

Impact of ICT Strategy on Intellectual Capital, Quality of Service, and Financial Autonomy in Polish Hospitals

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Abstract: Information and Communication Technology (ICT) is crucial for the technological development of most areas of human economic activity. Appropriate ICT can positively influence the development of intellectual capital, knowledge management, enhancement of purely medical technologies, and the financial autonomy of health care units. The article aims to present and verify the model determining the impact of financial autonomy and the orientation of hospital managers on ICT strategy on the quality of medical services, and the development of intellectual capital of medical personnel. The research model was developed based on empirical studies conducted in Polish hospitals. This is the first study of its kind in Poland. Theoretical constructs of the model have been developed for the aforementioned phenomena. These constructs and their mutual relationships are the basis of the research model developed using Structural Equation Modeling (SEM). A survey was conducted among managers of Polish hospitals and used to create SEM measurement models. The survey was developed based on subject-based literature focused on similar research models and interviews with managers of Polish hospitals. The estimation and correctness of the model parameters were assessed using the partial least squares structural equation modeling (SEM-PLS) methodology. The hypotheses proposed in the paper have been acknowledged. The model meets the required quality criteria, and all model parameters are statistically significant. The appropriate use of ICT and the financial autonomy of Polish hospitals positively affect the development of intellectual capital and the quality of services provided. The research findings may be helpful for the knowledge management of hospital personnel.

Keywords: knowledge management, healthcare management, information and communication technology, knowledge management in the public sector, managing intellectual capital, SEM-PLS methodology

1. Introduction

Knowledge management in health care entities is essential due to the fact that they provide professional services. In this case, service providers are required to have a significant level of knowledge and skills, often confirmed by university degrees and other certifications. The basic resource of knowledge management, especially in medical entities, is the so-called intellectual capital. These are intangible resources including the knowledge, skills, and qualifications of the medical staff, and a type of relational capital, i.e. the trust of patients, their positive experiences, and the image of the hospital as an organization (Evans, Brown, Baker, 2015). Therefore, it is crucial to develop intellectual capital as an essential resource for knowledge management in medical entities (Alfiero, Brescia, Bert, 2021).

The modern information society is characterized by a high degree of complexity of social and economic processes. This requires the skillful use of specific methods to collect, process, transmit, and use an enormous and growing amount of data (Teubner, Stockhinger, 2020). Knowledge and ICT are increasingly taking over the role of the primary drivers of the modern economy. This also applies to health care services. Hospital managers should follow the example of other similar sectors to avoid mistakes and apply appropriate levels of good practices in the area of ICT management. Particularly important in this sector is to optimize the use of ICT, i.e., seeking to maximize the therapeutic effects, and reduce the costs of implementing these technologies. This should be part of the long-term strategy of a health care entity.

The primary purpose and mission of health care entities are to provide medical services. The vast majority of these services are provided in hospitals. There are many different systems of financing health care around the world, ranging from purely private, financed by patient insurance, to those financed by the state budget (Thomson, Foubister, Mossialos, 2009). The economic efficiency of private hospitals is one of the important conditions for their operation (Kourtis et al., 2021). For public hospitals, financial and economic autonomy is fundamental regardless of the type of health care system (Rutkowska-Podołowska et al., 2011). Funding for public hospital operations is of interest to politicians and legislators, NGOs, community organizations, patients, and related social media. The financial autonomy of public hospitals is significant from more than just a manager's perspective. Managing this type of hospital requires taking into account the specifics of the healthcare market. Rising health care costs, limited funding, and social and political factors must be taken into account as health has a pretty high value for every human being.

The development of a hospital's intellectual capital and other intangible assets is not possible without the use of ICT, which is a kind of environment for intangible resources like knowledge and intellectual capital. Therefore, the development of intellectual capital is linked to and correlated with the development of ICT. Intellectual capital, especially the knowledge and skills of the staff, undoubtedly supports the improvement of the quality of medical services provided. Efficient financing of hospital operations should positively influence the discussed phenomena and their mutual relations (Wang, Wang, McLeod, 2018).

In research practice, some phenomena that cannot be measured directly have to be explored. This is also true for the issues studied in this paper. In such cases, theoretical constructs with unobservable variables are developed. Analysis of these types of research models can be performed using structural equation modeling (SEM) (Purwanto, 2021). The research model in this paper was designed and verified using the SEM-PLS methodology. WarpPLS v8 software (www.scriptwarp.com, 2022) was used to calculate model parameters.

This paper examines the aforementioned phenomena and their mutual relationships. The graphical form of the model provides a synthetic and simple form of presentation of the relationships studied.

The empirical survey of Polish hospitals presented in the paper aims to fill the research gap in this area. The author has not encountered previous cases of similar studies carried out in Polish hospitals in subject-related literature. The results of the study presented in this paper may be useful to medical personnel and hospital managers in the area of knowledge management.

2. Literature overview

The development of modern economic organizations depends on the intangible resources they own, including knowledge, intellectual capital, and the ability to manage these resources (Hussinki, et al., 2017). Among knowledge in an organization, one can distinguish between knowledge owned and used directly by an individual and knowledge owned by an organization. This corresponds to the concepts of intellectual human capital (e.g., employees' tacit knowledge) and intellectual structural capital (including relational capital) (Chang, Chen, Lai 2008, p. 300). An overview of intellectual capital in contemporary businesses was provided by Goldin (2016) and Paoloni et al. (2020).

Numerous studies in different sectors show the competitive and financial advantage of the companies that manage knowledge and their intellectual capital well and effectively (Jordão, Almeida, Novas, 2022) (Pirozzi, Ferulano, 2016). The effectiveness and efficiency of diagnosis and treatment are important not only for patients but also for the state's economy and health care financing. The recommendations of scientists, practical actions of managers, legal regulations, and actions of politicians in this area vary depending on the degree of economic development of individual countries and the type of financing system for health care. Research on efficiency should take the country's specificity into account (Kozuń-Cieślak, 2020).

In her studies, Krukowska-Miler (2015) analyses the factors influencing the evaluation of Polish hospitals by patients and other possibilities of building a hospital's image and developing relational intellectual capital. In another study, Krukowska-Miler (2017) demonstrated that patients, in addition to the quality of medical services and waiting time, seek understanding, interest, and partnership in physicians, which are soft skills that can be considered to be a type of intellectual and relational capital. Wielki et al. (2020) studied the problems of knowledge acquisition and ICT implementation and adoption in Polish hospitals. The research of Chluski (2018) showed the positive impact of ICT development on building intellectual human capital in Polish hospitals. The author focused on a narrower perspective of the intellectual capital of Polish hospitals in the form of human capital. The present paper examines the relationships between the strategic role of ITC, the quality of medical services, while also the development of intellectual capital more generally.

For medical activities, ICT is increasingly integrated with purely medical technologies (Aceto, Persico, Pescapé, 2018). In diagnostic imaging, most of the data is digital. This not only applies to computed tomography and magnetic resonance techniques, but also X-rays, endoscopic examinations, ultrasound examinations, various types of apparatus measuring health parameters of patients, apparatus supporting body functions, specialized life support apparatus, and surgical equipment such as surgical robots, etc. Studies conducted by Lopo (2020) and his colleagues have shown the significant effect of ICT on the effectiveness and efficiency of medical entities

and on improving the quality and accessibility of the medical services provided. ICT facilitates the acquisition of knowledge by medical staff and enhances the image of individual physicians and the hospital as an organization.

The quality of health care services is of interest not only to patients, for whom health is a fundamental value, but also to health care financing institutions, politicians, NGOs, social media, etc. (Quentin et al., 2019). The high quality of medical services may be influenced by the following factors (Chluski, 2016): universal accessibility, effectiveness, and efficiency of diagnosis and treatment, while also social acceptance of health care. Social acceptance of medical services (e.g., cultural and religious aspects) means that the hospital has an individual patient's or community's consent for the form and types of providing health care services (Sawyer et al., 2014).

Universal accessibility of medical services is related to the concept of social justice and refers to the equal treatment of all patients by publicly funded health care (Nadziakiewicz, Mikolajczyk, 2019). Frackiewicz-Wronka, Austen, Wronka (2010) emphasized the positive impact of the development of the intellectual capital of managers and their management style on the economic efficiency of hospital operations. Extensive research on the evaluation of economic activities including the efficiency of using sources of financing for Polish hospitals was conducted by Strzelecka and Nieszporska (2015), while also Skrodzka and Nieszporska (2015).

3. Theoretical constructs and research hypotheses

SEM-PLS modelling is often used in exploratory research where new phenomena, interrelationships, and corresponding research hypotheses are sought. A mathematically and statistically valid SEM-PLS model allows the corresponding hypotheses to be considered true. As a result of preliminary work, four theoretical constructs defining the basic structure of the SEM-PLS model were identified. The relationships between these variables correspond to research hypotheses.

The first construct, *financial autonomy*, is defined in three aspects. The first one concerns the employees' opinion about the development of their hospital, whereas the second one relates to the revenue, liquidity, and payment of liabilities. The third aspect relates to managers' views on the financial efficiency of the hospital (Opolski et al., 2018). Similarly defined constructs were used in research by Bardhan and Thouin (2013). Research on efficiency should take the country's specificity into account (Cantor, Poh, 2018). The construct *financial autonomy* corresponds to the latent variable finAuton. The relationships between this construct and other elements of the model are expressed by the hypotheses H2, H4, and H6 presented later in this paper.

The second construct: *orientation on a strategic approach to the management of ICT* refers to the extent to which ICT development is compatible with the hospital's overall development strategy. Managers of ICT departments in hospitals should be aware and take into consideration the overall hospital development strategy. Consultation with the hospital's medical staff and mid-level management is crucial because they are the end-users of the ICT systems (Jelonek, Chluski, 2014) (Bardhan, Thouin, 2013). The variable ictOrient corresponds to this construct. The relationships between this construct and other elements of the model are expressed by the hypotheses H3, H4, and H5.

The third construct is the *quality of medical services provided*. This construct is considered in two areas. The first relates to staff views on the increase in the availability and range of medical services provided. The second aspect concerns patients' perceptions of the quality and availability of health care services. Universal accessibility, the efficiency of diagnosis and treatment, and social acceptance of health care are essential factors in the high-quality medical services provided (Chluski, 2018). A similar analysis of the dimensions of healthcare service quality was presented by Pai and Chary (2013) and Quentin et al. (2019). The servQual variable corresponds to the construct discussed. The relationships between this construct and other elements of the model are expressed by the hypotheses H1, H5, and H6.

The fourth construct is *the degree of development of intellectual capital*. It concerns managing the image and brand of the hospital and treating the knowledge and skills of the staff as a strategic and key resource for the hospital (Hsu, Sabherwal, 2011) (Kim, Kumar, 2009). The latent variable devCap corresponds to the construct discussed. The relationships between this construct and other elements of the model are expressed by the hypotheses H2, H4, and H6.

Research hypotheses are as follows:

- H1. Degree of development of intellectual capital has a positive effect on the Quality of medical services provided.
- H2. Financial autonomy of hospital has a positive effect on the Degree of development of intellectual capital.
- H3. Orientation on a strategic approach to the management of ICT has a positive effect on the Degree of development of intellectual capital.
- H4. Orientation on a strategic approach to the management of ICT has a positive effect on the Financial autonomy of hospital.
- H5. Orientation on a strategic approach to the management of ICT has a positive effect on the Quality of the medical services provided.
- H6. Financial autonomy of hospital has a positive effect on the Quality of the medical services provided.

The presented path-based SEM model enables the confirmation of the hypotheses proposed in this paper. It allows for the determination of the basic relationships between latent variables in numerical form, their statistical significance, and the direction of impact .

4. SEM-PLS research model

The research model was implemented using the SEM-PLS methodology. The SEM-PLS methodology is increasingly used in the social sciences to carry out non-experimental research (Hancock, Stapleton, Mueller, 2018). The research is non-experimental in nature and based on respondents' opinions on concepts, phenomena, and the relationships between each other.

The SEM-PLS research model is composed of two types of sub-models. The first is a structural model. It is formed by variables and relationships that cannot be measured directly and are called latent variables. Latent variables correspond to predefined theoretical constructs. The structural model examines the relationships that exist between various latent variables. These relationships correspond to path connections. They are pre-determined, based on previous research and theory and the expectations of the researchers (model developers). This model is also termed the inner model.

The second part of the SEM-PLS research model consists of measurement sub-models created for all latent variables of the structural model. The measurement of a latent variable is performed using indicators. These are most often in the form of selected survey questions that often create quantitative measurement scales such as the Likert scales. This model is termed the outer model. The questionnaire used in the present study employed a seven-point interval Likert scale. The ovals correspond to latent variables. The research hypotheses correspond to the relationships between these variables represented by arrows. Rectangles contain indicators of the measurement models connected by arrows to the corresponding latent variables.

The proposed theoretical constructs correspond to the latent variables of the model contained in Table 1.

Table 1: Latent variables of structural model and indicators of measuring models

The theoretical construct	The latent variable of the structural model
Degree of development of intellectual capital	deveCap
Financial autonomy of hospital	finAuton
Orientation on a strategic approach to the management of ICT	ictOrien
Quality of medical services provided	servQual

The proposed SEM-PLS research model in graphical form is shown in Figure 1.

The individual questions of the research survey are indicators in the measurement models of the latent variables of the SEM-PLS model. For example, the indicators for the measurement model of the servQual variable correspond to the following survey items:

- serQual1 - The quality of services provided as perceived by patients has increased over the last five years.
- serQual2 - The range of services provided at our hospital is constantly expanded.
- serQual3 - The number of services provided at our hospital shows an upward trend.
- serQual4 - The availability of services provided as perceived by patients has increased over the last five years.

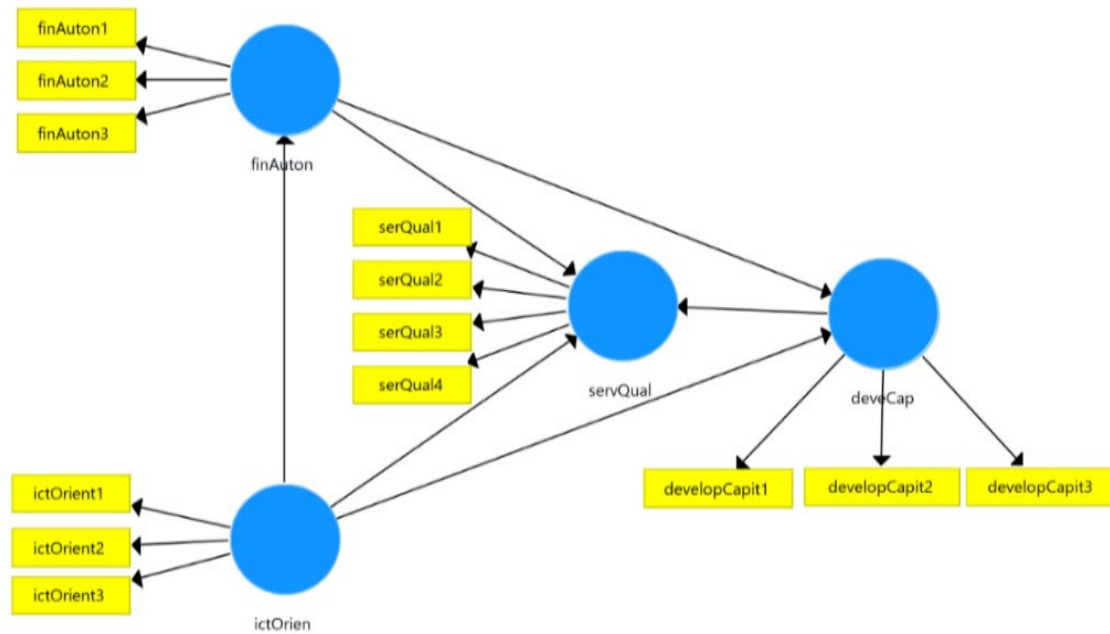


Figure 1: The research model in graphical form (source: own elaboration)

5. Research sample and data collection

A research questionnaire was developed as a research tool to measure variables of the model, and it consisted of statements corresponding to the individual indicators of each measurement model. An interval Likert-type scale was used. The survey was addressed to managers and was sent to selected Polish hospitals. To ensure sample representativeness, 170 questionnaires were sent to all 16 voivodeships (provinces). Correct responses were obtained from 96 respondents. The percentages of particular types of hospitals in the research sample approximately corresponded to the structure of the entire population of Polish hospitals (hospitals were divided by taking account of the founding body). Questionnaires were received from all over Poland. Table 2 contains the quantitative structure of the research sample. The number of Polish hospitals slightly exceeds 850 (Bank DanychLokalnych, 2022).

Table 2: Structure of the research sample

district hospitals	29
municipal hospitals	21
provincial hospitals	17
teaching hospitals	12
private hospitals	10
other hospitals	7

The minimum sample size was estimated based on the requirements specified for the SEM-PLS method using the appropriate assumptions about the statistical power of the test. The minimum sample size was calculated assuming the smallest path coefficient of 0.267, the significance level of 0.05, while also the test power of 0.825. For the inverse square root method the minimum sample was 94 (Kock, Hadaya, 2018). The research sample turned out to be sufficient to yield adequate parameters of the research model for the SEM-PLS methodology.

6. Research results and model evaluation

The research model in graphical form and the basic computational results are presented in Figure 2.

The path coefficients are shown next to the arrows connecting the latent variables. Furthermore, next to the endogenous variables are the corresponding values of the R^2 coefficients of determination, which indicate the amount of variance explained by each variable.

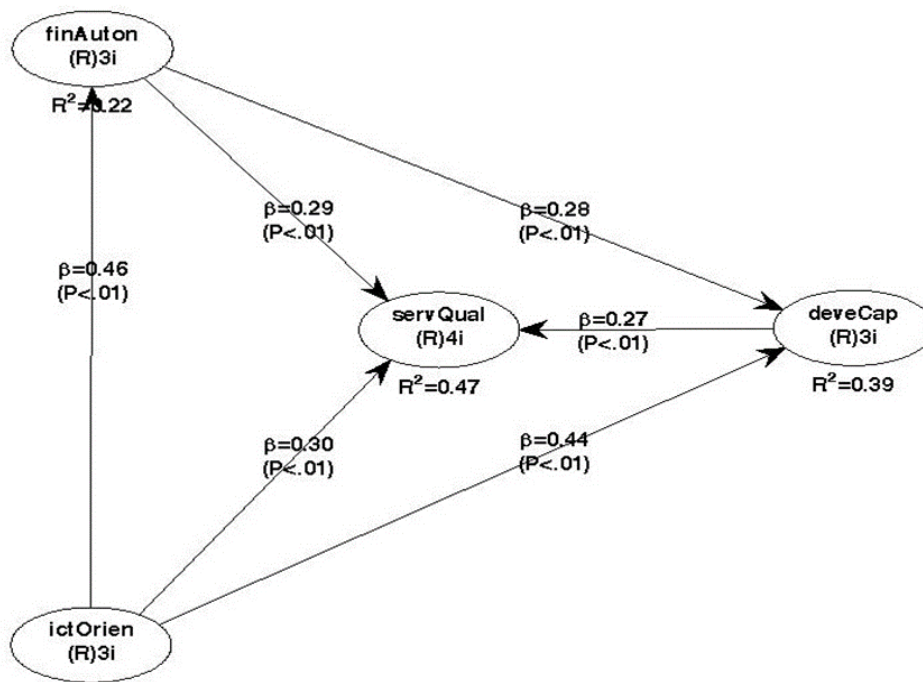


Figure 2: Research model and calculation results presented in graphical form (source: own elaboration)

Table 3: Path coefficients β of the structural model

	ictOrien	finAuton	deveCap
finAuton	0.465	-	-
servQual	0.297	0.289	0.267
deveCap	0.442	0.281	-

The p-values for all path coefficients are less than 0.005 whereas standard errors are less than 0.095.

Path coefficients β represent the relative effect size for the relationships between the variables of the SEM structural model. They are similar in nature to the coefficients in an econometric regression equation. It is assumed that variables are measured on quantitative scales. Therefore, the effect of a particular variable with a path coefficient twice as large is correspondingly twice as large. Path coefficient values must be statistically significant. Statistical significance is a strict and unambiguous feature of the estimated parameters. If the parameters are not statistically significant, they are not taken into account and discarded. Values of β greater than 0.20 are considered acceptable in path modeling (Hair et al., 2010).

6.1 Assessment of the structural model and measurement models

There is no one-size-fits-all and universally accepted quality criterion for the SEM-PLS model. Therefore, several types of indices are used to evaluate the quality of PLS SEM modeling. Using the WarpPLS program, a number of different indicators of research model quality can be calculated.

The quality assessment applies to the structural model and measurement models. The assessment measurement models require verification of the parameters for model reliability and validity. This includes internal consistency reliability, convergent validity, and discriminant validity for each measurement model. The internal consistency reliability was determined by composite reliability, Cronbach's alpha coefficient, and Dijkstra's rho_a coefficient. The values of coefficients determining the internal consistency of the research model are presented in Table 4.

Table 4: Basic reliability coefficients for latent variables

	ictOrien	finAuton	servQual	deveCap
Composite reliability	0.838	0.869	0.905	0.885
Cronbach's alpha	0.712	0.770	0.861	0.805
Dijkstra's rho_a	0.723	0.769	0.869	0.808

The coefficients shown in Table 4 are statistically significant and are greater than 0.7. Therefore, they meet the assumptions for SEM PLS measurement models (Hair et al., 2021).

Table 5: Values of loadings and cross-loadings

	ictOrien	finAuton	servQual	deveCap
ictOrient1	0.742	-0.081	-0.099	0.003
ictOrient2	0.841	-0.036	-0.140	0.160
ictOrient3	0.802	0.096	0.206	-0.153
finAuto1	-0.039	0.865	0.070	-0.066
finAuto2	-0.108	0.889	-0.066	0.020
finAuto3	0.140	0.729	-0.010	0.048
serQual1	0.054	0.046	0.823	0.203
serQual2	-0.101	-0.153	0.828	-0.033
serQual3	-0.035	-0.108	0.886	-0.098
serQual4	0.051	0.167	0.819	-0.113
developCapit1	0.097	0.180	-0.091	0.793
developCapit2	0.074	-0.112	0.025	0.892
developCapit3	-0.197	-0.077	0.076	0.858

Table 5 shows the values of loadings and rotated cross-loadings. Loading values are greater than 0.725 and significantly exceed cross-loadings. The basic conditions of reliability and validity (discriminant validity) are met.

The Fornell-Larcker criterion was used to determine discriminant validity. Table 6 illustrates correlation coefficients and the Average Variance Extracted (AVE) root values on the diagonal. They are greater than the correlations between the latent variables. The Fornell-Larcker criterion is thus satisfied (Santos, Cirillo, 2021)

Table 6: Correlations between latent variables with AVE root values

	ictOrien	finAuton	servQual	deveCap
ictOrien	0.796	0.458	0.565	0.567
finAuton	0.458	0.831	0.518	0.470
servQual	0.565	0.518	0.840	0.557
deveCap	0.567	0.470	0.557	0.849

The heterotrait-monotrait criterion (HTMT) was used to evaluate discriminant validity. The results of HTMT calculations are presented in Table 7. They are significantly less than the threshold value of 0.9 (Henseler et al., 2015) and are statistically significant.

Table 7: HTMT criterion ratios

HTMT ratios	ictOrien	finAuton	servQual
ictOrien	-	-	-
finAuton	0.606	-	-
servQual	0.701	0.621	-
deveCap	0.740	0.592	0.657

The R² coefficient of determination is an important measure in SEM-PLS modeling. Table 8 shows the R² values. All coefficients are statistically significant (p < 0.001). The effect sizes are considered small for R-squared below 0.19, moderate for 0.33, and large for values above 0.67 (Chin, 1998, p. 323).

Table 8: Coefficient of determination R²

variable	R ²	Adjusted R ²
finAuto	0.216	0.208
servQual	0.474	0.457
deveCap	0.386	0.373

Cohen (1992) proposed another measure (effect size: f^2) similar to R². Table 9 reports the f^2 values for the model tested. According to Cohen (1992), 0.02 indicates small, 0.15 indicates medium, and 0.35 indicates large effect size.

Table 9: The f^2 effect size for the model studied

	ictOrien	finAuto	servQua	deveCap
finAuto	0.216			
servQua	0.168	0.156		0.151
deveCap	0.251	0.135		

In the case of the model studied, the effect size values are medium. Only for finAuto->deveCap f^2 is it less than 0.15 (0.135).

The total variance inflation factor (VIF) is a measure of the degree of collinearity between the two latent variables and should be less than 5 (Hair et al., 2021), and, according to Knock (2015), even less than 3.3. The VIF values are presented in Table 10.

Table 10: Values of full collinearity VIFs

ictOrien	finAuto	servQua	deveCap
1.742	1.499	1.817	1.737

The effect of multicollinearity in the model studied is negligible.

6.2 Indices of research model fit

Several types of indices are used to evaluate the fit of PLS-SEM modeling. The WarpPLS program was used to compute the most commonly used SEM-PLS model fit indices, which are presented in Table 11. All the presented values of the research model quality indicators have relatively high values. The exception is the standardized root mean squared residual (SRMR).

Table 11: Basic model fit indices for the SEM-PLS research model

Fit indices of research model	Computed value	Fit quality conditions
Average path coefficient	0.357	p<0.05
Average R-squared	0.387	p<0.05
Average adjusted R-squared)	0.375	p<0.05
Average full collinearity VIF	1.699	acceptable if <= 5, ideally <= 3.3
TenenhausGoF (GoF)	0.516	small >= 0.1, medium >= 0.25, large >= 0.36
Sympson's paradox ratio	1.000	acceptable if >= 0.7, ideally = 1
R-squared contribution ratio	1.000	acceptable if >= 0.9, ideally = 1
Statistical suppression ratio	1.000	acceptable if >= 0.7
Standardized root mean squared residual	0.109	acceptable if <= 0.1
Standardized chi-squared with 77 degrees of freedom	2.365	p<0.05

SRMR is an absolute measure of model fit. It is a standardized difference between the predicted and the observed correlation. SRMR has larger values for small sample sizes and models with a low number of degrees of freedom. This is probably why the SRMR of the tested model is slightly above the acceptable value and is 0.109. Cangur and Ecran (2015, p. 164) do not recommend using SRMS as a measure of fit of SEM-PLS models. All other indices of research model fit reported in Table 10 are well above the minimum acceptable values.

7. Results and discussion

The path parameters of the model determine the relative strength and direction of the relationships that exist between the theoretical constructs of the model. Based on the results, the *Degree of development of intellectual capital* has a positive effect on the *Quality of medical services provided*. The relative strength of this interaction

(path coefficient) is 0.27. This is in line with expectations, as medical services belong to professional services, in which a high level of knowledge, skills, and trust in the people providing these services is the key thing. Therefore, the development of such intellectual resources in the hospital has a positive effect on the quality of medical services provided.

The Development of intellectual capital is positively affected by the *Financial autonomy*, with a strength of 0.28, and the *Orientation on a strategic approach to the management of ICT*, with a relative strength of 0.44. There is a general consensus that modern ICT tools and resources facilitate knowledge acquisition and creation, while also enhancing workforce competencies in health care. This is also supported by a high level of employee compensation and the ability to purchase the required equipment, tools, and medical supplies.

Financial autonomy also has a positive effect on the *Quality of medical services provided* with a power of 0.29. *Orientation on a strategic approach to the management of ICT* has a positive effect on other latent variables of the model, such as the *Financial autonomy of a hospital*, with a strength of 0.46, the *Quality of the medical services provided*, with a strength of 0.30, and the *Degree of development of intellectual capital*, with a strength of 0.44.

The model presented in this paper represents the relationships between the constructs studied. It determines the relationships between the financial autonomy and the orientation of hospital managers on ICT strategy, while also the quality of medical services and the development of intellectual capital of medical personnel. In addition to a numerically expressed relative strength, these relationships have a specific direction of effect. Some researchers equate this direction of effect with a cause-and-effect relationship (Loehlin, 1987, p. 13). However, the prerequisite for the existence of such relationships is to demonstrate that the cause occurred earlier, before the moment of the appearance of the effect, which is impossible in this type of modeling (Bollen, Pearl, 2013).

8. Conclusions

Medical activities are inextricably linked to the use of ICT in a manner adjusted to hospital specificity. This is especially important for publicly funded hospitals. For providing medical services, the knowledge and skills of the medical staff are critical, as they mean resources of the nature of intellectual capital. Undoubtedly, the development of this capital has a positive effect on the quality of medical services.

The research model presented in this paper meets all the basic quality criteria used in SEM-PLS modeling. The measurement models and the structural model meet the assumptions required by the social sciences for the SEM-PLS methodology. All model parameters are statistically significant and take positive values. The model parameters are within acceptable ranges of values. Depending on their type, they reach medium and large values. This allows for the confirmation of the hypotheses posed in the paper.

The model developed in the paper can be useful for the managers and staff of health care providers. It presents specific phenomena and complex relationships between each other in a precise manner, with the direction and strength of their effect. The graphical presentation of the model facilitates the interpretation of the phenomena studied and the practical use of the model.

No studies have been conducted to date in Polish hospitals on the discussed constructs using the SEM-PLS methodology. The research carried out in this paper was exploratory and was of a pilot study nature. This can form the basis for further more in-depth analyses. The structural model presented in this paper can be extended with additional variables that describe the analyzed phenomena in more detail. Expanded research involving other European countries with similar health care systems is also possible.

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