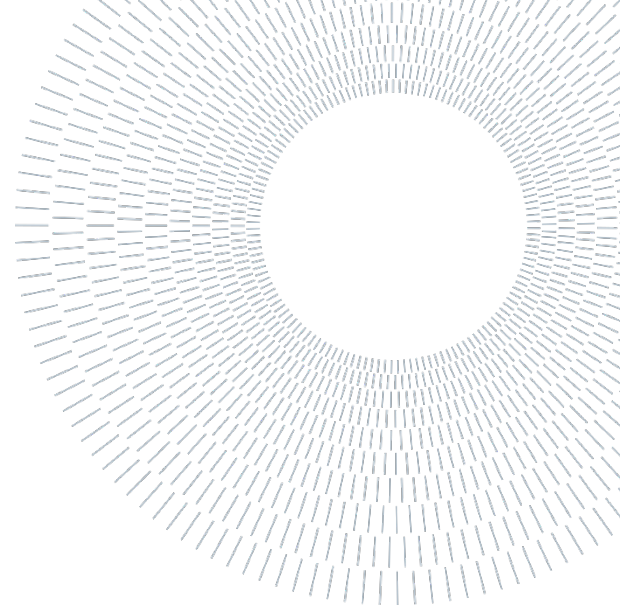




POLITECNICO
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SCUOLA DI INGEGNERIA INDUSTRIALE
E DELL'INFORMAZIONE



EXECUTIVE SUMMARY OF THE THESIS

Which mechanisms of Telemedicine influence the Relational Coordination between Specialist Doctors and General Practitioners: evidence from an Italian survey

TESI MAGISTRALE IN MANAGEMENT ENGINEERING – INGEGNERIA GESTIONALE

AUTHOR: FEDERICA PILI

ADVISOR: PROF. LUCA GASTALDI

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1. Introduction

The landscape of healthcare has undergone a profound transformation with the advent of Telemedicine, ushering in an era where Specialist Doctors (SDs) and General Practitioners (GPs) engage in more nuanced and facilitated interactions. This transformative shift has been particularly salient against the backdrop of the global challenges posed by the Covid-19 pandemic, prompting a substantial surge in the adoption of tele-expertise. This surge is attributable to the technology's demonstrated capacity to enhance the accessibility of healthcare

services, elevate their overall quality, and optimize operational efficiency.

In response to this paradigmatic evolution, policymakers are actively engaged in endeavors to seamlessly integrate tele-expertise into the standard operating procedures of healthcare delivery systems. Recognizing its potential to significantly augment collaborative dynamics between SDs and GPs, tele-expertise, characterized by its reliance on digital artifacts, emerges as a pivotal force in fostering cooperative endeavors within the healthcare domain. To comprehensively fathom the intricate mechanisms through which tele-expertise contributes to collaborative practices, this research strategically employs the Relational Coordination Theory as a robust and

comprehensive theoretical framework. We know from the literature that relational coordination refers to a collaborative and interconnected way of communicating and building relationships that aims to enhance the coordination of tasks and improve overall performance [1].

The main gap the Author encountered was that there is not a substantial amount of literature available regarding the cross-cutting structures that contribute to its implementation, or among those present, none refer to the topic of remote communication and coordination among health care professionals. There is more research on the effect of relational coordination on performance [2].

This study aims to delve into the multifaceted impact of Telemedicine integration on the relational coordination between healthcare professionals, particularly SDs, and GPs. It seeks to elucidate how this evolving phenomenon is perceived by the healthcare professionals themselves, offering insights into the intricate dynamics of their collaborative efforts. Through a meticulous and in-depth examination, the research also endeavors to shed light on the mediating role of tele-expertise in shaping and enhancing the intricate relationship between healthcare professionals and GPs. Grounded in both theoretical rigor and empirical analysis, this investigation aspires to contribute valuable and nuanced insights to the dynamic and evolving landscape of Telemedicine and its profound implications for the relational dynamics within the broader healthcare ecosystem.

2. Methods

In this research endeavor, the Survey model was strategically chosen as the methodological framework to comprehensively investigate the nuanced dynamics of Telemedicine's impact on relational coordination between Specialist Doctors (SDs) and General Practitioners (GPs). Relational Coordination is a theoretical construct that encapsulates the quality and intensity of communication and relationships among individuals within a collaborative work setting. It emphasizes the interdependence of tasks and the need for timely, accurate, and problem-solving communication to enhance overall system

performance. The concept underscores the significance of mutual respect, shared goals, and comprehensibility in fostering effective coordination and collaboration among individuals in complex organizational contexts, particularly within the realm of healthcare.

The primary focus of the investigation was to discern the perceived benefits derived from Telemedicine by SDs and their subsequent influence on relational coordination with GPs.

2.1 Perceived Advantages of Telemedicine for Specialist Doctors: the investigated causes of Relational Coordination

Telemedicine offers numerous benefits in the healthcare industry, including time-saving benefits for healthcare professionals and patients [3], improved information sharing and management [4], and fostering innovative work approaches. It allows for real-time consultations and smooth transmission of patient data between providers. The openness to innovative work approaches, such as adaptability and autonomy, is crucial for public organizations to address societal challenges [5].

2.2 Data Collection

The survey, a pivotal component of this research, was meticulously executed through the Digital Healthcare Observatory of Politecnico di Milano, engaging a substantial participant pool comprising more than 1,900 SDs across various regions in Italy. This extensive and diverse sample size was considered instrumental in capturing a comprehensive spectrum of perspectives and experiences, thereby enhancing the generalizability and robustness of the findings.

2.3 Model Design

To analyze the intricate relationships and interactions within the context of Telemedicine, the Research employed Structural Equation Modeling (SEM) as a sophisticated analytical framework. SEM was chosen for its capacity to delineate and quantify the complex interplay between variables,

offering a nuanced understanding of how Telemedicine may influence not only the frequency but also the quality of relationships and communication between SDs and GPs.

The Author categorizes survey questions into five variable groups for Structural Equation Modeling (SEM) in the following manner:

Control Variables: *Age* and *Region* (specifically the age and the Italian region of healthcare operation) act as factors influencing the dependent variable without being the primary focus.

Moderators: *Frequency* (rate of Telemedicine usage) and *Interest* (willingness to use Telemedicine in the future) impact the association between independent and dependent variables.

Mediators: *Integration*, representing Telemedicine unique nature, its integration with other systems and the establishment of rules and procedures, with *Competences*, like digital literacy, serve as mediators between independent and dependent variables.

Dependent Variables: *Communication* (frequency, speed, and accuracy) and *Relationship* (collaboration, clarity, transparency) contribute to the theory of Relational Coordination.

Independent Variables: *Confidence* (assesses respondent's confidence in evaluating patient eligibility), *Effectiveness* (evaluates respondent's communication effectiveness with patients), *Personal Scheduling* (evaluates respondent's ability to balance home and work), *Planning* (evaluates respondent's ability to integrate TM activities with other tasks), and *Embracing Innovation* (assesses respondent's adaptability and agility towards workplace innovation) are intentionally manipulated factors hypothesized to influence the dependent variables in the context of Telemedicine in healthcare.

The identified pattern can be summed up in the following framework. (Figure 1)

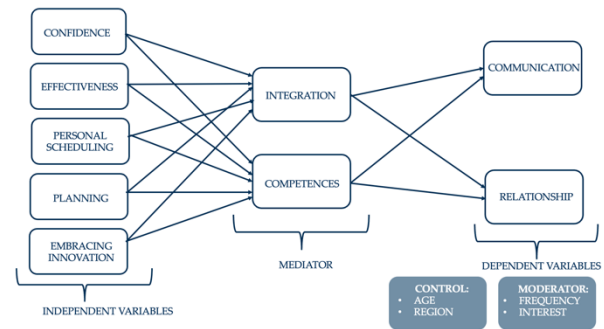


Figure 1: Framework of the Thesis

2.4 Hypothesis Formulation

The Author presents five hypotheses:

Hypothesis 1: The *Integration* of Telemedicine (TM) and the digital *Competences* mediate positive effect of confidence in evaluation on frequency and quality of *Communication* and quality of *Relationships* with General Practitioners (GP). These effects are positively moderated by the *Frequency* of usage and the *Interest* in future adoption of Telemedicine.

Hypothesis 2: The *Integration* of Telemedicine (TM) and the digital *Competences* mediate positive effect of ability to communicate with patients on frequency and quality of *Communication* and quality of *Relationships* with General Practitioners (GP). These effects are positively moderated by the *Frequency* of usage and the *Interest* in future adoption of Telemedicine.

Hypothesis 3: The *Integration* of Telemedicine (TM) and the digital *Competences* mediate positive effect of flexibility in personal scheduling on frequency and quality of *Communication* and quality of *Relationships* with General Practitioners (GP). These effects are positively moderated by the *Frequency* of usage and the *Interest* in future adoption of Telemedicine.

Hypothesis 4: The *Integration* of Telemedicine (TM) and the digital *Competences* mediate positive effect of planning skills on frequency and quality of *Communication* and quality of *Relationships* with General Practitioners (GP). These effects are positively moderated by the *Frequency* of usage and the *Interest* in future adoption of Telemedicine.

Hypothesis 5: The *Integration* of Telemedicine (TM) and the digital *Competences* mediate positive effect of adaptiveness and agility towards innovation in the workplace on frequency and

quality of *Communication* and quality of *Relationships* with General Practitioners (GP). These effects are positively moderated by the *Frequency* of usage and the *Interest* in future adoption of Telemedicine.

The assumptions were incorporated into the model in the subsequent manner. (Figure 2)

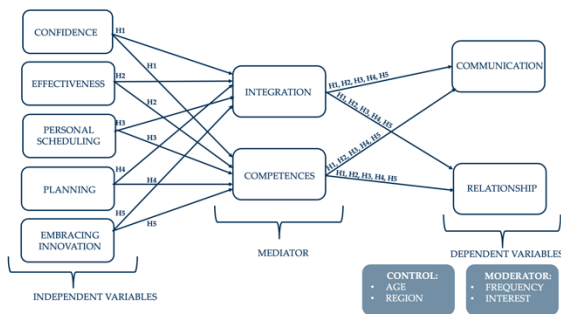


Figure 2: Framework of the Thesis with Hypothesis

3. Findings

The outcomes of the research substantiate a series of hypotheses positing that Specialist Doctors (SDs) perceiving Telemedicine as a facilitator for performance improvement, enhanced productivity, and efficient time management experience a discernible enhancement in their relational coordination not only with General Practitioners (GPs) but also with other specialists within the healthcare ecosystem.

These findings underscore the pivotal role of telemedical perceptions in shaping the intricate dynamics of professional collaboration among healthcare practitioners. The possession of digital skills by specialist doctors does not have a statistically significant reinforcing effect on the mechanisms of Telemedicine influencing relational coordination.

Table 1-2-3 presented below show that all p-values reflect a significant level of significance, as they are all below the threshold of 0.05. This suggests that all coefficients inside the model, pertaining to each variable, exhibit statistical significance.

Integratation	coefficient	P > z
Confidence	.0695709	0.000
Effectiveness	.0988181	0.010
Personal Scheduling	-.17187	0.000
Planning	.136115	0.001
Embracing Innovation	.1020808	0.002

Table 1: Output 1 of Stata

Relationship	coefficient	P > z
Integratation	.1302773	0.002
Competences	.3470527	0.000

Table 2: Output 2 of Stata

Communication	coefficient	P > z
Integratation	.1428778	0.001
Competences	.3525388	0.000

Table 3: Ouput 3 of Stata

Furthermore, the study reveals that the positive impacts attributed to Telemedicine are markedly augmented when this technology is seamlessly integrated into healthcare practices. The integration of Telemedicine, coupled with robust organizational support, emerges as a critical facilitator in amplifying the favorable outcomes on relational coordination. This underscores the importance of an organizational milieu that actively promotes and sustains telemedical initiatives, thereby fostering an environment conducive to heightened collaboration among healthcare professionals.

Moreover, the findings emphasize the significance of digital proficiency among Specialist Doctors as a contributing factor to the observed positive impacts of Telemedicine on relational coordination. SDs possessing advanced digital skills and a familiarity with technology demonstrate a more pronounced improvement in their collaborative interactions, indicating the intrinsic link between technological aptitude and the effectiveness of Telemedicine in facilitating enhanced professional relationships.

In summary, the research illuminates a multifaceted nexus between Telemedicine

perceptions, integration into healthcare practices, organizational support, digital skills, and technology familiarity, collectively influencing the relational coordination dynamics among healthcare professionals. These findings contribute substantively to the evolving discourse on the mechanisms through which Telemedicine intricately shapes and augments collaborative efforts within the healthcare landscape.

4. Discussion

The discerned insights from our investigation underscore the pivotal significance of instituting Telemedicine services that not only bolster the effectiveness of communication between Specialist Doctors (SDs) and their patients but also instill a sense of confidence in SDs concerning the evaluation of patient eligibility for such services. The ability for SDs to meticulously plan their activities without undue time expenditure is identified as a crucial attribute facilitated by Telemedicine, contributing to heightened operational efficiency and resource optimization. Within this context, the anticipated corollary is an enhancement in the relational coordination dynamics between SDs and General Practitioners (GPs), positing Telemedicine as a catalyst for fortifying collaborative efforts within the healthcare domain.

Furthermore, the study accentuates the imperative of integrating Telemedicine comprehensively across various dimensions of healthcare systems, encompassing governance, processes, treatments, and other pertinent facets. The recognition of Telemedicine as an integrative force within healthcare infrastructure is underscored by its potential to transcend singular applications and become an integral element permeating the entire healthcare ecosystem. Such integration not only augments the interoperability of healthcare services but also aligns with the overarching objectives of optimizing patient care, promoting efficiency, and fortifying the coordination dynamics inherent in the collaborative interplay between healthcare professionals. The research thus advances a holistic perspective on the transformative potential of Telemedicine, urging for its strategic integration into medical practices.

5. Conclusions

The outcomes of this Research bear significant implications for practical applications, advocating a comprehensive evaluation of the consequences of Telemedicine implementation on Specialist Doctors (SDs) both personally and professionally. A meticulous scrutiny of these effects is deemed essential to ascertain and fortify the quality of communication and relationships extended not only to SDs but also to their collaborative counterparts, the General Practitioners (GPs). Such an approach aligns with the imperative to optimize the interpersonal dimensions of healthcare delivery, recognizing the pivotal role played by relational coordination in the effective functioning of healthcare teams.

Furthermore, the research affirms and augments existing theoretical frameworks, substantiating the proposition that tele-expertise constitutes a paramount factor in the enhancement of medical relationships. The validation of these theories underscores the transformative influence of Telemedicine on the dynamics of professional collaboration, shedding light on its role in fostering improved communication and rapport among healthcare professionals.

In addition to reinforcing established theories, the findings underscore the critical need for the seamless integration of Telemedicine services into the broader healthcare infrastructure. This imperative arises from the demonstrated positive impact of Telemedicine on relational coordination among clinicians. The integration of Telemedicine is posited not merely as a technological imperative but as an organizational strategy to fortify and streamline collaborative efforts among healthcare professionals, thereby advancing the overarching objectives of healthcare delivery systems.

In sum, this research underscores the imperative for a holistic and evaluative approach to Telemedicine implementation, solidifies existing theoretical foundations, accentuates the pivotal role of tele-expertise, and advocates for the strategic integration of Telemedicine services to fortify relational coordination within the intricate fabric of contemporary healthcare systems.

6. Bibliography

- [1] Bolton, R. E., Logan, C., & Gittel, J. H. (2021). Revisiting Relational Coordination: A Systematic review. *The Journal of Applied Behavioral Science*, 002188632199159. <https://doi.org/10.1177/0021886321991597>
- [2] Otte-Trojel, T., Rundall, T. G., De Bont, A., & Van De Klundert, J. (2016). Can relational coordination help inter-organizational networks overcome challenges to coordination in patient portals? *International Journal of Healthcare Management*, 10(2), 75–83. <https://doi.org/10.1080/20479700.2015.1101911>
- [3] Kruse, C. S., Krowski, N., Rodríguez, B., Tran, L. M., Vela, J., & Brooks, M. (2017). Telehealth and patient satisfaction: a systematic review and narrative analysis. *BMJ Open*, 7(8), e016242. <https://doi.org/10.1136/bmjopen-2017-016242>
- [4] Cramm, J. M., & Nieboer, A. P. (2014b). The importance of productive patient–professional interaction for the well-being of chronically ill patients. *Quality of Life Research*, 24(4), 897–903. <https://doi.org/10.1007/s11136-014-0813-6>
- [5] Bekkers, V., & Tummers, L. (2018). Innovation in the public sector: Towards an open and collaborative approach. *International Review of Administrative Sciences*, 84(2), 209–213. <https://doi.org/10.1177/0020852318761797>

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