (14)	0.3349	0.854 (0.000)	0.128 (0.001)	0.084 (0.000)	0.079; 0.086

Table 11: Summary of hypotheses testing for the structural model across countries

Hypothesis & Path	Expected Sign (Constrained across groups)	Country	B	β	z	p	Adjusted p	Confirmed?
H1 PTh→PR	+ (No)	SI	0.769	0.568	7.631***	0.000	0.000	Yes
		CZ	0.441	0.394	5.670***	0.000	0.000	Yes
		PO	0.583	0.463	6.257***	0.000	0.000	Yes
H2 PR→PT	- (Yes)	SI	-0.139	-0.086	-2.719**	0.007	0.008	Yes
		CZ		-0.103				Yes
		PO		-0.113				Yes
H3 TS→PT	+ (Yes)	SI	0.390	0.387	11.183***	0.000	0.000	Yes
		CZ		0.422				Yes
		PO		0.375				Yes
H4 PP→HC	+ (No)	SI	0.377	0.489	8.030***	0.000	0.000	Yes
		CZ	0.260	0.347	6.048***	0.000	0.000	Yes
		PO	0.505	0.596	9.480***	0.000	0.000	Yes
H5 HC→PU	- (No)	SI	-0.226	-0.239	-4.053***	0.000	0.000	Yes
		CZ	-0.038	-0.036	-0.713	0.476	0.476	No
		PO	-0.295	-0.264	-4.052***	0.000	0.000	Yes
H6a PEU→PU	+ (Yes)	SI	0.480	0.383	8.744***	0.000	0.000	Yes
		CZ		0.332				Yes
		PO		0.374				Yes
H6b PEU→BIU	+ (Yes)	SI	0.253	0.094	2.208*	0.027	0.030	Yes
		CZ		0.074				Yes
		PO		0.098				Yes
H7a PT→PU	+ (Yes)	SI	0.308	0.396	6.723***	0.000	0.000	Yes
		CZ	0.509	0.599	11.020***	0.000	0.000	Yes
		PO	0.264	0.308	4.803***	0.000	0.000	Yes
H7b PT→BIU	+ (Yes)	SI	0.755	0.455	10.908***	0.000	0.000	Yes
		CZ		0.378				Yes
		PO		0.436				Yes
H8 PU→BIU	+ (Yes)	SI	0.385	0.181	4.351***	0.000	0.000	Yes
		CZ		0.163				Yes
		PO		0.191				Yes
H9 Age→BIU	- (Yes)	SI	-0.007	-0.060	-1.845	0.065	0.069	No
		CZ		-0.057				No
		PO		0.046				No

Table 12: Coefficients of determination (R^2)

Construct	SI	CZ	PO
PR	0.323	0.155	0.214
HC	0.239	0.120	0.355
PT	0.157	0.189	0.153
PU	0.368	0.470	0.314
BI	0.335	0.260	0.306

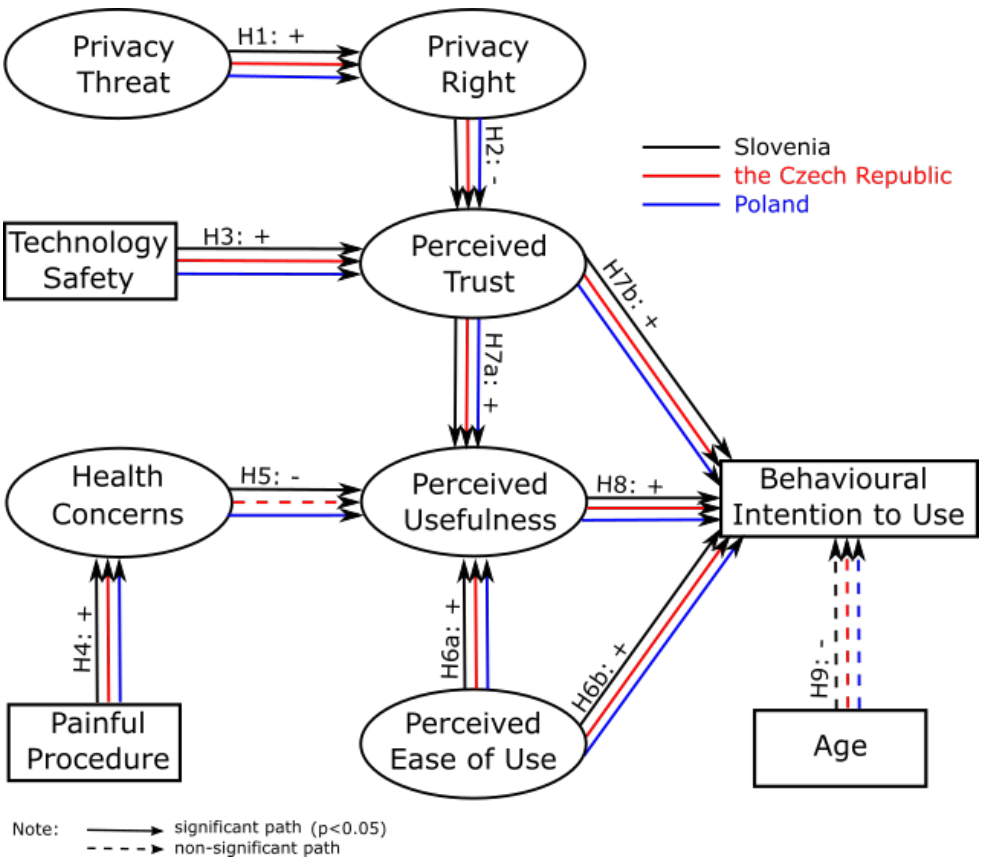

Figure 2: The final acceptance model for behavioural intention to use microchip implant

5 Discussion and conclusions

With today's access to information, people are becoming more and more aware of new technologies and their widespread applications. When we think about the use of new technologies, we are confronted with a variety of attitudes, from technophile to traditionalist to conservative. Despite many concerns about privacy (Rodriguez, 2019) and possible reactions to a foreign body in the human body (Albrecht, 2010), the applications of MI in healthcare are very successful (e.g. pacemakers, drug administration, prostheses). Although some people have already decided to use MI for non-therapeutic purposes (Fram et al., 2020), research on the adoption of MI by individual users, factors that influence attitudes towards MI should be investigated. Although the general attitude towards implants has changed in recent years, some health, religious or personal concerns still limit the general use of MI.

The aim of this study was to identify the drivers and barriers to the adoption of MI in the general population. It complements previous research on the adoption of MI by providing insight into the attitudes of an individual, the actual user of MI. The cross-sectional study, which was

conducted in three European countries, showed similar attitudes towards the introduction of MIs.

In general, people would be most willing to use MI for healthcare purposes (47.8%), whereas, similar to Franks & Smith (2021), willingness for other purposes was significantly lower. For example, 31.2% of respondents would be willing to use MI for identification, 20.6% for shopping and payment, and 22.8% for everyday use at home.

Perceived ease of use, usefulness, and trust were identified as the most important predictors of intention to use MIs. In addition to their influence on intention to use, perceived trust and ease of use, influence perceived usefulness. In contrast to these predictors, health concerns act as a negative predictor of perceived usefulness in two out of three countries. According to these results, the public is aware of the variety of useful applications of MI but has no confidence in research on the safety of the technology. We anticipated that due to the variety of body modifications, such as piercing, tattoos and even plastic surgery, which have become popular in recent years, the problem of pain when inserting foreign bodies will no longer be an obstacle. Nevertheless, according to the results of this study, health concerns are still anticipated by the fact that the insertion of a MI is a painful procedure.

Privacy right perception can be predicted by the individual's attitude towards threats to privacy. Furthermore, concerns about privacy rights act as a negative predictor of perceived trust. Given that people have become accustomed to wearable devices or smartphones and have agreed to be tracked by them in order to take advantage of their benefits, we can therefore say that this is a surprising result. In line with the lifestyle changes mentioned above, our expectation that the perceived trust is anticipated by the perception of the security of the technology of MI, was confirmed.

It is interesting to note that age is not a predictor of intention to use MIs in any of three countries studied. We expected a negative relationship between age and intention to use MIs. Table 5 shows that, the willingness to use MI is much higher when it is used for health purposes. Since older people have more health issues they might be more prone to use MIs for specific use in healthcare (e.g. MI in peacemaker) than we expected. Therefore, this specific use would need to be researched in detail. So far, we cannot confirm that older people are less likely to use new technologies.

The results show that there are barriers related to privacy issues that affect trust in MI. On the other hand, the safety of the technology has a significant positive impact on trust. Moreover, perceived trust in the technology of MI influences the decision to accept MI.

In general, we can conclude that attitudes towards the acceptance of MIs are similar in all European countries considered. The results of this research could be useful for other research areas, especially for the healthcare industry, where the use of MI could contribute the most. The bottom line is that we are not yet ready to use MI. We could use it if it would benefit our health status. There are still many health and privacy issues to be addressed in order to achieve greater adoption of this technology in our daily lives.

Although the current situation surrounding the Covid-19 pandemic has likely had a significant impact on individual perceptions of new technologies, the results of this study have made an important contribution to research on MI by providing an insight into perceptions of use from the end-user perspective. It is expected that willingness to adopt will increase as more applications of MI become available, not only in healthcare but also in daily life.

5.1 Practical implications

MI has the potential to become an inevitable part of our lives in the near future. Not only its applications in healthcare, but also its everyday use could significantly change our lives. The recent situation has revealed even more potential MI applications in preventing the spread of pandemics. Identifying the key factors that influence attitudes towards MI is essential for organizations aiming to promote MI and support its widespread adoption. The research shows that despite the ease of use of MI, there is still too many fears about the privacy and safety of this technology. It is therefore necessary for public authorities to ensure standards and legislation that enable the safe use of MIs.

Although several research papers show the present use of MIs by hobbyists and in certain work environments, there is still no research on the effect on the human body. Thus, before proposing a general use of MIs, research on health issues should be shifted from animals to humans so that individuals have enough information to make a reasonable decision about the use of MI.

This study also highlighted the lack of knowledge about this technology. Despite the fact that MI was introduced as a passive device that cannot be tracked from distance, the respondents were afraid of being tracked. On the other hand, most of them use mobile or wearable devices without proper security settings or even publish their location and status on social media and other platforms. It would therefore be crucial to educate the potential users about the real benefits and weaknesses of MIs before using them in a particular setting. The research also found, that people would be more willing to use MI if it would benefit their health. Thus, if MIs with health benefits (e.g. measuring blood pressure or sugar) were offered to the public, they would be more readily accepted than identification-only devices.

5.2 Limitations and further research

Unlike other technologies, MIs are quite specific, so there are many arguments for and against their adoption. The variables included in the proposed model were defined based on previous research and a pilot study. We do not exclude the possibility that other external variables could influence attitudes towards the adoption of MIs (e.g. (Mohamed, 2020) including religious concerns, which we believe are not a major issue in the EMEA region where this study was conducted). The cost of implantation and use of MIs was also not considered in this study. Due to the small sample size, the Croatian subsample of this study with 146 responses (131 complete surveys) was not included in the analyses.

Although we found some similarities with studies performed on other continents (Franks & Smith, 2021; Perakslis & Michael, 2012), further research should include other regions or continents to obtain an overall picture of public acceptance of MI and identify the factors that influence the diversity of attitudes. In addition, other factors such as religious views, conspiracy mentality or online activities could also be considered. Particular attention should be paid to changes in attitudes due to the current extreme health problems associated with the virus COVID-19.

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Smo pripravljeni uporabiti podkožni mikročip? Mednarodna presečna raziskava

Ozadje in namen: Kljub očitni pomembnosti podkožnih mikročipov za naše življenje, jih v večini primerov ljudje še vedno obravnavamo kot negativne. Prevladuje mnenje, da ogrožajo našo zasebnost in lahko vplivajo na naše zdravje. V prispevku preučujemo pomembne dejavnike, ki vplivajo na dojemanje podkožnih mikročipov in pripravljenost posameznika, da bi podkožni mikročip uporabil za različne namene.
Metodologija: Presečno študijo smo izvedli v treh evropskih državah, podatke pa smo analizirali s pomočjo modeliranja strukturnih enačb. V analizo smo vključili priložnostni vzorec 804 anketirancev, ki so v celoti izpolnili spletni vprašalnik.
Rezultati: Rezultati kažejo, da lahko na osnovi konstruktov zaznana enostavnost uporabe, uporabnost in zaznano zaupanje napovemo pripravljenost za uporabo podkožnega mikročipa. Na zaznano zaupanje vplivata zasebnost in varnost tehnologije. Zaznano uporabnost podkožnega mikročipa zmanjšuje zaskrbljenost zaradi bolečih postopkov vstavljanja in skrbi glede zdravja. Razen vpliva konstrukta skrb za zdravje, so rezultati podobni v vseh državah.
Zaključki: Prikazani rezultati lahko služijo kot dobra osnova za nadaljnje raziskave glede dejanske uporabe podkožnih mikročipov. Rezultati lahko snovalcem zakonodaje pomagajo pri oblikovanju usmeritev in predpisov, ki bodo zagotovili varno uporabo podkožnih mikročipov in zagotovili višjo stopnjo varnosti. V nadaljevanju bi bilo smiselno raziskati ali se je pripravljenost za uporabo podkožnih mikročipov spremenila po izkušnji z globalno pandemijo.

Ključne besede: *Podkožni mikročip, Komunikacija kratkega dosega, Vedenjske namere, Model strukturne enačbe, Model sprejetja tehnologije*

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Mapping of the Emergence of Society 5.0: A Bibliometric Analysis

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Background and purpose: The study aims to answer a research question: With which essential cornerstones technological innovations the transformation from Society 4.0 and Industry 4.0 to Society 5.0 and Industry 5.0 is enabled? The study is important for practitioners and researchers to understand the meaning of Society 5.0 and to familiarise themselves with the drivers that will help shape Society 5.0 policies and play an important role in its further development. Therefore, the authors conducted a quantitative bibliometric study that provides insights into the importance of the topic and incorporates current characteristics and future research trends.
Methodology: The study used algorithmic co-occurrence of keywords to gain a different insight into the evolution of Society 5.0. Thirty-six selected articles from the Web of Science database were analysed with the bibliometric analysis and overlay visualisation.
Results: The co-occurrence analysis shows that terms artificial intelligence, cyber-physical systems, big data, Industry 4.0, Industry 5.0, open innovation, Society 5.0, super-smart society have been widely used in researches in the last three years.
Conclusion: The study presents a bibliometric analysis to analyse the current and future development drivers of a Society 5.0. According to the results, the transition from Society 4.0 to Society 5.0 can be achieved by implementing knowledge and technologies in the IoT, robotics, and Big Data to transform society into a smart society (Society 5.0). In particular, the concept would enable the adaptation of services and industrial activities to individuals' real needs. Furthermore, these technologies allow advanced digital service platforms that will eventually be integrated into all areas of life.

Keywords: *Society 5.0, Industry 5.0, Information society, Smart society, Data-driven innovations*

1 Introduction

After 2016 Society 5.0 has become a new research phenomenon, which has been introduced in the Japanese government policies to establish a better, super-smart, and more prosperous human-centred society to help overcome chronic social changes. The strategy represents the Japanese response to other socio-technological strategies as Industry 4.0 in Europe, Industrial Internet in the US and Chinese Made in China 2025 (Harayama, 2017).

According to Harayama (2017), Society 5.0 is directly related to the appearance of the 5th Industrial Revolution (Industry 5.0), and they will both occur when artificial intelligence (AI) is managed to think and lead the organisational processes independently, which is expected that will emerge in 2030.

It is expected that Society 5.0 will continue with the evolution of human and technology relations through a cyber-physical system (CPS; Shiroishi, Uchiyama, & Suzuki, 2018) which began in the current Industry 4.0. In the last few years, therefore, investment has accelerated in research & development (R&D) of cognitive computing based on AI, and it is expected that it would shortly enable complete self-managed organisation (Roblek, Erenda, & Meško, 2020) and humans to machine communication and cooperation (Guzman & Lewis, 2020). Thus, the relations between people and technology can improve the quality of

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life and ensure sustainable development in all areas (education, health, democracy, economy) (Ferreira & Serpa, 2018). However, on the other hand, the issue opens to the question of the negative impact of AI on human society (e.g., errors in algorithms that can cause the death of people because of wrong decisions of the computer system, loss of jobs, ethical and economic issues regarding the transfer of responsibility from humans to machines, social control) (Makridakis, 2017).

Based on social changes because of the technology development and known theoretical background about the Society 5.0, the following research question has been set: With which essential cornerstones technological innovations the transformation from Society 4.0 and Industry 4.0 to Society 5.0 and Industry 5.0 is enabled?

The paper includes a scientometric analysis of the co-occurrence keywords and a systematic literature review of existing theoretical explanations of Society 5.0, research on and its development mechanisms that can impact the further transition from Industry and Society 4.0 to Industry and Society 5.0.

2 Theoretical background

2.1 Historical evolution of information society

The emergence of the third industrial revolution (which began around 1960) was based on the invention of the transistor and the microprocessor. These innovations enabled the accelerated development of telecommunications and computer technology. Automation of processes began, followed by the penetration of computing with computers such as the IBM 370. Thus, society began to move from producing goods and making profits to a post-industrial society based on knowledge production and the growth of service activities (Hughes, 2004). In the 1980s, a shift occurred with digitalisation, which contributed to the post-industrial or information society, which focuses on the organisation of knowledge and serves as social control, guiding innovation and change (Peters, 2020). Table 1 shows the crucial technological factors for a successful transformation process, and Table 2 shows the key economic factors. The emergence of the Internet led to an exposure of a global information society that aims to provide access to the Internet, better education, business support, and networking. All this leads to Castells' opinion that post-industrial society needs to be replaced by information society (Castells, 1996). Since the existing information societies are based on a capitalist system, it is also necessary to emphasise information systems institutional and cultural diversity (e.g. the differences between individual nations and countries) (Salehan, Kim, & Lee, 2018). The modern information society is based on innovative technological solutions for knowledge creation and data processing. The information society has focused on collecting and processing data at several stages (Abubakar et al., 2019).

We can conclude that we understand society as a special form of social organisation in which information, its collection, processing and transmission become the primary source of power and productivity.

2.2 Industry 4.0 and emergence of Society 5.0

Industry 4.0 represents a completely new way of integrating technology into society. New technologies are being researched and developed that connect the physical, digital and biological worlds, which affect all disciplines, economies and industries (Caruso, 2018). Industry 4.0 appears as a continuation of the third industrial revolution. It enables the digital interconnection of products, machines, tools and more. It brings 3D printers, self-driving vehicles, AI, and nanotechnology, but unlike the second and third industrial revolutions based on raw materials and energy, Industry 4.0 emphasises knowledge as an essential resource (Roblek et al., 2016).

One of the most important innovations in Industry 4.0 is robotics. Robots have been around for several decades, but the question arises as to why today's robots are different from those of the past? The difference is that robots and humans are now equal partners, meaning robots today have a higher level of artificial intelligence. Furthermore, they can communicate with machines and humans through smart devices. Therefore, it is important to compare and list the special human abilities concerning robots' unique abilities. It becomes clear where robots can help us and what human characteristics they can replace with their unique abilities. With the emergence of robots in everyday human life, the question of taxing not only internet companies but also robots increased, as some scholars suggest that "whoever owns the robots rules the world" (Freeman, 2015). Holder et al. (2016) discuss the identification of the main legal and regulatory implications of robotics. According to the authors, it is time to start a dialogue in society about "how our existing legal framework may need to be adapted and changed to meet the demands of the robotics era."

The negative connotations of Industry 4.0 are seen in reducing the number of employees, and the entire industrial revolution is accompanied by the abolition and creation of new jobs. There are also three crucial areas of concern: inequality, cybersecurity and identity (Schwab & Davis, 2018). In addition to creating inequalities between people, it can also lead to an even more significant gap between the countries' economies. Less developed economies that are just beginning to industrialise would lag even further behind developed ones (Hughes & Southern, 2019). When it

Table 1: Technology-based society and transformation processes – technological factors

Factor	Main topics	Author
Computerisation (1960-)	The invention of the transistor and the microprocessor had an important impact on the rise of telecommunications and computer technology.	Ensmenger, 2012; Frey & Osborne, 2017; Jorgenson, 2001
Digitalisation (1980-)	Word digitalisation cannot be used as a synonym for computerisation. In business administration, digitalisation often means the adoption and increased use of information and communications technologies. Other meanings of the word digitalisation are connected with the process of converting something to digital form (e.g., digitalisation of payments, digitalisation of the printed documents and books, the transformation of the analogue signals in a digital representation)	Jedynak et al., 2021 ; Katsikas & Gritzalis, 2017, Valenduc & Vendramin, 2017
Informatisation (2011-)	The word informatisation is used to introduce and adopt information systems, technologies, for instance, informatisation of the company (self-management organisation, public apparatus, business).	Paulin, 2019; Schuetz & Venkatesh, 2020; Sony and Naik, 2020

Table 2: Technology-based society and transformation processes – economic factors

New economy (1980-2006)	Within the information society, the so-called new economy has been established. During this period, the contribution of information companies and service activities (e.g., trade, publishing, entertainment, consulting) in the developed countries expanded to such an extent that it exceeded production agriculture measured by the contribution to the gross national product. Thus, in general, analysts use the term information economy or new economy to describe a situation where the gross national product dominates the information industry.	Cant, 2020; Daveri, 2002; Farell, 2003
Innovative economy or knowledge-based economy (2003-2030)	The new economy is passed into an innovative economy based on the thesis that capital accumulation is the main vehicle for economic growth. The rate of economic growth in the innovative economy depends on the products and services resulting from knowledge (R&D)	Chen (2008); Drucker (2002); Tocan (2012)
Data Economy (2011-)	Industry 4.0 enable that humanity is generating more information than an individual can implement. It is also coming to the situation that more interdependencies emerging than an individual can handle, and rapid changes have been observed that are difficult to track. ICT and big data analytics have given rise to the "data economy". Society is coming to data accumulation instead of capital. Data's key features become: data present a by-product of economic activity; data is the information used for prediction and uncertainty reduction enhances organisations profit. Implementing data-driven solutions in the human ecosystem enables the flow of services, operations and functions and the design and implementation of strategies and policies. The government policies allow the emergence of open data (freely available)	Farboodi & Veldkamo, 2021; Teece, 2018: Wamba et al., 2019

is going for the security in Industry 4.0, the digital world's combination with new technologies creates new battlefields, especially in the cyber world, increases access to lethal technologies, and makes administration and negotiations between countries to secure peace more difficult (Horowitz, 2019). The Industry 4.0 technologies also offer expanded possibilities for warfare, which are increasingly available to state and non-state actors, such as autonomous weapons, nanomaterials, biological and biochemical weapons, portable devices and distributed energy sources (Yoo, 2017). New AI-based autonomous weapons also pose a potential threat to humanity. Without legal restrictions on these technologies' operation and development, there may be unauthorised use for terrorist purposes and likely AI dominance over humans in the fifth industrial revolution (Russel et al., 2015). In addition to concerns about growing inequality and security threats, this fourth industrial revolution also affects us as individuals and community members, i.e., our identity. Digital media are already becoming the main driver of our individual and collective shaping of society and community. They connect people to individuals and groups in new ways, fostering friendships and creating new interest groups. Moreover, such connections transcend many traditional boundaries of interaction (Davis, 2016).

Industry 4.0 has led to a digital transformation of the information society (in business and private life) and the future of Society 5.0. The future society members who will benefit from living and working in smart urban areas will enjoy their advantages enhanced by technological, social and cultural aspects that enable the concept of smart living. The Japanese government introduced Society 5.0 in 2016 as the 5th Science and Technology Master Plan (Cabinet Office, 2016). The concept was described as a vision of a

Table 3: Journals used for the scientometric analysis and systemic literature review

Journals
Annals of the American Association of Geographers
Applied Science
Computer
Data
Engineering
IEEE Communications Magazine
Information
International Journal of Production Economics
Inzinerine ekonomika-engineering economics
Journal of Asian Public Policy
Journal of Clinical Medicine
Journal of Industrial Integration and Management-Innovation and Entrepreneurship
Journal of the Knowledge Economy
Journal of the Manufacturing Systems
Kybernetes
Libri-International Journal of Libraries and Information Studies
Nature
Omics-A Journal of Integrative Biology
Pakistan journal of medical sciences
Sotsiologicheskie Issledovaniya
Sustainability
Technology Analysis & Strategic Management
Wireless Personal Communications
Zeitschrift fur Wirtschaftsgeographie

future society characterised by scientific and technological innovation. It aims to create a society centred on human beings that, by merging the physical world with cyber-space, will facilitate economic development and ensure a high quality of life for all citizens (Fukuda, 2020; Potočan, Mulej and Nedeljko, 2020).

3 Research methodology

The study aims to provide an interpretive overview of the emergence of Society 5.0, and it is prepared using a mixed research methodology. The study was designed

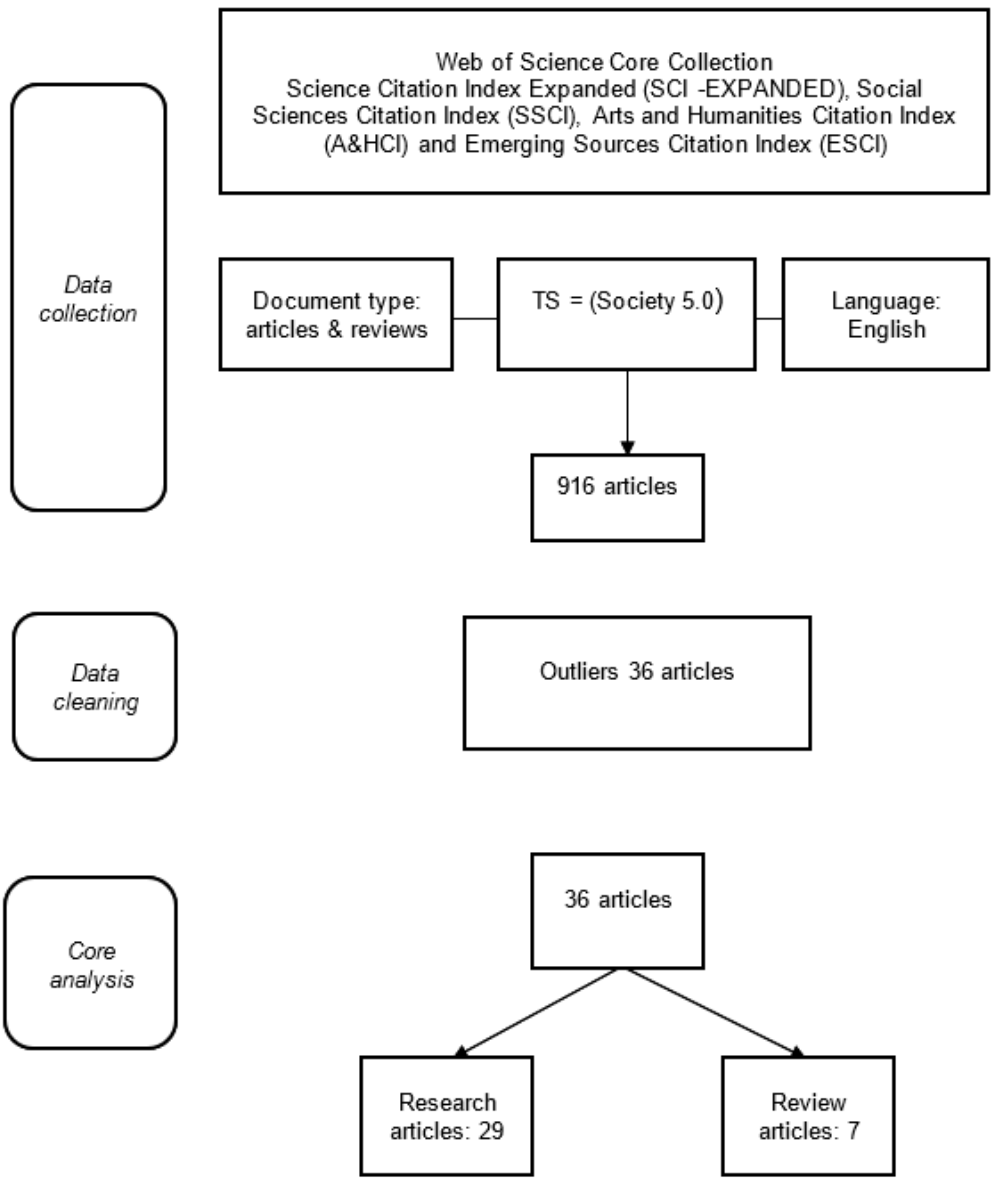

Figure 1: The three steps study protocol

with the software Vosviewer version 1.6.16 and includes scientometric research used to construct density visualisation and identify the topic clusters based on the keywords co-occurrence (van Eck & Waltman, 2020). In selecting the literature, was followed the three-step protocol approach used in previous studies such as Chandra and Walker (2020), Dabić et al. (2020), and Palumbo et al. (2021). A three-step protocol (Figure 1) includes i) data collection: selecting articles published in scientific journals indexed in the Web of Science database; ii) data cleaning: a manual review of article titles and abstracts. Based on their content, we excluded articles that were inappropriate in terms of content; and 3) basic analysis: in-depth review of the articles covered. The search itself is divided into two parts. The first part includes the articles' classification according to scientometric research, and the second part is followed by an interpretation of the articles' content. Table 3 presents papers from the journals used in analyses.

The first phase includes the data collection process. The search for articles was done in the Web of Science and Scopus databases. The Boolean keyword combination was used to search for the relevant papers (TS = (Society 5.0) AND LANGUAGE: (English) AND DOCUMENT TYPES: (Article, Review) Indexes = SCI-EXPANDED, SSCI, A&HCI and ESCI). It was no temporal restrictions. The search results were limited to the research and review articles published in the refereed journals only. The peer review was limited to scientific journals written in English and was not intended to provide a comprehensive assessment of the state's totality. In the second phase (data cleaning), only the important papers whose content fits the research area were included along with their topics. The papers' content (titles, abstracts, keywords and conclusion) was manually reviewed, and those whose content did not match the research phenomenon were eliminated. In the third phase (core analyses), the information from 36 papers was exported from the WOS, all selected papers' data were chosen and then exported in text format. The data were then imported into Vosviewer version 1.6.16. The search was performed on April 14 2021.

The WOS database was used as a literature source because it is the most reliable and comprehensive source of data and is frequently used in bibliometric research on the progress and evaluation of various scientific fields (Bernatović et al. 2021).

4 Results and discussion

4.1 The visualisation of the topic clusters

Figure 2 is a visual representation of the cluster analysis results based on the co-occurrence of keywords. In table 4 are presented the clusters with their most important keywords. First, in the analysing process, a minimum number of occurrences of keyword one was determined. Of the 136 keywords, 102 keywords meet the threshold. Next, the authors manually removed seven keywords related to the choice of research methods in the articles and are not associated with the topic's content (e.g., content analysis, methodology, case study). Then, for the remaining 95 keywords, the overall strength of the co-correlation links with other keywords was calculated.

A total of nine clusters were found. Some of the clusters were interwoven with each other. However, as shown in Figure 2, the clusters are mostly relatively far apart from each other. Therefore, it can be concluded that most of the topics covered in this literature review do not overlap.

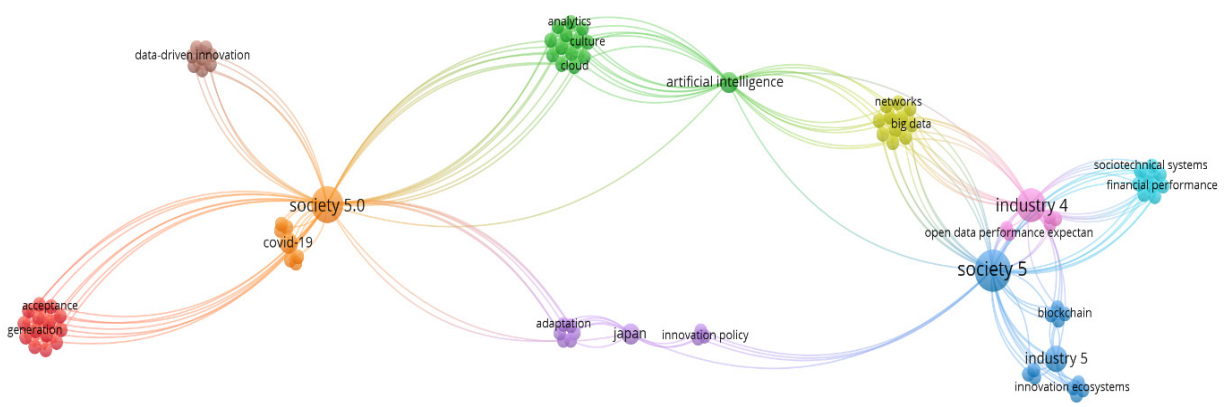

Figure 2: Co-occurrences of keyword network (min. 1). Data source: WOS. Visualisation: VOSviewer

Each cluster offers a different topic. Thus, all nine clusters provide a comprehensive overview of what is already known about Society 5.0. We did not need to reduce the number of clusters because we wanted to discover the broadest knowledge from homogeneous pieces to present a new social phenomenon. This approach allowed us to give a comprehensive view of research and theory in the field of Society 5.0.

On average, the clusters contained nine articles, ranging from a minimum of 4 to a maximum of 12. According to the topics, the clusters can be divided into a part related to the consideration of Society 5.0 itself and a second part associated with Industry 5.0. The naming of clusters is based on the authors' personal views and experiences of the research topic. According to the co-occurrence analysis, up to the present day, it can be concluded that terms artificial intelligence, cyber-physical systems, big data, Industry 4.0, Industry 5.0, open innovation, Society 5.0, super-smart society have been widely used in researches in the last three years.

4.2 Systematic literature review

As part of the systematic analysis of the articles, according to the content of each cluster, authors have decided to group clusters 2- Industry 4.0 and transformation processes for Society 5.0, 3- Technological development and 9- Industry 4.0 as well as 5- Society 5.0 and the environment, 7- Society 5.0 and innovations and 8- Society 5.0 and medicine, into subchapters that are rounded off in terms of content due to their semantic similarity.

Table 4: Topic clusters of Society 5.0 research from 2017- March, 31 2021 (n = 36)

Clusters	Cluster colour in Figure 2	Topic community cluster	Top items	Total numbers of terms
1	red	New approaches in HRM	generation, work values, personal innovativeness, career	14
2	green	Industry 4.0 and transformation processes for Society 5.0	Industry 4.0, cities, culture, smart society, human-centred management systems	13
3	blue	Technological development	Artificial intelligence, cyber-physical systems, big data, open innovation, Internet	13
4	yellow	Industry 5.0	Industry 5.0, blockchain, decentralised web, innovation ecosystems, knowledge circulation	13
5	purple	Society 5.0 and the environment	Super-smart society, innovation policy, climate change, disaster management, Japan	10
6	light blue	Corporate social responsibility	CSR, financial performance, ISO 26000, organisational innovations, sociotechnical systems, social responsible economic	9
7	orange	Society 5.0 and innovationS	data-driven innovation, technology and innovation, system resilience, productivity and growth, science	9
8	brown	Society 5.0 and medicine	Covid-19, AI, emerging technology, medicine 4.0, the industrial revolution	8
9	light purple	Industry 4.0	Industry 4.0, digitalised society, open data performance, SDGs, super-smart society	6

4.2.1 Society 5.0 and social changes

In the modern world, the process of digitalisation is strongly embedded in social processes. It thus influences changes in the contexts of reference for human action and increasingly shapes human-machine relations. The importance of the technological approach for the future transformation of societal processes is already evident in the Japanese concept of Society 5.0, which has emerged as a strategic national policy initiative. The concept goal is to transform the science, technology and innovation system toward Society 5.0 (Fukuda, 2020). The actual purpose of this strategy is defined by Hayashi et al. (2017, 264) as follows:

»… create new values by collaborating and cooperating with several different systems, and plans standardisation of data formats, models, system architecture, etc. and development of necessary human resources. Besides, it is expected that enhancements of intellectual properties development, international standardisation, IoT system construction technologies, big data analysis technologies, artificial intelligence technologies, and it is encouraging Japans competitiveness in a»super-smart society. «

According to the authors, it is a serious concept of social development that will affect all levels of society. The concept elements are based on the role of individual technology relationship by promoting the quality of life in a sustainable world and the emergence of a superintelligent society. Yousfikhahb (2017) has highlighted that if society 5.0 is to be a successful concept, it must integrate innovation policies (from the government), entrepreneurship (from the society) and entrepreneurial skills (from the civil society and institutions). The author also warns that "the social aspects of technology are usually underestimated in the policy-making process which may impact limiting the policy intentions underlying the implementation of Society 5.0".

It can be concluded that self-organisation in smart technologies has an important influence on the future societal impact of smart technologies. Human self-organisation will depend on the availability of smart technologies in the future, especially in education, business and personal life. The use of smart technologies also opens ethical dilemmas about communication in CPS connexion with personal privacy. These implications can be found in a more dynamic social system in terms of socialisation, but it can also lead to negative consequences, such as losing personal contact with friends and family (Roblek, Meško, Dimovski, and Peterlin, 2019; Shiroishi et al., 2018).

4.2.2 Society 4.0 and transformation to Society 5.0

Society 4.0 was created based on a German economic program called Industry 4.0. To this program, Germany aimed to boost the economy in Germany and all of Europe. The Japanese responded with the concept of Society 5.0. If European countries rely on the gradual integration of artificial intelligence and other cutting-edge technologies to further develop an innovatively designed economy, the Japanese have decided to go beyond this concept and take the next step in data-driven social development to establish Society 5.0 (Onday, 2019).

The main goal of Society 5.0 is to enable the wellbeing of citizens provided by available system services that also enable value creation for society (e.g., economic development, social transformation, and economic growth). Therefore, the program implementation introduced next-generation technologies, governance reform, and value-creating strategies developed for urban centres (Fukuda, 2020).

The aim of Society 5.0 is to further combine innovative knowledge with the use of AI, which is only in the concept or development phase, and to offer new human-centred technological solutions in all areas of human activity. It should be noted that Society 4.0 focuses more on technological solutions in the field of digitalisation of businesses and local government processes, intending to improve the efficiency and effectiveness of the operational and financial processes of private and public organisations and public administration (Pereira, Lima, & Charrua-Santos, 2020). On the other side, Society 5.0 is expected to be more involved in all population groups' general social development. Thus, there would be a commercial focus on using new technologies and what is called social robotics. Therefore, AI, IoT, virtual reality, algorithms, cyber-physical systems (CPS) would lead to positive social effects that can be incorporated under this technology (Serpanos, 2018; Song, Song, Timakum, Ryu, & Lee, 2018):

- Home automation for independent living (home security and safety systems, motion sensors, remote monitoring, indoor air quality control, smart lighting, safe bed, smart sofa, domestic/service robots),
- health and wellbeing for functional ability (safety bracelets, activity wristbands, personal health monitor, smart medicine disappearances, exercise and memory games, smart rollator, daily medical testing) and active participation and social inclusion (entertainment and news, smart governance, online work, video chat, remote medical consultation).

CPS presents the urban governance system and enables the emergence of the so-called smart community that thrives in the data economy (Kuru & Ansell, 2020). Communities also began with the research about the modes of preparation for transforming the local community into a smart community, including fintech solutions. The city's urbanisation has to enable urban solutions to become suitable for implementing and integrating the information technologies (Alawadhi et al., 2012). The Canadian Governance Center at The Ottawa University was criticised for its research approach, which they felt was too technically oriented. They suggested that research concepts should be

more governance-oriented, emphasising the importance of social relations and social capital in urban development (Albino, Berardi, & Dangelico, 2015). The lack of generally accepted definitions that would clearly explain these terms is partly due to the different scientific fields from which they originate and partly due to changing trends.

4.2.3 Emergence of the Industry 5.0

If Industry 4.0 has been introduced, the concepts such as CPS, IoT, blockchain, smart factory, big data, cloud storage and cybersecurity, which all have an important function for manufacturing efficiency and lower costs of production (Nahavandi, 2019; Jerman et al., 2020), Industry 5.0 is going beyond Industry 4.0. The focus of Industry 5.0 is on the interaction between machines and semi-finished products, individual machine parts, robots and people. For this process to succeed, the use of big data is essential. Therefore, it is going for a technology that enables the collection and processing of large amounts of data in real-time (Büchi, Cugno, & Castagnoli, 2020). Furthermore, for the transition to Industry 5.0 itself, it is important to make rapid progress in the areas of AI, machine learning (ML), robotics, Internet of Things (IoT), autonomous vehicles and cars, 3D and 4D printing, virtual and augmented reality, wearable materials, additive manufacturing, nanotechnology, biotechnology, energy storage and quantum computing (European Commission, 2021).

According to the European Commission, in January 2021, it adopted the document Industry 5.0: Towards a more sustainable, resilient and human-centric industry. It follows that Industry 5.0 complements and expands Industry 4.0. Thus, Industry 5.0 focuses on aspects that will shape economic and technological development and determine the direction of industrial policies in the future European society. These factors also have environmental, social and fundamental rights dimensions. The document emphasises that Industry 5.0 should not be compared as a chronological continuation of the Industry 4.0 paradigm, nor should it be understood as an alternative. The document is thus defined as (European Commission, 2021).

"The result of a forward-looking exercise to help frame how European industry and emerging societal trends and needs can co-exist".

4.2.4 Corporate social responsibilities

According to Keidanren (2016, 3), Society 5.0 presents a new vision of society:

»that incorporates several new technologies in all industries and social activities and achieves both economic development–primarily based on Sustainable Development Goals established by the United Nations, and solutions to key social problems in the present society«.

As part of the implementation of the concept of Society 5.0 in Japan, Keidanren (Japan Business Federation) amended the Charter of Corporate Behavior, also added the section on "Achieving a Sustainable Society" as part of the amendments, with the primary goal of proactively achieving the Sustainable Development Goals. SDGs) by creating a Society 5.0 (Fukuyama, 2018). According to these changes, Society 5.0 enabled a responsible human-centred society and offered a promising integral framework for the potential development of CSR in organisations (Potočan et al., 2020).

4.2.5 Society 5.0 and social innovations

Within the societal innovations associated with Society 5.0, we focus on the impact of innovative technologies in healthcare, climate change, and disaster management. It is expected that new technologies in the medical field will also become one of the capillaries of Society 5.0. Thus, smart tools adapted to medical needs include material innovations, nano-devices, and smart technology (sensors, controls) (Lewis, Gandomkar, & Brennar, 2019), making their way into medicine. Artificial intelligence is also playing an increasingly important role in medicine. For example, AI-based medical image analysis has already been established in some Covid ten centres. In addition, AI is becoming increasingly customer-centric and impacting the quality of medical services (Vaishya et al., 2020).

In climate change and disaster management, a transformation of disaster and climate change management is expected in the context of innovative solutions brought by Society 5.0. Environmental and climate change requires the development of technologies that enable the early detection and adaptation of hazards. The goal is to provide faster and more effective information. Increased use of technology in Society 5.0 is also expected to improve environmental and public health protection (Mavrodieva & Show, 2020).

5 Discussion and conclusion

According to the co-occurrence analyse of the papers key words were the most discussed topics careers, Society 5.0 in connection with Covid-19, data-driven innovation, cities, analytics, enterprise systems, big data, knowledge, Society 5.0 in relationship with digitised society, open data, performance expectations, Industry 5.0, blockchain, critical juncture.

The paper discusses a series of activities necessary to transfer modern knowledge and new technologies, typical of the fourth industrial revolution or Industry 4.0, from research institutes and economic entities to the broader society, Society 5.0. The process can be achieved by implementing knowledge and technologies in the IoT, robotics

and Big Data to transform the existing society into a smart society (Society 5.0). In particular, the concept would enable the adaptation of services and industrial activities to individuals' real needs, as these technologies allow advanced digital service platforms that will eventually be integrated into all areas of life.

Our study indicates that the more intensive the transition to Society 5.0 will be, the more services and daily tasks can be provided via the cloud, e.g., on the Internet. Therefore, this data processing would send information or enable services related to applications on the telephone, the computer and robots, among others. This will allow individuals to have more free time and the free allocation of other activities because artificial intelligence will replace manual data processing, typical of traditional digital algorithms. Therefore, it will save much time and increase the productivity of the individual. As a result, it will positively affect increasing the value-added in the economy and enhance all generations.

Authors expect that with the emerging Society 5.0, developed economies will solve many social problems through innovation in technology and science. According to some estimates, the share of Japan's working population will shrink from 77 million to about 54 million people by 2050 (National Institute of Population and Social Security Research: IPSS 2017). Economists estimate that it is precisely the demographic problem that will cause fewer and fewer young people to opt for family and children, which means that the number of older people in need of social care will increase. This applies to Japanese society, which faces a similar, equally pressing demographic problem and many European countries (National Institute of Population and Social Security Research: IPSS 2017). In addition, the developed economies face environmental degradation problems, logistical problems (transport of people and goods within cities, between cities and rural areas, and environmental protection or reduction of greenhouse gases - climate change).

The limitations of the research can be divided into content and methodological limitations. Among the content limitations, the presentation of only some aspects of Society 5.0 applies because we used to analyse only the research papers from the WOS database. As methodological limitations, we refer to the boundary associated with the research paradigm. This paper's limitation is that it is based on scientific paper reviews and not on primary research. It is based on a topic whose development for the future capabilities of artificial intelligence depends on a parallel development of cyberspace and its importance for everyday human life. Our study should be taken as inherently biased from an analytical perspective, but at the same time, it enriches us with data that quantitative methods cannot produce.

For future research, we suggest examining and identifying a set of good practices of Society 5.0. in Japan (Pereira et al., 2020) to assess the possibility of their implementation in other countries (especially in developing countries). We also propose future research to consider the risks that may arise in a digital society, e.g., cybersecurity, including possible cyber terrorism, relations between humans and robotics and ethical questions related to AI implementation and enabling of decision-making instead of a human.

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Mapiranje nastanka družbe 5.0: bibliometrična analiza

Ozadje in namen prispevka: Cilj študije je odgovoriti na raziskovalno vprašanje: Kateri bistveni elementi tehnoloških inovacij omogočajo preobrazbo družbe 4.0 in industrije 4.0 v družbo 5.0 in industrijo 5.0? Študija je pomembna za praktike in raziskovalce, ker jih seznanja tako s samim pomenom družbe 5.0 kot z gonilniki, ki bodo pomagali oblikovati politike družbe 5.0 in igrali pomembno vlogo pri njenem nadaljnjem razvoju. Avtorji so tako izvedli kvantitativno bibliometrično študijo, ki daje vpogled v pomen teme ter vključuje aktualne značilnosti in prihodnje raziskovalne trende.
Metodologija: Z namenu, da se pridobi vpogled v razvoj družbe 5.0, je bilo v študiji uporabljeno algoritemsko sočasno pojavljanje ključnih besed. Z bibliometrično analizo smo analizirali 36 izbranih člankov iz baze Web of Science.
Rezultati: Analiza sopojavnosti je pokazala, da se v zadnjih treh letih v raziskavah pogosto uporabljajo pojmi umetna inteligenca, kiber-fizični sistemi, veliki podatki, Industrija 4.0, Industrija 5.0, odprta inovacija, Družba 5.0, super-pametna družba.
Zaključek: Študija predstavlja bibliometrično analizo v okviru katere je bila izvedena analiza trenutnih in prihodnjih razvojnih gonilnih sil družbe 5.0. Glede na rezultate je prehod iz družbe 4.0 v družbo 5.0 mogoče doseči z implementacijo znanja in tehnologij v IoT, robotiko in Big Data. Koncept bi zlasti omogočil prilagajanje storitev in industrijskih dejavnosti dejanskim potrebam posameznikov. Poleg tega te tehnologije omogočajo napredne platforme digitalnih storitev, ki bodo sčasoma integrirane v vsa področja življenja.

Ključne besede: *Družba 5.0, Industrija 5.0, Informacijska družba, Pametna družba, Podatkovno vodene inovacije*

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Content Analysis of Gossip at Different Levels of a Hospital

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Background: Most societies have a negative attitude toward gossip and managers are concerned about the impact of gossips on the communication in an organizational environment. Our study examined the perception of gossip, and the context of gossip at different levels of a hospital, a case of organization with high communicational relation among staff. Also, the differences between the gossip context within the organizational context and within the social environment have been considered.
Methodology: Semi-structured interviews were conducted with 27 informants, 9 in each of three groups: nurses, supervisors and managers of the Hospital. Recorded interviews were analyzed using content analysis, and results for each group of respondents were compared. Finally, the main gossiping issues for each group were categorized.
Results: The study revealed that the topics of gossip in a hospital can be divided into eight main categories, and 34 sub-categories all identifiable by special topics. These main topics included confidentiality issues, merits, financial status/standing, personal characteristics, position, communications, biography, and job conditions. In terms of organizational gossip, a person's merit in the workplace and financial standing were of particular interest to the participants of this study. Also, the gossip topics at different levels among nurses, administrators, and managers had significant differences.
Conclusion: Managers should acknowledge different gossip contents among people at different organizational levels, and that employees do not have the same motives for communication at different organizational levels. Additionally, the distances between contents in the Tendency to Gossip Questionnaire and categories in the organizational environment need more studies, to explore precedents and outputs. Managers may use these findings to facilitate organizational change and communication.

Keywords: *Gossip in organizations, Construct of gossip, Content analysis, Informal communication*

1 Introduction

Gossip is an "evaluative informal discussion about the social environment member who is absent" (Dores Cruz, Nieper, Testori, Martinescu, & Beersma, 2021; Lee & Workman, 2013). People are, with a significant frequency, volunteers of gossiping (Beersma & Van Kleef, 2011) and gossiping is effective on pro-social behavior and on the intention to volunteer (Eckhaus & Ben-Hador, 2020). However, most societies have a negative attitude toward gossip, but on the other hand, view gossip as a form of verbal communication to praise or denigrate people (Ceylan & Çetinkaya, 2020), or as a player in employees task-related behavior (Tan, Yam, Zhang, & Brown, 2021). From the perspective of organizational managers, because gossip can cause problems in the organization, managers should be concerned with the content of gossip in the organizational environment (Wittek, Hangyi, Van Duijn, & Carroll, 2000). In fact, a one-dimensional (negative) view of peo-

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ple on gossip has led managers to have the opinion that it should be eradicated from organizations, claiming that employees "steal" money from the organization by getting involved in gossiping, not working hard, and wasting their time (Noon & Delbridge, 1993). However, some studies indicate that gossip can play both positive and negative roles in organizations and have various effects on organizations' management and staffing (Chang & Kuo, 2020; Ellwardt, Labianca, & Wittek, 2012). In general, researchers remain ambivalent about gossiping with some claiming it can positively help managers make better decisions, yet others considering it to be detrimental (Clegg & van Iterson, 2009). Gossip is naturally consistent with informal organizational networks and informal structures of organizations have a mutual relationship with their formal structures so that similar functions might be expected for gossiping in both networks (Mills, 2010).

Researchers have categorized gossip into two types: positive and negative (Grosser, Kidwell, & Labianca, 2012), with each type having different functions and results. In a study in an organizational environment, Georganta, Panagopoulou, and Montgomery (2014) found that negative gossip in a hospital is positively correlated with emotional exhaustion, depersonalization, and suboptimal care, and is negatively correlated with patient safety culture and job commitment. Another study showed that gossips turned out to be an important determinant regarding women's motivation for and ability to participate in health-promoting activities. Moreover, gossip was identified as a factor strongly undermining their health and sense of wellbeing (Aambø, 2017) and that, employees who are exposed to gossip feel sad and angry and distrust the organization in which they are working (Şantaş, Uğurluoğlu, Özer, & Demir, 2018).

A review of a significant number of studies shows that people participate in positive and negative gossiping for many reasons and may have different aims (Foster, 2004; Liff & Wikström, 2021; Michelson, Van Iterson, & Waddington, 2010). In this regard, Foster (2004) argues that in a social structure, people participate in gossiping for four reasons: information, entertainment, influence, and friendship. Furthermore, studies indicate that employees' level of neuroticism moderates the positive effect of the workplace, negative gossip, and work-family conflict. It also moderates the mediating effect of workplace negative gossip on employees' work-family conflict by psychological distress (Liu, Wu, Yang, & Jia, 2020). However, the researchers found that people with higher perceived insider status in the organization are more likely to be interested in positive gossip because of their more desirable treatment and the motivations offered by their organization and supervisor. Hence, in order to foster positive gossip and detract negative gossip in an organization, it is necessary to make people feel as though they are insiders and depend on their organization (Kim, Moon, & Shin, 2019). Additionally, recent studies show that a tendency to gossip through different levels may result in different outcomes. For example, positive gossip among managers affects commitment and recognition in subordinates (Chang & Kuo, 2020) which are clues to reconsidering gossiping in organizations at different organizational levels and in a top-down manner.

To or best knowledge, the only available model in the field of gossip content is the study by Nevo, Nevo, and Derech-Zehavi (1993) who defined gossip according to its four aspects of physical appearance, social information, achievement, and sublimation. Their proposed model Tendency to Gossip Questionnaire (TGQ) was based on the study conducted on students in a learning environment and has adopted a social perspective.

Some factors cause organizational environments to differ from each other, including purposes, strategies, different operational, management levels, and the nature of the job a person has. Some official rules and regulations in organizations make these differences more pronounced. A simple example of such laws and regulations is the uniforms worn by employees of an organization, which makes their clothes more unified and reduces variety (Lee & Workman, 2013), consequently reducing the curiosity of people, causing them not to use gossip on clothing as a means of comparison. Physical appearance in TGQ model is the first priority and has the most prominence and frequency; people speak and show curiosity about the changes and diversity of dresses, appearances, and behaviors.

In addition, gossip has its roots in interaction and communication, and its amount may vary at different organizational levels. Subordinates may use negative gossip to put the supervision under motional and cognitional threats (Ye, He, & Sun, 2021). Moreover, organizational factors that can contribute to gossip may have different effects at various levels. For instance, nurses, as frontline employees of the hospital, work under stressful conditions and are more likely to spread gossip. Gossips among nurses can improve their social ties regardless of the generated positive or negative gossip (Thomas & Rozell, 2007). The findings revealed that gossip helps nurses express their feelings and overcome their difficult and stressful working conditions (Waddington, 2005; Waddington & Michelson, 2007). The change in speaking topic from working to personal releases employees' minds from the stressful conditions of patients and the hospital and provides them a way of coping with strategy (Georganta et al., 2014).

Considering the role of gossip in the organization, its role in hospitals is valuable to study in hospitals where communication is very important in the healthcare system performance and nurses' job outcomes (Ardabili, 2020). At a first glance, the outcomes of the hospitals have been affected positively by information technology (Arfara, Tsivos, Samanta, & Kyriazopoulos, 2017) and gossip is the way to boost the ability of informal communication

and transference of information. In the wake of such influence, it stands to reason that the causes and consequences of gossip may be different in organizational environments compared to non-organizational ones. To determine whether such differences exist, the basic structures of organizational gossip should be identified to facilitate the distinction between social and organizational gossip.

The present study aimed to investigate the contents of the organizational gossip and answer the following questions:

- Which types of gossip exist in an organizational environment?
- What do employees say about others?
- Do these topics have distinct constructs and groupings?
- Does the gossip content change according to the organizational levels?

2 Literature Review

The role of gossip in organizations has been considered recently and gossip is of critical importance in management, due to its role in reinforcing social bonds and formal work structures (Liff & Wikström, 2021) and also because of its effects on informal communication. However, many researchers have analyzed the role of organizational gossip in a limited form (Hallett, Harger, & Eder, 2009), paying little attention to its positive impact on organizations (Eckhaus & Ben-Hador, 2020) and different organizational groups in achieving organizational goals. Fan and Dawson (2021) explained that social interactions are often viewed as activities beyond the edges of organizational life so less value has been attributed to gossip in organizations by managers, even though gossip is "at the core of human social relationships" (Michelson et al., 2010).

Enhancing employees' performance levels in healthcare systems, especially nurses, is important for both health institutions and patients who are in direct contact with patients (Durmuş, Kirilmaz, & Şahin, 2020). Covid-19 pandemic showed that the healthcare professionals' job performances and effective services are important in the face of busy, long, and stressful working conditions. But high stress in the work environment and increasing pressure and concern, affect the amount of gossip shared (Bulduk, Özel, & Dinçer, 2016).

2.1 Gossip, Culture, and Organizations

Gossip has been identified as a tool that helps people to know and understand their social environment better. As social interaction, some people do gossip for various reasons such as group protection, self-interest, or evolutionary needs (Bechtoldt, Beersma, & Dijkstra, 2020). But there is no evidence for specific motives for gossiping in an organizational context. In the organizational view, managers try to enhance productivity through developing the quality of work-life, well-being, and motivating employees (Abdi, Chaib, & Verzea, 2020) which may be mediated or affected by gossiping in various ways, e.g., through positive gossip about mangers to increase commitment to the managers (Chang & Kuo, 2020) . In instances where information transfer cannot be done through official channels, gossip can help people understand the environmental conditions better, and cause environmental recognition in organizations through which people gain the ability to compete for organizational bonuses and promotions (Kniffin & Wilson, 2010). From the perspective of cultural learning, gossip can teach people how to be successful in an environment and how to learn from others' mistakes (Grosser, Lopez-Kidwell, & Labianca, 2010). Moreover, when assessing their performance and determining ways to improve it, employees can be assisted by gossip to collect information and compare themselves with others (Waddington & Michelson, 2007).

The exchange of information through gossip can also reduce stress and anxiety in situations, such as organizational changes, by implementing group norms and strengthening social bonds in the organization (Kniffin & Wilson, 2005). People motivated to protect the group may spread negative gossip on members whose behaviors violate the norms of the group and spread positive gossip on behaviors that conform to group norms and strengthen them (Ellwardt et al., 2012), because as defined earlier, gossip is an informal discussion in the social environment on an absent member (Babaei Aghbolagh & Ardabili, 2016; Lee & Workman, 2013). This gossiping occurs in such a way that people may not show the same reaction to strangers (Beersma & Van Kleef, 2012). Thus, this process can be helpful in educating members on organizational culture (Michelson et al., 2010). Accordingly, it is argued that gossip, through cultural education and social comparison by which people take actions to improve their position and performance, can lead to improvements in organizational performance.

2.2 Gossip and Organizational Changes

Gossip is also used to express concerns and feelings on threats to an organization's internal policies and may cause some resistance to the implementation of change programs (Ybema, 2004). Based on this viewpoint, gossip can act as a process through which administrative privileges are put to challenge and questioned and the powers of management to control the organization is diminished. Employees have various forms of interpersonal relations among employees, such as competition, and gossip can erode the unity and continuity of organizations as well as

negatively influence the efficiency of organizations' goals and programs (Noon & Delbridge, 1993).

Stated differently, the positive or negative effects of gossip in organizations depend on the conditions, atmosphere, and manner of management in organizations. Common examples of organizational changes that create gossip are appointment and dismissal of directors of organizations (Gholipour, Fakheri Kozekanan, & Zehtabi, 2011). Such changes, similar to other changes, cause untrustworthiness and hesitation in people's organizational life and have the potential to engage all employees in the process of spreading gossip. Following changes, some information of varying accuracy has been released on people, such as candidates for management positions, a dismissed manager, and people involved in the manager selection (Mills, 2010). However, such gossip can have both positive and negative functions (Rosnow & Foster, 2005) in a way that people remove ambiguities, create a common sense, and relieve produced stress and anxiety by speaking on that area.

Despite the importance of gossip content, specific studies on the extraction of subjects and content of gossip in an organization at different levels have not been conducted. Hence, whether the content of the gossip at all levels is the same or the dimensions of gossip and their importance are subject to change as the organizational level rises remains unknown. To this end, the present study aimed to study the content of gossip and its dimensions in a reputable and reliable manner through which the tools to measure the gossip and differences in various groups and organizations with different cultures can be developed.

3 Methodology

3.1 Participants

To analyze gossip in an organizational context and to show its differences with gossip in the non-organizational environments (e.g., a school in TGQ model), participants of the study should have been selected from an organization where employees have high social interactions. The need for teamwork should also be evident in the organization and it should not merely focus on individual administrative activities to identify content and themes of gossips. For this purpose, 27 nurses, experienced hospital supervisors, and managers were selected randomly from Imam Khomeini Hospital in Ardabil from December 2019 to February 2020 to specify important involved issues from different perspectives. The selected participants were the most experienced persons in their group based on the Hospital management report. Among selected participants 44% were men, and 39% aged between 30-40, 52% aged higher than 41 years.

3.2 Interview Procedure

Semi-structured interviews were conducted so as to facilitate a free flow of ideas with the respondents and generate information-rich data based on the clinical method of interviewing (Dapkus, 1985) to understand the meanings conveyed in communication contents between people in organizations. All participants ensured about Anonymity, Privacy, & Confidentiality of the interviews.

One main area was covered in the interview: What do employees say about each other? The responses were allocated three subcategories:

1) People's favorite subjects in daily life (e.g., what issues would employees like most to talk about with others in their interpersonal interactions?),

2) People's conversations on others' issues in the time of organizational changes (e.g., which gossips are exchanged among employees in the shift-change time of staff and management, etc.?), and

3) The subjects of staff or conversations in the time of change in the quality of interpersonal relations (e.g., if the employees have personal disputes, how they speak about each other?).

These contents (Clegg & van Iterson, 2009; Grosser et al., 2010) are based on a comparison with the social gossip content to present the definition of organizational gossip (limited social structure).

The interviews were conducted over the course of 10 days through tape recording and in different places at the request of the respondents. The interviews had no time limit to allow the respondents to express their opinions easily and to avoid limiting the range of topics and codes in the analyses. This strategy was adopted to obtain a wide range of possible answers. Following the interviews, data analysis was carried out in three stages. First, the transcription of the recorded voices carried out as conversation analysis method (CA). The researchers aimed at identifying the potential themes and developing a formal codebook in the first stage. In the second stage, the research team used a sample text to ensure intercoder reliability for each of the themes in the codebook. When the researchers were able to make sure that they had established acceptable and appropriate intercoder reliability levels, they moved to the final stage and applied the codebook, in a systematic form, to the entire corpus of text (Kurasaki, 2000).

Step 1: Codebook Development

In this article, the grounded theory approach (Corbin & Strauss, 1990; Martin & Turner, 1986) was used to detect potential themes and develop a formal codebook. The grounded theory style of qualitative research has been used extensively, from psychology to information science to education to many communities of practice within health care and to management and organization studies. Indeed, in the domain of qualitative research, the original text has assumed canonical status (Locke, 2001).

Step 2: Intercoder Reliability

At this point, four people were trained for coding, including the two interviewers. When the team completed the code definitions, the four coders were then tasked with coding the same sample of text independently to examine the consistency of text segmentation and code application. In order to test their understanding of each code, each of the four coders read the same portions of six interviews that were selected randomly and the text was marked for all of the thirty-four code categories. The marking behaviors of the coders were compared in order to calculate the measures of coder reliability. Based on Kurasaki's work (2000), the researchers calibrated the four coders to an agreed level of .70, according to the data presented during the training phase.

The researchers also instructed each coder in order to delineate text units and assign numeric code(s) to each text unit independently. A text unit is a unit of conversation representing a single message (McFadden, Seidman, & Rappaport, 1992), a distinguishing feature (Pennartz, 1986), or a change of subject (Dapkus, 1985).

During the open coding step, 191 open codes have been extracted. Then, regarding the similarities and differences of the codes, categorization has been done and summarized to 123 codes in 9 themes. Each themes encompasses sub-codes which totally reached to 16 concepts and 37 codebooks. Finally one theme has been deleted or combined to other themes after agreement calculation step, and resulted to eight final constructs. A sample, part of interview with one of nurses is as bellow:

…. all co-workers talk about how much others earn. But the payment details and how exactly we are measured were not clear. As colleagues say, some managers or even nurses receive more than others. I think it is different for everyone and those who have a friend among managers receive more. Mr… was after me. But he bought a new car soon, and I even heard that he wants to change his house. Does he deserve being promoted so fast? How much he earns? I am not sure about managers and supervisors' incomes, but I heard they have various advantages besides salary. So, it is not their concern how we live with such low wages. They are not worry about our problems because they earn well enough…I am not sure how I can get promoted. I have more than 10 years experiences and some of my colleagues, with less experience, are now my manger. It is clear that we should join the managers' team to get promoted. There are no obvious indexes to find a higher position and income…..

4 Results

We annotated the text by examining all initial six transcripts and performing the 'annotation' step. Annotations refer to the notes that are written in the margins with regard to the interview's contents. For the following excerpt, for instance, the title "Salary" would constitute a typical annotation: "Have you heard that the salaries of operating room staff are supposed to increase?"

A verbatim list of all of the annotations was compiled. The annotations in this list were sorted into similar categories and subcategories by the two members of the research team. The redundancies were removed and an initial hierarchy of thematic categories was created. In light of the above consolidation step, forty thematic categories were identified.

The research team developed descriptive labels for each of the forty thematic categories in order to offer the intended meaning of each category. In the next step, they operationalized them and individual reports were generated for each of the themes in order to examine the taxonomy for possible redundancies that were missed during the earlier sorting step (Kurasaki, 2000). A number of redundancies were observed and, after additional sorting, thirty-seven themes were selected for further consideration (Table 1).

The research team applied a decimal numbering system to ensure that the numerical digits represent the different levels of the themes. For example, all themes assigned with a 1.x numeric code were related to finances. The digit following the decimal further distinguishes different types of finances, in no specific order. Numeric codes assigned to individual themes are presented in Table 1.

The codebook was further refined when training the two research assistants as coders. In the training session, the coders acquainted themselves with definitions, applications of the themes, and coding procedures (Kurasaki, 2000). At the coders' request, two amendments were made to the codebook. They unanimously chose to eliminate categories 7.2 (chances, destiny) and 7.3 (helping others' claims, the claim of advice, and solutions to others). They also decided to combine categories 7.1 and 6.4, and agreed that it better reflects its intended meaning. As a consequence of such amendments, the final codebook contained thirty-four categories and their corresponding numeric codes (Table 1).

To calculate agreement, we selected five interviews randomly. The five interviews were divided between coders who read and coded all five interviews individually. Then, to check the coders' agreement, we scored one on the parts of the interview agreed on in a group and scored zero on the parts no agreement was reached between the coders. This step can highlight the lack of compatibility and application of codes in each segment (MacQueen, McLellan, Kay, & Milstein, 1998).

Coder agreement results of the themes are provided in Table 2. Inter-coder agreement on the thirty-four themes ranged from .69 to 1.00 with a mean of .89. The highest agreements were on the supplemental received (1.2), financial situation (1.3), demeanor (5.1), dress (5.5), and

Table 1: Reliability of Encoding

Theme List	*Numeric code*	*Agreement*	*Theme List*	*Numeric code*	*Agreement*
Salary	1.1	0.99	Personality	5.3	0.96
Supplemental receive	1.2	1.00	Morality	5.4	0.85
Financial situation	1.3	1.00	Clothes	5.5	1.00
Economic activities	1.4	0.98	Personal appearance	5.6	1.00
Appointment and promotion	2.1	0.95	influence	6.1	0.82
Job displacements	2.2	0.87	Relations	6.2	0.78
Persons' brand	2.3	0.90	Association with power bases	6.3	0.83
Punishment and leaving jobs	2.4	0.79	Political Relations	6.4	0.88
Education	3.1	0.98	Combined with 6.4	7.1	-
Backgrounds	3.2	0.97	Deleted	7.2	-
Capabilities	3.3	0.69	Deleted	7.3	-
Achievements	4.1	0.88	Familial Culture	8.1	0.82
The effort	4.2	0.94	Aspects of life	8.2	0.87
Empowerment	4.3	0.80	Ethical issues	8.3	0.98
Performance	4.4	0.84	Family matters	8.4	0.85
Illegal activities	4.5	0.92	Security and comfort	9.1	0.86
Failure	4.6	0.85	Difficulty work	9.2	0.88
Demeanor	5.1	1.00	Business issues	9.3	0.90
Motivation	5.2	0.78			

Table 2: Descriptive labels of Constructs and Codes

Construct	***Code***	***Construct***	***Code***
Finance	Salary	Persons' communications	Influence
	Supplemental receive		Relations
	Financial situation		Association with power bases
	Economic activities		Political Relations
Persons' Positions	Appointment and promotion	Confidentiality issues	Familial Culture
	Job displacements		Aspects of life
	Persons' brand		Ethical issues
	Punishment and leaving jobs		Family matters
Persons' Biography	Education	Job conditions	Security and comfort
	backgrounds		Difficulty work
	Capabilities		Business issues
Merit	Achievements	Personal characteristicS	Demeanor
	The effort		Motivation
	Empowerment		Personality
	Performance		Morality
	Illegal activities		Clothes
	Failure		Personal appearance

Table 3: Frequency and Prioritization of Groups Codes

Groups	**Managers**		**Supervisors**		**Nurses**			
Groups codes	**F**	**P**	**F**	**P**	**F**	**P**	**Total F**	**P**
Salary	6	2.8	9	4.2	15	8.1	30	4.9
Supplemental receive	3	1.4	13	6.1	25	13.5	41	6.7
Financial situation	8	3.8	6	2.8	11	5.9	25	4.1
Economic activities	5	2.4	2	0.9	0	0	7	1.6
Appointment and promotion	14	6.73	8	3.8	5	2.7	27	4.4
Job displacements	5	2.4	8	3.8	6	3.2	19	3.5
Persons' brand	2	0.9	3	1.4	3	1.6	8	1.3
Punishment and leaving jobs	0	0	6	2.9	2	1.1	8	1.3
Education	6	2.8	4	1.9	1	0.5	11	1.8
Backgrounds	10	4.8	4	1.9	2	1.1	16	2.6
Capabilities	4	1.9	4	1.9	0	0	8	1.3
Achievements	7	3.3	5	2.4	0	0	12	1.9
The effort	4	1.9	5	2.4	8	4.3	17	2.8
Empowerment	27	12.9	12	5.7	14	7.6	53	8.7
Performance	17	8.1	23	11	9	4.9	49	8.1
Illegal activities	7	3.3	4	2	0	0	11	1.8
Failure	7	3.3	10	4.8	5	2.7	22	3.6
Demeanor	5	2.4	7	3.3	6	3.2	18	2.9
Motivation	8	3.8	2	1	5	2.7	15	2.4
Personality	6	2.9	13	6.2	15	8.1	34	5.6
Morality	3	1.4	7	3.3	3	1.6	13	2.1
Clothes	2	1	5	2.4	3	0	7	1.2
Personal appearance	0	0	2	0.9	0	0	2	0.3
Influence	4	1.9	0	0	3	1.6	7	1.2
Relations	2	1	2	0.9	6	3.2	10	1.6
Association with power bases	9	4.3	8	3.8	8	4.3	25	4.1
Political Relations	8	3.8	1	0.5	3	1.6	12	2.0
Familial Culture	4	1.9	3	1.4	1	0.5	8	1.3
Aspects of life	6	2.9	9	4.3	5	2.7	20	3.3
Ethical issues	3	1.4	3	1.4	3	1.6	9	1.5
Family matters	10	4.8	7	3.3	7	3.8	24	4.0
Security and comfort	0	0	2	0.9	2	1.1	4	0.7
Difficulty work	2	1	6	2.9	6	3.2	14	2.3
Business issues	4	1.9	7	3.3	6	3.2	17	2.8
Total	208	100	210	100	185	100	603	100

F=Frequency, P= Percent of Answers for Each Group

personal appearance (5.6). The lowest agreement was on capabilities (3.3). These results are summarized in Table 1.

Step 3: Applying the Codebook Systematically to the Data

Descriptive labels were developed in order to display the intended meaning of codes as shown in the Table 2, perform thematic searches of all data, and count the number of occurrences for each one of the eight constructs. We calculated the frequency of thematic categories as an indication of the prominence of each thematic code (Table 3).

To investigate the importance of issues for staff, the frequency and average of the codes and constructs were calculated based on which the constructs were prioritized. Table 3 shows the frequency and average for each code with separated groups of employees.

As Table 3 shows, the highest frequencies in each of the three groups are different. For managers' empowerment (F=27), performance (F=17) and appointment and promotions (F=14) were the most frequent contents of gossip respectively. Among supervisors, however, performance got the highest rank with 23 frequencies and was followed by speak about personality and supplementary whose frequency was13. Among nurses the topics frequencies were much different with supplemental receiving the first rank (F=25), personality the second rank (F=15) and empowerment the third rank (F=14).

Table 4 shows the frequency, frequency percentage, and average of constructs. As represented in Table 5, the construct of "merit" with total weighted average of 5.85, and frequency percentage of 27.52, was the first priority among the answers and Persons' biography with an average of 1.18 and 5.57 frequency percentage was the last priority (Table 4).

Table 4: Frequency and Prioritization of Construct

	Merit (R=1)	Finance (R=2)	personal characteristics (R=3)	Confidentiality issues (R=4)	Persons' Positions (R=5)	persons' Communications (R=6)	Job conditions (R=7)	Persons' Biography (R=8)	Total
Total frequency	158	92	87	61	55	54	35	32	603
Percent	27.52	16.02	15.15	10.62	9.58	9.40	6.09	5.57	100
Average of managers	9.00	2.58	3.14	3.28	2.57	3.28	0.85	2.42	--
Average of supervisors	5.90	2.60	3.60	2.20	2.40	1.10	1.50	1.20	--
Average of nurses	3.60	4.80	2.90	1.60	1.30	2.00	1.40	0.30	--
Total average	5.85	3.40	3.22	2.25	2.03	2.00	1.29	1.18	--

R= Rank based on average score

In executives' group, punishment code and personal appearance were not presented in the answers and thus has zero repetition score. Empowerment is the most repeated theme. Among the group of supervisors, the code was not mentioned in the replies and the most frequent repetition was code performance. Among the nurses, the highest frequency (F=24) was related to supplementary received and the lowest frequency (F=0) was related to economic activities, capabilities, achievements, clothes, personal appearance, and illegal activities.

The difference test shows the average difference of answers among three groups of samples. Meaningfulness of a code's differences indicates that the corresponding code does not have the same importance in the viewpoints of all three groups, and could represent a potential difference among the respondents.

Analysis of variance among the eight constructs shows agreement/disagreement among respondents' comments on the defined codes, which suggests gossips in organizations, from the perspective of supervisors, nurses, and managers, are identical in some areas but differ in other areas. The difference between tasks, types of works and individuals' responsibilities at different organizational levels makes some factors significant for the staff to discuss among themselves. According to these three groups, one-way ANOVA test was applied to each variable. The tests for normality and homogeneity were done for these groups and the results verified for the ANOVA analysis. Table 5 shows the results of one-way ANOVA along with Leven test results for each constructs.

According to the coefficient of analysis of variance for constructs of personal characteristics (0.78) and job con-

Table 5: Results of ANOVA between constructs

		SS	df	MS	F	Sig.
Merit	Between Groups	120.107	2	60.054	26.063	.000
	Within Groups	55.300	24	2.304		
(Levene= .926; Sig.= .410)	Total	175.407	26			
Finance	Between Groups	30.804	2	15.402	17.023	.000
	Within Groups	21.714	24	.905		
(Levene= .247; Sig.= .783)	Total	52.519	26			
Personal characteristics	Between Groups	2.510	2	1.255	.789	.466
	Within Groups	38.157	24	1.590		
(Levene= .162; Sig.= .852)	Total	40.667	26			
Confidentiality Issues	Between Groups	11.757	2	5.878	5.144	.014
	Within Groups	27.429	24	1.143		
(Levene= .027; Sig.= .974)	Total	39.185	26			
Persons' Positions	Between Groups	8.749	2	4.374	4.005	.032
	Within Groups	26.214	24	1.092		
(Levene= 1.187; Sig.= .323)	Total	34.963	26			
Persons' Communications	Between Groups	19.671	2	9.836	22.855	.000
	Within Groups	10.329	24	.430		
(Levene= .304; Sig.= .740)	Total	30.000	26			
Job conditions	Between Groups	1.872	2	.936	1.265	.300
	Within Groups	17.757	24	.740		
(Levene= .622; Sig.= .545)	Total	19.630	26			
Persons' Biography	Between Groups	18.660	2	9.330	10.456	.001
	Within Groups	21.414	24	.892		
(Levene= 2.143; Sig.= .139)	Total	40.074	26			

SS = the sum of squares, DF = the degrees of freedom, MS = the mean sum of squares, F = the F-statistic, Sig. = the P-value.

ditions (1.26), which are not at significant levels, no difference was observed among the different groups on these constructs. The variance coefficients of constructs of merit (26.06), finance (17.02), confidentiality issues (5.14), persons' positions (4.0) persons' communications (22.85), and persons' biography (10:45) were significant, thereby suggesting the topics of organizational gossip have different importance among different groups, and organizational staff do not necessarily use common themes in gossiping.

According to these variables, due to the differences are statistically significant, post hoc analysis should be carried out for the reason behind the significant result. The results for Tukey's HSD test is shown in the Table 6.

For each height differences between points (Table 6), sub groups were shown in pairwise comparison. The results showed that all three groups are significantly different in Merit, and Persons' communications. Whereas gossiping about personal characteristics, and job conditions include all three groups in one subset. Therefore, there are no differences between these three groups regards to gossiping contents about personal characteristics and job conditions. Interestingly, nurses and supervisors are same subset in finance and persons' biography and in both constructs managers stands alone in one separate subset. However, supervisors showed similarities with nurses and managers in constructs of persons' positions, and confidentiality issues.

5 Discussion and Conclusion

The first aim of this study was to identify gossiping contents in hospitals where employees are under huge work pressure and stress, especially during this Covid-19 period. The second aim of the study was to explore gossiping differences at organizational levels to show that employees at the various levels of a hospital, as an example of organization, do gossip significantly and the topics of their

Table 6: Post-Hoc analysis results for groups

Merit				*Finance*				*Personal characteristics*			
	Subset				Subset				Subset		
	1	2	3		1	2	3		1	2	3
Managers	3.600			Nurses	2.571			Managers	2.900		
Supervisors		5.900		Supervisors	2.600			Nurses	3.142		
Nurses			9.000	Managers			4.800	Supervisors	3.600		
Confidentiality Issues				*Persons' Positions*				*Persons' Communications*			
	Subset				Subset				Subset		
	1	2	3		1	2	3		1	2	3
Managers	1.600			Managers	1.300			Supervisors	1.100		
Supervisors	2.200	2.200		Supervisors	2.400	2.400		Managers		2.000	
Nurses		3.285		Nurses		2.571		Nurses			3.285
Job conditions				*Persons' Biography*							
	Subset				Subset						
	1	2	3		1	2	3				
Nurses	.857			Managers	.300						
Managers	1.400			Supervisors	1.200						
Supervisors	1.500			Nurses		2.428					

Tukey HSDa (subset for alpha = 0.05);
Means for groups in homogeneous subsets are displayed. Sig. = The P-value

gossips vary. The third goal was to categorize the contents of gossip in hospitals.

The results showed that the content of gossips in hospitals has some differences with the content of gossips in a social structure (Nevo et al., 1993) and is in line with the results of (Foster, 2004). This means that the context of the work provides or affects the content of gossip. Also, the aims of gossiping in hospitals are far different from the aims of gossiping in social environments. It was shown that the merit and financial issues got the first and second highest ranks between other constructs, respectively. Therefore, we can conclude that gossiping contents are various based on social or organizational milieu.

The second result of this study indicates that employees at organizational levels have different aims for gossiping. In line with Durmuş et al. (2020), we also found differences between employees at different levels of hospitals. These diversities may be rooted in the work attitudes and behaviors which are affected by work and need to adjustment. At the managerial levels, it may be for accessing relevant information in their decision-making (Liff & Wikström, 2021). But at the lower levels in hospitals, work stress and responsibility pressure make a stronger demand for group protection, coping strategies, and reducing stress. These findings are in contradiction to Wu, Birtch, Chiang, and Zhang (2018) findings. On the one hand, the themes of gossip, at the practical level of a hospital, are mostly individual oriented while on the other, at the higher level of a hospital, contents tend to be organizationally oriented and includes issues such as performance. More to the point is that, the employees may use gossiping in response to their superiors' misbehaviors and to put them under pressure (Ye et al., 2021). This response helps them feel better and cope with situation, or acts as the conjunction between these levels (Michelson et al., 2010). Additionally, a transition in the organizational level (from nurses to managers) shows that the discussion topics on gossips shift from individual issues such as financial matters and receiving side benefits to human characteristics, such as performance and character leading to organizational issues including empowerment. This diversity may be rooted in the concerns in the hospital or due to the different situations of each group that affects their motivations for gossiping (Dores Cruz, Beersma, Dijkstra, & Bechtoldt, 2019). Nurses have the same concerns about the financial issues. Thus, the strategy for coping motivates them to speak about shared needs and situations. The same conclusion is generalizable for supervisors and managers. Their situations are varying, too.

However, the rules would provide a context for the growth of gossiping. Some official rules and regulations in organizations make differences more pronounced e.g., laws and regulations on uniforms (Lee & Workman, 2013).

The results also showed that gossip topics can be divided into eight groups involving main issues and their sub-codes involving 34 more minor issues. The main top-

ics of gossip include confidentiality issues, merits, financial issues, personal characteristics, individuals' positions, individuals' communications, individuals' biography, and job conditions.

The category of merits and financial affairs are the first two priorities that hospital personnel talk about. Personnel always seek to compare the ability and competence of others with their own abilities and competence and thereby make comparisons about revenues and supplements received from organizations or outside sources.

However, among managers and supervisors, merit is the first priority in comparison with other issues of gossip. This is while, among nurses, financial issues are of greatest importance. Compared with head nurses and hospital administrators, staff nurses do not benefit from suitable payments. Likewise, no acceptable payment transparency exists among nurses, making them attempt to spread gossip while their superiors mainly try to advance and succeed in their positions.

Furthermore, the analysis of the results between groups showed that however all three groups have similarities about gossiping, but the as person's position changed to managerial levels in the hospital, the gossiping constructs are going to more related to the job conditions. Also, people in organization have same gossip constructs based on their job situation. For example, all staff in all levels do gossip about job conditions. Therefore, the employee tries to find same issues for gossiping which means that even the positions in the organizations are in close relation with colleagues' concern.

Identifying the quality of relationships among members of organizations and gossiping activities can be a tool for managers to understand and better manage the conditions of their organizations and human resources.

5.1 Implications for Managers

Managers should know that the consequences of gossip can be both positive and negative (Michelson & Mouly, 2002), but its main function is to provide information related to the organization. The employees in an organization are likely to use gossip in response to organizational situations. Because of this, the contents of the gossip are different at different organizational levels. It can also be argued that within an organization, topics can be of varying importance based on job levels and hierarchies, such that the average frequency groups differ in all constructs except for private issues and personal characteristics.

The authors hope this study contributes to improving knowledge in the field of gossip and in examining the impact of organizational variables regarding the content of gossip. It is also hoped that managers take benefit of gossip to reduce organizational resistance to change through sharing information. The results of the study may be of practical use for checking organizational variables and situations. The contents of the gossips would be helpful to find employees' concerns and viewpoints, even about appointments and evaluating the performance of the hospitals.

Limitations of this study, such as the number of people participating in the research and the qualitative method used should be considered in future studies. Also, due to the pandemic of Covid-19, employees in the hospitals are under a huge workload and stress, and therefore, the results may be different in normal time.

Future studies on different organizations are recommended. In particular, checking the gossip in virtual spaces and in different communities can contribute significantly to better identify the communication issues in virtual organizations and the formation of gossip in them. We also suggest studying employee roles in gossiping and their personality in and out of the job.

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Vsebinska analiza tračev na različnih ravneh bolnišnice

Ozadje in namen prispevka: Večina organizacij ima negativen odnos do opravljanja ali tračev. Menedžerji so zaskrbljeni zaradi vpliva tračev na komunikacijo v organizacijskem okolju. Naša študija je proučevala dojemanje opravljanja in kontekst tračev na različnih ravneh bolnišnice, kot primeru organizacije z intenzivno komunikacijo med zaposlenimi. Proučili smo tudi razlike med kontekstom tračev znotraj organizacijskega konteksta in znotraj socialnega okolja.
Metodologija: Izvedli smo polstrukturirane intervjuje s 27 respondenti, po 9 v vsaki od treh skupin: medicinske sestrami, administrativnimi zaposlenimi in vodilnimi bolnišnice. Posnete intervjuje smo proučili z metodo analize vsebine in primerjali rezultate za vsako skupino respondentov. Na koncu smo kategorizirali glavna opravljanja oz. trače za vsako skupino.
Rezultati: Teme opravljanja v bolnišnici lahko razvrstimo v osem glavnih kategorij in 34 podkategorij, ki jih je mogoče prepoznati po njihovi specifiki. Te glavne teme so vključevale vprašanja zaupnosti, zasluge, finančni status/položaj, osebne lastnosti, delovno mesto, komunikacije, biografijo in delovne pogoje. Z vidika organizacijskih tračev so udeležence te študije še posebej zanimale zasluge in napredovanje osebe na delovnem mestu in finančni položaj. Tudi pri temah tračev na različnih ravneh med medicinskimi sestrami, administratorji in menedžerji so se pokazale pomembne razlike.
Zaključek: Vodje bi morali priznati različne vsebine tračev med ljudmi na različnih organizacijskih ravneh, saj zaposleni nimajo enakih motivov za komunikacijo na različnih organizacijskih ravneh. V razdaljah med vsebinami v vprašalniku nagnjenosti k opravljanju in kategorijami v organizacijskem okolju potrebujejo ugotavljamo potrebo po nadaljnjih študijah, da bi raziskale precedence in rezultate. Vodje lahko uporabijo te ugotovitve za olajšanje organizacijskih sprememb in izboljšanje komunikacije.

Ključne besede: *Opravljanje v organizacijah, Trači, ANALIZA vsebine, Neformalna komunikacija*

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Antecedents of Service Innovative Behavior: The Role of Spiritual Leadership and Workplace Spirituality

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Background: Managers in labor-intensive industries are facing challenges on how to encourage innovation, as services are mostly offered by employees and not machines. Intense competition in the service and hospitality industry calls for more innovative work behavior exhibition among employees, and the question on how enterprises can nurture innovative behavior remains unanswered. The objective of the research is to clarify the inter-relationship between spiritual leadership and workplace spirituality and how their collective effect can nurture employee service innovative behavior in the hospitality industry by drawing on relational energy theory.
Methodology: Data were obtained using a survey quantitative research method based on a convenience sampling technique from (n = 867) employees working in four- and five-star Jordanian hotels. A partial least squares structural equation modeling (PLS-SEM) technique was applied to assess the proposed research model and hypotheses.
Results: Findings from PLS-SEM show that spiritual leadership impacts and increases the level of workplace spirituality and service innovative behavior among employees. Workplace spirituality increases the level of service innovative behavior and mediates the relationship between spiritual leadership and service innovative behavior.
Conclusion: Spiritual leadership and workplace spirituality initiatives and practices can be beneficial for hospitality enterprises in terms of service innovative behavior. Moreover, the key point is that hospitality HR practitioners should not only focus on selecting, training, and appointing leaders with spiritual characteristics, but also on creating a spiritual work atmosphere to enable employees to exhibit service innovative behaviors. The results did not only advance our knowledge concerning the nexus and importance of spirituality in the workplace, but also validates and reveals the importance of spirituality on innovative behavior in the Arabian context.

Keywords: *Behavior, Innovation, Jordan, Service, Spiritual leadership, Workplace spirituality*

1 Introduction

The present-day business environment is characterized as having intense competition and uncertainties, which increases work pressure and anxiety among employees. Work pressure, stress, and anxiety have been associated with negative work outcomes (Abubakar, 2018; Tabor et al., 2019). Hence, the need for leaders who can motivate, share, and energize employees to deal with these problems has never been this great before (Ghaedi et al., 2020; Tabor et al., 2019). Unlike other traditional leadership traits, spiritual leadership is a value-based and spirit-centered style to leadership that stresses workers' perception of meaningful work by fulfilling their need for otherworldly survival (Fry, 2003). Many studies have linked spiritual leadership to increased workplace spirituality (Afsar et al., 2016; Fry & Slocum, 2008). Spirituality in the workplace is distinct from spirituality in general, as it relates with individual spiritual well-being within the context of employment.

Workplace spirituality has been defined as "a framework of organizational values evidenced in the culture that promote employees' experience of transcendence through the work process, facilitating their sense of being connected to others in a way that provides feelings of complete-

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ness and joy" (Giacalone & Jurkiewicz, 2003). At work, employees are typically insecure and fearful, which is why they rely on workplaces and peers for social support and courage and identity (Jurkiewicz & Giacalone, 2004). Specifically, workplace spirituality aims to empower workers to discover the purpose of life, develop bonds with peers, and enhance work atmosphere (Fry & Slocum, 2008). Tentatively, spirituality in the workplace is not limited to practices such as cultural diversity, fairness, ethics, support, and development programs, but also covers facets of innovation, as individuals work in harmony, have shared goals, are encouraged to share knowledge and allowed to express their opinions.

Innovative behavior is seen as employees' response and generation of solutions to ongoing business problems (Cozzarin, 2017; Scott & Bruce, 1994). Because of the tremendous rivalry among businesses in today's economic climate, exhibition of innovative behavior is extremely important. Basically, spiritual leadership and workplace spirituality have many beneficial effects on employees, such as high levels of life satisfaction, organizational citizenship behavior, and in-role performance (Houghton et al., 2016; Krishnakumar et al., 2015), organizational commitments (Fry & Slocum, 2008), and group innovativeness (Ghaedi et al., 2020). Existing works on spiritual leadership are mainly focused on employee well-being and outcomes, the question as to the benefit of how spiritual leadership affects performance remains elusive as shown in a meta-analytical study (Oh & Wang, 2020). To this end, this study aims to make pivotal contributions to spiritual leadership and workplace spirituality research streams. Since only a few studies have linked the concepts to innovative outcomes in the hospitality industry (Oh & Wang, 2020), our work will add to the body of knowledge.

Second, by incorporating service innovative behavior, we unveil the mechanism by which spiritual leadership practices result in desired organizational outcomes. Specifically, this paper draws on the theory of relational energy (McDaniel, 2011) to investigate the relationship between spiritual leadership, workplace spirituality, and service innovative behavior. Third, although, it is acknowledged that spiritual care does not equate only to religious care (Weathers, 2018), there is almost an inseparable link between spiritual and religious practices in a Middle Eastern and Muslim context. Because most practices and teachings such as connection, peace, transcendence are drawn from the Holy Quran and Hadiths (Cruz et al., 2017). Thus, the hospitality and Arabian context of this study provides a relevant domain for additional invetsigation, as past works were mostly in advanced nations such as the US and Far East context such as China. This study expands on the Afsar et al. (2016) theoretical model of spirituality in terms of organization and leadership by adopting an innovative perspective and investigating the associations in a different contextual setting, specifically, the hospitality industry. Similar calls for additional studies in the hospitality industry context were issued by Milliman et al. (2018).

2 Literature review and hypotheses development

A positive sensation and sense of enhanced resourcefulness due direct psycho-social interaction with others is known as relational energy. According to relational energy theory, some individuals appear to boost our energy, optimism, and wit, while others appear to have no effect or drain such vitality or energy. More specifically, energy emanating from colleagues can impact the work motivations of individuals as a result of 'contagious effects' (McDaniel, 2011; Owens et al., 2016). Research also found that the level of relational energy among members of a team equates to their performance (Borgatti & Cross, 2003). Employee service innovative behavior denotes "the production or adoption of useful ideas and idea implementation and begins with problem recognition and the generation of ideas or solutions" (Scott & Bruce, 1994, p. 581). These behaviors have been shown to boost organizational growth, agility, productivity, and competitiveness (Hu et al., 2009; Shih & Susanto, 2016). Work behaviors are essential inputs for value creation, due to their role in how businesses innovate. Several studies have linked leadership style (Ghaedi et al., 2020; Afsar et al., 2016) and organizational culture (Kaya et al., 2020; Likoum et al., 2020) to enhanced firm innovation.

Spiritual leadership is defined as "the values, attitudes, and behaviors that one must adopt in intrinsically motivating oneself and others so that both have a positive increase in the sense of spiritual well-being through calling and membership, that is, they experience meaning in their lives, have a sense of making a difference, and feel understood and appreciated" (Fry et al., 2005, p. 836). This leadership style is tripartite where the (1) vision dimension reflects a picture of the future with implicit or explicit outcomes on why people should try to make that picture come to reality; (2) hope and faith dimension reflects the belief that the goals/mission/vision of the hiring firm can be attained; and (3) altruistic love dimension reflects a sense of completeness, harmony, and well-being achieved via self-care, love, and appreciation by others (Fry et al., 2005; Yang et al., 2019).

The employee's experience of spirituality in the workplace is called workplace spirituality (Pawar, 2009). Workplace spirituality is comprised of three dimensions, namely: at employee level – meaningful work; at team level or group level – sense of community; and alignment to organizational values at organizational level. Workplace spirituality embodies a sensation of belongingness and employee interconnectedness. Such experiences and feelings strengthen the social bond and compassion toward others,

which foster community and/or group harmony (Milliman et al., 2003). This sense of community encourages workers to help and exhibit good Samaritan attitudes through work support, citizenship, and innovative behaviors that align with the organization's goals and values. Spirituality supports the spirit of the employees by enhancing work meaning and employee engagement (Gotsis & Grimani, 2017; Helmy et al., 2020).

Managers and leaders "have a responsibility for nurturing the spirit by helping their subordinates be open to their inner lives, by helping them find meaning in their work, and by strengthening a sense of community in the workplace" (Duchon & Plowman, 2005, p. 828). Spiritual leaders are known and portrayed as having humility; research shows that such traits can foster creativity in workplaces (Wang et al., 2017). All in all, spirituality can be viewed as a facilitator and life-giving energy that encourage employees to take part in helping others as well as generation of creative work ideas. Previous findings show that spiritual leadership is an antecedent for workplace spirituality (Afsar et al., 2016). Spiritual leadership together with workplace spirituality are antecedents for greater levels of life satisfaction and in-role performance (Houghton et al., 2016; Krishnakumar et al., 2015), organizational commitment (Fry & Slocum, 2008), and group innovativeness (Ghaedi et al., 2020). In a nutshell, spiritual leaders are able to lead with calmness and strength, show some level of mindfulness, and also maintain person-centered relationships with subordinates.

Accordingly, research noted that spirituality can foster higher levels of prosocial attitudes and behavior among individuals (Rezapouraghdam et al., 2018; Wierzbicki & Zawadzka, 2016). Some scholars have linked spiritual leadership to higher job performance (Yang et al., 2019) and group innovativeness (Ghaedi et al., 2020). Workplace spirituality has to do with the conception of connectedness and amalgamation of self-values with those of the hiring firms; when there is a fit between these two, service innovative behavior is likely to emerge. Past findings have also linked workplace spirituality with innovative and creative outcomes (Afsar & Badir, 2017). Building on past literature, we draw on relational energy theory to suggest that spiritual leadership and workplace spirituality can spread contagious energy that could spur innovation within the hotel context. The following hypotheses are proposed:

H1: Spiritual leadership has a positive and significant impact on workplace spirituality.

H2: Spiritual leadership has a positive and significant impact on service innovative behavior.

H3: Workplace spirituality has a positive and significant impact on service innovative behavior.

H4: Workplace spirituality will mediate the relationship between spiritual leadership and service innovative behavior.

3 Methodology

3.1 Research data collection procedures

The study variables were used in past studies and mostly in non-Arabic speaking countries. The authors used back-translation approach with two translators to translate the survey items. Additionally, the survey was tested with five people and few changes were conducted to reduce ambiguities and enhance communication. The data of the study was collected from cities, namely: Amman and Aqaba, and tourist regions, namely: Petra and the Dead Sea. Based on the report from MoTA, Statistics Department (2019), there are 42 five-star hotels and 44 four-star hotels in the mentioned cities and regions with more than 14,000 employees. We contacted the top management of the hotels for permission to conduct the study. Using a convenience sampling technique, data was obtained from employees working in a total of thirty (30) four- and five-star rated hotels who agreed to take part in the current investigation. This sampling technique was utilized to encourage participation due to the long working days and anti-social hours in the industry. We asked the employees to fill out the survey voluntarily, and we also told them they can choose to stop at any time; consequently, we assured them that the responses they gave will be used only for research purposes and will not be disclosed to third parties or the hotel management to mitigate the tendency of social desirability bias and alteration of responses (MacKenzie & Podsakoff, 2012).

3.2 Variables and measurements

Spiritual Leadership has been abstracted as a trichotomic construct with the following subsets: (1) vision – which "describes the organization's journey and why we are taking it; defines who we are and what we do"; (2) hope/faith – which describes "the assurance of things hoped for, the conviction that the organization's vision/purpose/mission will be fulfilled"; and (3) altruistic love – which describes "a sense of wholeness, harmony, and well-being produced through care, concern, and appreciation for both self and others" (Fry et al., 2005). In this study, the dimensions of spiritual leadership were measured using borrowed 5-items for vision, 5-items for hope/faith, and 7-items for altruistic love, totaling 17 items (Fry et al., 2005). Sample of items include: "My organization's vision is clear and compelling to me" (vision dimension), "I demonstrate my faith in my organization and its mission by doing everything I can to help us succeed" (hope/faith dimension), "The leaders in my organization have the courage to stand up for their people" (altruistic love dimension). This scale has been shown to work well in the hospitality context (Afsar et al., 2016) and also fits in with

the conceptualization in this study.

Workplace Spirituality has been abstracted as a trichotomic construct with the following subsets: (1) meaningful work – at individual level, has to do with employee's perception of joy, energy, and personal meaning in carrying out assigned duties; (2) sense of community – at group level, is interested in employee's sense of connectedness with peers and superiors, supportive atmosphere, and having a shared goal; and (3) alignment of values – at organizational level, is interested in how employee's goals, norms, and values align with those of the hiring organization (Milliman et al., 2003). In this study, the dimensions of workplace spirituality were measured using borrowed 6-items for meaningful work, 7-items for sense of community, and 8-items for alignment of values, totaling 21 items (Milliman et al., 2003). Sample of items include: "I see a connection between work and social good" (meaningful work dimension), "Working cooperatively with others is valued" (sense of community dimension), and "Our organization cares about all its employees" (alignment of values dimension). This scale has been shown to work well in the hospitality context (Milliman et al., 2018) and also fits in with the conceptualization in this study.

Service Innovative Behavior was measured with a first-order construct consisting of 6-items adapted from past studies in the hospitality industry (Hu et al., 2009; Scott & Bruce, 1994). The items were designed to capture employee's inclination to innovative and creative work behaviors. The research measures were docked on a 5-point Likert scale such that strongly disagree was represented by (1) upward to strongly agree represented by (5). Sample of items include: "At work, I seek new service techniques, methods, or techniques." This scale has been shown to work well in the hospitality context (Hu et al., 2009) and also fits in with the conceptualization in this study.

Demographic features of the employees and the hiring hospitality enterprises under investigation were obtained to help provide a general industrial outlook and the representativeness of the sample. Captured information includes employee educational level, age, gender, hotel classification (e.g., four- or five-star), and yearly revenue of the enterprises. A complete list of the scale items alongside descriptive statistics is presented in the Appendix section.

4 Results

4.1 Participant's profile

Out of the 1,000 questionnaires distributed, in total, 867 complete answers were retrieved. To compare and comprehend the profile of the research participants, we ran frequency analysis in SPSS software, and the demographic characteristics of the respondents is presented in Table 1. Briefly, information about participating employees' educational level, age groups, gender, type of hiring organization (four- or five-star hotel), and monthly income level. Although a number of hotels did not take part in the study, population ecology theory argues that hotels operating in a common marketplace begin to resemble one another over time. The resemblance is associated with the demographics and/or classification of organizational species (Hannan & Freeman, 1977). Such that the hotels operating in a common marketplace tend to have employees with similar demographical features, such as education, age, income, etc.

Table 1: Hotel classification according to employee numbers

Hotel type	1-stars	2-stars	3-stars	4-stars	5-stars	Total
Number of employees	343	787	1,880	3,127	10,643	16,780
Source (MOTA, 2019),						

According to the Ministry of Tourism and Antiquities (MOTA), there are approximately 13,770 employees working in five- and four-star hotels out of the entire 16,780 employees in the industry (MOTA, 2019), suggesting that 82% of the employees in the industry are working in four and five-star hotels (See Table 1 for details). Consequently, in comparison to the hospitality industrial reality, the industry's actual employees' structure and distributions are reflected in the study demographic makeup. Building on the breakdown in Table 2, we concluded that the obtained sample appears to be representable.

4.2 Measurement model

This research expended a structural equation modeling technique by drawing on the partial least squares (PLS-SEM) algorithm. The main aspiration of PLS-SEM algorithms and techniques are to maximize the explained variance in the response variable and also to diminish the presence of estimation errors in the response variable (Khaddam et al., 2021; Mert et al., 2021). PLS-SEM operates on composite-grounds and is causal-predictive in terms of estimations (Hair et al., 2019; Yakubu et al.,

2020). PLS-SEM is superior especially when addressing models with multiple direct, indirect, and moderating associations. These features make PLS-SEM superior over the traditional covariance-based SEM. Research variables spiritual leadership and workplace spirituality are operationalized as higher-order constructs. According to Sarstedt et al. (2016), the two-stage approach is useful when a research model has a combination of first-order (e.g., service innovative behavior) and second-order constructs (e.g., spiritual leadership and workplace spirituality) in terms of normalizing the relationships. Specifically, the two-stage approach shows a "better parameter recovery of paths pointing (1) from exogenous constructs to the higher-order construct, and (2) from the higher-order construct to an endogenous construct in the path model" (Sarstedt et al., 2019, p. 199). Following expert recommendations (Sarstedt et al., 2016; 2019), we employed the two-stage approach where the latent scores of the first-order constructs (vision, hope/faith, and altruistic love) were calculated and utilized as indicators for the second-order construct (spiritual leadership). The same approach was applied to workplace spirituality first-order constructs (meaningful work, sense of community, and alignment of values). Although, model fit indices are not necessary in PLS-SEM analysis, we perused the results, which all appear to be sufficient, suggesting a fit between the data

Table 2: Demographic breakdown

Educational Level	**Frequency**	**Percentage**
High school	399	46.0%
Diploma	162	18.7%
Bachelor's degree	277	31.9%
Graduate degree	29	3.3%
Total	**867**	**100%**
Age		
Less than 20 years	101	11.6%
21-30 years	369	42.6%
31-40 years	244	28.1%
41-50 years	122	14.1%
Above 51 years	31	3.6%
Total	**867**	**100%**
Gender		
Female	152	17.5%
Male	715	82.5%
Total	**867**	**100%**
Hotel classification		
Four stars	333	38.4%
Five stars	534	61.6%
Total	**867**	**100%**
Income		
Less than 499 Dinars[1]	549	63.3%
Between 500 and 999 Dinars	223	25.7%
Between 1,000 and 1,499 Dinars	61	7.0%
Between 1,500 and 1,999 Dinars	18	2.1%
Above 2,000 Dinars	16	1.8%
Total	**867**	**100%**

[1] Current exchange rate: 1 Dinar equals 1,23 Euro

and the model. Indicators and their respective values for model fit are reported in Table 3. We therefore expended SmartPLS software version 3 to operationalize the measurement model. In doing so, we perused the values of Cronbach's alpha (Cα), composite reliability (CR), and Rho to establish construct reliability. In Table 3, all the values were above the 0.70 thresholds (Hair et al., 2019; Henseler et al., 2009). Consequently, we perused the research indicators using each construct's average variance extracted (AVE), each item's standardized factor loadings, and t-values to establish convergent validity. In Tables 3, the AVE values were above the 0.50 threshold; In Tables 4 the factor loadings and t-values were also above the 0.70 and 1.96 thresholds.

Table 3: Reliability of constructs

	Variables	Cα	Rho	CR	AVE
1	Spiritual leadership	0.906	0.906	0.941	0.841
2	Workplace spirituality	0.907	0.907	0.941	0.843
3	Service innovative behavior	0.927	0.929	0.943	0.735
***Model fit**: NFI = 0.908; SRMR = 0.042; d_ULS = 0.138; d_G = 0.162; Chi-Square = 844.519*					

Table 4: Factor loadings, t- and p-statistics for the scale items

Measures	Original Sample	Sample Mean	Standard Deviation	T-Statistics (|O/STDEV|)	P-Values
Spiritual leadership					
Vision	0.924	0.924	0.007	126.313	0.000
Altruistic love	0.908	0.908	0.008	118.388	0.000
Hope/faith	0.919	0.919	0.007	134.541	0.000
Workplace spirituality					
Sense of community	0.928	0.928	0.006	142.771	0.000
Alignment of values	0.925	0.925	0.006	158.178	0.000
Meaningful work	0.901	0.901	0.009	102.304	0.000
Service innovative behavior					
SIB item1	0.860	0.860	0.011	81.032	0.000
SIB item2	0.888	0.888	0.010	87.510	0.000
SIB item3	0.884	0.884	0.010	87.052	0.000
SIB item4	0.866	0.866	0.011	76.635	0.000
SIB item5	0.796	0.796	0.017	46.636	0.000
SIB item6	0.845	0.844	0.013	63.485	0.000
Notes: *Original Sample = standardized factor loadings; SIB = service innovative behavior*					

Table 5: Discriminant validity

	Variables	1	2	3
1	Spiritual leadership	***0.917***	.912	0.679
2	Workplace spirituality	0.828	***0.918***	0.773
3	Service innovative behavior	0.623	0.709	***0.857***

Finally, we establish discriminant validity by perusing the square root of each construct's AVE based on the Fornell-Larcker Criterion. All the square roots of the AVE values are above any other inter-construct correlations establishing discriminant validity (Fornell & Larcker, 1981). The Heterotrait-Monotrait Ratio of Correlations (HTMT) appears to be below the 0.90 threshold with one exception (Henseler et al., 2015). Nevertheless, by combining the results from the Fornell-Larcker Criterion and HTMT in Table 5, we conclude that discriminant validity of the constructs has been established.

4.3 Structural model

We tested the study hypotheses through a structural model based on a biased-corrected bootstrapping approach that ran with 5,000 sub-samples. The hypotheses were assessed using the traditional beta, t- and p-values. To evaluate whether a statistically significant effect also has a practical relevance, we perused the f-squared (f2) values, also known as effect size, following expert guidelines (Cohen, 2013) where (large effect = 0.35), (moderate effect = 0.15), and (small effect = 0.02). The structural model presented in Figure 1 generated four distinct outcomes as follows: First, the results show that spiritual leadership has a significant and positive effect on workplace spirituality ($\beta = 0.828$, $\rho < 0.01$). This suggests that a 100% increase in spiritual leadership can result in an 82.8% increase in the level of workplace spirituality. Furthermore, spiritual leadership also explained 68.6% of the variance in workplace spirituality (R-squared = 0.686), and effect size is deemed to be very large (f-squared = 2.180). Based on these results, hypothesis 1 received empirical support. Details are available in Table 6.

Second, the results show that spiritual leadership has a significant and positive effect on service innovative behavior ($\beta = 0.114$, $\rho < 0.01$). This suggests that a 100% increase in spiritual leadership can result in an 11.4% increase in the level of service innovative behavior. The effect size is deemed to be very small (f-squared = 0.008). Based on these results, hypothesis 2 received empirical support. Details are available in Table 6.

Third, the results show that workplace spirituality has a significant and positive effect on service innovative behavior ($\beta = 0.615$, $\rho < 0.01$). This suggests that a 100% increase in workplace spirituality can result in a 61.5% increase in the level of service innovative behavior. The effect size is deemed to be moderate (f-squared = 0.24). Based on these results, hypothesis 3 received empirical support. Details are available in Table 6.

Fourth, spiritual leadership and workplace spirituality jointly explained 50.7% of the variance in service innovative behavior (R-squared = 0.507). Finally, the mediating role of workplace spirituality on the relationship between spiritual leadership and service innovative behavior holds ($\beta = 0.509$, $\rho < 0.01$). Based on these results, hypothesis 4 received empirical support. Details are available in Table 6.

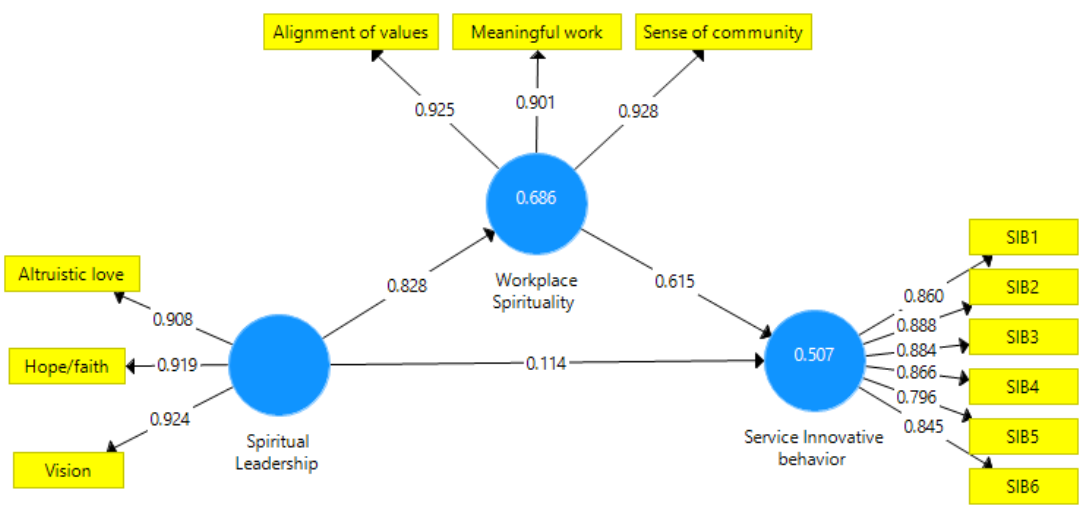

Figure 1: Structural model

Table 6: Direct and indirect effects

Panels		***Endogenous variables***	
Panel A – Direct effects			
Exogeneous variables		Workplace spirituality	Service innovative behavior
Spiritual leadership		0.828**	0.114*
Workplace spirituality		-	0.615*
Panel B – Effect sizes (F-squared)			
Spiritual leadership		2.180	0.008
Workplace spirituality		NA	0.241
Panel C – Specific indirect effect (Mediation)			
Exogeneous variables	***Mediator variables***		Service innovative behavior
Spiritual leadership	Workplace spirituality	-	0.509**
Notes: *p < 0.05; **p < 0.01; NA= Not Applicable			

5 Discussion

5.1 Findings

Drawing on relational energy theory, we examined the association among spiritual leadership, workplace spirituality, and service innovative behavior. Results show that spiritual leadership increases the level of workplace spirituality, which makes sense as spiritual leaders have a specific desire and focus to energize the connection between the leaders, the organization, and their employees (Afsar et al., 2016). We also show that spiritual leadership and workplace spirituality can enact higher levels of service innovative behavior among employees (Afsar & Badir, 2017). Employees see spiritual experience as a personal bond to work activities and other entities who are touched by it, which goes beyond self-interest. We extend past work by unveiling the potentials of spiritual leadership to foster service innovative behavior and also show that spiritual work cultures are vital for innovative outcomes. In other words, workplace spirituality mediates the relationship between spiritual leadership and service innovative behavior.

Employees are mostly under stress, and sometimes even alienated from their organizations. Spiritual leaderships create a work atmosphere and culture of support, meaningful work life, community of support and achieving goals, which may reduce employees' fear and insecurity; these, we show, can enhance their confidence and sense of sharing that could further result in innovative ideas and ways of dealing with business problems. Although, spirituality in the Middle East has religious roots (Abu-El-Noor & Abu-El-Noor, 2019), the mainstream attributes such as connection, peace, transcendence, and seeking meaning and purpose are like those of the Western context (Weathers, 2018). There is a fine line between spirituality and religion in the Jordanian society because individuals live in a way that religious beliefs are reflected in all aspects of their lives, including work life.

In lieu of this, this study denotes that spiritual beliefs and practices are excellent sources of support, comfort, and coping mechanisms that can be built upon to create positive a work atmosphere for innovative activities in the Jordanian tourism and hospitality context. Past research noted that in Muslim perspectives, spirituality practices were mainly derived from the Holy Quran and the Hadiths (Cruz et al., 2017). Given that the Jordanian population is predominantly from the Sunni sect, the applicability of the current findings in other Arabian or Middle Eastern contexts is contingent upon the Islamic sect. In sum, the findings are in congruence with existing assertions in the literature on the effects of spiritual leadership and workplace spirituality on work outcomes such as performance (Duchon & Plowman, 2005; Yang et al., 2019), innovativeness (Afsar et al., 2016; Ghaedi et al., 2020), positive attitudes, and prosocial behaviors (Rezapouraghdam et al., 2018; Wierzbicki & Zawadzka, 2016). Although four- and five-star hotels employs a large portion of approximately 82% of the hotel industry workforce in Jordan (MOTA, 2019). It is also important to caution readers about the generalizability and interpretations of the current findings. The fact that the study sample was drawn from four- and five-star hotels limits our ability to generalize and draw inference on the applicability of the findings in other hotel settings such as one-, two- and three-star hotels that are mainly family owned and managed.

5.2 Theoretical and practical implications

The results of the current study delineate that spiritual leadership impacts and increases the level of workplace spirituality and service innovative behavior. Consequently, workplace spirituality increases the level of service innovative behavior and mediates the relationship between spiritual leadership and service innovative behavior. This paper's theoretical contributions and originality does not only lie in uncovering how and when spiritual leadership influences service innovative behavior, but also on the mediating mechanisms of workplace spirituality. Understanding how spiritual leadership and workplace spirituality predict service innovative behavior theoretically enriches the hospitality management literature. Logically, this is a viable way to understand a spectrum of leader actions and environmental forces that are productive and beneficial. Afsar et al. (2016) and Milliman et al. (2018) previously suggested more empirical evidence on these interdependences. This paper addresses this research call by showing the mediating role of workplace spirituality on the relationship between spiritual leadership and service innovative behavior in the tourism and hospitality context. The current study also extends the scope by drawing on relational energy as a theoretical framework. By taking this lens, this work unveils the black box between spiritual leadership and service innovative behavior. Specifically, spiritual leaders are social innovators of good and positive energy that reinforces a sense of community membership, transcendence, meaning, and shared values among employees, which reflected and/or reciprocated in their work behavior in form increased service innovative behavior.

Besides theoretical contributions, the findings in this paper have a few industrial implications. We recommend that hospitality enterprises in Jordan should take spirituality into consideration when selecting and training supervisors or unit chiefs. In other words, HR professionals should promote spirituality to ensure that potential managers or supervisors fully recognize the benefits of spirituality leadership and its outcomes. For instance, organizing social activities and counseling sessions to help both leaders and employees build a positive understanding of workplace spirituality. Hospitality enterprises often place emphasis on technical training and compensations as predictors of innovation, this work suggests that hospitality enterprises in Jordan should include the soft side of management, in terms of creating a workplace culture with spirituality and placing individuals with spiritual awareness in supervisory positions. The findings assert that having spiritual leaders and working in a spiritual environment where individuals are cared for, loved, appreciated, and supported by leaders and co-workers can encourage employees to carry out service innovative behavior and/or activities.

5.3 Limitations and future research

This research has several clampdowns that should be mentioned, starting with the design; the cross-sectional design may affect causational claims. Although, the study utilized a large sample size, the exclusion of one-, two- and three-star hotels reduce the generalizability of the findings in the Jordanian hotel industry. The observed variables data were obtained through self-assessment and as such may be susceptible to social desirability bias. Future works are encouraged to use multi-source or secondary data sources and longitudinal design to mitigate these problems. Consequently, the usage of non-probability sampling technique: convenience has the tendency to omit certain species in the population, thus, upcoming works are encouraged to utilize random sampling techniques for a more representable sample. Also, this paper did not consider the role of mindfulness, justice, organizational, and co-worker support on the scrutinized associations. Spiritual leadership and workplace spirituality have been shown to play a moderating role on the association between antecedents of burnout; what remains unclear is the role spiritual leadership and workplace spirituality play in the link between antecedents and boreout, the opposite of burnout. Another fruitful research avenue could be knowledge-related outcomes, such as individual sharing, hiding, sabotage, and the like. Finally, the model could be tested in other industries and countries as spirituality varies across countries and cultures.

5.4 Conclusion

The present research provides a new direction for underexplored spirituality and service innovative outcomes. Building on the relational energy theoretical framework, this study explores the influence of spiritual leadership on workplace spirituality and service innovative behavior, and the mediating role of workplace spirituality on the relationship between spiritual leadership and service innovative behavior. We contribute to literature theoretically and empirically by proving the presence of the path between spirituality and innovative work outcomes in a non-Western context. We found that spiritual leadership enhances workplace spirituality and service innovative behavior; workplace spirituality enhances service innovative behavior and also mediated the relationship between spiritual leadership and service innovative behavior.

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Predhodniki inovativnega vedenja v storitveni dejavnosti: vloga poduhovljenega vodenja in duhovnosti na delovnem mestu

Ozadje/namen: Vodje v delovno intenzivnih panogah se soočajo z izzivi, kako spodbujati inovacije, saj storitve večinoma opravljajo zaposleni in ne stroji. Močna konkurenca na področju storitev in gostinstva zahteva bolj inovativno delovno vedenje zaposlenih; vprašanje, kako lahko podjetja negujejo inovativno vedenje, pa ostaja neodgovorjeno. Cilj raziskave je z uporabo teorije relacijske energije pojasniti medsebojno razmerje med poduhovljenim vodenjem in duhovnostjo na delovnem mestu ter kako lahko njun skupni učinek vpliva na inovativno vedenje zaposlenih v gostinstvu.
Metodologija: Podatke smo zbrali z anketiranjem n = 867 zaposlenih v jordanskih hotelih s štirimi ali petimi zvezdicami. Za oceno predlaganega raziskovalnega modela in preverjanje hipotez je bila uporabljena tehnika modeliranja strukturnih enačb z delnimi najmanjšimi kvadrati (PLS-SEM).
Rezultati: Poduhovljeno vodenje vpliva na in povečuje raven duhovnosti na delovnem mestu in služi inovativnemu vedenju med zaposlenimi. Duhovnost na delovnem mestu povečuje raven storitvenega inovativnega vedenja in posredno vpliva na povezavo med poduhovljenim vodenjem in inovativnim vedenjem na delovnem mestu.
Zaključek: Pobude in prakse poduhovljenega vodenje in duhovnosti na delovnem mestu so lahko koristne za gostinska podjetja v smislu inovativnega obnašanja storitev. Poleg tega je ključna točka, da se strokovnjaki za kadrovske zadeve v gostinstvu ne osredotočajo le na izbiro, usposabljanje in imenovanje voditeljev z duhovnimi lastnostmi, temveč tudi na ustvarjanje duhovnega delovnega ozračja, ki zaposlenim omogoča, da pokažejo inovativno vedenje pri storitvah. Rezultati niso samo dopolnili našega znanja o povezanosti in pomenu duhovnosti na delovnem mestu, ampak tudi potrjujejo in razkrivajo pomen duhovnosti za inovativno vedenje v arabskem kontekstu.

Ključne besede: *Vedenje, Inovativnost, Jordan, Služba, Duhovno vodstvo, Duhovnost na delovnem mestu*

Appendix I: Measurement Items

Spiritual Leadership	Mean	SD
Vision		
1. "I understand and am committed to my organization's vision".	3.84	1.14
2. "My workgroup has a vision statement that brings out the best in me".	3.96	1.06
3. "My organization's vision inspires my best performance".	3.84	1.09
4. "I have faith in my organization's vision for its employees".	3.83	1.06
5. "My organization's vision is clear and compelling to me".	3.88	1.10
Hope/faith		
1. "I have faith in my organization, and I am willing to do whatever it takes to ensure that it accomplishes its mission"	3.96	1.09
2. "I persevere and exert extra effort to help my organization succeed because I have faith in what it stands for"	4.02	1.03
3. "I always do my best in my work because I have faith in my organization and its leaders"	4.00	1.02
4. "I set challenging goals for my work because I have faith in my organization and want us to succeed"	3.67	1.18
5. "I demonstrate my faith in my organization and its mission by doing everything I can to help us succeed"	4.03	1.02
Altruistic love		
1. "My organization really cares about its people"	3.67	1.18
2. "My organization is kind & considerate toward its workers, and when they are suffering, wants to do something about it"	3.73	1.11
3. "The leaders in my organization walk the walk as well as talk the talk"	3.74	1.15
4. "My organization is trustworthy and loyal to its employees"	3.66	1.19
5. "My organization does not punish honest mistakes"	3.62	1.18
6. "The leaders in my organization are honest and without false pride"	3.76	1.10
7. "The leaders in my organization have the courage to stand up for their people"	3.69	1.18
Workplace Spirituality		
Meaningful work		
1. "I experience joy in work"	3.82	1.14
2. "Spirit is energized by work"	3.85	1.03
3. "Work is connected to what I think is important in life"	3.90	1.02
4. "I look forward to coming to work"	3.81	1.05
5. "I see a connection between work and social good"	3.83	1.03
6. "I understand what gives my work personal meaning"	4.00	0.96
Sense of community		
1. "Working cooperatively with others is valued"	4.04	1.11
2. "I feel part of a community"	4.05	1.01
3. "I believe people support each other"	3.80	1.06
4. "I feel free to express opinions"	3.80	1.10
5. "I think employees are linked with a common purpose"	3.74	1.07
6. "I believe employees genuinely care about each other"	3.70	1.09

Appendix I: Measurement Items (continues)

7. "I feel there is a sense of being a part of a family"	3.75	1.12
Alignment of values		
1. "I feel positive about the values of the organization"	3.81	1.12
2. "Our organization is concerned about the poor"	3.64	1.15
3. "Our organization cares about all its employees"	3.60	1.16
4. "Our organization has a conscience"	3.78	1.08
5. "I feel connected with the organization's goals"	3.76	1.04
6. "Our organization is concerned about health of employees"	3.77	1.08
7. "I feel connected with the mission of the organization"	3.81	1.01
8. "Our organization cares about whether my spirit is energized"	3.75	1.09
Service Innovative Behavior		
1. "At work, I come up with innovative and creative notions"	3.87	1.04
2. "At work, I try to propose my own creative ideas and convince others"	3.92	0.96
3. "At work, I seek new service techniques, methods, or techniques"	3.97	0.93
4. "At work, I provide a suitable plan for developing new ideas"	3.93	0.96
5. "At work, I try to secure the funding and resources needed to implement innovations"	3.90	0.98
6. "Overall, I consider myself a creative member of my team"	4.01	1.01

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Narcissistic Leadership and Workplace Deviance: A Moderated Mediation Model of Organizational Aggression and Workplace Hostility

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Background: Workplace Deviance are among the most common phenomena observed in organizations. This might be attributed to narcissistic style of leadership and the manifestations of organizational aggression. It is further aggravated by increased workplace hostility. The main purpose of this research is to observe the impact of moderated mediation of organizational aggression and workplace hostility upon the relationship between narcissistic leadership and workplace deviance.
Methodology: A cross-sectional investigation was conducted using self-survey method. With 673 participants in the study, the author used an electronic questionnaire (Google Forms) to collect data from employees working at five food product companies in Iraq. Mediation model, moderation analysis, and moderated mediation models were evaluated using Structural Equation Modeling (SEM) for which AMOS V.23 software was used.
Results inferred that organizational aggression partially mediates a positive relationship between narcissistic leadership and workplace deviance. Further, the relationship between organizational aggression and workplace deviance depends on the changes in level of workplace hostility. Moreover, the study empirically supports the fundamentals of moderated mediation model. In other terms, the study infers that indirect effect of narcissistic leadership in workplace deviance through organizational aggression has been significantly moderated by workplace hostility.
Conclusion: When leaders adopt narcissistic behaviors to achieve their personal interests, it leads to increased organizational aggression and workplace deviance that eventually increase the levels of workplace hostility. Accordingly, moderated mediation model provides a better understanding about how narcissistic leadership, organizational aggression, and workplace hostility all work together to influence workplace deviance.

Keywords: *Narcissistic leadership, Organizational aggression, Workplace hostility, Workplace deviance*

1 Introduction

Narcissistic leadership is one of the leadership styles in which the leader does not care about his followers whereas his or her only priority is to project himself. Such a leader possess characteristics such as arrogance, domination, hostility etc. (Aboramadan et al., 2021). Further, they create a hostile work environment among his or her followers too (Redondo et al., 2017). As time passes by, the gap among the employees increases and the hostility in their workplace rises to an unprecedented level which can be understood by organizational aggression and selfish behavior of the narcissistic leader (Yildiz & Alpkan, 2015).

Narcissistic leaders bring specific groups of workers close to them and stay away from other groups (Fatfouta, 2019). This characteristic increases the organizational ag-

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gression among groups and workers adopt aggressive behavior that harms other groups (Olson et al., 2006). Organizational aggression often originates from the groups that are close to the leader. Continuous arrogance and authoritarian behavior and partiality towards other groups who do not admire his or her behavior results in the development of a hostile work environment (Ghislieri et al., 2019). It negatively affects the creativity and leads to a decline in organizational loyalty, these consequences drive the workers to deviate from their workplace (Bowles & Gelfand, 2010). Because the employees feel they are treated unequally, and loss of harmony and compatibility between the leader and rest of the employees create an unrest in the organization (Nevicka et al., 2013).

Employees who are loyal to the narcissistic leader are the first ones to implement deviance in their work environment. This phenomenon occurs since such employees feel that they are supported by the leader (Rahman et al., 2018; Judge et al., 2006a). This motivates other groups to get drawn towards the workplace deviance behavior, because they feel unfair treatment is rendered to them in a hostile work environment (Rosenthal, 2006). The employees further feel pushed towards deviation in the workplace and express it as an aggressive behavior against the behavior of narcissistic leader (Burton & Hoobler, 2011) Who always seeks to achieve his self-interest rooted in his self-egomaniacal belief (Aboramadan et al., 2021) In this case, thoughts of deviation and aggression rising due to the leader narcissism, and the subsequent harmful behaviors of the followers (Tiwari & Jha, 2021).

Based on the previous studies, there is a need arise here to conduct more studies on the relationship among narcissistic leadership, and aggressive and deviant behaviors in the workplace (Michel & Bowling, 2013) add to that and after reviewing the literature concerning narcissistic leadership, we found only one study, which examined the links between leader narcissism and workplace deviance (Judge et al., 2006a). On the other hand, escalation effects of the narcissism in creating aggressive behaviors in the work environment and the exacerbation of its effects on the career level (Li et al., 2016). It is also very important to understand the causes of deviant behaviors in the food industry and the resulting frustration and exhaustion at work, and to determine their future treatments. (Jacinto et al., 2009). The need for current research is evident through increasing adoption of leaders to narcissistic traits that stimulate emergence of deviant and hostility behaviors among employees in the industrial sector and to diagnose their effects on performance. The current research work refers to a number of scientific contributions that established the relationship between the above-mentioned variables by adopting moderated mediation model among food product companies in Iraq. The current research work has a framework to achieve achieving four goals which are given herewith; first is to diagnose the extent of link between narcissistic leadership, organizational aggression, and hostility in the workplace with that of the workplace deviance. The second goal is to examine whether organizational aggression mediates the relationship between narcissistic leadership and workplace deviance. The third goal is to ascertain the moderated role played by workplace hostility in the relationship between organizational aggression and workplace deviance. Fourth goal is to understand the impact of narcissistic leadership on workplace deviance through organizational aggression conditions on increasing levels of workplace hostility.

2 Theoretical Background

2.1 Narcissistic leadership

Narcissism is a personality trait that includes grandiosity, arrogance, aggression, loss of self and entitlement, fragile self-respect, and hostility towards others (Fatfouta, 2019). Narcissistic leaders possess leadership beliefs and styles which are generally motivated by their needs for power and admiration, rather than emotional concern for components and organizations which they lead (Rosenthal, 2006). Narcissistic leaders feel that they must rely on themselves rather than others to satisfy their needs of life. They fake self-sufficiency (Nevicka et al., 2013; Huang et al., 2020). In narcissistic leadership, leaders' actions are primarily driven by their selfish needs and beliefs. Narcissistic personality is a great sense of self-importance, preoccupied with illusions of unlimited success and power, excessive need for admiration, envy, inferiority, and hypersensitivity (Fatfouta, 2019). It also leads to excessive self-centered behavior, manipulation, lack of empathy, and exploitation of others. Moreover, these aspects may translate into a competitive and unreliable climate which negatively affects the organizational culture (Ong et al., 2016). Narcissistic leaders like to be in professional environments that allow their narcissism to thrive, they look for organizations that tolerate their narcissistic traits. If an organization does not appreciate these traits, they avoid such organizations with flourishing cultures that are mission-focused (Anderson et al., 2007). Further, they look for hostile environments for their narcissism to thrive (Hellmich & Hellmich, 2019). These characteristics make narcissists more inclined towards leadership positions. It ultimately results in negative consequences, in terms of decreased support, for follower's professional growth and poor work quality (Ghislieri et al., 2019).

2.2 Organizational aggression

Organizational aggression is defined as a behavior exhibited by a person who intends to harm another party. It is similar to chronic stress in the workplace which results in a state of panic, psychological and emotional stress in

the organization (Ersan, 2020). Aggression is highly dangerous if it is issued by the leadership towards specific categories of employees (Hershcovis & Barling, 2010). Aggression behaviour can be understood through intentional harming of one or more persons or even the organization. It may involve personal aggression too, driven by factors within the organization (Wittmer et al., 2013). Aggression within organizations may have several causes such as type of leadership and the approximation of some employees while rejecting other categories. This scenario creates aggression and workplace deviance for some groups from the right path, especially those employees who are close to the leader (Bryant & Smith, 2001). In the United States of America and Europe, researchers estimated that organizational aggression costs organizations billions of dollars annually. These costs include direct costs such as workers' compensation, and indirect costs such as employee withdrawal behaviors or shareholder depreciation (Olson et al., 2006).

Aggressive behavior can otherwise be detailed as an individual or group social interaction that intends to harm the group or the company. There are two types of aggressions present such as emotional and reactive or vengeful aggression. While the latter occurs as a response to provocation and the former includes the means or directed towards a goal or predation (Bushman & Anderson, 2001).

A number of classifications and dimensions of aggression has been suggested so far. Aggression may be in kind of forms such as verbal or physical, whether or not harm is intended to others and whether it is actively carried out or expressed negatively (Ramirez & Andreu, 2006). The classification may also include emotions associated with aggression (such as anger) and mental states (such as impulsivity and hostility) while aggression may occur in response to social and antisocial factors (Ersan, 2020).

2.3 Workplace hostility

Workplace hostility may include physical actions, such as standing close to an individual, blocking doorways, and turning around hallways, Workplace hostility may also include subtle, but equally-frightening behavior, such as exclusion of individuals (Dickmann & Watson, 2017). Hostility of the workplace negatively affects innovation and results in reduced organizational loyalty, the employees tend to move towards workplace deviance due to inequality in such hostile environment. Such behaviour is characterized by uncertainty during when it becomes highly challenging to obtain accurate information in a timely manner (Calantone & Di Benedetto, 1994). The risks of working in such hostile work environments reduce the employees' ability to cope up which eventually cause stress among the employees. This stress reduces the employees' levels of adaptation to their environment and makes them undergo a phase of psychological burnout, isolation and increased levels of stress (Vance et al., 2004). Likewise, gender discrimination at work also increases the stress and make work environment hostile in the form of usage of vulgar words when dealing with employees, deliberate rejection of the leadership towards specific groups, sexual harassment and the lack of treatment (Walker, 2018; Worley & Worley, 2020). Workplace turns hostility when leadership acts in a determined and intended manner to make the employee resign in retaliation for some actions. For example, employers force employees to resign by imposing undue discipline, reducing working hours, reducing wages, or transferring the complaining employee to a remote workplace (Maneethai, 2019).

2.4 Workplace deviance

Workplace deviance can be defined as any behavior that violates the values and standards of a governing society (Fagbenro & Olasupo, 2020). These values and standards may be known or unknown while the deviant act harms and damages others and their private and public properties (de Lara et al., 2007). Workplace deviance is a voluntary behavior that violates the organizational rules, it is adopted by an individual or a group of people who endanger the health of other employees or the organization (Bowles & Gelfand, 2010). Workplace deviance behavior is understood through different forms such as extortion of money, abuse of position, sexual harassment, gross disobedience, acceptance of fraud, impersonation, distortion of employee records, and manipulation (Fagbenro & Olasupo, 2020; Abbas & Al Hasnawi, 2020). Workplace deviance is a global phenomenon that has begun to spread widely in the recent years. It includes the exploitation of the employee and resources of an organization to achieve personal or collective benefits in violation of honor and official regulations (Bennett & Robinson, 2000).

Workplace deviance has multiple negative effects, the most important of which are loss of job integrity, robbing honor and neutrality of an employee and broken justice and equality between individuals and the groups (Robinson & Bennett, 1995). When employees suffer from weak relationships with the leader and when they receive fewer resources, responsibilities, and results for the same job title for many years, their behavior is likely to turn negative which can be understood through their performance (Malik & Lenka, 2018).

2.5 Hypotheses development

Nowadays, organizations undergo different challenges and crises who hinder the growth of the organization. These events may affect the behavior of the leader and subordinates in the organization (Yildiz & Alpkan, 2015). Especially, when the leader has narcissistic char-

acteristics, this growth hindrance reflects on the employees in the form of aggression (Jørstad, 1996). Therefore, tools with psychometric safeguards are needed to assess aggression, anger and hostility among aggressive leaders (Judge et al., 2006a). These variables indicate the intensity of aggression and violence committed by leaders towards their employees. These are highly essential and should be considered when designing specific and effective intervention programs for these groups of leaders (Redondo et al., 2017). Extremely high levels of a leader's narcissistic traits are often associated with significant social impairment, increased alcohol use, aggressiveness, and antisocial behavior (Semenyna, 2018). Leadership narcissism affects individuals' relationships within the work environment and provokes aggressive behavior for them to achieve self-gain (Michel & Bowling, 2013). Therefore, narcissists aggress others once they feel that their ego is loomed up (Mousa et al., 2020). Also, workplace deviance may be a violation of laws, rules, and regulations that govern the relationship of individuals with each other and with that of the public or private organization (Fagbenro & Olasupo, 2020). This deviation occurs due to several reasons, including employees' exposure to organizational aggression by their leader or by other groups that are loyal to the leader (Michel & Bowling, 2013). When their interests conflict with other groups in the same workplace, this makes the workers resort to workplace deviance (Rahman et al., 2021; Rahman et al., 2020; Yildiz & Alpkan, 2015). In addition, the lack of harmony between workers in the same organization increases ostracism and hostility between individuals, and they divide into groups that supports the leader or oppose them which is in conflict with them (Judge, 2006b). The narcissistic type of leader often reacts in an aggressive manner to negative opinions and criticism, which in turn is reflected in employee deviation (Mousa et al., 2020). In contrast, employees with negative work climates will be more inclined to morally disengage when they experience perceived narcissistic supervision and implement organizational deviance (Zhang et al., 2018). This gets reflected in low performance of the individuals, lack of commitment, and weak organizational loyalty. All these factors together cause workplace deviance, due to these negative behaviors (Alavosius, 2008).

Based on the above discussion, the following hypotheses are proposed.

Hypothesis 1: Narcissistic leadership positively affects organizational aggression.

Hypothesis 2: Organizational aggression positively affects workplace deviance.

Hypothesis 3: Narcissistic leadership positively affects workplace deviance.

Hypothesis 4: Workplace hostility positively affects workplace deviance.

Some researchers argue that the negative impact of narcissistic personality of the leader leads to an increase in organizational aggression among workers (Li et al., 2016; Redondo et al., 2017). This phenomenon is represented by physical aggressive behavior since a group of employees feel dejected by their leader, and they feel they are contemptuous of the leader which finally ends their deviation (Michel & Bowling, 2013). Traits of narcissism also stimulate aggression, arrogance, and control over others (Rosenthal, 2006).

These characteristics encourage more workplace deviance (Malik & Lenka, 2018). Especially if the narcissistic leader continue pressurizing the employees, it gets converted into aggression and is reflected by increased workplace deviance (Ghislieri et al., 2019). Negative work conditions increase aggression among workers. If a hostile environment is available, it is considered as a predisposing factor for organizational aggression. This situation may develop further, and becomes highly dangerous and turns into quarrel and attacks in the work environment (Posthuma et al., 2019). The leader's negative behavior and increased practicing of psychological terror towards employees leads to an increase in organizational aggression. It turns into a violent phase of systematic attack against colleagues or subordinates (Godhardt, 2017). and this effects increase with the hostile climates of the work environment, such as poor relations with colleagues and weak cooperation in completing tasks (Greitemeyer & Sagioglou, 2017). The individual leaves the organization or reaches a state in which he or she could not practice the profession and lose commitment to it which also drives him or her towards deviance (Krsnik Horvat & Pagon, 2012). The arrogant and selfish behavior of the narcissistic leader may contribute in the creation of increased organizational aggression among workers. All of these qualities turn the organization dysfunctional, influence workers not to be committed towards the organization's goals and mission and search for their personal interests. The hostility of the work environment increases further and results in lower performance. Finally, most workers exhibit workplace deviation in their behavior and functioning (Goldman, 2009). Based on the above discussion, the following hypotheses are proposed.

Hypothesis 5: Organizational aggression mediates the relationship between narcissistic leadership and workplace deviance.

Hypothesis 6: Workplace hostility moderates the relationship between organizational aggression and workplace deviance.

Hypothesis 7: There is an indirect effect of narcissistic leadership in the workplace deviance of organizational aggression conditional on increased workplace hostility.

Based on the above hypotheses, the conceptual model shown in Figure 1 is proposed.

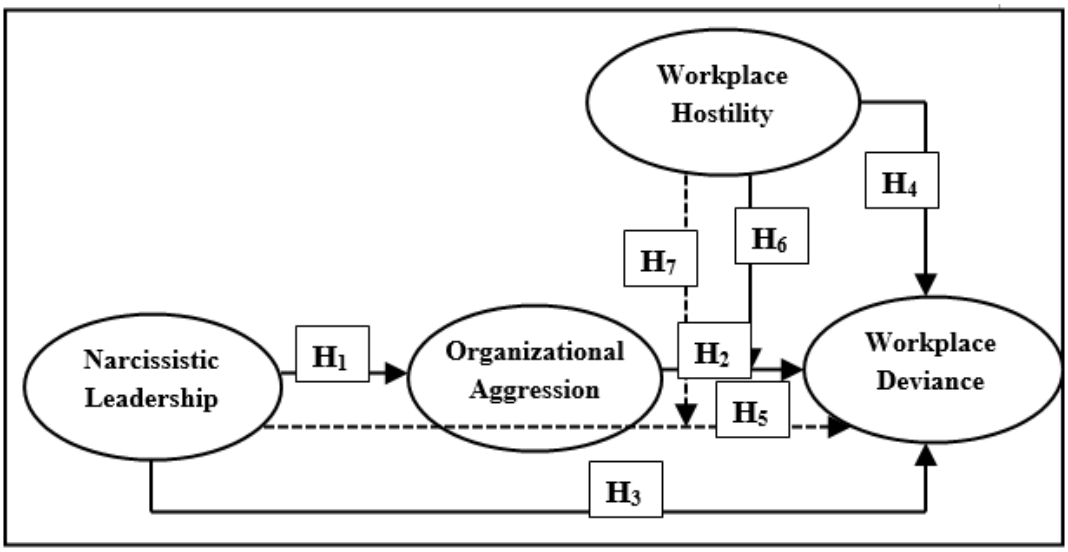

Figure 1: The conceptual model of research

3 Methodology

3.1 Sample and data collection

Food production sector in Iraq was chosen as the study setting since it has a heavy role in influencing the lives of citizens and it is important in the economic growth of the country. The data was collected in September 2020 by randomly selecting employees who work in five food product companies under different departments such as administration, technical, marketing and production. Online data was collected through questionnaire using google forms. A total of 673 completed questionnaires was selected for statistical analysis which represent 39% of the total population. Unfilled and partially-filled questionnaires were ignored for further analysis. The staff were given 10 days to complete the survey. Table 1 illustrates the distribution of sample among the companies under study.

Among the study population, 5% of the participants hold a higher degree, whereas 69% people completed their university studies whereas rest of the proportion remain on hold a high school degree. Out of the total samples, males were (64%) whereas females were (36%). The ages of the respondents were in the range of (21) to (63) years. In terms of nature of activity, (48%) workers function under production department while the remaining (52%) people work in administrative and technical departments.

Table 1: No. of samples collected from each company

Company name	Number of filled questionnaire
The General Co. for Food Products	204
Tariq Food Products Co.	81
Etihad Food Industries Co. Ltd.	174
Advanced Foodstuff Industrial Co.	122
Yafa Co. foods industries	92
Total Sample	673

3.2 Measures

Narcissistic leadership: This variable is measured on the basis of (Fung et al., 2019). The measure included four sub-dimensions: Entitlement / exploitativeness (EE) 4 items, Authority / Leadership (AL) 4 items, Superiority / Arrogance (SA) 4 items, and Self-admiration / Self-absorption (SS) 4 items.

Organizational Aggression: This variable is calculated on the basis of (Bryant & Smith, 2001) and includes four dimensions such as Physical Aggression (PA) 9 items, Verbal Aggression (VA) 5 items, Anger (AN) 7 items, Hostility (HO) 8 items.

Workplace Hostility: This variable is measured on the basis of (Selden & Downey, 2012) and includes three dimensions: Interference with Work (IWW) 14 items, Denigration (DE) 11 items, Exclusion (EX) 5 items.

Workplace deviance: This measure was adopted from (Bennett & Robinson, 2000) and includes two dimensions namely, Interpersonal Deviance (ID) 7 items and Organizational Deviance (OD) 12 items.

4 Data analysis and results

4.1 Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis (CFA) confirm the existence of a relationship between dimensions and items. Further, it ensures that the items do not go to all dimensions and every dimension is represented by a clear and appropriate number of non-measured items (Al Hasnawi & Abbas, 2020). When performing CFA analysis for four variables, it becomes clear whether The Standards Loadings of all items are acceptable and exceeds the ratio of 0.40 (Holtzman & Sailesh, 2011). The values were found to be significant since the critical ratio for them were significant values, as shown in Table 2. Structural models for variables has a high degree of fit and, and values of the Compound Reliability coefficient has exceeded (0.7). the values of the Average Variance Extracted (AVE) for the variables were good and exceeded (0.50) (Hair et al, 2017), as shown in Table 3. Table 4 shows Cronbach's Alpha, descriptive statistics and the correlation coefficient among the variables.

Table 2: The Standard Loadings, Critical Ratios for Measurement model

Narcissistic Leadership			Organizational Aggression			Workplace Hostility			Workplace Deviance		
Items	Loading	Critical Ratio	Items	Loading	Critical Ratio	Items	Loading	Critical Ratio	Items	Loading	Critical Ratio
EE1	.602	5.448	PA1	.561	***	IWW1	.786	9.032	ID1	.885	7.387
EE2	.578	5.273	PA2	.796	7.500	IWW2	.802	10.107	ID2	.912	5.882
EE3	.791	6.925	PA3	.802	7.507	IWW3	.894	5.832	ID3	.726	***
EE4	.632	***	PA4	.600	6.898	IWW4	.961	7.174	ID4	.671	6.135
AL1	.758	***	PA5	.776	7.788	IWW5	.954	6.180	ID5	.634	6.688
AL2	.584	5.989	PA6	.731	6.226	IWW6	.654	6.627	ID6	.817	5.864
AL3	.842	9.108	PA7	.689	5.243	IWW7	.863	***	ID7	.662	5.255
AL4	.763	6.953	PA8	.510	4.317	IWW8	.629	6.514	OD1	.695	8.286
SA1	.544	5.692	PA9	.979	5.001	IWW9	.662	6.653	OD2	.810	8.738
SA2	.619	5.679	VA1	.793	***	IWW10	.680	7.564	OD3	.673	***
SA3	.822	9.175	VA2	.792	5.612	IWW11	.808	7.213	OD4	.762	7.583
SA4	.789	***	VA3	.649	5.338	IWW12	.722	7.210	OD5	.704	8.357
SS1	.764	4.446	VA4	.753	5.162	IWW13	.692	8.322	OD6	.756	7.490
SS2	.741	7.407	VA5	.646	5.318	IWW14	.954	6.808	OD7	.782	6.380
SS3	.933	8.332	AN1	.679	5.495	DE1	.802	6.940	OD8	.679	6.354
SS4	.678	***	AN2	.565	***	DE2	.704	***	OD9	.645	7.380
			AN3	.766	7.107	DE3	.464	5.424	OD10	.892	6.323
			AN4	.698	5.555	DE4	.648	7.344	OD11	.616	5.964
			AN5	.723	7.728	DE5	.796	7.108	OD12	.663	5.289
			AN6	.712	7.541	DE6	.859	7.564			
			AN7	.801	8.589	DE7	.851	6.307			
			HO1	.876	7.541	DE8	.710	6.520			
			HO2	.752	***	DE9	.629	7.297			
			HO3	.697	7.443	DE10	.761	9.412			
			HO4	.743	7.960	DE11	.907	12.483			
			HO5	.726	7.445	EX1	.837	***			
			HO6	.923	7.830	EX2	.870	13.992			
			HO7	.538	6.621	EX3	.772	9.883			
			HO8	.565	7.218	EX4	.722	8.645			
						EX5	.829	10.444			

4.2 Hypothesis testing

4.2.1 Test hypotheses of direct effect

Direct effect hypotheses were tested based on regression analysis method using SPSS V.24 software. As shown in Table 5, a significant positive effect was observed between narcissistic leadership and organizational aggression (β = .613, p <.01, R2 = .376) and this result supports (H1). It is also evident from Table 5 that there is a significant effect of organizational aggression upon workplace deviance (β = .541, p <.01, R2 = .292). Therefore, (H2) is supported. A significant effect of narcissistic leadership is evident in workplace deviance (β = .482, p <.01, R2 = .232) which supports (H3). A significant effect was found between workplace hostility and workplace deviance (= .374, p <.01, R2 = .140) due to which (H4) is supported.

4.2.2 Hypothesis testing for mediating effect

Figure 2 shows the structural model of mediating effect of organizational aggression upon the relationship between narcissistic leadership and workplace deviance. It is evident from the figure that there is a direct and significant

Table 3: Fit indices, Discriminant and convergent validity Indices for research variables

Fit Indices, Discriminant and convergent validity Indices	Narcissistic Leadership	Organizational Aggression	Workplace Hostility	Workplace Deviance
χ^2	1089.312	933.845	1288.440	1108.220
CMIN/DF	2.126	1.993	2.471	2.055
GFI	.925	.908	.914	.919
CFI	.958	.933	.942	.949
IFI	.963	.938	.947	.954
TLI	.916	.901	.910	.918
RMSEA	.060	.076	.068	.056
Composed Reliability (CR)	0.918	0.918	0.884	0.808
Average Variance Extracted (AVE)	0.557	0.617	0.528	0.523
The Square Root (AVE)	0.746	0.785	0.727	0.722
Maximum Shard Variance (MSV)	0.376	0.376	0.376	0.376
Maximum Reliability MaxR(H)	0.929	0.926	0.901	0.816

Table 4: Cronbach's Alpha, Descriptive statistics, and the correlation coefficient

Variables	α	M	SD	1	2	3	4
1. Narcissistic Leadership	.829	3.118	.774	1			
2. Organizational Aggression	.784	3.223	.765	.613**	1		
3. Workplace Hostility	.746	3.177	.806	.483**	.517**	1	
4. Workplace Deviance	.868	2.965	.929	.482**	.541**	.374**	1
***Correlation is Significant at the .01 level, n=673.*							

Table 5: Hypotheses testing for direct effect between the variables

Regression Paths	*B*	*t*	*P*	R^2
NarLea —> OrgAgg	.613**	20.113	.000	.376
OrgAgg —> WorDev	.541**	16.646	.000	.292
NarLea —> WorDev	.482**	14.256	.000	.232
WorHos —> WorDev	.374**	10.436	.000	.140
*Notes: n=673. **p<0.01*				

impact created by narcissistic leadership upon workplace deviance (β = .24, p <.01). As per Table 6, the presence of an indirect impact of narcissistic leadership upon workplace deviance through the mediating role of organizational aggression (β = .238, p <.01) is confirmed. With regards to the value of coefficient of determination (R2 = .332), narcissistic leadership and organizational aggression result in (33%) of the changes that occur in workplace deviance. Thus, it is inferred that organizational aggression partially mediates the relationship between narcissistic leadership and workplace deviance. The study results supports (H5).

4.2.3 Hypothesis testing for moderation effect

From Figure 3, it is evident that the regression coefficient of interaction variable (β = .29, p <.01) is a significant value through (R2) value as shown in Table 7. It is evident from the figure that the first regression model reached explanatory ability (R2 = .258) and the second regression model (R2 = .371) was attained. This indicates a positive difference between two models in (R2) value that reaches the (Change of R2 = .113). Further, this difference is due to the entry of interaction variable as third variable in second regression model. Through the application of effect size equation (f 2), it becomes clear that the workplace hostility, by interacting with organizational aggression, resulted in workplace deviance and it reached (.180) according to (Selya et al., 2012). Figure 4 shows the graph of interactive relationship among the research variables. Thus, the results support (H6).

4.2.4 Moderated mediation model test

The moderated mediation regression analysis determines whether workplace hostility increases the indirect effect of narcissistic leadership in workplace deviance through organizational aggression at the companies under study. Figure 5 and Table 8 show the parameters of for moderated mediation regression model. As a regression coefficient of interaction variable between organizational aggression and workplace hostility, in the presence of independent variable, narcissistic leadership (β= .17, p <.01) remained a significant value. The value of coefficient of

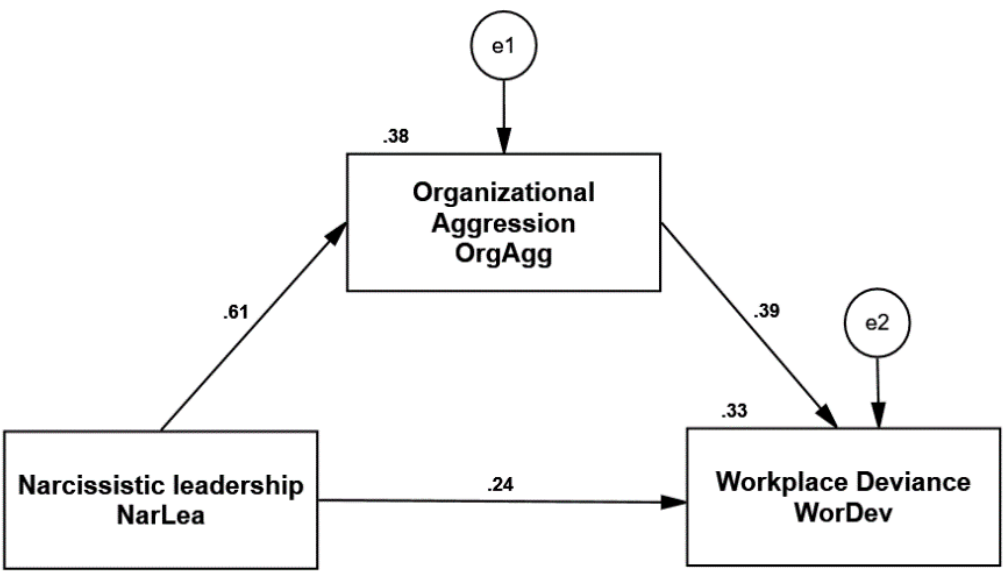

Figure 2: Hypothesis test of the mediating effect

Table 6: Hypothesis test parameters for mediating effect

Regression Paths	Direct Effect	Indirect Effect	Total Effect	R^2
NarLea —> WorDev	.241	-	.479	.332
NarLea —> OrgAgg —> WorDev	-	.238		

determination (R2 = .38) was higher than its value in all existing regression models.

This proved the usefulness of the moderated mediation model. Three levels of standard deviation of the moderated variable were also tested for workplace aggression (low, medium, and high). The results showed that the negative impact of organizational aggression in workplace deviance tend to increase with workplace hostility levels. Through bootstrapping test, the conditional indirect effects of narcissistic leadership on workplace deviance through organizational aggression were examined at three different workplace hostility levels (low, medium, and high) as shown in Table 9. The results showed that conditional indirect effect increased, when the levels of workplace hostility increases. Thus, it has been proven that the moderated mediation model is significant (p = .0042) which confirms that the mediating effect has been moderated through workplace hostility. Thus, the current result supports (H7).

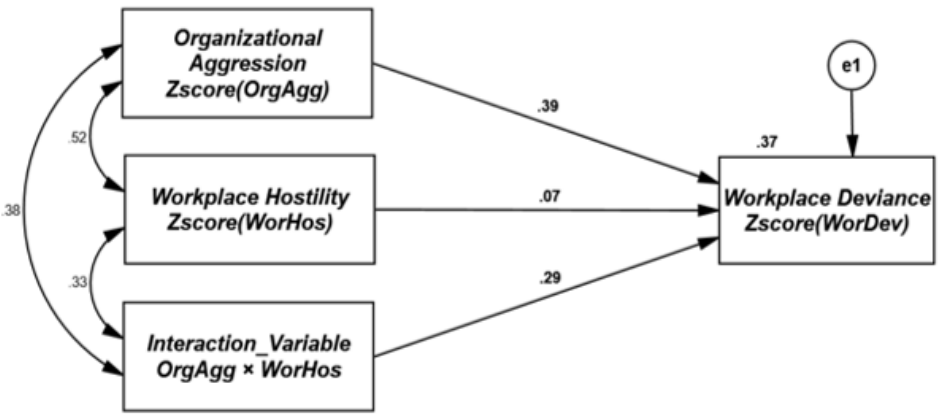

Figure 3: Hypothesis test of the moderated effect

Table 7: Hypothesis testing parameters for the moderated effect

Regression Paths	Estimate	S.E.	C.R.	P	R^2
ZOrgAgg —> ZWorDev	.394	.037	10.664	***	Model 1
ZWorHos —> ZWorDev	.074	.036	2.051	.040	R^2 = .258
Interaction Var. —> ZWorDev OrgAgg × WorHos	.243	.028	8.544	***	Model 2 R^2 = .371

5 Discussion

The results from hypothesis testing infer that narcissistic leadership has a direct impact on both organizational aggression and workplace deviance. This is embodied through narcissistic behaviors exhibited by the leader to achieve personal gain. But the phenomenon results in the emergence of some aggressive manifestations among employees (Rosenthal & Pittinsky, 2006). Also, aggressive behavior of narcissistic leaders, when dealing with followers, leads to the emergence of a state of hatred and indifference between the leader and his followers. It further establishes a state of organizational aggression in the future (Jørstad, 1996). Such leaders fail to establish positive relationships with their followers in the organization. They leverage their skills to create a suitable work environment for their goals in which their self-interests can be attained (Higgs, 2009). Such leaders exhibit contradictory behaviors whose behaviors differ and negatively influence in the performance of their followers. This scenario results in aggression, workplace deviance, and inappropriate environment for work (Al Hasnawi & Abbas, 2020).

It is also evident from hypotheses testing that there is a direct effect of organizational aggression upon workplace

deviance. The deviation in job behavior indicates the existence of ethical crisis in behavior. This further can be understood through imbalance in values and deviations in attitudes. Mostly, it gets expressed through sound controls and standards that may be due to aggressive behaviors in work environment (Yildiz & Alpkan, 2015). The employees who are exposed to aggression are likely to get dissatisfied or absent for their work or leave or change their jobs. Thus, the reduction in employee participation can be understood through their work performance which in turn increases the number of workplace deviance cases (Michel & Bowling, 2013).

The results further infer that workplace hostility directly impacts the employees and induce workplace deviance. This phenomenon can be confirmed through interference with work, distortion of reputation, gossip, self-love and

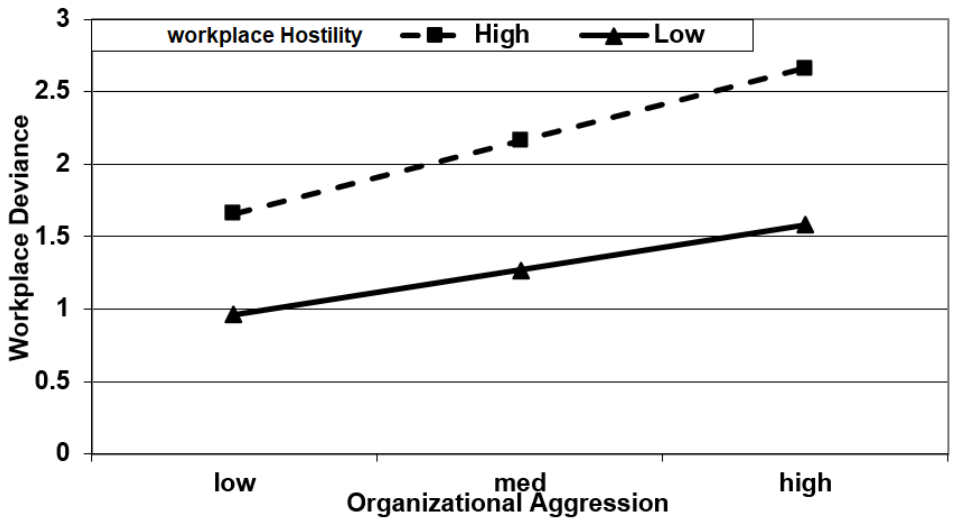

Figure 4: Moderated effect of workplace hostility upon relation between organizational aggression and workplace deviance

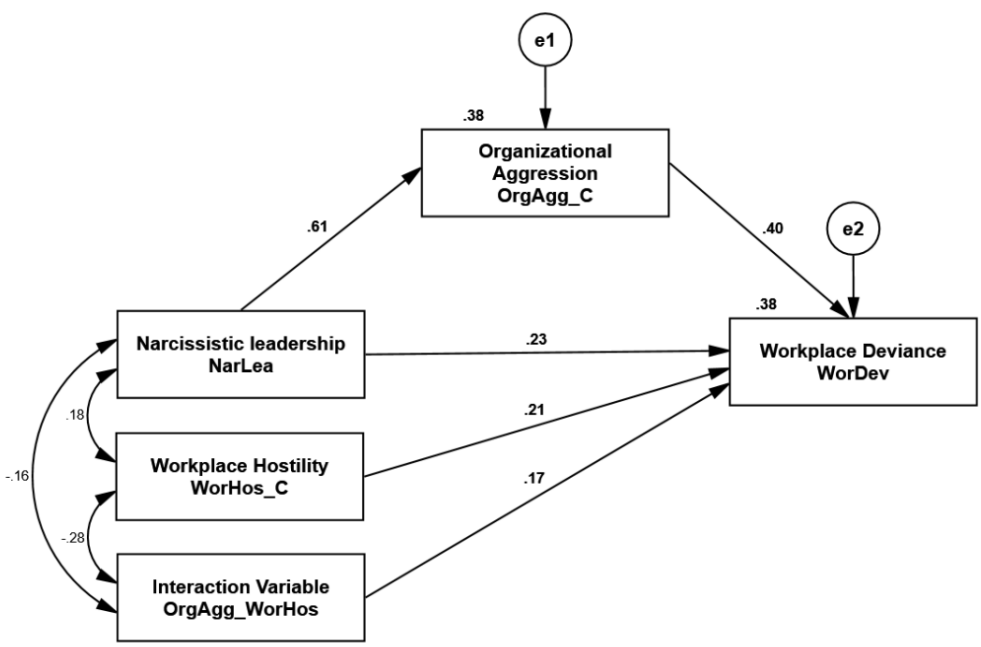

Figure 5: Hypothesis test of the moderated mediation effect

Table 8: Parameters of hypothesis test of the moderated mediation effect

Paths			S.R.W.	Estimate	S.E.	C.R.	P
Narcissistic leadership	—>	Workplace Deviance	.230	.277	.047	5.909	***
Narcissistic leadership	—>	Organizational Aggression	.613	.607	.030	20.128	***
Organizational Aggression	—>	Workplace Deviance	.396	.481	.047	10.316	***
Workplace Hostility	—>	Workplace Deviance	.207	.132	.020	6.500	***
Interaction Var. OrgAgg×WorHos	—>	Workplace Deviance	.170	.093	.017	5.346	***

Table 9: Bootstrapping test of the moderated mediation model

Parameter	Estimate	Lower	Upper	P
Low_SS	.4069	.3157	.5021	.0001
Med_SS	.4812	.3772	.5839	.0001
High_SS	.5599	.4576	.6401	.0000
Low_CIE	.2465	.1396	.3505	.0001
Med_CIE	.2926	.1989	.3836	.0001
High_CIE	.338	.2198	.4429	.0000
Mod_Med	.045	.0223	.0694	.0042

(Low_SS , Med_SS , High_SS) Simple Slope ; (Low_CIE, Med_CIE, High_CIE) Conditional Indirect Effect; (Mod_Med) Hayes Index of Moderated Mediation.

self-preference over others. All these scenarios increase the employees' deviation at workplace (Alavosius, 2008). Also, behavioral patterns in hostile work environments of all kinds may lead to demeaning social behavior and silver gestures that increase employees' tendency to deviate (Gates, 2016). This may lead them to violate job rules and threaten the well-being of an organization (Rahman et al., 2017; Fagbenro & Olasupo, 2020). The results also demonstrated that organizational aggression partially mediates the relationship between narcissistic leadership and workplace deviance. Thus, it is inferred that narcissistic leaders have high aggression rate as a result of their arrogance which can be understood from their aggressive behaviors towards others (Lee et al., 2013). Narcissistic leader may reach a stage in which he or she turns destructive to the organization by implementing excessive aggression at workplace and exhibit aggressive behaviors that push employees to deviate (Beugre, 2005). It is a dark side in organizational work that occurs mainly due to its leader. The consequences get reflected in the deviation of employees, due to aggressive behaviors in workplace (Baars, 2015).

The results further infer that workplace hostility moderates the relationship between organizational aggression and workplace deviance. The behavior of job delinquency arises from several aggressive factors spread across job environment. Its impact gets increased with absence of conscience, wrong family upbringing, weak supervision and disciplinary systems (Bowles & Gelfand, 2010; Selden & Downey, 2012). The employees exhibit laziness in completing the tasks and if done so, the tasks are improper and unfulfilled. This increases the deviations of the employee when they perform their duties related to regularity at work and behavioral, financial and criminal deviations (Bennett& Robinson, 2000; Malik & Lenka, 2018).

The hypotheses testing further established the role played by moderated mediation effect of the variables. The organizational aggression played a mediating effect in the relationship between narcissistic leadership and workplace deviance through workplace hostility. In other terms, the relationship between organizational aggression and workplace deviance was proved in the presence of independent variable. Narcissistic leadership increases with increasing

level of hostility in the workplace. As the hostility of workplace increases, the negative factors in the organization also increase. For instance, the type of leadership that encourages and supports certain groups and aims at them to favor their personal interests. This contributes in providing such leaders a fertile ground for organizational aggression. Such situation turns the organization in a state of uncertainty, loss of stability and motivates the employees to deviate from workplace (Posthuma et al., 2019). Also, organizational aggression continues in the work environment as a result of leadership's failure to interfere in finding quick solutions. This occurs especially if the leadership is isolated from employees as in narcissistic leadership. Such leaders create barriers from their employees and often do not listen to them (Selden & Downey, 2012). The competition among employees often creates a hostile work environment. This environment is mostly created by the leadership characterized by behavioral and social imbalance and those who prefer personal interest over public interest. This behaviors deviates the employees through aggression that may spread among them (Godhardt, 2017).

6 Theoretical and Practical implications

To our best knowledge, this is contribution to supplying literatures with a moderated mediation model of the relationship between narcissistic leadership and workplace deviation by mediating organizational aggression and by adopting workplace hostility as a moderator variable. The current study identified new insights on the level of administrative work regarding current variables. **First**, in general, the current study draws attention of the leaders of companies i.e., the sample considered for the study, towards the negative aspects included in study variables. It may appear in the workplace that narcissistic leaders are busy in proving their sufficiency, strength, beauty, stature and superiority. However, it is striking to know about the behavior of these individuals in terms of personal exploitation of followers and making them live under delusion resulting in workplace deviation during many times (Braun, 2017). **Second**, as per the study results, one of the most common reasons in the emergence of workplace deviance is the prevalence of hostility factors in work environment, especially in food industries and the companies under study. This findings necessitate that the leaders should pay attention to prevent interference in work and the destructive factors such as defamation, exploitation, exclusion and personal favoritism at work so that deviation can be avoided (Lyubykh et al., 2020).

Third, it turns out that organizational aggression mediates a positive relationship between narcissistic leadership and workplace deviance. Narcissistic leaders are self-absorbed, and can be distinguished by their aggressive tendencies under criticism. They tend to prove their self-worth by detracting from others which drives other individuals to deviate from the true course of action (Nevicka et al., 2018).

Fourth, this study found that workplace hostility increases the impact of organizational aggression on workplace deviance. The organizational aggression leads to the emergence of behavior that deviates from agreed standards to achieve special goals and objectives. This gets increased by hostility factors that spread from time to time in the work environment (De Lara, 2004). **Fifth**, this study contributed an in-depth understanding about the moderated mediation role. Further it also demonstrated the indirect effect of narcissistic leadership in workplace deviance through organizational aggression conditioned on increasing levels of workplace hostility. This proves the opinion that in many cases, due to narcissistic behaviors, leader adopts an aggressive environment in his dealings. This contradicts with the values and expectations of the employees in the organization which in turn results in the existence of hostile work climate. Such hostile climate negatively affects the employees through their actions and communications with their colleagues at work (Heathfield, 2014).

7 Conclusions

On the basis of experimental results attained from this study, it can be concluded that leadership narcissism is an indicator of functional deviation. A narcissistic leader achieves an increase in organizational aggression which in turn results in more deviation at personal and organizational level. Likewise, workplace hostility is an important factor that predicts the level of workplace deviance, especially with regard to interference in work and personal affairs by colleagues or by direct higher official. Workplace hostility continues with distortion of reputation, relationships, exceptions, and personal favoritism that gets justified for deviation and error in case if it spreads too.

On the basis of current study results, it can be concluded that the narcissistic behaviors of a leader, in their day-to-day activities, increase the aggressiveness of organizational environment in terms of persistence of employees against verbal and physical aggression and hostility behavior towards others. This becomes a reason for some to practice deviant behaviors in their workplace. Moreover, the study found that there is a relationship between organizational aggression and workplace deviance changes, according to the variations in the level of workplace hostility. This scenario has been proved at corporate level too. The study results mentioned that, in terms of negative factors, sometimes the aggressive behavior spreads in organizational and functional environment too and lend their shadows. The prevailing organizational climate clearly increased the impact of aggressive behaviors towards employee deviation at workplace.

Based on the above results, the study draws attention to the indirect role of narcissistic leadership in workplace deviance through organizational aggression conditioned on workplace hostility. The study results leads to an important conclusion that the deviant behaviors of the employees are motivated at individual and organizational level with increase in the narcissism of leaders. This phenomenon occurs in terms of exploiting the efforts of individuals, admiring oneself, bullying others, arrogance, and the desire to accomplish victory at the expense of others that accentuate negative, unsupportive climates, tension, intimidation, sabotage at work and aggressive behavior. In organizational environment, whether public or private, there are increasing levels of workplace hostility observed these days in terms of increased work pressures, gossip, ostracism, harassment, interference in work, and organizational violations.

8 Limitations and Future trends

Despite the contributions of current study on addressing the identified gaps and the importance of relationships between study variables, there are some potential limitations related to this investigation as well. **First**, the study data was obtained from five organizations in the food industry. The generalizability of our results to rest of the industrial sectors is limited. So, this calls for implementation of current study model in other industries such as construction, textile, rubber industries, and service fields in future studies. **Second**, the study was conducted in private sector organizations and it did not include public sector organizations characterized by high workplace deviance due to huge number of employees and nature of prevailing structures. **Third**, since the adopted measures are based on self-report method, this raises the possibility of restricted results, due to difference in common method/source. Thus, future studies should consider in-depth reliability of multiple sources used in data collection.

The future directions of the current study are as follows: **First**, although the current study findings proved the moderated mediation role among the study variables, there is still room for more empirical research for these variables to determine other predictors of workplace deviance. **Second**, the current study intended to identify some indicators that correspond to workplace deviance. So, future studies should be conducted to identify other indicators that exert the same effect, for example negative relationship between the leader and the followers, ostracism in workplace, leader's contradictory behaviors, gossip at workplace, bullying behavior at work, and authoritarian leadership and so on. **Third**, it will be highly useful if future studies try to include some positive variables that reduce the level of workplace deviance. The future researchers may also adopt variables that reduce the negative effects of organizational aggression or workplace hostility such as trust, justice, organizational integrity, and positive leadership theories such as authentic, participatory and paternal leadership as positive functions to reduce the effect of negative variables considered in this study.

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Narcisoidno vodenje in deviantnost na delovnem mestu: moderiran model organizacijske agresije in sovražnosti na delovnem mestu

Ozadje: Deviantnost na delovnem mestu je eden pogostih pojavov, ki jih opazimo v organizacijah. Mogoče ga je pripisati narcističnemu stilu vodenja in manifestacijam organizacijske agresije. Še dodatno ga poslabša povečana sovražnost na delovnem mestu. Glavni namen te raziskave je proučiti posredni vpliv organizacijske agresije in sovražnosti na delovnem mestu na odnos med narcističnim vodenjem in deviantnostjo na delovnem mestu.
Metode: Podatke za raziskavo smo zbrali z anketiranjem 673 zaposlenih v petih podjetjih živilske industrije v Iraku. Za modeliranje in analizo posrednih vplivov smo uporabili strukturne enačbe (SEM) in programsko opremo AMOS V.23.
Rezultati: Rezultati so pokazali, da organizacijska agresija delno moderira pozitiven odnos med narcističnim vodstvom in deviantnostjo na delovnem mestu. Poleg tega je povezava med organizacijsko agresivnostjo in deviantnostjo na delovnem mestu odvisna od sprememb v ravni sovražnosti na delovnem mestu. Študija empirično podpira osnove modela moderirane mediacije: študija ugotavlja, da je posredni vpliv narcisoidnega vodenja na deviantnost na delovnem mestu skozi organizacijsko agresijo znatno moderiral sovražnost na delovnem mestu.
Zaključek: Ko managerji uporabijo narcisoidno vedenje, da bi dosegli svoje osebne interese, to vodi v povečano organizacijsko agresijo in deviantnost na delovnem mestu, ki sčasoma povečata raven sovražnosti na delovnem mestu. V skladu s tem model moderirane mediacije omogoča boljše razumevanje tega, kako narcisoidno vodstvo, organizacijska agresija in sovražnost na delovnem mestu delujejo skupaj, da vplivajo na deviantnost na delovnem mestu.

Ključne besede: *Narcisoidno vodenje, Organizacijska agresija, Sovražnost na delovnem mestu, Deviantnost na delovnem mestu*

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