

# Complexity of services and productivity in public organizations; model design and explanation by grounded theory and structural equations

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## Abstract

The paper aims at developing a model for improving service productivity in public organizations based on the service complexity approach. This is an applied, descriptive qualitative and, quantitative paper. The population in the qualitative section (grounded theory) includes 16 experts in the field of productivity in the university and managers of government organizations in Tehran province who were selected by theoretical sampling method as a method of targeted sampling. The statistical population in the structural equations section includes three categories: 1) Managers and experts of government service organizations; 2) Experts and deputies of government service organizations and, 3) Consultants and experts of government service organizations. In this section, we used multi-stage relative stratified sampling, which according to Cochran's formula, a total of 384 samples acceptable. Thus, the questionnaires were randomly distributed in each of the five regions of the country and, the data from 390 questionnaires were completed through the data analysis algorithm in PLS software. Having analyzed the interviews based on the grounded theory method and in NVivo Plus 2020 software and by open coding, we obtained 143 items as basic concepts from the text of the interviews, which were classified into 31 sub-indices and 11 main indices and five dimensions. Then, we validated and approved the results of the qualitative section through the data analysis algorithm in the PLS software. Given the research findings, we presented and fitted the model of improving service productivity in public organizations based on service complexity in a paradigm model.

Keywords: Productivity, Service Productivity, Service Complexity, Grounded Theory  
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## 1 Introduction

Today, the service industry is increasingly competitive and unpredictable for the increasing diversity of services offered, the constant introduction of radical innovations and, most importantly, the complex and diverse needs and priorities of customers [34]. In such a dynamic environment, service providers are constantly striving to optimize

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their service delivery process [21]. On the other hand, the design and implementation of service delivery methods are key components of a successful service delivery process [38], especially for organizations whose front-line employees are directly involved in the delivery, promotion and sales of services provided to customers [23]. An important but relatively undisputed aspect of successful service design and implementation is related to understanding the impact of complexity on the service delivery process, which is rooted in service interactions with important implications for both sides of the service experience (e.g. front-line staff and citizens) [8].

It is wise to make service complexity possible by making the service design process more efficient by adjusting service delivery according to the services' degree of complexity [40]. Given the high complexity of services in public organizations, the services provided by these organizations may be disrupted for the increased cognitive effort required by them to complete such interactions [27]. Although public organizations strive to balance compliance with standardized requirements and manage customer needs' diversity of, the impact of service complexity on the parties (organization and customer) remains unperceived [1].

The complexity of services is seen either from an intra-organizational perspective in which its benefits and costs are assessed in internal exchanges [8] or as an operational feature of providing services evaluated through objective proxies, such as the number of steps. Is considered intermediate [24].

So far, some challenges for public organizations have emerged from this debate. First, a lack of knowledge about service complexity prevents managers from attributing low productivity to work overload or other underlying factors, which is critical to distinguish between the two in performance-based services. Second, high levels of service complexity may require the development of more accurate task descriptions and more custom training on tasks that lead to improved productivity. As a result, service organizations can not properly focus on the negative consequences of low productivity due to service complexity [8].

Given these challenges, the current paper aims at expanding the previous conceptualizations of service productivity and providing a more comprehensive view of it by considering the complexity of services for the reality of dealing with services, by introducing a paradigm model to improve service productivity in public organizations based on the complexity of services. Accordingly, the present study is based on the realization of two key objectives: a) presenting a paradigm model and identifying its basic components, b) evaluating the validity of the criteria of a constructive model and its impact on two well established outcomes, (e.g. role clarity and job performance).

In the following, we will review the literature. Then, we address the research method, including the type of research, population and sampling method and at the end, after presenting the research findings, we will conclude.

## 2 Literature review

Service organizations are recognized as the largest and fastest growing economy in the world [37]. Robert and Peter [35] state that despite the importance of productivity management in service organizations, it is surprising that there is relatively little empirical research on the field. According to Sahay [37], the origins of productivity management are deeply rooted in mass production; Therefore, productivity problems are mainly analyzed in this field, this may be the main reason for the long-term disregard for productivity problems in the service sector. Rutkauskas and Paulavičienė [36] also state that organizations that provide services should extend their view of productivity from a conventionally organizational perspective to a dual organization-customer perspective. This broader approach can help reconcile improving service quality and increasing productivity.

On the other hand, public sector productivity has long been considered as one of the most important and challenging issues in the literature of public administration and public administration. Managers and policymakers are always looking for ways to improve public sector productivity. In our country, the issue of productivity has been emphasized in policies and macro programs [11]. Service organizations in Iran, as the support of production organizations, play an important role in the success or failure of the production system, and improving their productivity has a great impact on the excellence of the country's economy and improves the quality of life of society. In addition, Iranian society over the past few decades has witnessed significant and dramatic changes in various fields, these changes have affected governments in terms of breadth, complexity, intensity and speed in the age of information explosion with increasing pressure to make them more productive [15]. Unfortunately, there are no official statistics on public sector productivity in our country; however, given the high share of labor in our country's public sector and the opinion of many experts on the importance of manpower in public sector productivity, we can conclude that our public sector productivity is not favorable. Hence, according to statistics published by the Asian Productivity Organization in 2018, Iran is ranked eighth in terms of labor productivity (per worker). However, the official statistics of this organization show that labor productivity in our country has been declining compared to Asian countries; while in the seventies,

the labor productivity of our country was higher than countries such as Japan, Singapore and Hong Kong, being at the top of Asian countries [3].

On the other hand, main features of service systems include the use of the concepts of diversity, dynamism and value creation [29] as well as the focus on openness and multifactoriality [4] that lead to a flexible service system. Clearly, this amount of complexity is related to the inherent characteristics of service systems. Researchers have argued that "complex behavior does not arise from how system components are connected because system components themselves are complex" [41].

Accordingly, Choi et al. [9] consider the unpredictability of interaction between customers and service providers as another factor that increases the complexity of services. Uncertainty occurs because of a discrepancy between the information needed to evaluate services and the information available about a situation. This effect is reinforced by the low level of procedures and the challenge between interactions; and it affects not only foreign service delivery but also customer-supplier relationships [27].

One of the reasons for the complexity of service delivery is the higher degree of cooperation and coordination between suppliers and customers. However, we know that people's expectations, behaviors, and attitudes are highly unpredictable [31]. Thus, the complexity of the service will increase. As a result, employee skills can play a key role in perceived complexity. Therefore, it is necessary to consider the factors that affect the level of complexity associated with suppliers. Initially, building trust is an important factor that can help limit complexity [20]. In addition, given the problem of task complexity - which is structured in the same way as employee task structure - it can be said that employee experience and knowledge can also help reduce perceived complexity. Also, self-efficacy is a limiting factor of complexity because high self-efficacy suppliers believe that their current skills are sufficient to achieve positive results [20].

Factors limiting and increasing the complexity of services must be considered when dealing with the complexity of customer-perceived services. Customers are facing with limitations such as having a limited choice to choose the person or organization providing services and also with challenges such as choosing service providers with good quality or with cost constraints or with the issue of professionalism or non-professionalism of individuals or organizations service providers [16].

The following are the determinants of the complexity of the services examined in the research:

Table 1: Factors determining the complexity of services

Level	Researchers	Effective factors
Organizational	[6, 12, 26, 28]	Company strategy Service delivery systems Communication and information channels Common goals Being modular Transparency in interdepartmental relations Accountability
Interdepartmental	[14, 30]	Unpredictability of interactions. Presence of conflicts in interactions Absence of range of information and information Needed to solve the problem Presence of original and defined relationships High degree of coordination and cooperation
Supplier	[5, 20, 31]	Employee skills Trust Experience and knowledge of employees Self- efficiency

The literature review shows a variety of productivity papers, some of which are referred to:

Gokulakrishnan et al. [17] stated that queue management is very important for service sectors. Improper waiting line management causes customers to turn to alternative service providers. This study showed that many users have started to adopt virtual queue management service because it is user-friendly, saves time, provides more access to paperless services, and increases service productivity. Gumah and Aziabah [18] conclude that there is a difference in the perception of efficiency and inefficiency between essential services, and also show the spatial-economic characteristics for citizens. Public services can affect lives through a combination of policy measures by increasing the fight against corruption, improving budgets, increasing oversight, and increasing institutional capacity to improve the expansion of physical presence, quality, and visibility of public services. Rana et al. [33] stated that accountability in public organizations is essential to ensure the delivery of public service efficiency that ultimately strengthens democ-

racy. Statistical analysis of the data showed that there is a direct relationship between accountability and public service delivery. The government must ensure accountability in public organizations to increase the level of efficiency of public service delivery. Braun and Hadwich [8] examined this issue through empirical analysis of the promotion and limitation of complexity factors. In this study, an experimental model was presented to analyze the factors that enhance and limit the complexity of internal services as well as its nonlinear effects on the quality of internal services. There is also a three-step guide to optimizing internal services. Durdyev et al. [13] examined the factors affecting the productivity of the service industry. In this study, direct and indirect factors affecting productivity were investigated. The results showed that labor factors (e.g. skills, labor experiences), management cluster (intergroup communication) compared to financial clusters (e.g. reconstruction) and procurement (e.g. timely delivery) had the greatest impact on productivity and perceived service quality. Rahmati et al. [32] examined this issue among the three types of service organizations, agriculture and industry. The findings showed that the most important complexities are in order of importance: environmental complexity, structural complexity, technological complexity, and information complexity. The results also showed that the most complex organizations are: industrial organizations, service organizations, agricultural organizations, respectively. Amir Kamali[2], in a study entitled, "The effect of e-citizen communication dimensions on increasing the productivity of government services", concluded that the dimension of social communication, environmental communication and physical citizenship of e-citizen affect the increase of government services productivity. And this is in the case that the economic connection of the e-citizen does not affect the increase of productivity of government services. Mazraji [25] studied this issue in the statistical population of all customers and clients of the Credit Institution of the Nations of the Khorasan Region. The results of regression analysis showed that the variables of productivity and service quality have the greatest role in explaining the variance of customer satisfaction, respectively, and these predictor variables explain 63% of the variance of the variable of customer satisfaction. The literature review shows that a variety of proposed theoretical and empirical frameworks related to service efficiency and complexity in the literature, but there is not yet a "comprehensive hybrid" model that examines the whole phenomenon. The present study will consider the improvement of service productivity in public organizations based on the complexity of services.

### 3 Research method

This is an applied, descriptive, qualitative and quantitative survey.

1. **Research Qualitative Section:** In the current paper, grounded theory was used to collect data for qualitative analysis. The statistical population of this study consisted of two groups: 1) University experts (public administration lecturers in universities of Mazandaran province) and 2) Managers of government organizations in Tehran province (with at least 10 years of experience in managing government services). Given the dominant qualitative approach in this section, the theoretical sampling method was used as a methods of continuous or sequential targeted sampling. In theoretical sampling, which is known as the dominant method in contextual theory, samples are selected in a way that helps to develop the theory. In other words, the researcher selects from the range of potential people to observe, those who can enrich the required data repository in the collection process to develop the theory. In this method, instead of selecting a fixed sample, the sample size increases until it is sufficient (theoretical saturation) [7]. Accordingly, having conducted 11 interviews, it was seen that the main and sub-factors were repeated in the interviews and the answers followed a repetitive process, but for more certainty, five more interviews were conducted and the sample was approved by 16 people. The interview process was completed and the researcher reached theoretical saturation. Following the interviews, initial, axial and selective coding was performed in NVivo Plus 2020 software.
2. **Research Quantitative Section:** The quantitative section of the research was performed using structural equation modeling. The statistical population and sampling method in this part of the research include three categories: 1) Managers and experts of government service organizations, 2) Experts and deputies of government service organizations and, 3) Consultants and experts of government service organizations. In this stage, the multi-stage relative stratified sampling method was used. Each of the five regions of the country based on the Ministry of Interior, represents a class and government service organizations located in each region are selected. In the next step, some organizations will be randomly selected in each region and the questionnaire were randomly distributed in each class and in proportion to the population of that class. In this paper, Cochran's formula and mathematical method was used to determine the sample size, the random sample size. According to the above, the minimum sample size for this paper was estimated at least 384 people. Accordingly, an electronic research questionnaire was designed and provided to the respondents. A total of 390 questionnaires were completed and used to continue the research. In this part of the research, the conceptual model of the research, which is of a hybrid type, was tested using the structural equation modeling technique using the Partial Least Squares (PLS)

method. The software used is Smart PLS. Structural equation methods estimate the magnitude and intensity of hypothetical relationships between variables in a theoretical model. These techniques show the direct impact of one variable on another variable as well as the impact of another variable that lies between the two variables (intervening or mediating variables). If it can be assumed that the hypothetical model is correct, it can be said that the information resulting from the model shows exactly the basic (causal) processes between the variables [22].

## 4 Findings

### 4.1 Research Qualitative Section

This section presents the results of initial coding or open, axial and selective coding. Before presenting the results, Figure 1 shows the word frequency in interviews extracted from Nvivo software:

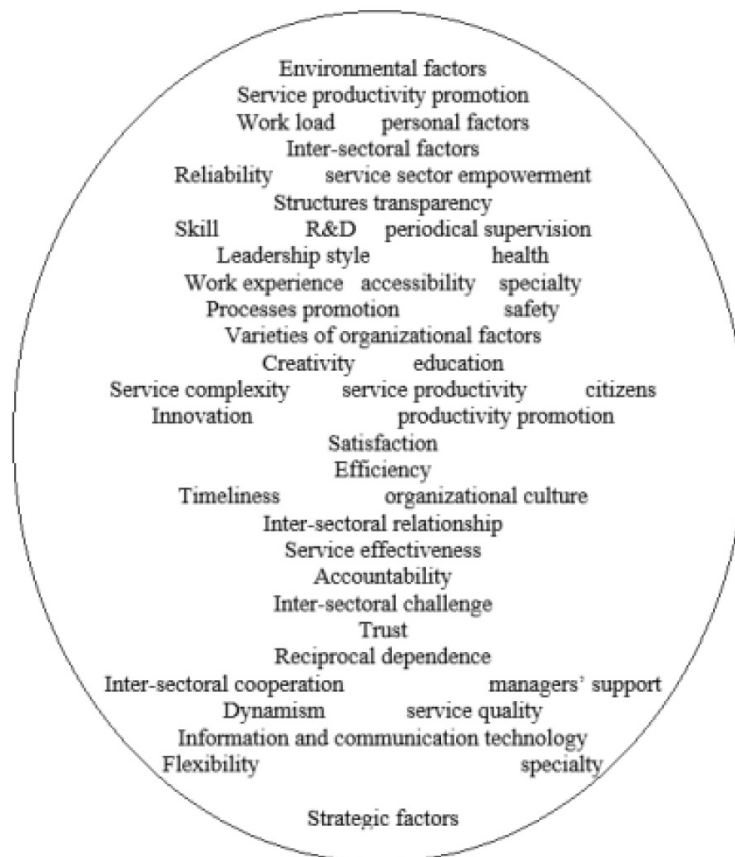


Figure 1: Word cloud extracted from 16 interviews in Nvivo software

The method of member control (researchers have controlled their findings with five informed individuals under study and the researcher's interpretations have been confirmed) was used to validate the results of the qualitative part. Accordingly, following the interviews, the narratives were coded in three levels of initial, axial and selective coding. Coding in the first stage is considered as the initial coding due to its generality and openness. In the next step of this type of coding, secondary coding should be done in which the primary codes become a concept code due to the large number of similar categories or the same secondary codes.

Table 2: Interviews Analysis

Categories	Axial coding	Open coding	Concepts (numbers in parentheses indicate repetition of concepts)	
Causal	Service quality	Citizens' satisfaction	<ul style="list-style-type: none"> <li>• Citizen-centered and attention to the quality and quantity of service (7)</li> <li>• The services provided must meet the expectations of citizens (10)</li> <li>• Recognizing citizens' expectations of services is the basis for improving productivity in the public service sector (11)</li> <li>• Consideration of personal preferences and individual values of service recipients (5)</li> </ul>	
		Process upgrades	<ul style="list-style-type: none"> <li>• Speed and accuracy of providing services are necessary to each other in providing optimal services to citizens (12)</li> <li>• Reaching the set standards and modifying the service processes (14)</li> <li>• Use of higher level communication technology and higher quality information (9)</li> <li>• Upgrading business processes (10)</li> </ul>	
	Reliability	Trust		<ul style="list-style-type: none"> <li>• Transparency in the provision of services and inter-organizational relations (5)</li> <li>• Adherence to and fulfillment of the promises made (7)</li> <li>• Ensuring service continuity has become an important issue for the organization (5)</li> <li>• Commitment and trust in the organization to provide services continuously (7)</li> <li>• Privacy of service recipients (11)</li> </ul>
			Specialized	<ul style="list-style-type: none"> <li>• Trust, belief and integrity in the provision of services (12)</li> <li>• There is a high level of service knowledge in the organization (5)</li> <li>• High competence and expertise of human resources in various fields of services (8)</li> </ul>
		Punctuality		<ul style="list-style-type: none"> <li>• Willingness of specialized services to citizens (8)</li> <li>• On time delivery of services (7)</li> </ul>
				<ul style="list-style-type: none"> <li>• Providing timely and comprehensive services by creating coordination between service delivery units (5)</li> <li>• No delay in providing services (8)</li> <li>• Fast delivery to the desired location (9)</li> </ul>
		Availability		<ul style="list-style-type: none"> <li>• Most public services are not limited to a specific location (6)</li> <li>• Setting up online support (13)</li> <li>• Use of multiple communication channels (5)</li> </ul>
		Responsiveness		<ul style="list-style-type: none"> <li>• Sequence of communication and renewal of relations with citizens (4)</li> <li>• Willingness to help and provide high level services to citizens (4)</li> <li>• Flexibility and investigate complaints (9)</li> <li>• Making quick calls without delay after requesting services (12)</li> <li>• Online and fast response (13)</li> <li>• Accountability on social networks (10)</li> </ul>
Contextual	Personal factors	Training	<ul style="list-style-type: none"> <li>• Sending valuable information to citizens in the form of newsletters (4)</li> <li>• Employ trained personnel (12)</li> <li>• Development of vocational training in the provision of standard services (14)</li> <li>• Acquisition of new skills and upgrading of expertise with the help of training (9)</li> </ul>	
			<ul style="list-style-type: none"> <li>• Continuation of in-service courses (10)</li> <li>• Continuous workforce training (9)</li> <li>• Provide productivity related training at work (8)</li> </ul>	



	Expertise and skill	<ul style="list-style-type: none"> <li>• Employees have sufficient skills, knowledge and expertise to provide services (7)</li> <li>• Updating the knowledge, ability and expertise of human resources in the organization (5)</li> <li>• Ensuring knowledge transfer between employees over time (6)</li> <li>• Production of new knowledge by employees and trust-based cooperation (5)</li> </ul>
	Work experience	<ul style="list-style-type: none"> <li>• Staff use of past experiences (12)</li> <li>• Providing opportunities and incentives for experience and learning (6)</li> <li>• Gain new experience through job growth, acceptance of new responsibilities, and transfer to another department (8)</li> <li>• Entrusting work to professionals and appointing people to suitable jobs (10)</li> </ul>
Interdepartmental factors	Interdepartmental relation	<ul style="list-style-type: none"> <li>• The possibility of easy communication, regardless of rank and job position (10)</li> <li>• Presence of many opportunities for information exchange (12)</li> <li>• Ease of contact between people (9)</li> <li>• Scheduling a meeting with other staff (8)</li> <li>• Ease of sharing information with others (8)</li> </ul>
	Interdepartmental collaboration	<ul style="list-style-type: none"> <li>• Efforts by different departments to align strategies and goals (8)</li> <li>• Inter-departmental cooperation to create internal customer orientation (7)</li> <li>• Inter-departmental cooperation to create desirable citizenship behavior in the organization (5)</li> </ul>
	Interdepartmental challenge	<ul style="list-style-type: none"> <li>• High stress (5)</li> <li>• Non-synergy and parallelism (11)</li> <li>• Incompatibility of goals (4)</li> <li>• Presence of a large number of inter-departmental conflicts (5)</li> </ul>
Organizational factors	Organizational culture	<ul style="list-style-type: none"> <li>• Organizational culture based on Islamic values (13)</li> <li>• Institutionalizing a culture of agility in the organization (4)</li> <li>• Creating commitment in employees (11)</li> <li>• Creating a productive culture in the workplace (9)</li> <li>• Development of work ethic (5)</li> <li>• Creating a culture of self-control (7)</li> <li>• Creating a spirit of cooperation and problem solving in the organization and believing in it by managers and employees (9)</li> </ul>
	Transparency of structures	<ul style="list-style-type: none"> <li>• Setting of responsibilities (5)</li> <li>• Awareness of responsibilities (5)</li> <li>• Transparency and monitoring of funding sources (13)</li> <li>• Financial transparency and discipline (12)</li> <li>• Transparency in cross-sectoral relations (8)</li> </ul>
	Leadership style	<ul style="list-style-type: none"> <li>• The head or manager of the organization promotes and supports internal customer orientation (7)</li> <li>• The head or manager of the organization, clearly define his goals (5)</li> <li>• Promoting organizational citizenship behavior with transformational leadership (8)</li> <li>• The manager or manager of the organization considers mistakes as an opportunity to learn and not to measure (7)</li> <li>• Encouraging employees to engage in extra-role behaviors (6)</li> <li>• Applying correct and scientific management style (5)</li> </ul>

Environmental factors	Work load	<ul style="list-style-type: none"> <li>• There are so many services to provide (7)</li> <li>• Performance standards are constantly improving (7)</li> <li>• Service jobs are very laborious (7)</li> </ul>	
	Safety and health	<ul style="list-style-type: none"> <li>• Efforts to avoid injury and side effects from providing services (5)</li> <li>• Providing technical solutions for the prevention of accidents at work (9)</li> <li>• Risk identification, risk assessment and proposal for control of occupational hazards in the service environment (11)</li> <li>• Occupational safety training for employers, employees and citizens (10)</li> <li>• Investigation and measurement of physical and chemical harmful factors of service environment (8)</li> <li>• Maintaining the physical health and proper nutrition of individuals (7)</li> </ul>	
	Flexibility	<ul style="list-style-type: none"> <li>• Public sector clients want flexibility in how laws and regulations are enforced (6)</li> <li>• Adaptation to important and immediate environmental changes (7)</li> <li>• Increasing dynamics and environmental change (7)</li> <li>• Alternative resources and programs in special circumstances (7)</li> </ul>	
	ICT	<ul style="list-style-type: none"> <li>• IT infrastructure upgrades (7)</li> <li>• Application of information technology in improving the procedures of the organization (15)</li> <li>• Facilitating the provision of services using information technology (9)</li> <li>• Use of powerful and up-to-date information and communication systems (8)</li> <li>• IT support of staff efforts (6)</li> </ul>	
Strategic factors	R&D	<ul style="list-style-type: none"> <li>• Establishment of research and development units and the importance of their position (13)</li> <li>• Research and development to be used to improve the technical quality and support of software and hardware systems (12)</li> <li>• Research to achieve superior technology and reduce service costs (7)</li> </ul>	
	Innovation and creativity	<ul style="list-style-type: none"> <li>• Application of innovative technology in the development of service delivery process (10)</li> <li>• Innovation and updating of technology used (7)</li> <li>• Innovation in behavior, process and strategies (8)</li> <li>• Support for ideation and creativity (13)</li> <li>• Promotion of internal innovation and technological changes in service provider operational units (9)</li> </ul>	
	Diversity	<ul style="list-style-type: none"> <li>• Service components are different (9)</li> <li>• Services can be received from different organizational units (8)</li> <li>• The time required to receive services varies according to the components of the service (7)</li> <li>• Some services are provided in a customized way (5)</li> </ul>	
Intervening	Service complexity	Interdependence	<ul style="list-style-type: none"> <li>• We often have to coordinate our work with sub-units / organizations (6)</li> <li>• Often, job duties in a unit / organization are affected by the performance of sub-units / organizations (9)</li> <li>• Completion of job duties depends on the work of a large number of colleagues in different units / organizations (7)</li> <li>• Achieving sub-units / organizations in their goals helps our unit / organization achieve our goal (5)</li> </ul>



		Dynamism	<ul style="list-style-type: none"> <li>• The number of service components changes over time (6)</li> <li>• The variety of components of the services provided changes over time (5)</li> </ul>
Strategies	Emphasis on policies to encourage capacity building and empowerment of the service sector	Top managers support	<ul style="list-style-type: none"> <li>• Obligation and practical commitment of managers to improve service efficiency (5)</li> <li>• Perceived reflection of the support of the highest levels of the organization hierarchy in related organizational policies and plans (7)</li> <li>• Full, active, visible support and participation of managers at all levels, especially senior managers (5)</li> <li>• The readiness and willingness of the senior management of the organization to make the necessary changes in the current process (6)</li> </ul>
		Periodic monitoring	<ul style="list-style-type: none"> <li>• Formation of a monitoring committee to guide the efficiency of public services (7)</li> <li>• Close monitoring to identify and fix problems (8)</li> <li>• Establishment of service quality control departments (7)</li> <li>• Action to research and investigate ongoing programs and receive suggestions (4)</li> <li>• Occasional presence of senior managers at the service site (9)</li> <li>• Monitoring the performance of the organization not only the performance of the individual or individuals (7)</li> </ul>
	Establish a system of continuous improvement of productivity in the service sector	Design a service efficiency improvement program	<ul style="list-style-type: none"> <li>• Planning to achieve productivity improvements (11)</li> <li>• Establishment of an integrated knowledge-based infrastructure system to improve productivity (4)</li> <li>• Develop a model and mechanism of transfer and localization of knowledge in the field of productivity (5)</li> <li>• Develop a mechanism for measuring the productivity of public services according to the existing complexities (5)</li> </ul>
		Improving productivity and service standards	<ul style="list-style-type: none"> <li>• Promoting the share of knowledge-based productivity in all activities (8)</li> <li>• Focusing productivity on public sector activities (7)</li> <li>• Organizing public sector activities to improve productivity (5)</li> <li>• Improving service standards and improving the efficiency of public services (8)</li> <li>• Improving the operational efficiency and effectiveness of the organization in implementing a comprehensive productivity program (4)</li> <li>• Cooperation with similar organizations at the international and regional level to improve the level of productivity (6)</li> <li>• Management of motivational tools to improve productivity in activities and service sector activists (8)</li> </ul>
Outcomes	Improve service productivity	Improve service effectiveness	<ul style="list-style-type: none"> <li>• Focusing service productivity on goal rather than data alone (5)</li> <li>• Promoting customer or citizen satisfaction (13)</li> <li>• Creating a positive attitude and perception of service recipients (12)</li> <li>• Promotion of services provided to the community and customers of the organization (7)</li> <li>• Reduce unwanted results in service delivery (8)</li> <li>• Increasing the amount of positive feeling and stimulus created to use the service (6)</li> </ul>

Improve service efficiency

- Balance between the amount of services provided and the consumption budget (9)
- Balance between service delivery time and cost per unit of service (7)
- Balance between the amount of services provided and the number / hours of employees (12)
- Balance between the output of the services provided and the input of capital, equipment and labor (10)
- Value-added of capital, labor, equipment used and resources consumed (5)

Given the results of content analysis and final coding, the initial research model is designed as Figure 2:

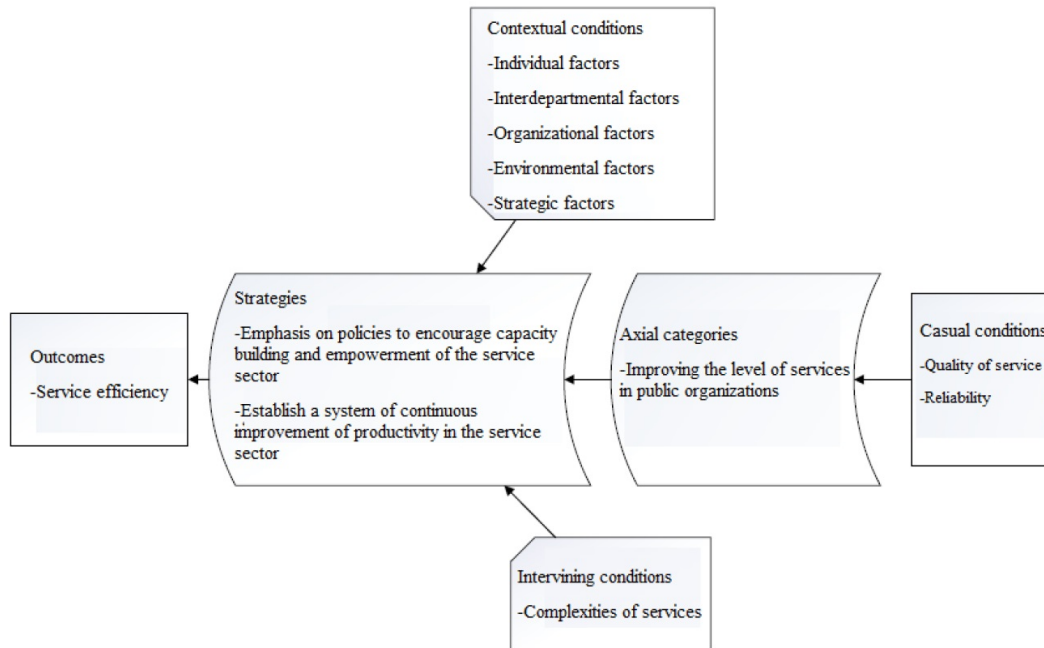


Figure 2: Research model based on the results of qualitative section content analysis

## 4.2 Research Quantitative Section

The main assessment tool in this part of the research is a questionnaire. This questionnaire consists of 31 items and is designed using a five-point Likert scale as the desired scale.

The validity of this part of the research has been examined in the following three ways:

**Content validity:** One of the methods to evaluate and ensure content validity is the reasonable formation of tools. Since all items of the questionnaire were first reviewed by a number of university lecturers and experts in this field and based on their feedback and in order to reduce ambiguities, the initial questionnaire was modified and the final questionnaire was developed, its content validity can be ensured.

**Structural validity:** Structural validity of a measuring instrument indicates the extent to which the measuring instrument measures the size of a structure or property that has a theoretical basis [10]. Confirmatory factor analysis is one of the most useful methods. The value of t-statistic is in fact the main criterion for confirming or rejecting confirmatory factor analysis. If this value of statistics is more than 1.64, 1.96 and 2.58, respectively, we conclude that the hypothesis is confirmed at the levels of 90, 95 and 99% [39]. Figures 2 and 3 show the T-statistic of all relationships is high indicating good validity of the model construct.

**Content Validation Ratio (CVR):** This method measures the degree of agreement between evaluators or judges about the "appropriateness or relevance" of a particular item. Lawshe suggested that each item or question be given to a set of evaluators or judges and asked if the item in question is essential or useful for measuring the structure in question [19]. Thus, the C-lawshe method was used to assess the validity of the content (CVR) and a statistical

population of 30 people answered the items of this questionnaire. The results related to the content validity ratio obtained for all questionnaire items are shown in Table 3—5.

Table 3: Results of the content validity ratio obtained for the questionnaire items

Item	CVR	Item	CVR	Item	CVR
1	1	12	1	23	1
2	1	13	1	24	1
3	1	14	1	25	1
4	0.90	15	0.95	26	1
5	1	16	1	27	1
6	1	17	0.90	28	1
7	1	18	1	29	1
8	1	19	1	30	1
9	1	20	1	31	0.95
10	0.95	21	1		
11	1	22	1		

**Questionnaire reliability:** Cronbach's alpha coefficient was used to evaluate the reliability of the questionnaire by SPSS. In general, its value for the questionnaire items was 0.945, which is a significant value for the reliability of the questionnaire. As can be seen in Table 4, and since Cronbach's alpha coefficient is higher than 0.7, Cronbach's alpha is acceptable for all questionnaire items and the reliability of the questionnaire is confirmed.

Table 4: Relevant Cronbach's alpha test results for each of the questionnaire constructs

Questionnaire scope	Number of items	Cronbach's alpha	Categories	Number of items	Cronbach's alpha	Main indices	Number of items	Cronbach's alpha						
Improving service efficiency in public organizations based on the service complexity approach	31Items	0.945	Causal	7	0.9575	Service quality	2	0.962						
						Reliability	5	0.953						
			Contextual	15	0.9322	Individual factors	3	0.941	Interdepartmental factors	3	0.935			
									Organizational factors	3	0.899			
									Environmental factors	3	0.947			
									Strategic factors	3	0.939			
									Intervening	3	0.945	Complexity of services	3	0.945
			Strategy	4	0.954	Emphasis on policies to encourage capacity building and empowerment of the service sector	2	0.951	Establish a system of continuous improvement of productivity in the service sector	2	0.957			
									Outcomes	2	0.963	Improve service productivity	2	0.963

## Descriptive Statistics

We present the obtained information from the SPSS software data analysis as follows:

Table 5: Respondents' demography

Education							
Bachelor degree	21.5%	Master degree	52.3%	PhD	26.2%		
Age							
20-35 years old	21.7%	35-40 years old	40.7%	40 and older	37.6%		
Experience							
5-10 years	13.5%	10-15 years	19.5%	15-20 years	29.2%	20 and more	27.8%

### Evaluation of conceptual model using Smart PLS software

In this part of the research, the conceptual model of the research, which is of a hybrid type, was tested using the structural equation modeling technique using the Partial Least Squares (PLS) method. The software used is Smart PLS. Structural equation methods estimate the magnitude and intensity of hypothetical relationships between variables in a theoretical model. These techniques show the direct effect of one variable on another variable as well as the effect of another variable that lies between the two variables (intervening or mediating variables). If it can be assumed that the hypothetical model is correct, it can be said that the information resulting from the model shows exactly the basic (causal) processes between the variables [22]. Compared to regression methods, in which only one level of relationship between independent and dependent variables is analyzed simultaneously, in modeling structural equations as a secondary method, it is possible to model the relationship between several independent and dependent structures.

Least Partial Squares (PLS) is a relatively new method of regression structural equations. This method is used for both univariate and multivariate regression with multiple dependent variables. To examine the relationship between dependent variables and independent variables, PLS generates new explanatory or independent variables, often called agents, latent variables, or components. These components are linear combinations of their markers.

PLS is based on the estimation of the least squares with the primary aim of optimizing the explanation of variance in the dependent structures of structural models. The PLS method is initially used to analyze very complex situations or models about which little theoretical information is available, or whether the purpose of testing these models is to predict or apply. The Least Partial Squares are introduced as a linear method, prediction and explanation, not interpretation. The use of this method is recommended before using interpretive methods such as multiple linear regression or (SEM or Structural Equation Modeling).

The research model was tested using the technique of minimum partial squares and Smart Pls software. In this model, all simultaneous relationships were analyzed. In the following, the research model in the case of standardized coefficients (Figure 3) is presented.

Figure 3, shows that the path coefficient was used to evaluate the model. Each path coefficient in the PLS structural model can be considered equivalent to a standardized beta coefficient in ordinary least squares regressions. Structural paths whose sign agrees with the algebraic sign of the previous hypotheses provide an empirical validation of theoretical assumptions about the relationships between latent variables. Paths whose algebraic sign is contrary to expectation do not confirm the previously formed hypotheses. Accordingly, according to the fitted model (Figure 2); the path coefficients, standard deviation, T statistic and probability value (P) are as in Table 6:

According to the fitted model, the T-statistic shows the significance of the relationships of the model variables, because the probability value of this statistic is less than 0.05.

## 5 Conclusions and Suggestions

In the current paper the grounded theory and interviews were used in qualitative data collection and analysis. Having conducted the interviews, the interviews were coded in three levels of initial, axial and selective coding. In the first stage, coding is considered as initial coding due to its generality and openness. In the next stage of this type of coding, secondary coding was performed in which the primary codes became a concept code due to the large number of similar categories or the same secondary codes. During open coding, about 143 items were obtained as basic concepts from the text of the interviews, which were classified into 31 sub-indices and 11 main indices, as well as five dimensions. Then, the research model was fitted using structural equation modeling, and all relationships were confirmed.

The research findings show that public organizations do not pay attention to improving the quality of services and this shortcoming is seen in many governmental and quasi-governmental organizations, for non-competitive nature of

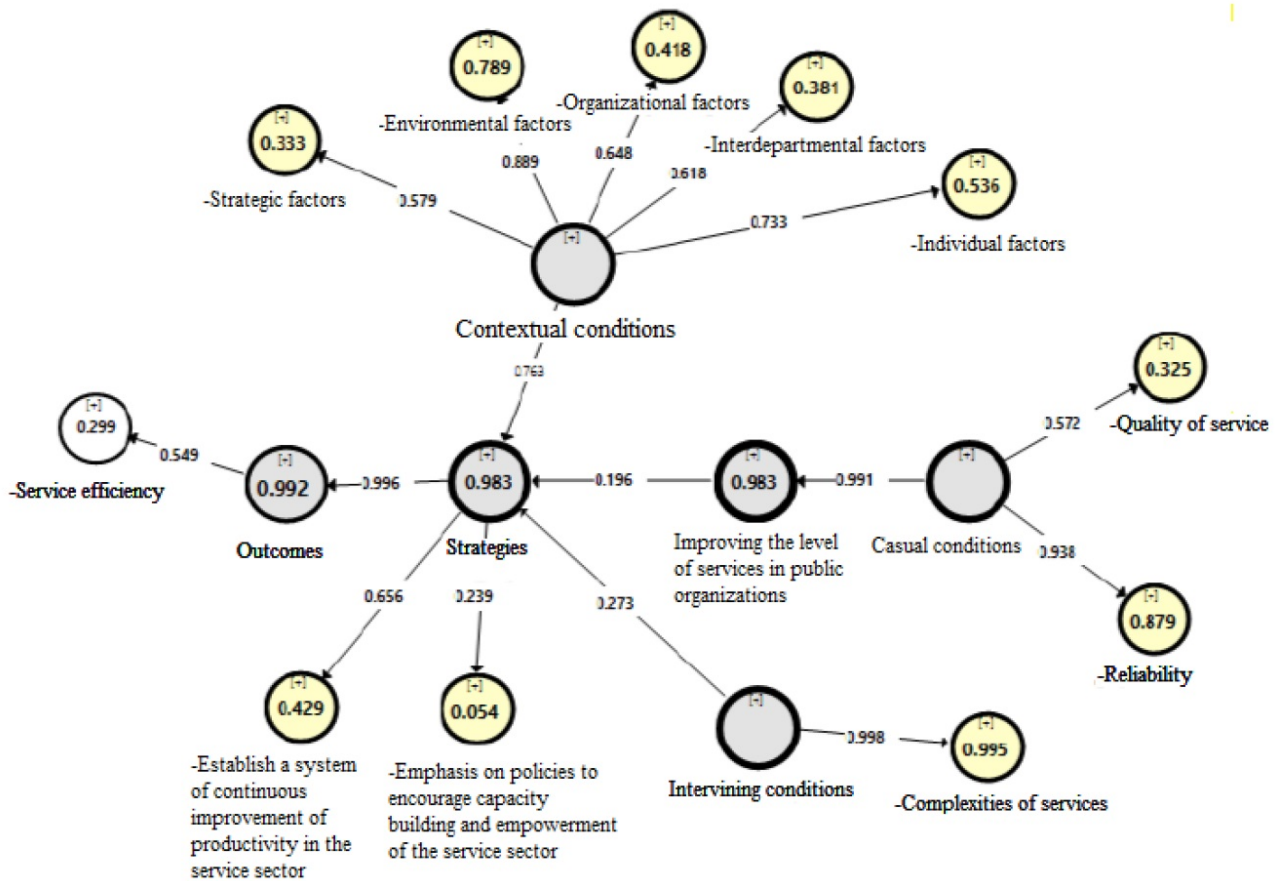


Figure 3: Testing the research model in the case of standardized factors

Table 6: Results of structural equation modeling

Structural path	Standardized factors	(STDEV)	T Statistic	P value
Causal > Reliability	0.938	0.017	54.657	0.000
Causal > research main category: (Productivity of services in public organizations)	0.991	0.002	444.273	0.000
Causal > service quality	0.572	0.085	6.691	0.000
Research main category: (Service efficiency in public organizations) > Strategy	0.196	0.045	3.290	0.001
Intervening > Strategy	0.273	0.035	7.126	0.000
Intervening > Service complexity	0.998	0.001	1306.608	0.000
Contextual > Strategy	0.763	0.040	20.067	0.000
Contextual > interdepartmental factors	0.618	0.043	14.358	0.000
Contextual > Strategic factors	0.579	0.055	10.581	0.000
Contextual > Organizational factors	0.648	0.044	14.613	0.000
Contextual > Individual factors	0.733	0.035	21.115	0.000
Contextual > Environmental factors	0.889	0.015	59.959	0.000
Strategy > Creating a system of continuous improvement of productivity in the service sector	0.656	0.038	17.107	0.000
Strategy > Emphasis on policies to encourage capacity building and empowerment of the service sector	0.239	0.056	4.466	0.000
Strategy > Outcomes	0.996	0.001	1141.412	0.000
Outcomes > Improving Service Productivity	0.549	0.036	15.247	0.000

their services in most cases. As we review the concepts of productivity of public organizations, we find that productivity is defined as an intellectual perspective, in the sense of working intelligently and believing in continuous improvement. Contrary to many people’s beliefs, productivity is not just an economic and financial measure. Productivity in the depths of its meaning is an attitude to rationalize activities. With this attitude of productivity, it means that organizations can do their jobs and activities better every day. The goal of improving productivity is to maximize

resource efficiency, reduce labor costs, expand markets, increase employment, strive to increase real wages instead of nominal wages, and improve living standards.

The service complexity index provides a new insight and idea to the managers and senior decision makers of a service organization on how to satisfy citizens by providing desirable and appropriate services. Given the non-competitive nature of their services, public organizations do not pay much attention to improving the quality of services, and this shortcoming is seen in many governmental and quasi-governmental organizations. "Service Complexity Index" creates a positive mental image of the organization among different segments of society, because it has increased the amount customer satisfaction with the organization by requiring the organization to provide high quality services and considering the diversity of services, the use of modern technology in service delivery and differentiation in services, as the organization will take steps to "do the right thing" and "do the things right."

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