
Dynamic Capabilities Affecting the Functioning of E-Administration in Polish Public Administration Entities

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Abstract:

Purpose: Dynamic capabilities are an intended strategy for implementing changes in public sector organizations to execute the organizations' tasks effectively. The paper's main objective is to identify the dynamic capabilities affecting e-administration functioning and the determinants of the capabilities' formation, aimed at establishing and then verifying a conceptual model.

Design/Methodology/Approach: The proper study was focused on Polish Public Administration entities that provide electronic administrative services. The sample consisted of 634 entities. The data collection was conducted with the use of the CAWI method. The verification of the assumptions was conducted through a series of confirmatory factor analyses using the modeling of structural equations based on the SEM-CB and SEM-PLS methods.

Findings: As a result of the conducted research, it was ascertained that dynamic capabilities (especially knowledge absorption and application) affect e-administration effects and that culture, structure, and technology affect dynamic capabilities. The contextualization of dynamic capabilities allowed for broadening the knowledge on the conditions of their use and the possibilities of their impact on e-administration effects.

Originality/value: Despite assigning many potential benefits to dynamic capabilities, the knowledge about their impact on the effects of e-administration functioning is surprisingly narrow. The obtained results lead to conceptual transparency concerning the dependency between dynamic capabilities (knowledge absorption, conversion, and application) and the effects of e-administration functioning, considering the dynamic capabilities' determinants.

Keywords: Dynamic capabilities, e-administration, dynamic capabilities' determinants, e-administration effects.

JEL classification: H79.

Paper Type: Research study.

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1. Introduction

The e-administration concept was subject to numerous transformations in the last several decades and evolved from the predominance of technological orientation manifesting in focus on computerization (1960's and 1970's) to orientation on organizational redesigning (Jones, 2012). In the latter, the administration becomes an arbiter inviting social partners to seek the best solutions collectively. The dynamic capabilities concept allows for finding such solutions.

The dynamic capabilities concept moves the center of gravity from resources to capabilities, thereby appreciating the significance of capabilities as significant strategic prospects, separate from resources, determining the effects achieved by organizations (Peteraf, Di Stefano, and Verona, 2013). In this concept, the organization's capabilities act as mechanisms that integrate various resource compositions used in the organization and its competencies. The integration of resources and competencies allows for their simultaneous use to achieve the planned effects (Eisenhardt and Martin, 2000). Dynamic capabilities are defined as the ability to integrate, build and reconfigure internal and external competencies to address rapidly changing environments (Teece, Pisano, and Shuen, 1997). Dynamic capabilities in e-administration can constitute an organization's potential for systemic problem solving (Piening, 2013), resulting from the mindfulness of the signals deriving from inter-organizational relationships to ensure the correct direction of the entities' functioning and development (Maj, 2017; Maj and Walkowiak, 2015; Saeed, Malhotra, and Grover, 2005). Despite considerable scientific achievements in the scope of profit-oriented organization management, there is still a tiny number of publications and elaborations concerning dynamic capabilities concerning e-administration.

Therefore, this paper attempts to fill this theoretical and empirical gap, especially in the field of management practices related to the execution of statutory tasks with state-of-the-art communication technologies. Thus, it constitutes an essential direction of research. The paper's general objective is to identify the dynamic capabilities affecting e-administration functioning and the capabilities' determinants to establish a conceptual model. In order to achieve the general objective, several detailed objectives were distinguished and arranged in three phases.

The article is organized as follows. The following section specifies the literature on dynamic capabilities to clarify the nature of these capabilities and then continues the study of literature on dynamic capabilities in e-administration, dynamic capabilities' determinants, and effects. The analytical model of dynamic capabilities in e-administration was developed by integrating three research streams (dynamic capabilities in e-administration, determinants of dynamic capabilities in e-administration, and e-administration effects). Finally, the model and its implications for future research are discussed.

2. Dynamic Capabilities in E-administration

The current public tasks' execution management paradigm, especially tasks related to e-administration functioning, is viewed as a social learning process that includes actors with various social statuses and formal nature. Thus, e-administration needs to focus on dynamic capabilities, which help the organization understand the need for change. Researchers point out that the improvement of capabilities concerning the flow of knowledge between the organization and its environment, which is very important in e-administration, requires the improvement of routines (operating capabilities) (Teece, 2014) concerning knowledge transmission into the inter-organizational relationships and knowledge acquisition from the inter-organizational relationships in a manner that allows it to create the highest value for the organization and its stakeholders (Nah, Siau, and Tian, 2005). In terms of the effects achieved by e-administration, aside from knowledge embedded in the internal network, knowledge embedded in its inter-organizational relationships is also essential. The absorption of knowledge existing in an organization and its inter-organizational relationships is essential, but it cannot be responsible for the effects achieved by the administration.

Nevertheless, the few tools for measuring the dynamic subject capabilities primarily had the absorption capability (Zahra and George, 2002). This capability should be complemented by embedding knowledge in organizational knowledge repositories (conversion), i.e., processes (Teece and Pisano, 2003), and then its application. Identifying and absorbing knowledge depends partially on an individual's capabilities and partially on the organization's knowledge and the organization's learning capability to which the individual belongs, especially in terms of stakeholder needs concerning existing and new solutions (Teece *et al.*, 1997). This requires specific knowledge, creative activity and the ability to understand the decisions made by the stakeholders (Preskill and Torres, 1999). It consists of the interpretation of any form of available information - chart, image, discussion, the novelties on scientific and technological breakthroughs, or the services' recipient's opinions. It is necessary to collect and then filter the information from professional and social contacts to create the assumption or hypothesis about the probable technological evolution, customer needs, and market responses (Chiu and Chen, 2016). This is the purpose of the conversion and application capabilities. Knowledge conversion is an organization's ability to transform knowledge absorbed within the organization to places where needed and applied.

This task encompasses scanning and monitoring internal and external technological achievements and evaluating expressed and hidden stakeholder needs. It includes education, interpretation, and creative activity. The application lies at the heart of creative activity. It means absorbing activity and converting knowledge to create value for the organization. Whereas some individuals in an organization can have the necessary cognitive and creative skills, a more desirable approach is to embed the scanning, interpretative, and creative processes in the organization and its processes.

Organizational processes can collect new information, monitor stakeholder needs (absorption), and develop new services and processes (application). The information must be filtered and reach everyone who needs it (Teece, 2018), not only in the organization but also in its inter-organizational relationships (conversion). The specifics require this of e-administration functioning. The paper proposes the following research hypotheses:

H1: Absorption of knowledge considerably affects the effects of e-administration functioning.

H2: Conversion of knowledge considerably affects the effects of e-administration functioning.

H3: Application of knowledge considerably affects the effects of e-administration functioning.

3. Determinants of Dynamic Capabilities in E-Administration

Dynamic capabilities require an adequate background. This “background” is also referred to as determinants (Chiu and Chen, 2016). Determinants constitute an organization’s inherent potential required for building and maintaining organizational capabilities. Determinants require a systemic approach to designing and organization management (Preskill and Torres, 1999). Liebowitz identified six elements of dynamic capabilities’ determinants. These include the support for the highest-level management, culture favorable to knowledge, knowledge repositories, knowledge management strategy, knowledge management determinants, and promoting knowledge sharing (Liebowitz, 1999). Bapuji and Crossan point to the following determinant elements, organizational culture, strategy, organizational structure, environment, level of possessed resources, and the organization’s development (Bapuji and Crossan, 2004). Wong emphasizes the importance of supporting the highest-level management, organizational culture, IT level, strategy and objective of activity, organization’s soft determinants, processes and activities, incentive systems, resources, training and education, human resources management (Wong, 2005).

The analysis of the present scientific accomplishments regarding the dynamic capabilities’ determinants demonstrates the lack of systematization in studying the notion. The selection of determinants is random and often leads to replicating the variables (e.g., distinguishes cultures favorable to knowledge and promoting knowledge sharing, which should be the primary element of such a culture). After analyzing several theoretical and empirical studies, the identified determinants were collected, detailed, and organized into three main groups: culture, structure, and technology.

The description of specific values, creating the contents of organizational culture about dynamic capabilities in e-administration, is fragmentary in subject literature and rather an exception than standard in management sciences’ accomplishments.

As mentioned above, the development of e-administration requires a thorough redesigning of organizations and orienting them towards creating a values network, i.e., eliciting the cooperation of many independent entities providing values that could not have been provided by any of the entities on their own (Wimmer, Traunmüller, and Lenk, 2001). This task requires aware shaping of the organizational culture. A systematic analysis of the subject literature was conducted to identify the factors determining such a culture. It was pointed out that researchers deemed organizational culture as one of the primary determinants of shaping and developing dynamic capabilities (Teece, 2018). The researchers especially pointed out that organizational culture provides a familiar context that allows or hinders knowledge exchange, specifying the degree of employee engagement and superior officers and defining the limits of cooperation. The context determines a common way of thinking and conducting individuals based on common standards, beliefs, values, and assumptions (Nold and Michel, 2016).

The value significant in terms of dynamic capabilities in e-administration, embedded in organizational culture, focuses on learning both individually and in a group, sharing knowledge, human creativity, people's ability to act and engage, and vigilance in changing stakeholder needs (Atkinson, 1999). The knowledge that is not shared, exchanged, and conveyed is of no value to the organization. A common way of thinking, conduct, decision-making, and acting requires direction, balance, and coordination. A challenge for the management staff is creating a culture that facilitates joint work on tasks that add value to the organization currently and in the future. Practical cooperation requires a clearly defined objective, mutual trust, openness, and commitment to working with people working jointly on a standard action method (Baker and Chasalow, 2015). Teece emphasizes the significance of organizational culture for dynamic capabilities and points out that the strength of dynamic capabilities depends on their roots in the organization, not on manager attitudes and features (Teece, 2018).

H4: Culture considerably affects the dynamic capabilities in e-administration.

Researchers agree that its structure also affects dynamic capabilities (Teece, 2018). A flat organizational structure and decentralized authority are favorable to dynamic capabilities, however developing a suitable balance between delegation and control can take some time (Foss, 2003). Organizational structure should be designed to acquire, convert, and apply the knowledge required to achieve its objectives. In terms of dynamic capabilities, and organizational structure should be decentralized. A decentralized structure ensures greater flexibility in reacting to occurring stimuli and facilitates the information flow between an organization's functionally distinct departments (Willem and Buelens, 2007). Admittedly, researchers concluded that there is no such thing as a single correct learning processes' structure (Fenwick and Mcmillan, 2005).

However, they agree that a structure should provide a foothold for emerging initiatives, allowing them to spread along inter-organizational networks (Kulkarni, Ravindran, and Freeze, 2007). Like organizational culture and its values, the structure can reinforce or weaken an organization's dynamic capabilities (Ireland, Covin, and Kuratko, 2009).

H5: Structure considerably affects the dynamic capabilities in e-administration.

Technology becomes essential in terms of deliberations on the dynamic capabilities' determinants in e-administration. It constitutes a peculiar link between man and information, between particular organization members, and between organization members and its stakeholders (Atkinson, 1999). According to researchers, an organization is a repository of knowledge included in its business processes, whereas technology is the tool that facilitates its flow (Teece, 2018). Due to the above, an organization's nature lies in creating, conveying, collecting, integrating, and using knowledge resources (Preskill and Torres, 1999). Technology allows knowledge management, especially its acquisition, storage, exchange, mapping of internal or external knowledge sources, integrating organizational knowledge flow, and using the existing knowledge to create new knowledge (Chuang, 2004; Gold, Malhotra, and Segars, 2001). Technology facilitates the acquisition of information, mainly thanks to a network of professional and social contacts, and then filtering them to outline the most probable evolution of stakeholder needs (Wimmer *et al.*, 2001). Hence, integrating and incorporating knowledge through the effective use of information and communication technologies (ICT) is essential to dynamic capabilities.

H6. Technology considerably affect the dynamic capabilities in e-administration.

4. E-Administration Effects

Dynamic capabilities concern the re-configuration, integration, and coordination of the existing resources and the organization's capabilities, thereby constituting the basis for its effects (Motebele and Mbohwa, 2016). The studies on the measurement of effects related to the implementation of IT technologies, conducted for over three decades, lead to a bit of consensus on the adequate measures of IT systems' success (Scott, Delone, and Golden, 2016). Petter, DeLone, and McLean identify the lack of development in measuring specific dimensions of studying IT effects (Petter, DeLone, and McLean, 2008).

When analyzing the effects of applying IT systems, researchers mainly focused on single dimensions, e.g., on the work environment (Petter *et al.*, 2008), using the indicators, productivity, efficiency, and task improvement (Gable, Sedera, and Chan, 2008). Researchers also analyzed e-Government systems from a citizen's perspective (Wang and Liao, 2008) and rated the availability and variety of online e-administration information and services (Connolly, Bannister, and Kearney, 2010).

In some of the papers, researchers applied a single-dimension measure (Petter and McLean, 2009) that does not consider the complexity of the services' provision process (Marwa and Zairi, 2009). Therefore, further studies focused on developing e-administration effects' measures, especially with an approach encompassing the multi-dimensional nature of these effects, are required. The e-administration effects' measurement is not well understood among practitioners or scientific communities (Heeks, 2008), and the development of success measures is an urgent task that would allow for technology investments to justify their public value (Yildiz, 2007).

It is worth noting that the latest definition states that e-administration is concerned with better service, better governance, and practical and efficient relationships with citizens and businesses (Ma and Zheng, 2018). Thus, the very definition of e-government implies the need to consider many dimensions to measure its effects. Considering the need to include many dimensions to measure e-administration effects, it is proposed to use the construct constituting part of the CAF model widely known (and accepted) in public sector organizations. Most of the changes occurring in e-administration result from society's and citizens' expectations. The level of public service effectiveness usually rises with collaboration and integration (Chen *et al.*, 2019). This is the reason why increasing public participation, transforming government bureaucracies, promoting transparency, and improving service provision (Zheng, 2017) have become critical indicators of effects. The development of a society-focused approach requires cooperation.

Because services are becoming more complex, efficiency requires greater cooperation between agencies in such fields as cross-boundary collaboration and integration for improving the service quality, providing the highest quality services at the lowest possible costs, eliminating unnecessary features, avoiding duplication of the same initiatives (Nograšek and Vintar, 2014). The consideration of the role of employees is a complement to the two perspectives above. Effective e-administration functioning requires broadening employee power to help citizens most quickly and suitably, accelerating administrative processes, and optimizing governmental solutions.

5. Research Methodology

In order to achieve the detailed objectives described in the introduction and organized into three phases, a series of theoretical and empirical analyses were conducted and organized into three phases adequate to those previously described.

Phase 1: The objectives of this phase were to identify Polish Public Administrations entities that provide services utilizing cutting-edge communication technologies and provide a diagnosis of the current situation of public services through e-administration practices in the Polish Public Administrations entities that enabled observing their condition (i.e., maturity level). The phase featured the specification of the research sample. The research sample was determined based on the Act of 24

July 1998, which introduced the three-level territorial division of the state. According to the act, the units of the primary three-level territorial division in Poland include municipalities, private, and voivodeships. According to the data available as of 30 September 2017, Poland features 2.803 entities that mostly employ less than nine people. Based on an analysis of the entities' websites, providing services utilizing cutting-edge communication technologies was distinguished. The website analysis was conducted using the e-administration maturity model proposed by Belanger and Hiller (2006). The model consists of five stages of maturity ordered from lowest to highest (informative, two-way communication, transactional, integrative, participatory). Entities lower than in the third stage, i.e., transactional, were excluded from the research sample. This stage enables ongoing contact with the online administration, enabling, e.g., license renewal, payment of fees, applying for financial aid. The study only featured organizations that hired more than ten employees. After such narrowing, the study sample consisted of 634 entities. The conducted research shows that only 30 percent of Polish Public Administration entities are at a stage enabling them to use the potential resulting from the mindfulness of the signals deriving from inter-organizational relationships. These organizations were invited to participate in Phase 3.

Phase 2: The objectives of this phase were to analyze the theoretical approaches to dynamic capabilities in the environment of Public Administrations and design a research model. The analysis of the theoretical approaches and designing of the research model was conducted via a systematic review of the subject literature using various databases and corresponding to different publishing houses. These mainly included EBSCO, EMERALD, ScienceDirect, and SCOPUS. Bibliometrics was used as an additional measure during the literature analyses.

Phase 3: In the third phase, the objective was to verify the factor-related adequacy of the studied questionnaire variables and then verify the relevance of theoretical predictions regarding the cause and effect model. The phase featured a verification of the theoretical model developed during the second phase. In order to verify this model, the entities identified in the first phase were invited to participate in the study. The request for consent for participation in the study was sent via a cover letter to persons holding the highest position in each of these organizations. Two hundred eighty-eight organizations out of a sample of 634 entities took part in the study, with a fraction of 0.5 and max. With an error of 5%, the obtained study sample meets the minimum sample condition.

Due to the lack of responses or their inconsistency, the sample ultimately featured 226 Polish Public Administration entities. The data collection was conducted with the use of the Computer-Assisted Web Interview (CAWI) method. The respondents were contacted via an e-mail outlining the research project, inviting them to participate, and offering a link to a dedicated website with a digital questionnaire. This questionnaire was available for a participant in the period from November 2017

to January 2018. The verification was conducted in two stages. The first stage was aimed at verifying the factor-related adequacy of the studied questionnaire variables. For the verification, a series of confirmatory factor analyses were conducted using the modeling of structural equations based on the SEM-CB variance and covariance matrix. The analyses were conducted using the IBM SPSS Statistics AMOS program. Stage two aimed to verify the relevance of theoretical predictions in terms of the cause and effect model. The verification was conducted using structural equation modeling based on the SEM-PLS partial least squares in the WarpPLS program.

All scales for measuring particular constructs are seven-point Likert scales, from 1-” I strongly disagree” to 7-” I agree.” Such a scale requires structural modeling used in the study for analyzing the dependencies between the studied phenomena postulated by the theory.

The paper was mainly focused on providing public services through electronic administration practices in Poland because due to its social and economic situations before 1990, Poland has been behind other European states for many years in terms of implementing the e-administration concept.

6. Results

The confirmatory factor analysis was used to verify the impact of latent variables on the variability of the test positions of the three-factor model. The analysis was conducted using the highest reliability method, which perfectly matched the collected data with the three-factor theoretical model structure. The CMIN/DF matching test value amounted to 3.22, which means a good model matching. RMR amounted to 0.05. The matching indicators of the tested model compared with the matching of the NFI, TLI (tucker-lewis index), IFI, and CFI independence model allow for the approval of the model. The NFI indicator amounted to 0.87, IFI=0.91, TLI=0.89, CFI=0.91. Detailed values of individual variables are presented in Table 1.

The analysis of the correlation of latent variables demonstrated substantial and positive relations between them. The absorption variable was strongly correlated with the conversion variable $r=0.94$; $p<0.001$ and application $r=0.76$; $p<0.001$. On the other hand, the conversion variable was also strongly correlated with absorption $r=0.80$; $p<0.001$. The three-factor theoretical model concept was matched very well with the empirical data. The latent variable had a substantial and strong impact on the variability of the survey’s test positions.

The confirmatory factor analysis was used to verify the impact of latent variables on the variability of the test positions of the three-factor model. Initial analyses demonstrated that the variable 5.10 (organizational structure allows for co-operating with the stakeholders) strongly correlated with other factors, and it was decided to

remove it from the confirmatory analysis. The final analysis was conducted using the highest reliability method, which perfectly matched the collected data with the three-factor theoretical model structure.

Table 1. *Impact of latent variables - absorption, conversion, application on the variability of the test positions*

Variables	Direction of influence	Latent variables	B	β	R ²	S.E.	C.R.
1.1			1.00	0.78	0.62		
1.2			1.00	0.76	0.58	0.06	16.07***
1.3			1.18	0.77	0.59	0.09	12.82***
1.4			1.19	0.88	0.78	0.08	15.32***
1.5		Absorption	1.22	0.83	0.69	0.09	14.19***
1.6			1.13	0.84	0.71	0.08	14.44***
1.7			1.25	0.87	0.76	0.08	15.05***
1.8			1.32	0.91	0.83	0.08	16.12***
1.9			1.18	0.76	0.58	0.09	12.59***
1.10			1.17	0.81	0.66	0.08	13.83***
2.1			1.00	0.87	0.76		
2.2			0.96	0.87	0.76	0.04	25.96***
2.3			1.01	0.85	0.72	0.06	17.54***
2.4			1.01	0.91	0.83	0.05	20.58***
2.5			1.03	0.91	0.83	0.05	20.38***
2.6	<-	Conversion	0.97	0.82	0.67	0.06	16.45***
2.7			0.98	0.91	0.83	0.06	17.80***
2.8			1.04	0.82	0.67	0.06	16.39***
2.9			1.04	0.82	0.68	0.06	16.52***
2.10			1.02	0.90	0.82	0.05	20.02***
3.1			1.00	0.67	0.45		
3.2			1.12	0.87	0.76	0.07	15.22***
3.3			1.13	0.91	0.83	0.09	12.30***
3.4			1.13	0.91	0.83	0.09	12.29***
3.5		Application	1.17	0.90	0.82	0.10	12.23***
3.6			1.19	0.84	0.71	0.10	11.63***
3.7			1.21	0.89	0.80	0.10	12.12***
3.8			1.23	0.94	0.88	0.10	12.64***
3.9			1.19	0.94	0.89	0.09	12.65***
3.10			1.08	0.86	0.73	0.09	11.67***

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Own study.

The CMIN/DF matching test value amounted to 3.17, which means a good model matching. RMR amounted to 0.07. The matching indicators of the tested model compared with matching the NFI, IFI, TLI, and CFI independence model allow for the approval of the model. The NFI indicator amounted to 0.88, IFI=0.91, TLI=0.89, CFI=0.91. The exact values of individual variables are presented in Table 2.

Table 2. Impact of latent variables – technology, structure, culture on the variability of the test positions

Variables	Direction of influence	Latent variables	B	β	R ²	SE	CR
4.1			1,00	0.83	0.69		
4.2			1.14	0.72	0.52	0.09	12.53***
4.3			1.08	0.71	0.51	0.09	12.32***
4.4			0.93	0.86	0.75	0.06	16.29***
4.5	<---	Technology	0.88	0.70	0.48	0.08	11.82***
4.6			0.89	0.79	0.62	0.06	14.14***
4.7			0.86	0.75	0.57	0.07	13.16***
4.8			0.89	0.85	0.72	0.06	15.81***
4.9			0.84	0.85	0.73	0.05	15.96***
4.10			0.82	0.88	0.78	0.06	14.62***
5.1			1,00	0.90	0.81		
5.2			0.89	0.89	0.79	0.04	23.48***
5.3			1.03	0.90	0.82	0.04	25.00***
5.4			0.93	0.88	0.77	0.05	19.76***
5.5	<---	Structure	0.78	0.86	0.74	0.04	19.01***
5.6			0.91	0.72	0.51	0.07	13.66***
5.7			0.94	0.91	0.83	0.04	21.72***
5.8			0.99	0.86	0.73	0.05	18.73***
5.9			0.92	0.90	0.81	0.05	17.93***
6.1			1,00	0.88	0.77		
6.2			1.22	0.89	0.79	0.06	19.40***
6.3			1.28	0.90	0.82	0.06	20.21***
6.4			1.07	0.86	0.73	0.06	18.15***
6.5			1.19	0.86	0.74	0.07	16.69***
6.6	<---	Culture	1.19	0.87	0.75	0.07	18.39***
6.7			0.96	0.84	0.71	0.05	19.68***
6.8			1.23	0.89	0.80	0.06	19.56***
6.9			0.85	0.47	0.22	0.11	7.44***
6.10			1.02	0.74	0.55	0.07	13.98***

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Own study.

The analysis of the correlation of latent variables demonstrated substantial and positive relations between them. The technology variable was strongly correlated with the structure variable $r=0.78$; $p < 0.001$ and culture $r=0.79$; $p < 0.001$. On the other hand, the structure variable was also strongly correlated with culture $r=0.85$; $p < 0.001$. Based on the results, it is possible to state that the three-factor theoretical model concept was matched very well with the empirical data. The latent variable had a substantial and robust impact on the variability of the survey's test positions.

The confirmatory factor analysis was used to verify the impact of latent variables on the variability of the test positions. The analysis was conducted using the highest reliability method, which perfectly matched the collected data with the effects' dimension theoretical model structure.

The CMIN/DF matching test value amounted to 5.64, which means a good model matching. RMR amounted to 0.1. The matching indicators of the tested model compared with matching the NFI, IFI, TLI, and CFI independence model allow for the approval of the model. The NFI indicator amounted to 0.91, IFI=0.93, TLI=0.88, CFI=0.92. The exact values of individual variables are presented in Table 3.

Table 3. *Impact of latent variable effects on the variability of the test positions*

Variables	Direction of influence	Latent variable	B	β	R ²	S.E.	C.R.
7.1.1			1.00	0.72	0.51		
7.1.2			0.85	0.77	0.59	0.06	13.3***
7.1.3			0.95	0.89	0.80	0.07	13.37***
7.1.4			0.92	0.94	0.89	0.07	14.04***
7.2.1			0.94	0.83	0.69	0.08	12.36***
7.2.2			0.98	0.88	0.77	0.08	13.07***
7.2.3	<---	Effects	0.98	0.86	0.74	0.08	11.87***
7.2.4			0.83	0.78	0.61	0.07	11.66***
7.3.1			1.02	0.70	0.49	0.10	10.40***
7.3.2			1.04	0.72	0.52	0.10	10.72***
7.3.3			0.98	0.72	0.53	0.09	10.72***
7.3.4			0.92	0.75	0.57	0.08	11.19***

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Own study.

The single-factor theoretical model concept was matched very well with the empirical data. The latent variable had a substantial and robust impact on the variability of the survey's test positions. The modeling of structural equations was conducted using the PLS linear regression to verify the relevance of the theoretical assumptions regarding the chain of causes and effects of the variables of technology, structure, absorption, conversion, application, and effects. The reflective model was used as the structural model. All latent variables were shaped by their indicators developed during the confirmatory analyses stage.

The analysis of the matching coefficient of the model and the GoF data demonstrated that the empirical model was matched very well with the theoretical model GoF=0.64; it featured an acceptable average block variance inflation factor AVIF=4/48 and average full collinearity VIF=4.39. Further analysis demonstrated the model's perfect causality; the Simpson's paradox factor amounted to 1, while the similarity of correlations between the variables was similar to the model's path force SSR=1. The analysis of the R-squared contribution ratio demonstrated that the studied structural variables' model has in no way reduced the explained

measurement variance RSCR=1. The results of matching coefficients are presented in Table 4.

Table 4. Information about the model, adjusted and quality indicators

Information about the model, adjusted and quality indicators	Status in the model	Meaning
(APC)=0.31, p<0.001	Moderate	average path coefficient
(ARS)=0.579, p<0.001	Moderate	average R-squared
(AARS)=0.57, p<0.001	Moderate	average adjusted R-squared
(AVIF)=4.48	Acceptable	average block variance inflation factor
(AFVIF)=4.39	Acceptable	average full collinearity VIF
Tenenhous GoF (GoF)=0.64	Ideal	model's explanatory power
(SPR)=1	Ideal	the extent to which a model is free from Simpson's paradox instances
(RSCR)=1	Acceptable	the extent to which a model is free from negative R-squared contributions
(SSR)=1	Ideal	the extent to which a model is free from statistical suppression instances
Number of observations: 226	-	-
Number of latent variables: 7	-	-
Number of indicators: 71	-	-
Algorithm of the measurement model: regression PLS	-	-
Structure model algorithm: Linear	-	-

Source: Own study.

The measurement reliability analysis demonstrated that the measured variables were characterized by high reliability measured with the Cronbach and composite reliability. The average variances extracted (AVE) analysis demonstrated that a very high convergent validity characterized all measurements. The results of the measurements' strength assessment are presented in Table 5.

Table 5. Coefficients of reliability, explained variance and extracted variance

Measure	Items	Composite reliability	Cronbach's Alfa	AVE	R ²	ΔR ²
Absorption	10	0.96	0.96	0.72	0.59	0.58
Conversion	10	0.97	0.97	0.78	0.63	0.63
Application	10	0.98	0.98	0.97	0.73	0.73
Technology	10	0.96	0.96	0.69		
Structure	9	0.97	0.97	0.79		
Culture	10	0.96	0.96	0.72		
Effects	12	0.96	0.96	0.69	0.60	0.59

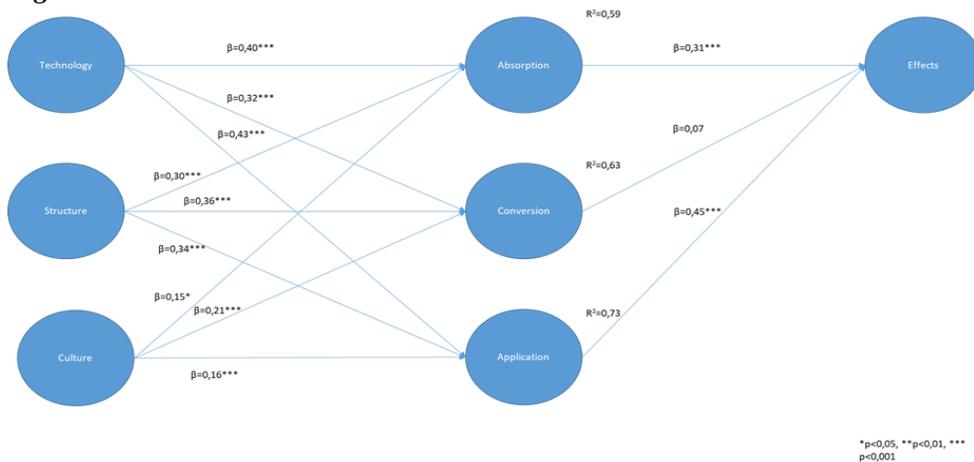
Source: Own study.

The model's path coefficients analysis showed that technology $\beta=0.40$; $p<0.001$, structure $\beta=0.30$; $p<0.001$, and culture $\beta=0.15$; $p<0.05$ considerably affects the effects of absorption, explaining at the same time 59 percent of its variation $R^2=0.59$. Technology $\beta=0,32$; $p<0.001$, structure $\beta=0.36$; $p<0.001$ and culture $\beta=0.21$;

$p < 0.001$, considerably affects the effects of conversion, explaining at the same time 63 percent of its variation $R^2 = 0.63$. Technology $\beta = 0.43$; $p < 0.001$, structure $\beta = 0.34$; $p < 0.001$ and culture $\beta = 0.16$; $p < 0.001$, considerably affects the effects of application, explaining at the same time 73 percent of its variation $R^2 = 0.73$.

Further analysis has shown that the effects are the most affected by the application $\beta = 0.45$; $p < 0.001$, slightly less by absorption $\beta = 0.31$; $p < 0.001$, whereas conversion has a zero effect $\beta = 0.07$; $p > 0.05$. The results are presented in Figure 1.

Figure 1. Path structural model



Source: Own study.

Based on the results of the conducted analyses, it is possible to state that the model's theoretical concept was matched very well with the data, it was characterized by a clear and a cause-and-effect direction of input, as well as the lack of encumbrance related to negative variance and collinearity of latent variables and all variables in the model. The measurements used in the path model were characterized with a high degree of accuracy, convergent validity, and the dependent variables were powerfully explained by the independent variables. The path model was characterized by a strong impact of the casual variables on subsequent variables in the model. The conducted analyses allow for the conclusion about the lack of bases to reject H1, H3, and H4, H5, H6, but did not allow for confirming H2. Conversion considerably affects the effects of Polish Public Administration entities' functioning..

7. Discussion

The paper's general objective is to identify the dynamic capabilities affecting e-administration functioning and the capabilities' determinants to establish a conceptual model. In order to achieve the general objective, several detailed objectives were distinguished and arranged in three phases.

The analysis conducted in the first phase helped to establish a research sample of Polish Public Administration entities. This analysis demonstrates that only 30 percent of Polish Public Administration entities are at a stage enabling them to use the potential resulting from the mindfulness of the signals deriving from inter-organizational relationships. This result is generally lower than that indicated in the reports of the European Commission, both for Poland and the EU 28+ average. This is because only administration entities were included in this study, not all government entities. For several years now, the government at the central level was focused on this topic, and much higher financial resources were allocated to it. Thereby, the latest technologies are used more commonly at the central level when compared to the local levels.

In the second phase, theoretical analyses featured developing a dynamic capabilities' analysis model in e-administration and designation of appropriate indicator(s) to measure e-administration effects. Three dynamic capabilities (absorption, conversion, and application) and three determinants of dynamic capabilities (technologies, structure, and culture) were distinguished in the model. This model was verified in the third phase. Based on the conducted analyses, it is possible to state that the model's theoretical concept was matched very well with the data.

For the absorption capability, all processes enabling intra-and inter-organizational cooperation were fundamental. Thanks to these processes, the organization can collect new information and monitor the stakeholders' needs, also pointed out by Gold *et al.* (2001) and Chiu and Chen (Chiu and Chen, 2016). For the conversion capability, all processes enabling the use and the flow of knowledge within the organization were critical. Thanks to these processes, the organization has a better chance to explore the absorbed knowledge, thereby increasing the probability of achieving better results (Gold *et al.*, 2001). All processes enabling the effective acquisition and application of knowledge, especially for service designing / redesigning, were critical for the application capability.

Effective acquisition and application of knowledge for service designing / redesigning is a significant factor in an organization's dialogue with stakeholders and a measure of the service's efficiency. Three determinants were identified for the aforementioned dynamic capabilities: technology, structure, and culture. An analysis of the technology shows its significant importance for establishing relationships with stakeholders, particularly cooperation in acquiring knowledge from them and its transfer. The technology should facilitate active interactions with stakeholders. The organizational structure should facilitate knowledge transfer regardless of functional divisions, group working, and communication. The organizational culture should facilitate trust, openness, and commitment of employees and managers. The results obtained in this study are very similar to the studies previously conducted by Gold *et al.* (2001) and Chiu and Chen (2016). As a result of the conducted analyses, it was noted that from the perspective of the dynamic capabilities' effects in e-administration, it was essential to care for the stakeholder's engagement in the

service designing /redesigning/ provision process and flexibly adapt to the changing stakeholder needs.

8. Scientific, Practical and Social Implications

KM is a crucial consideration in e-administration functioning to ensure that knowledge flows efficiently between governments, citizens, and organizations. The focus was on analyzing the flows of absorption, conversion, and application of knowledge (Nah *et al.*, 2005), identified as dynamic capabilities.

This study made specific significant contributions to the preceding literature in several ways. The developed model allowed for viewing the effects of e-administration functioning in terms of dynamic capabilities, which enabled a closer integration of various theories explaining dynamic theories in e-administration. This paper is a specific inclusion into the scientific discourse concerning dynamic capabilities as an intended strategy oriented at implementing changes in e-administration in terms of effective task execution. Researches emphasize that the level of public service effectiveness usually rises with collaboration and integration (Chen *et al.*, 2019), so during the identification of model components, the focus was put on inter-organizational relationships. In this paper, the author hypothesized that absorption, conversion, and application of knowledge considerably affect e-administration functioning.

During empirical research, the author confirmed that absorption and application of knowledge considerably affect e-administration functioning. The results are the same as the conclusions of Gold *et al.* (2001) as well as Chiu and Chen (2016). At the same time, no confirmation was found that conversion of knowledge considerably affects e-administration functioning. The results are different from the conclusions of Gold *et al.* (2001) as well as Chiu and Chen (2016). The knowledge conversion dynamic capability consists of giving organizational knowledge a suitable form that would facilitate access to it to all persons who need it at the given time. This process concerns the development of operating capabilities related to the use of the knowledge existing both within the organization and outside of it and its updating. Knowledge conversion refers to knowledge transfer to places where it is necessary and can be used. In the light of the obtained analysis results, a lack or little focus on supporting the processes of knowledge flow within the organization was observed.

The results of the proposed study will assist managers by pointing out areas of strength and highlighting the perception of organizational effectiveness. The obtained results can help broaden the understanding of dynamic capabilities in e-administration and focus on integrating, building, and reconfiguring the internal and external capabilities to cope with the changing environment, i.e., skilfully identify and use the existing and contribute to the creation of new capabilities. During designing the conceptual model and the tools for its verification, special attention

was paid to organizing the studies on the measurement of e-administration effects. A methodical measurement of the effects of public sector organizations will allow for strengthening responsibility and transparency and contribute to the organizations' improved public resources economy and higher effectiveness (Bearfield and Bowman, 2017). As a result of a methodical analysis of the subject literature, many inaccuracies in the organization functioning effects' measurement were found, so a methodical approach to the CAF model's effects criterion was proposed.

The social implications of our findings are threefold. Firstly, the active inclusion of stakeholders in e-administration and flexible response to the changing needs of stakeholders is crucial for e-administration functioning. E-administration implementation requires stakeholders' participation at every level of the development lifecycle. Therefore, organizations would benefit from establishing an effective decision-making process that is transparent and capable of creating seamless e-administration services to support information sharing, cross-organizational collaboration, and interoperability across several systems.

Secondly, e-administration should focus on inter-organizational relationships and the acquisition of knowledge from the inter-organizational relationships in a manner that allows it to create the highest value for the organization and its stakeholders. Electronic exchange of information across organizations provides tangible savings in time and improves information accuracy compared to paper-based processes (Chen *et al.*, 2019). Thirdly, the dynamic capabilities concept in e-administration requires a new approach to the method of activity of e-administration and their employees. This mainly means the departure from the image of an employee performing activities strictly regulated by specific procedures and replacing it with the image of a knowledge-equipped employee taking a more active part in creating new products and services in organizations. An expression of this change in the approach to the task and methods of its execution is, among others, making decisions towards building relations not only between the employees of a single organization but also between organizations acting in the same or a complementary segment. Creating new entities with a network-like nature of the activity means an increase in the role of and need for professional management and incredibly strategic management in public organizations.

9. Research Limitation and Suggestions for Future Studies

The conducted studies must be repeated and broadened because, as in any scientific ideas, this one also featured various shortages and gaps. These shortages also constitute an opportunity for additional testing in future studies on dynamic capabilities in e-administration. Future studies should also note the potential impact of various aspects of the task environment on a public sector organization's dynamic capabilities.

When studying the factors concerning technology, organizational culture, and

structure, the focus was on studying those favorable to dynamic capabilities. Hence, in future studies, it would also be worth paying attention to factors that can negatively affect dynamic capabilities in e-administration.

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