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The Impact of Structural Capital components on Management Innovation implementation: PLS-SEM application on Portuguese healthcare professionals

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Abstract

This empirical study investigates the impact of structural capital components on the implementation of management innovations in the Portuguese healthcare sector, with a specific focus on nurses. Utilizing data collected from the Nurse Portuguese Association through an electronic survey, the study employs Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze the relationships between structural capital dimensions and management innovation implementation. The research identifies three key dimensions of structural capital: organizational trust, innovation procedures, and innovation culture. The PLS-SEM analysis reveals that these dimensions exert a positive and significant influence on the implementation of management innovations, both directly and indirectly through mediation effects. The findings suggest that organizational trust plays a crucial role in shaping innovation culture and procedures, which in turn affect the adoption of management innovations. However, the study's focus on nurses from a single professional association limits the generalizability of the findings. Nonetheless, the research provides valuable insights into the factors that influence innovation adoption in healthcare and offers practical implications for fostering a more innovative management culture within healthcare organizations.

Keywords: Intellectual Capital, Structural Capital, Trust, Organizational Culture, Innovation, Nursing

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1. Introduction

Intellectual capital (IC) encompasses the knowledge, information, intellectual capacity, and experience that an organization possesses, transforming these elements into tangible benefits for the organization [1]. From a strategic standpoint, IC significantly influences various aspects of organizational success, including economic growth [2], company performance [3–6], value creation [7], competitive advantage [8], strategic management [9], and innovation [10–12]. Existing studies on IC in healthcare have focused on specific areas such as the pharmaceutical industry [13], university hospitals from an accountability perspective [14], and the identification of IC elements and performance indicators in healthcare practices [15].

Structural capital (SC), a critical component of IC, is considered the only intangible asset that truly belongs to the organization. It is unique and inherent to the organization, representing its systems, policies, protocols, and communication channels that facilitate the sharing and application of staff experience toward common goals [16]. SC has been linked to competitive intelligence [17], innovativeness [11], and other organizational outcomes.

The healthcare sector's innovation landscape has been, also, surprisingly underexplored[18], and the relationship between SC dimensions and the implementation of innovations, particularly management innovations, remains largely unstudied. All support this research which aims to provide evidence of the influence of structural capital on the implementation of management innovations in healthcare, closing an existing gap in the literature.

This paper is structured into four main sections: the presentation of the conceptual framework, the description of the methodology and empirical analysis, the discussion of results, and the conclusion, which includes implications for strategic decision-makers and suggestions for future research.

2. Theoretical foundations and conceptual model

2.1. Structural capital

Research on intellectual capital (IC) in the healthcare system, particularly regarding structural capital (SC) and innovation, is limited, as noted by Paoloni, Mattei, Dello Strologo, and Celli [19]. According to Duffield, Roche, Blay, and Stasa [20]SC in nursing services includes guidelines and protocols that support professional practices, aiming to minimize errors and enhance care quality. However, Holmesland, Seikkula, Nilsen, Hopfenbeck, and Arnkil [21] highlighted the difficulties in evaluating SC in healthcare.

Healthcare organizations are knowledge-intensive and innovative in processes and procedures, following the fast science development. So, is expected that organizations with a greater (and even faster) innovative capability will have better organizational performance and consolidate a sustainable competitive advantage [22]. For this reason, it’s important to support an innovative culture, aimed at incentivizing the members to search for new or improved products, services, and processes [23]. The interactions between healthcare professionals are influenced by trust, perceived as honest and based on truth, which allows professionals to show their ideas and feelings, use each other as resources, and learn together [24].

2.2. Organizational Trust

Trust is a concept that might be viewed in different dimensions, such as strategic, personal, and organizational trust [25], and they are all related in an interdependent way [21].

Trust is a phenomenon of individual character [26] and is not clear how trust moves from an individual level to the organizational level, additionally, a trustworthy individual does not guarantee that he is capable of building trust in an organization [25].

Organizational trust means general orientation and awareness of the organization's reliability [27], so organizations must recognize the importance of developing, encouraging, and strengthening the trust among their employees [28],

developing trustful relationships. Organizational trust is an important source of competitive advantage [29], increase strategic flexibility and adaptability [24], moreover, increase collective effectiveness [30] and lead to employee risk taken that lead to greater work engagement and creativity [31].

2.3. Organizational culture

Research found that Organizational culture is a source of sustainable advantage [32], innovative performance [33], fosters innovation and learning [34], encourages risk [35], encourages the development of new ideas [36].

According to Chmielecki and Sulkowski (2018), healthcare organizational culture is the structure that drives people's behavior and helps filter information, is considered a stabilizer and reality generator.

Regarding organizational healthcare culture, Shortell et al. [37] found that a great perceived team efficiency is related to openness to innovation, And Mannion and Davies [38] suggest that specific healthcare subcultures may be powerful catalysts for innovation. So, sometimes the culture of the organization has to be modified or reoriented to implement and develop an innovative culture.

2.4. Organizational procedures

Organizational procedures play a pivotal role in healthcare organizations by providing a structured framework for delivering patient care, managing resources, and ensuring regulatory compliance [39]. Organizational procedures in healthcare refer to the systematic and standardized processes that govern how medical institutions operate, interact with patients, and deliver care.

Furthermore, effective organizational procedures facilitate seamless communication and collaboration among healthcare professionals. Clear guidelines for interdisciplinary teamwork, information sharing, and handoff protocols ensure that all members of the healthcare team are aligned in delivering comprehensive and coordinated care. This is particularly crucial in complex cases that require input from multiple specialists [40].

2.5. Management Innovation implementation

Innovation is the social phenomenon resulting from the creation of new values and knowledge, generating qualitative changes in products and processes [41]. It can be defined as the introduction of significantly improved goods or services and can be divided into product, process, organizational, and marketing innovations. In healthcare, management innovation is crucial for enhancing operational efficiency, patient care, and overall organizational performance, but it faces several challenges. Many researchers have suggested multiple factors that influence innovation implementation, such as hospital structure, culture, and work practices [42–44].

According to McSherry and Douglas (2011), innovation in nursing services involves encouraging nurses to use their acquired knowledge and skills to creatively develop new ways of working, utilizing technologies, systems, theories, and partnerships with stakeholders to improve and advance practice.

After the previous considerations, we propose the following hypotheses and the conceptual model that we intend to test:

H.1: Organizational trust influences Management innovation implemented:

Adler & Kwon (2002) discuss how trust within health associations fosters an environment conducive to innovation.

H.2: Organizational trust influences Organizational innovation Procedures:

Vineburgh (2010) explores the impact of trust on the development and implementation of organizational innovation procedures within health associations.

H.3: Organizational trust influences Organizational innovation Culture:

Chmielecki and Sułkowski (2018) highlight the significant influence of trust on organizational culture and identity.

H.4: Organizational innovation Procedures influence Management innovation implemented:

Price (2013) argues that effective organizational innovation procedures play a crucial role in facilitating the implementation of management innovation.

H.5: Organizational innovation Culture influences Management innovation implemented: Denisi et al. (2003) emphasize the role of organizational culture in fostering innovation and learning within health associations.

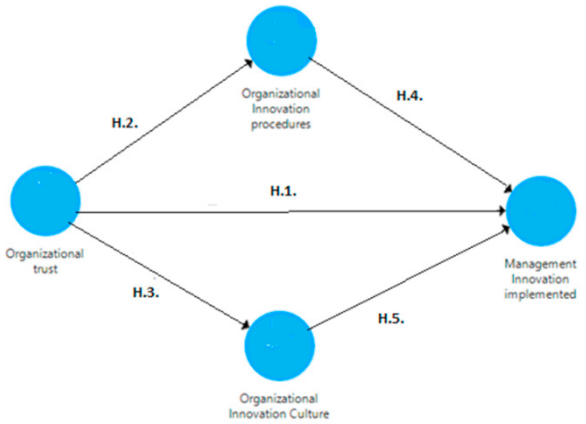

Figure 1. Conceptual Model.

3. Methodology

A cross-sectional correlational study with 1,388 Portuguese nurses used the QCICISE survey (33 items, 5-point Likert scale). The survey, administered via Qualtrics from February 19 to March 20, 2016, ensured anonymity and confidentiality, with ethics approval from the Institute of Health Sciences of the Portuguese Catholic University. Data analysis began with SPSS version 22.0 for data reduction using Principal Component Factor Analysis. The research model was then analyzed with SmartPLS software, employing structural equation modeling (SEM) based on partial least squares (PLS) statistical analysis. Reliability and validity of the reflective measurement models were assessed Individual item reliability was confirmed with factor loadings over 0.707, and no collinearity was found (VIF analysis). Construct reliability and validity were ensured using Cronbach's alpha, AVE, and composite reliability, meeting all criteria. Convergent validity was confirmed with AVE values over 0.5. Validation results are summarized in the accompanying tables.

Table 1. Measurement model analysis

Construct/Dimension/indicator	*Cronbachs Alpha*	*VIF*	*Loading*	*rho_A*	*Composite Reliability*	*AVE*
Organizational Innovation Culture	**0,905**			**0,906**	**0,904**	**0,703**
Q9_1_1		2,811	0,8			
Q9_2_1		2,745	0,819			
Q9_4_1		2,717	0,844			
Q9_5_1		2,421	0,889			
Organizational Innovation procedures	**0,842**			**0,844**	**0,843**	**0,728**
Q9_17_1		2,122	0,829			
Q9_18_1		2,122	0,877			
Organizational trust	**0,886**			**0,889**	**0,887**	**0,797**
Q9_10_1		2,72	0,861			
Q9_11_1		2,72	0,924			
Management innovation implemented	**0,841**			**0,845**	**0,842**	**0,64**
Q11_12_1		2,328	0,771			
Q11_4_1		2,158	0,858			
Q11_8_1		1,748	0,769			

We follow up by analyzing the discriminant validity (which indicates if the construct is different from the other constructs), using the Fornell-Larcker criterion (Table 2) and the HTMT criterion (Table 3)

Table 2 Discriminant Validity: Fornell-Larcker criterion

	Management Innovation implemented	Organizational Innovation Culture	Organizational Innovation procedures	Organizational trust
Management Innovation implemented	**0,8**			
Organizational Innovation Culture	**0,551**	**0,838**	0	0
Organizational Innovation procedures	0,561	0,826	**0,853**	0
Organizational trust	0,482	0,724	0,651	**0,893**

Table 3 Discriminant Validity: ratio heterotrit-monotrait (HTMT)

	Management Innovation implemented	Organizational Innovation Culture	Organizational Innovation procedures	Organizational trust
Management Innovation implemented	0			
Organizational Innovation Culture	0,551	0	0	0
Organizational Innovation procedures	0,562	0,826	0	0
Organizational trust	0,481	0,723	0,651	0

The analysis affirmed the reliability and validity of the reflective measurement models, along with the discriminant validity of the constructs. Subsequently, we assessed the structural model, analyzing the statistical significance of the path coefficients. Through bootstrapping with 5000 resamples, we obtained standard errors, t-statistics, and confidence intervals for the standardized regression coefficients. The 2.5% and 97.5% confidence intervals, validated using the percentile bootstrap method, further confirmed the significance of the path coefficients, as summarized in Table 4.

Table 4 Direct Effects on Endogenous Variable

Dependent variable	R^2	Antecedents	Path coefficients	Correlations	Explained variance
Management Innovation implemented	**0,277**				
		Organizational Innovation Culture	0,196	0,551	11%
		Organizational Innovation procedures	0,309	0,561	17%
		Organizational trust	0,139	0,482	7%
Organizational Innovation Culture	**0,422**				
		Organizational trust	0,724	0,724	52%
Organizational Innovation procedures	**0,318**				

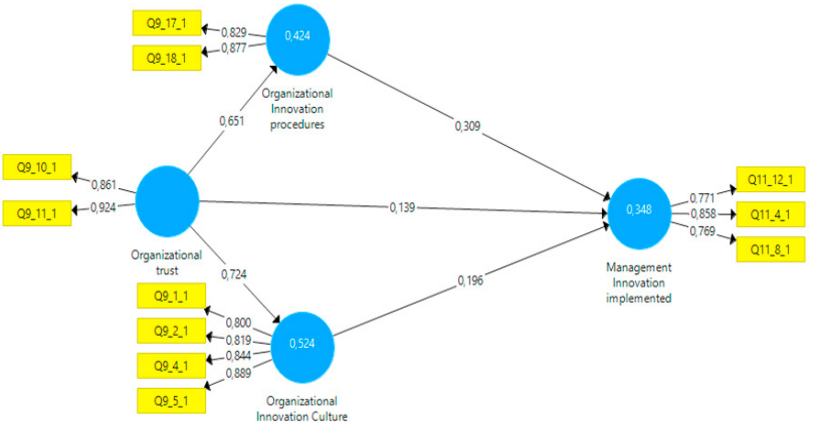

Figure 2. Final Model.

With this analysis, we verify that all direct effects of the proposed model are significant, so we conclude that the proposed Hypothesis are all supported. We also conclude that Management Innovation implemented is explained in 11% by Organizational Innovation Culture, 17% by Organizational Innovation procedures, and 7% by Organizational trust. Additionally, we conclude that Organizational Innovation Culture is explained in 52% by Organizational trust.

4. Conclusions and implications

Our findings are consistent with the assumptions of our conceptual model, suggesting that certain dimensions of structural capital (SC) influence the implementation of management innovation in health care. All of the hypotheses were tested and validated. The implementation of management innovations was found to be influenced by organizational trust, culture, and procedures. In our research the construct of SC that stood out the most was "trust", both in its direct influence on the management implemented innovation and on organizational culture, as supported by Chmielecki and Sułkowski [48]. As in previous research, we found that “organizational culture” is directly correlated with the implemented innovation. This study also shows that Organizational Innovation procedures influence the introduction of management innovations in healthcare organizations confirming that organizational procedures play a pivotal role in healthcare [39].

Future research could focus on the influence of other structural capital dimensions and explore it impact on other innovation dimension, such as process innovation

As noted by Cucciniello and Nasi [44], healthcare innovation is crucial, but analysis of its impact is necessary. So, future studies should assess the contribution of innovation to the efficiency of healthcare delivery and the overall performance of the healthcare system.

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