

ACCEPTANCE OF DIGITAL TECHNOLOGY IN HOSPITALS: WHAT PRESSURE FROM MANAGERS AND PEERS?

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ABSTRACT

This study gathers evidence on the interplay between the institutional and individual factors to explain which one may influence the use of a digital solution within hospitals. Data have been collected through a survey administered to nursing coordinators in an Italian Hospital in Italy. A total of 137 responses had been received. The analysis carried out shows that the key factors of the intention to use a digital solution in professional settings are the peer influence of colleagues and the perceived usefulness of the solution. Therefore, management can leverage on power users to motivate, generate and manage change.

Keywords: *Technology Acceptance Model; Institutional factors; Digital Technology*

1. INTRODUCTION

There is a growing awareness and need for digital innovation in hospitals for different applications (Lettieri and Masella, 2006). Nevertheless, the mechanisms guiding the adoption and continuative use of digital technologies within these organisations (e.g. systems for decision support, telemedicine, diagnostic imaging, drug administration, management of department orders, workflow optimization, diagnostic-therapeutic plans) remain a not-fully-understood issue (Gastaldi et al., 2019).

In particular, the adoption and continuative use of digital solutions by employees has been explained according to different, often conflicting, theoretical perspectives.

On the one hand, organisational studies, especially those about professional organizations, emphasized the role played by institutional arrangements, which bound individual behaviours through a complex combination of regulations, social norms and cultural systems (Butler, 2011). According to these studies, the employees' decision to engage with new technologies and, thus, with new practices is not entirely based on their rational thinking, but it is also – and mainly – affected by the influence of the overarching structures, rules, social norms and culture in which they are embedded (Scott, 1995; Radaelli et al., 2017).

On the other hand, information systems research has mostly adopted user acceptance models, derived from the seminal Technology Acceptance Model (TAM) by Davis (1989). According to this stream of research, the adoption of novel technologies is mostly the result of the rational evaluation made by employees on its usefulness and ease of use, with social pressures that are relevant when exercised by peers and not by top-managers, in particular in professionals organizations.

As a result, our current understanding of what drives the adoption and continuative use of digital technologies in professional organizations such as hospitals is still very limited. This represents a promising research opportunity for scholars of continuous innovation management, who might investigate to what extent user acceptance models and institutional frameworks might be integrated into a unique, coherent theory to explain professionals' engagement into new behaviours and practices as a result of the adoption of new digital solutions.

In this view, hospitals – and healthcare in general – are a paradigmatic case to be investigated, where employees are professionals and have expert knowledge that is inaccessible to managers who cannot easily mandate change or new practices. Doctors and nurses have considerable autonomy concerning innovations and the related changes in their professional practice (Barczak et al., 2006; Mura et al., 2016). In this view, they engage with new technologies when they “accept” them rationally, as well as the consequences of their adoption. Acceptance is the consequence of two main factors: perceived ease of use and perceived usefulness, both rationally evaluated by individuals (Gastaldi et al., 2019). However, hospitals are institutionalized settings, where social norms, culture, rituals and languages bound behaviours and practices of professionals. In such a context, to what extent institutional arrangements and rational evaluations might coexist and affect the one the other? And which strategies hospital managers should design and implement to promote and sustain the adoption and continuative use of digital solutions by hospital professionals? Should they refer to strategies based on user acceptance models or organizational studies? Or should they define a portfolio of interventions that integrate and balance both perspectives?

2. THEORETICAL BACKGROUND

Institutional and individual perspectives elicit different strategies for the adoption of new digital solutions. The institutional perspective argues that individuals (employees) reinforce the status quo, often “mindlessly”, since the “*institutions embodied in routines rely on automatic cognition and uncritical processing of existing schemata, and privilege consistency with stereotypes and speed over accuracy*” (Lawrence et al., 2009; p.15). By contrast, user acceptance models suggest for strategic and promotional interventions that fit individuals' self-determination and rationality, reinforcing their perceptions of ease of use and usefulness respect to processes, structures and/or other technologies (Gastaldi et al., 2019).

Both research streams have independently tried to incorporate elements of the other stream to enrich their explanatory power. User acceptance models have increasingly explored the effects of social influences and organisational conditions on user acceptance as well as their effects on the perceived usefulness (e.g., Chang et al., 2007; Tate et al., 2015), consolidating new theories such as TAM2 (Venkatesh and Davis, 2000) or UTAUT (Venkatesh et al., 2003). Similarly, recent institutional studies argued that the institutional influences are not “*cognitively totalising structures [and] even when actors are subject to institutional influences, they can develop a practical consciousness*” (Battilana and D'Aunno, 2009; p.47). It is conceded that individuals' self-determination – constrained and bounded as it might be – plays a significant role even in highly-institutionalised settings (Leca et al., 2008; Radaelli et al., 2017).

Although these valuable efforts, the discussion about the value of integrating the two theoretical perspectives is still fragmented and far from a shared understanding. Scholars from information science incorporated social influences and organisational conditions

without discussing the underlying assumptions of the theories where they come from (e.g., Lewis et al., 2003; Wade et al., 2017), thus offering a partial and not theory-driven view of how the users' rational choice about new technologies might be shaped by factors that are external to the users themselves. On the other side, scholars of organisational studies incorporated elements from information science to explain the behaviour of organisations – the locus of their researches – overlooking the micro-level perspective about the choices made by individuals (e.g., Mignerat and Rivard, 2009; for an exception, see Jensen et al., 2009). Recent studies (e.g., De Benedictis et al., 2020) investigated empirically their explanatory power either as competitive or integrated theories.

Against this background, this study aimed at gathering novel insights on which mechanisms drive the adoption and continuative use of novel digital solutions within hospitals by integrating user acceptance models and organizational studies.

3. MODEL AND HYPOTHESES

In order to answer to our research question we developed a theoretical model grounded on both user acceptance models and institutional theories. Among the user acceptance models, we selected TAM. First, the focus of the research is on the potential interplay between individual and organizational factors and, thus, there was no need to refer to more recent models such as TAM2 and UTAUT, which limit institutional factors to peer-related social norms. Second, TAM includes the most relevant explanatory variables from user acceptance models – i.e., usefulness and ease of use – thus allowing a more parsimonious model.

Second, from the Institutional theory, which recognize the significant organizational effects associated with the increase of cultural and social forces, we started from the investigation of the three forces that are present in developed institutional systems discussed by Scott (2008) as the key elements that, associated with activities and resources, offer stability and meaning to social life. In particular, individuals are embedded in institutional pillars limiting the scope of their rational assessment and direct the engagement of specific behaviours:

- *regulative pillars*: which regard the existence of regulations, rules and processes whose breach is monitored and sanctioned;
- *normative pillars*: which introduce a social dimension of appropriate behaviours in the organization;
- *cultural pillars*: which emphasize the use of common schemas, frames, and other shared symbolic representations that create an attachment to the 'appropriate' behaviour.

In the context of this paper we decided:

- Considering the peer influence among hospital colleagues as a normative factor, as did by Gastaldi et al. (2019);
- Not focusing on cultural pillar since respondents had highly similar cultural background.

Figure 1 describes our theoretical model and allows to empirically test the following hypotheses:

- H₁: individual factors (perceived usefulness, perceived ease of use) directly affect the intention of using a digital solution;

- H₂: institutional factors (organisation's expectations and peer influence) directly affect individual factors and the intention of using a digital solution;
- H₃: perceived ease of use affect perceived usefulness;
- H₄: organisation's expectations affect peer peer influence.

The research model includes also two control variables that are consistent with past research on user acceptance models (Agarwal and Prasad, 1999; Morris and Venkatesh, 2000), which suggest that:

- Professional age may be negatively correlated with the use of technologies, i.e., younger individuals are more familiar and open to new technologies (Chung et al., 2010);
- There might be differences in the acceptance of technologies when the complexity in terms of number of medical devices to be managed is higher.

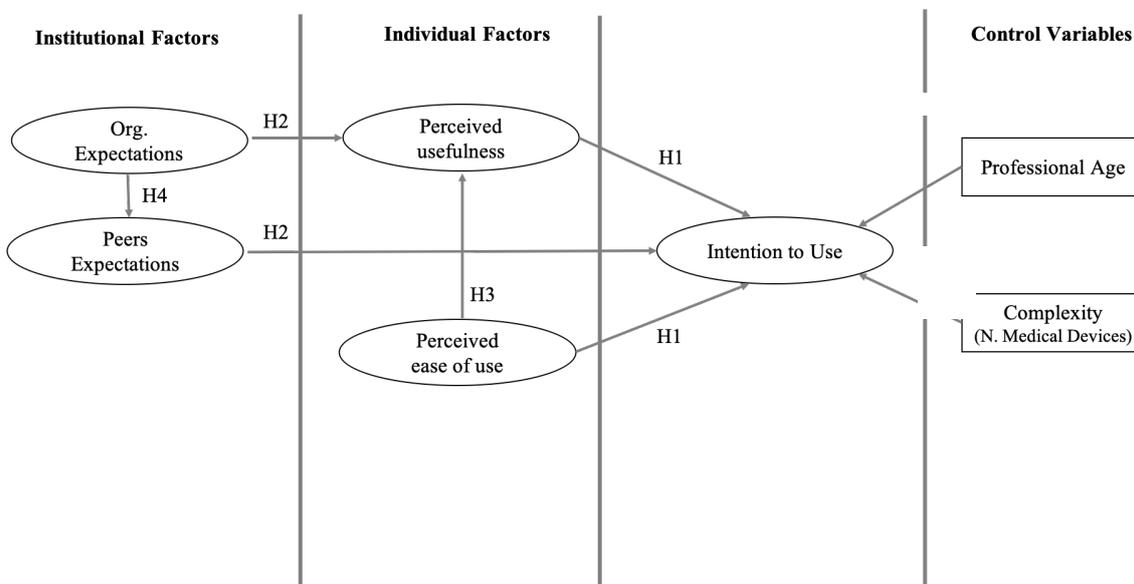


Figure 1. Theoretical model for investigating the interplay between individual and institutional factors about the acceptance of new technology in professional settings

4. METHODOLOGY

The paper is based on an exploratory single case study investigating an Italian hospital. The choice of a single case study offers the opportunity to avoid confounding factors due to the heterogeneity that different hospitals might show in terms of different strategies, legacy, professionals' behaviours, and technology infrastructure. The digital solution under investigation is a technology management software to be daily used by department nursing coordinators to report medical equipment failures or to monitor the corrective and preventive maintenance of the medical equipment of the hospital.

The assessment was based on a questionnaire delivered within the hospital. A convenience sampling strategy was adopted, specifically, the non-probability sampling method, which is based on data collection from a population of members who were conveniently willing to be involved in the study (coordinators of departments of one leading Italian hospital).

We surveyed the literature to identify valid measures for related constructs and adapted existing scales to measure the different constructs mentioned in the theoretical background. Measures associated with user acceptance models and intention to use of the digital solution have been derived and adapted from Venkatesh et al. (2003). Measures associated with institutional factors have been derived from Gastaldi et al. (2019). In this study the organisational expectations as a regulative pillar and referring to the degree of adherence to the expectations of the Clinical Engineering Department (CED) goals. All indicators were measured using a 7-point Likert scale as in Davis (1985). There were preliminary assessments of the questionnaire and pre-tested it in a hospital, which we visited to conduct face-to-face discussions with hospital professionals. Based on the feedbacks, we modified the wording of some questions and added or deleted some others, in order to ensure that the items were understandable and relevant to professionals.

Data were collected from nursing coordinators of departments one hospital in Northern Italy. After testing the model on a small sample (5 nursing coordinators), we mailed the questionnaire to these respondents, along with a cover letter highlighting the study's objectives and potential contributions. The cover letter also clarified that the survey was related to a scholarly research project, whose success was dependent on accurate and objective responses.

Out of a total of 164 coordinators. A reminder by email after the first week and by telephone after 10 days. After two weeks, a second reminder was sent by email. At the end of the set period, the following were collected. Out of f 164 coordinators contacted, a total of 132 usable questionnaires were collected with a response rate of 84%. (actually, we collected 137 questionnaires but of them 5 were not completely filled and, thus, have been discarded). The number of actual respondents mirrors previous studies that acknowledged the difficulty to collect primary data from hospital professionals (e.g., Mura et al., 2013).

As data analysis method we applied Structural Equation Modeling. The statistical analysis was performed using the software Stata 14.1®. The internal consistency was evaluated through Cronbach's Alpha coefficients, the path analysis was performed to test the proposed model considering a p-value of <0.05 as significant.

5. RESULTS

The internal consistency of constructs was evaluated through Cronbach's Alpha coefficients. Table 1 shows that all values are greater than the threshold of 0.7.

Variable	Cronbach's α	AVE	CR
Intention to use (I)	0.95	0.8402	0.9544
Perceived usefulness (PU)	0.93	0.6956	0.9320
Perceived ease of use (PEOU)	0.94	0.7425	0.9452
Organisational Expectations (OE)	0.93	0.7519	0.9236
Peer Influence (PI)	0.95	0.8653	0.9506

Table 1. Measurement properties of constructs (Cronbach's Alpha, AVE and CR)

As depicted in Table 3, the validity of convergence has been measured through Average Variance Extracted (AVE) and Construct Reliability (CR) (table). We controlled that

both composite reliability (CR) and average variance extracted (AVE) were above the recommended threshold of 0.7 and 0.5 respectively (Fornell and Larcker, 1981).

	OE	PI	PU	PEOU	I
OE	0,8671				
PI	0,7157	0,9302			
PU	0,7763	0,6406	0,8340		
PEOU	0,5067	0,3590	0,5810	0,8617	
I	0,7590	0,6615	0,8000	0,5125	0,9166

Table 3. Correlation Matrix

To further test for discriminant validity, we compared the squared correlation between two latent constructs and their AVE estimates (Fornell and Larcker, 1981). These constructs meet the validity condition of the AVE estimates exceeding the squared correlation between each pair of constructs (Table 3).

The perceived usefulness has a significant influence on the intention to use ($\beta = 0.59$) and greater than all the other paths to the intention. The hypothesis of the direct influence of the perceived ease of use on the intention to use, instead, is not supported, while it is supported the hypothesis of the ease of use on the perceived usefulness ($\beta = 0.25$). The peers influence, instead, significantly affect the intention, with a coefficient of 0.25, while the impact on perceived usefulness is not significant. The organization's expectations have a significant effect on both perceived usefulness and peers influence, in both cases with very high β values (0.55 and 0.72 respectively). Coordinators who therefore perceive a pressure from Clinical Engineering department sharing common objectives, are more likely to perceive the usefulness of this SW than those who do not care or do not share the expectations of Clinical Engineering department. In addition, the expectations of Clinical Engineering department have a strong impact on the Peer influence and therefore on the social pressure among the coordinators. Finally, that none of the two control variables included in the model has a significant effect on the intention. Figure 2 shows the results of the hypothesis testing. In the figure are reported only the significant paths.

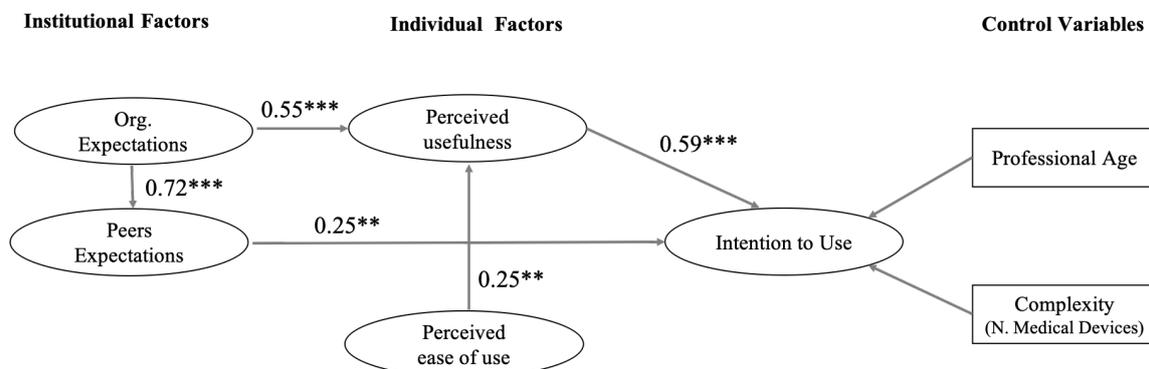


Figure 2. Path Model Results

Notes: *** = p-value < 0.001, ** = p-value < 0.01, * = p-value < 0.05

6. DISCUSSION

Results show that the coordinators' intention to use the software is mainly influenced by their perception of the software's usefulness as the main determinant of this variable, which is the main factor influencing the real usage. Users, therefore, tend to form their own intention to use a system, in this case, technology management software, mainly on their expectation that the SW itself will increase their performance. The coordinator, similarly to the figure of the doctor, tend to be pragmatic in their decisions to use the SW and then accepts a technology, focusing on the evaluation of usefulness rather than that of ease. The figure of the nursing coordinator therefore is comparable to the doctor rather than the nurse. In other words, a coordinator will use a technology when he/she considers it useful for the routine activities, and is willing to learn to use it, although this may involve an extra effort.

Secondly, institutional factors also have an impact, albeit less important, on intention. The influence and pressure exerted on a coordinator by his peers influence his intention to use the SW. The coordinators, therefore, form their own intention to use the SW based also on the potential benefits in terms of reputational image and social status that would result from its use. The perceived usefulness is influenced by two other factors: the expectations of the organization and secondly the perceived ease of use. A coordinator, therefore, builds his evaluation about the usefulness of the technology Management SW based primarily on what are the expectations that the Clinical Engineering department has versus the coordinators. The coordinators then, as hypothesized by Gastaldi et al. (2019) exploit their knowledge to mediate institutional pressures and influences and make individual decisions about new technology, in this case, Technology management SW. Moreover, the perceived usefulness is conditioned by the perceived ease of use of the departmental management software in general. The intention of use is also influenced, albeit to a lesser extent, by the social pressure within the group of hospital coordinators. In detail, when a coordinator perceives that the organization expects her/ him/ to behave, as the adoption of a specific technology, then he also feels the pressure from of her/his peers. The expectations of the organization, therefore, are also perceived by the rest of the coordinators, which, as a group, exerts a social pressure on the individual member to foster the use of that SW. The pressure at the organizational level, then, is transferred at group level and, subsequently, at the individual level. For this aspect, the coordinator is not comparable to the doctor: if the doctor is not influenced by the opinions of others, the coordinator also evaluates the suggestions and the indications of his/her peers to make decisions regarding the use of a technology. What other coordinators think about the SW, therefore, may influence the intention of use of a coordinator, who still does not have the permission to use the SW. The influence of peers, however, has not been as significant in the impact on perceived usefulness: if a coordinator perceives a social pressure from peers to use the SW, it directly impacts on the intention to have and therefore to use the SW.

Our Findings confirm that both theoretical perspectives have proved to be able to explain the intention of professionals to use new technologies and confirm the explanatory power of interplay between individual and institutional factors. Furthermore our study shed the light on the different role of organisational expectations as regulative pillar and peer influence as normative pillar.

7. CONCLUSION

This study sought to better clarify the relationship between institutional and individual factors of the intention to use a SW in a hospital setting by department coordinators. Our

results confirmed the positive role played by the perceived usefulness as driving individual factor to the intention to use the SW confirming the relevance of the adoption of TAM models in the healthcare sector. In the study, the institutional factors (organisation's expectations and peer influence), derived from the Institutional theory is aimed at exploring the pressure that a hospital professional might perceive from the goals set by hospital managers. Findings shed light on the significant positive role played by the peer influence factor as institutional factor supporting previous studies in clarifying the relationship between the two theories, i.e. whether and how organizational expectations represent institutional factors that shape the perception of usefulness and ease of use towards isomorphism.

In line with previous study (Gastaldi et al., 2019) in the absence of coercive mechanisms, institutional pressures toward the SW use are primarily normative and/or mimetic. Hospitals are intended as professional bureaucracies where professionals feel more the pressures from peers rather than from managers. In this view, hospital managers can leverage on lead peer influence (i.e., innovation champions) to motivate, generate and manage change and generate a virtuous circle inside the hospital to motivate the use of the SW by department coordinators.

From the academic viewpoint, the study offers an original perspective that combines organizational theories and models of technology acceptance to explain the acceptance of a SW by ward coordinators in the hospital. In particular, the results confirm the importance of individual variables, not only as directly related to the acceptance of new technologies, but also as important mediators between institutional variables and acceptance, thus highlighting and confirming the importance of the connections between organizational studies and information science.

Despite the original contributions, this study suffers from at least two limitations that should be addressed by future research. First, the research project is based on a single case study. In addition, the research should consider a multicentric design, thus allowing the generalization of results.

In addition, a multicenter study will explore the role that hospital characteristics in terms of strategy, legacy, etc. may have on the structuring of both the organization and the individual factors investigated in this study. Further research should consider hospitals where similar SW are already mature technologies, thus enabling the investigation of actual use and what factors could facilitate / inhibit the translation of the intention to use into the actual use.

REFERENCES

- Agarwal, R. and Prasad, J. (1999). Are individual differences germane to the acceptance of new information technologies?. *Decision Sciences*, Vol. 30, No. 2, pp.361–391.
- Barczak, G., Kahn, K.B. and Moss, R. (2006). An Exploratory Investigation of NPD Practices in Nonprofit Organizations. *Journal of Product Innovation Management*, Vol. 23, No. 6, pp.512–27.
- Batilana, J. and D'Aunno, T. (2009). Institutional work and the paradox of embedded agency. in Lawrence, T.B., Suddaby, R. and Leca, B. (Eds.); *Institutional Work: Actors and Agency in Institutional Studies of Organization*, pp.31–58, Cambridge University Press, Cambridge, UK.
- Butler T. (2011). Compliance with institutional imperatives on environmental sustainability: building theory on the role of green is. *Journal of Strategic Information Systems*, Vol. 20, No. 1, pp.6–26.
- Chang, I.C., Hwang, H.G., Hung, W.F. and Li, Y.C. (2007). Physicians' acceptance of pharmacokinetics-based clinical decision support systems. *Expert Systems with Applications*, Vol. 33, No. 2, pp.296–303.

- Chung, J.E., Park, N., Wang, H., Fulk, J. and McLaughlin, M. (2010). Age differences in perceptions of online community participation among non-users: an extension of the technology acceptance model. *Computers in Human Behavior*, Vol. 26, No. 6, pp.1674–1684.
- Currie, G. and Suhomlinova, O. (2006). The impact of institutional forces upon knowledge sharing in the UK NHS., *Public Administration*, Vol. 84, No. 1, pp.1–30.
- Davis, F. D. (1985). A technology acceptance model for empirically testing new end-user information systems: Theory and results (Doctoral dissertation, Massachusetts Institute of Technology).
- Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, Vol. 13, No. 3, pp.319–339.
- Davis, F.D., Bagozzi, R.P. and Warshaw P.R. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Management Science*, Vol. 35, No. 8, pp.982–1003.
- De Benedictis, A., Lettieri, E., Gastaldi, L., Masella, C., Urgu, A., & Tartaglino, D. (2020). Electronic Medical Records implementation in hospital: An empirical investigation of individual and organizational determinants. *PloS one*, 15(6), e0234108.
- Gastaldi, L., Radaelli, G., Lettieri, E., Luzzini, D., & Corso, M. (2019). Professionals' use of ICT in hospitals: the interplay between institutional and rational factors. *International Journal of Technology Management*, 80(1-2), 85-106.
- Hu, P. J., Chau, P. Y., Sheng, O. R. L., & Tam, K. Y. (1999). Examining the technology acceptance model using physician acceptance of telemedicine technology. *Journal of management information systems*, 16(2), 91-112.
- Jensen, T.B., Kjærgaard, A. and Svejvig, P. (2009). Using institutional theory with sensemaking theory: a case study of information system implementation in healthcare. *Journal of Information Technology*, Vol. 24, No. 4, pp.343–353.
- Ketikidis, P., Dimitrovski, T., Lazuras, L., & Bath, P. A. (2012). Acceptance of health information technology in health professionals: An application of the revised technology acceptance model. *Health informatics journal*, 18(2), 124-134.
- Lettieri, E, Masella C (2006). Measuring the value and sustainability of internet-based ICTs in healthcare organisation. *International Journal of Healthcare Technology and Management*, 7(3/4):319 – 33.
- Lawrence, T.B., Suddaby, R. and Leca, B. (2009) *Institutional Work: Actors and Agency in Institutional Studies of Organizations*, Cambridge University Press, Cambridge, UK.
- Leca, B., Battilana, J. and Boxenbaum, E. (2008). *Agency and Institutions: A Review of Institutional Entrepreneurship*, Working Paper 08-096, Harvard Business School.
- Lewis, W., Agarwal, R. and Sambamurthy, V. (2003). Sources of influence on beliefs about information technology use: an empirical study of knowledge workers', *MIS Quarterly*, Vol. 27, No. 4, pp.657–678.
- Mignerat, M. and Rivard, S. (2009). Positioning the institutional perspective in information systems research. *Journal of Information Technology*, Vol. 24, No. 4, pp.369–391.
- Morris, M.G. and Venkatesh, V. (2000). Age differences in technology adoption decisions: implications for a changing work force. *Personnel Psychology*, Vol. 53, No. 2, pp.375–403.
- Mura, M., Lettieri, E., Radaelli, G. and Spiller, N. (2013). Promoting professionals' innovative behavior through knowledge sharing: the moderating role of social capital. *Journal of Knowledge Management*, Vol. 17, No. 4, pp.527–544.
- Mura, M., Lettieri, E., Radaelli, G. and Spiller, N. (2016). Behavioural operations in healthcare: a knowledge sharing perspective. *International Journal of Operations and Production Management*, Vol. 36, No. 10, pp.122–124.
- Nadri, H., Rahimi, B., Afshar, H. L., Samadbeik, M., & Garavand, A. (2018). Factors affecting acceptance of hospital information systems based on extended technology acceptance model: a case study in three paraclinical departments. *Applied clinical informatics*, 9(02), 238-247.
- Pai, F.Y. and Huang, K.I. (2011). Applying the technology acceptance model to the introduction of healthcare information systems. *Technological Forecasting and Social Change*, Vol. 78, No. 4, pp.650–660.

- Peng, D.X. and Lai, F. (2012). Using partial least squares in operations management research: a practical guideline and summary of past research. *Journal of Operations Management*, Vol. 30, No. 6, pp.467–480.
- Radaelli, G., Currie, G., Frattini, F. and Lettieri, E. (2017). The role of managers in enacting twostep institutional work for radical innovation in professional organizations. *The Journal of Product Innovation Management*, Vol. 34, No. 4, pp.450–470.
- Rahimi, B., Nadri, H., Afshar, H. L., Timpka, T. (2018). A systematic review of the technology acceptance model in health informatics, *Applied Clinical Informatics*, vol. 9, no. 3, pp. 604634.
- Ryu, S., Ho, S.H. and Han I. (2003). Knowledge sharing behavior of physicians in hospitals. *Expert Systems with Applications*, Vol. 25, No. 1, pp.113–122.
- Scott, W.R. (1995) *Institutions and Organizations*, Sage, Thousands Oaks, CA.
- Scott, W. R. (2008). Approaching adulthood: the maturing of institutional theory. *Theory and society*, 37(5), 427.
- Scott WR. (2008) Lords of the Dance: professionals as institutional agents. *Organization Studies*. 29:2 (219–238).
- Tate, M., Evermann, J. and Gable, G. (2015). An integrated framework for theories of individual attitudes toward technology. *Information and Management*, Vol. 52, No. 6, pp.710–727.
- Thomas, P. and Hewitt, J. (2011). Managerial organization and professional autonomy: a discourse-based conceptualization. *Organization Studies*, Vol. 32, No. 10, pp.1373–1393.
- Venkatesh, V. and Davis, F.D. (2000). A theoretical extension of the technology acceptance model: four longitudinal studies. *Management Science*, Vol. 46, No. 2, pp.186–204.
- Venkatesh, V. and Morris, M.G. (2000). Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behaviour. *MIS Quarterly*, Vol. 24, No. 1, pp.115–139.
- Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D. (2003). User acceptance of information technology: toward a unified view', *MIS Quarterly*, Vol. 27, No. 3, pp.425–478.
- Wade, V., Gray, L. and Carati, C. (2017). Theoretical frameworks in telemedicine research', *Journal of Telemedicine and Telecare*, Vol. 23, No. 1, pp.181–187.