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Research Paper

Design and Implementation of Organizational Architecture in Organizations in Charge of Combating Smuggling of Goods and Currency with the Aim of Improving the Management of Organizational Networks

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Abstract

In the current situation, one of the concerns in the fight against smuggling of goods and currency is the improvement of the inter-organizational network. The purpose of this research is to design and implement organizational architecture to improve the management of organizational networks with SWOT approach, in this area using the artificial neural network toolbox and fuzzy logic in Matlab. This research is applied-modeling in terms of purpose. The statistical population includes expert professors and experts of organizations in charge of combating smuggling of goods and currency. After distributing 100 questionnaires, the sample size of this study is equal to 96 experts who were selected by a combination of two methods of non-probabilistic purposive sampling and snowball sampling. The results show that using the intelligent system, the status of "success of the organization's network management" can be examined numerically and more accurately: In terms of ideal importance, if; The "Network Management Based on EA Application Layer" status is good, ie

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exactly 0.813, and "Network management based on EA data source layer" is good, ie exactly 0.824, and "Network Management Based on EA Central Component Layer" is good, ie exactly 0.819, and "Network Management Based on EA Data Preparation Layer" is good, ie exactly 0.812, and "Network management based on EA service quality layer" in good condition, ie exactly 0.815;Then; The status of "successful implementation of the organization's network management" is at the top level (fifth level), ie exactly 0.952.According to the membership functions of language variables by experts, the value of 4.76 within the 5-value range in the range defined for the "excellent" language variable, ie the success status of the organization's network management, has been calculated exactly 0.952.

Keywords *Organizational Architecture, Organization Network Management, SWOT Approach, Smart System, Artificial Neural Networks*

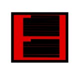
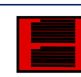
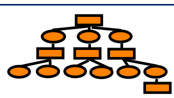
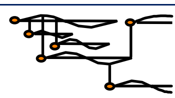
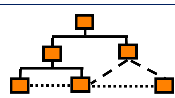
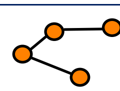
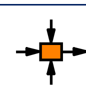
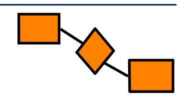
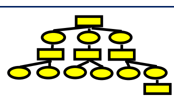
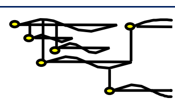
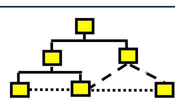
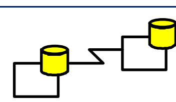
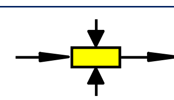
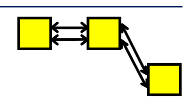
Introduction

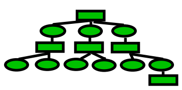
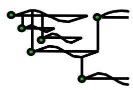
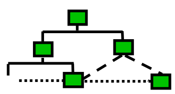
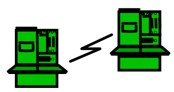
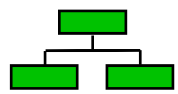
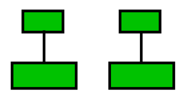
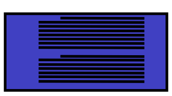
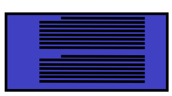
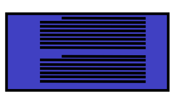
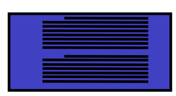
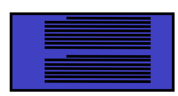
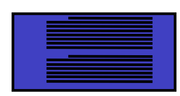
"Organizational architecture" is an almost new approach that is recognized today as an effective way to align the strategic goals of organizations with their information and communication technologies (Castillo, et al. 2020) and (Kandjani, et al. 2012). The above topic, which has been started since the late eighties and in parallel with significant advances in the field of information and communication technologies, is gaining more and more applications and its related methods and tools are evolving. This method is currently used in most countries of the world and its benefits for managers are often recognized in the macro-technology planning of "organizational architecture" of organizations (Ahlemann, et al. 2020) and (Takeuchi & Yamamoto. 2019). On the other hand, many systems of interest in physical, biological and social sciences can be considered as networks (Newman, 2018) and (Wang, et al. 2020). On the other hand, in almost every branch of science and technology, networks of one type or another product are growing, surely for organizational purposes, networks will be divided into four broad categories (Newman, 2018) and (Manikannan & Nagarajan, 2020): technology networks, Information Networks, Social Networks and Biological Networks. In fact, the problems of this research can be the ambiguity and fatigue of decision makers and managers of organizations in charge of combating smuggling of goods and currency in the field of smart building management system due to the combination of different network management methods based on EA application layer, network management based on EA data source layer, management Network based on EA core component layer, network management based on EA data preparation layer, network management based on EA service quality layer, in order to successfully implement organization network management; Stated. On the other hand, the need to use an intelligent system to increase trust and confidence in decision-making, as well as the need for multiple expertise by simultaneously applying the knowledge of experts in various fields to solve problems related to "successful implementation of organizational network management", led to The present study, an intelligent system for designing and implementing organizational architecture with the aim of improving the management of organizational networks with SWOT approach as the main topic, under the title of EA-NETWORK.SWOT for the first time in the field of research related to combating smuggling of goods and currency.

Literature Review

Given the pivotal role of information and communication issues and the predictions made about its future position in modern organizations around the world, familiarity with public and private sector managers with the basic concepts, benefits, and general process of implementing organizational architecture, can be of great help to Convergence of strategic planning activities as well as the direction of organizational change (Huang, et al. 2020) and (Manikannan & Nagarajan. 2020). The issue of alignment and integration of the organization and IT has hindered many organizations in their strategic and tactical development. Creating integrated architectural models helps to address this issue. Unfortunately, there is no descriptive language of organizational architecture recently that allows for a fully integrated modeling of the organization (Azzedin & Ghaleb. 2019) and (Alwadain, et al. 2016). Types of architectural domains, such as integrated language, are generally differentiated and explain concepts related to the architectural domain (Mirsalari & Ranjbarfard. 2020). This language is also used as a bridge between other existing languages. Alignment of management on the organization and IT services has become one of the most important concerns in organizations (Griffo, et al. 2019) and (Bhattacharya, 2018) and (Närman, et al. 2013). On the other hand, in 1987, Zackman introduced a conceptual framework for information systems architecture, which, after its completion and expansion in 1992, became known as the leading solution in the field of organizational architecture (Hinkelmann, et al. 2016) and (Lapalme, et al. 2016). Zackmann's organizational architecture framework is a table consisting of a number of cells, each of which emerges from the collision of a row and a column (Dantu & Smith. 2011). Each cell is assumed to contain a model that represents an aspect of architecture from the perspective of a particular group of stakeholders. The Zackmann Architectural Framework, which is a kind of Mendeleev table of architectural models, is a reference framework that covers six aspects of information, processes, places, people, events, and goals (Hinkelmann, et al. 2016) and (Dantu & Smith. 2011) and (Lapalme, et al. 2016):

Table 1.
Zakmann Architectural Framework (Hinkelmann, et al. 2016) and (Dantu & Smith. 2011) and (Lapalme, et al. 2016)

motivation Why	**Time who**	**Persons who**	**network where**	**duty How**	**Data What**	**aspect**
List of goals and strategies	List of important events of the organization	List of important parts of the organization	List of places where work is done.	List of processes performed by the organization.	A list of what matters to the organization.	**Area Programmer**
						
Results / Methods = Main Objectives of the Organization / Critical Success Factors	Time = Important events of the organization	Individual = classes of individuals and organizational departments	Node = main locations of the organization	Tasks = Classes related to organizational processes	Existence = classes related to the things of the organization	**Content**
Example: work planning	Example: Mother Scheduling	Example: Workflow model	Example: Logistics Network	Example: work process model	Example: semantic model	**Organizational model Owner**
						
Outcome = Short-term organizational goals Method = Mission Strategy	Time = organizational event Course = organizational course	Individual = organizational unit Work = work product	Node = organizational location Connection = organizational connection	Process = organizational process Input / Output =Organizational Resources	Existence = organizational existence Communication =organizational communication	**Conceptual**
Example: Organizational rules model	Example: processing structure	Example: Human communication architecture	Example: Distributed system architecture	Example: Application architecture	Example: Logical data model	**System model designer**
						

motivation Why	Time who	Persons who	network where	duty How	Data What	aspect
Result = structural judgment Method = structural activity	Time = System event Course = processing period	Individual = organizational role Work = Outputs	Node = System Tasks (Information) Connection = line properties	Process = application function Input / Output = User Comments	Unity = data existence Communication = data communication	logical
Example: Designing rules	Example: control structure	Example: Architecture How to present and display	Example: Technical architecture	Example: system design	Example: Physical data model	Technology dependent model Manufacturer
						
Result = status Method = Activity	Time = execution Period = time period of components	Individual = user Work = screen or device format	Node = Hardware or software system Connection = line specifications	Process = computer function Input / Output = Elements / Data Sets	Existence = table / segment / etc. Communication = key / pointer / etc.	Physical
Example: Specification of rules	Example: Definitions of time	Example: Security architecture	Example: Network architecture	Example: Applications	Example: data definition	Accurate descriptions Contractor
						
Result = lateral position Method = step	Time = interruption Period = Machine time period (microprocessor)	Individual = ID Work = job	Node = Addresses Connection = Protocols	Process = programming language phrase Input / output = control block	Existence = field Contact = Address	Non-content
Setting up Strategy	Setting up Scheduling	Setting up Organization	Setting up network	Setting up duty	Setting up Data	Active organization

On the other hand, a network can be defined as a group of dependent but independent purposeful actors who come together to produce a collective return (tangible or intangible) that none of the actors could produce alone (Marchiori & Franco. 2020). And (Cap, et al. 2019). Inter-organizational networks represent general patterns of formation and strengthening of relationships between individuals, groups or organizations. In inter-organizational networks, the focus is more on inter-organizational relationships (Randolph, et al. 2020) and (Cap, et al. 2019). Broadly speaking, networks are defined as stable exchange relationships between organizations, individuals, and groups. The characteristics of the levels of maturity model of cooperation in inter-organizational networks for different sectors are completely with their own characteristics (Dumitriu, et al. 2020), (Marchiori & Franco. 2020), (Randolph, et al. 2020) and (Manikannan & Nagarajan. 2020):

Table 2.
Characteristics of the Levels of Cooperation Maturity Model in Inter-organizational Networks

Organizational processes do not exist between different organizations in the network. The focus is internal, so there is no agreement on documenting inter-organizational processes in the network.	**Independent**
In order to be able to go from the first stage to the second, we have to establish a mental relationship with the outside. Collaboration is a small-scale organization. Several organizations work together in specific cases to achieve an unavoidable goal, but collaborations are not systematically and thoughtfully designed. The work tasks of the processes do not go beyond what is specified in the program and budget because nothing is documented; Successes are inevitable.	**Temporary**
At this stage, the common goal connects the organizations, network technologies are used to work together, organizations are known as a	**Coordinated**

network, roles and responsibilities lead to the clarification of the goal, to some extent, the alignment between the activities and processes of the organization's night has it.	
Formalization of collaboration takes place. The goal is to build an organization strategy and the process infrastructure of the joint organization for collaboration. A cooperation agreement is written between the organizing organizations on the network.	**Standardized**
The goal is to continuously improve the processes of the networked collaboration organization through continuous capability and innovative planned improvements. A network of organizations works together very effectively. The standards are fully adapted to the context of the network and have sufficient flexibility to adapt to changes in the environment.	**Optimization**

In fact, a network is paired as communication lines, and in its simplest form is defined as a set of points connected at a node (Node / Vertex) and a line as an edge. (Newman, 2018) and (Manikannan & Nagarajan. 2020). Today, with the use of Microsoft Windows Server, network management of organizations has become much simpler (Manikannan & Nagarajan. 2020). Microsoft Windows Server is a tool provided by Microsoft for managing enterprise networks (Huang, et al. 2020) and (Marchiori & Franco. 2020). With MS Windows Server, network administrators can easily manage their Windows-based infrastructure. Of course, all organizations are based on Windows and are managed. (Marchiori & Franco. 2020), (Randolph, et al. 2020) and (Cap, et al. 2019). According to Gartner's latest report on network configuration management for virtual and cloud infrastructure - almost 80% of all network components in any organization are due to human error, while only a small portion of the components are faulty due to equipment failure (Xie & Zhou, 2020) and (Wang, et al. 2020) and (Newman, 2018). Network configuration management is generally considered by most organizations, once there are solutions for fault management and performance management. There are practical reasons to support it. To clearly understand this motivation, one must have an understanding of the three main concepts of IT network management: fault management, performance management, and configuration management. While network configuration management (NCM) will gradually maximize the overall availability of the network, it usually requires a lot of planning and is not measurable. The use of error management and performance management systems, such as NMS, gives network administrators instant insight into network performance and availability. By doing this, users can also measure the positive impact that network configuration management has built after deployment (Dumitriu, et al. 2020) and (Newman, 2018). Network configuration management is very important because it increases the scalability of IT infrastructures without increasing the IT staff to manage those devices and systems. This enables the implementation of configuration management (Xie & Zhou. 2020) and (Wang, et al. 2020). One of the biggest responsibilities of system administrators and IT professionals is to ensure that networks operate properly at all times. Initially managing network configuration was once a simple task, but no longer (Xie & Zhou. 2020) and (Newman, 2018). Monitoring resource utilization and setting up appropriate tricks whenever spikes occur in traffic are now core tasks. As networks become more complex, so does their management (Wang, et al. 2020) and (Newman, 2018). The main advantage of the new classical school is the compatibility of software and systems. With Network Configuration Management, the other network configuration is up-to-date, because if Network Configuration Management (NCM) is available, your configurations are clearly in good condition. Some of the main benefits of network configuration management are as follows (Huang, et al. 2020), (Xie & Zhou. 2020), (Wang, et al. 2020) and (Newman, 2018).

Table 3.
Benefits of Managing Network Configuration

Quick solution of organizational problems with improvement as well as higher quality of services Effective nutrition management of the organization with the basic configuration Restoration services in case of interruption by documenting the network configuration Improve the customer experience by identifying the home and correcting incorrect network configuration	Reduce the risk of organizational network outage Reduce costs by preventing unnecessary duplication of IT assets and software engineering costs Simple processes with the implementation of formal methods for identification, monitoring and auditing of IT assets

On the other hand, SWOT analysis is an effective tool for identifying environmental conditions and internal capabilities of the organization (Namugenyi, et al. 2019) and (Stoller, 2020). The basis of this effective tool in strategic management as well as marketing is understanding the environment of the organization. The letters SWOT are the beginning of the words Strength means strength, Weakness means weakness, Opportunity means opportunity and Threat means threat. The nature of strengths and weaknesses is related to the organization and opportunities and threats are usually environmental (Namugenyi, et al. 2019) and (Stoller, 2020). Finally, the following table compares the most important results and findings of the present study with the results and findings of the most relevant research in the theoretical literature:

Table 4.

Comparison of the Most Relevant Findings in the Theoretical Literature with the Findings of the Present Study

Comparison of research findings																	Source
Case study: Organizations in charge of combating smuggling of goods and currency	Research validation	Expert system	Fuzzy logic	statistical analysis	Artificial Neural Networks	Matlab programming environment	Network management based on the EA service quality layer	Network management based on the EA data preparation layer	Network management based on the EA core component layer	Network management based on the EA data source layer	Network management based on the EA application layer	SWOT approach	Management of organizational networks	network	Organizational architecture	architecture	
-	*	-	-	-	-	-	*	-	*	-	-	-	*	*	*	*	**Huang, et al. 2020**
-	-	-	-	-	-	-	-	-	-	*	*	-	*	*	-	*	**Manikannan & Nagarajan. 2020**
-	-	-	-	-	-	-	-	*	*	-	-	-	*	*	-	-	**Cap, et al. 2019**
-	-	-	-	-	-	-	-	-	-	*	-	-	-	-	*	*	**Bhattacharya, 2018**
-	*	-	-	-	-	-	*	-	*	-	*	-	-	*	*	*	**Kandjani, et al. 2012**
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	**current study**

After reviewing the theoretical foundations of the research and reviewing the research background, it was found that due to research gaps in the knowledge areas of network management based on EA application layer, network management based on EA data source layer, network management based on EA core component layer, network management based on layer EA data preparation, network management based on the quality layer of EA service, in order to successfully implement the organization's network management, and the lack of a system to provide advice to the manager for decision, can be found in the current research innovations to fill existing research gaps. In fact, according to the modeling done in Scopus, ScienceDirect, Springer, IranDock databases, Islamic world citation database and also theses in Tehran universities, so far a similar research to design and implement organizational architecture to improve organizational network management with the approach SWOT using artificial intelligence; It's not done.

Method

In terms of purpose, this research is applied-modeling, because on the one hand, the concepts and rules related to the design and implementation of organizational architecture are described in detail in order to improve the management of organizational networks with SWOT approach and on the other hand, the relationship between these concepts and rules Experts are evaluated and appointed. Usually, in real-world engineering problems, there are different types of uncertainties about the studied variables, which can be due to the specific variables under investigation or interaction between them(Izadi, et al. 2019). One of the most important reasons for using artificial neural networks and fuzzy systems in this paper is that issues related to the fight against smuggling of goods and currency have a complex structure that indicates ambiguity and uncertainty in their definition and understanding, and since this system, Integrates neural networks and concepts of fuzzy logic, It can take advantage of both in one frame. Its inference system conforms to a set of fuzzy "if-then" rules, which have the ability to learn to approximate nonlinear functions (Abraham, 2005). Ever since man was able to think, he has always faced ambiguity in various social, technical and economic issues (Lin & Lee. 1996) and (Keshavarzmehr, ۲۰۱۲). The human brain defines and evaluates sentences based on a variety of factors based on inferential thinking, which can be very complicated if not impossible to model in mathematical language and formulas. Linguistic variables are expressed based on linguistic (spoken) values, which are in the set of phrases (words / idioms), and linguistic expressions are attributes for linguistic variables. Here, language variables are variables for which the acceptable values are instead of numbers, words and sentences of human and machine languages (Lin & Lee. ۱۹۹۶) and (Keshavarzmehr, ۲۰۱۲). A fuzzy number is a special fuzzy set as follows, in which x accepts the real values of the member of the set R and is a function of its membership (Azar & Faraji. ۱۳۸۹) and (Lin & Lee. ۱۹۹۶) and (Keshavarzmehr, ۲۰۱۲) :

$$A'=\{(x, \mu_{\tilde{A}}(x)) \mid x \in X\} \quad (1)$$

Neuro-fuzzy hybrid systems integrate the fuzzy systems' advantages that consider the explicit, explainable and understandable knowledge on the one hand, and neural networks which deal with implicit knowledge acquired through learning on the other hand(Alahyari & Pilevari. 2021).

In fact, the following classification expresses the relationship between fuzzy logic and neural network according to this view (Lin & Lee. 1996) and (Mishra & Mohanty, 2016) and (Keshavarzmehr, 2012) and (Moayer & Bahri. 2009). Symmetric neural-fuzzy models: The neural network and the fuzzy system work together on a single task but have no effect on each other. None are used to specify another parameter. Usually in this model, the neural network is used to preprocess the input or output of the fuzzy system. Collaborative neural-fuzzy models: The neural network is used to determine the parameters of the fuzzy system. These parameters include fuzzy rules, weight of rules, and fuzzy sets. Combined neural-fuzzy models: The neural network and the fuzzy system are combined in a coordinated structure. This model can be considered as a neural network with fuzzy parameter or a fuzzy system with distributed learning. ANFIS, ANNBFIS, NEFClass and FLEXNFIS are examples of this model. Considering the application of intelligent system designed in this research, in the end, inspired by the researches (Lin & Lee. 1996), (Keshavarzmehr, 2012) and (Mishra & Mohanty, 2016) and (Moayer & Bahri. 2009), the steps of five Several tools were designed to design an intelligent research system, which include:

- Modeling the concepts of the field of success of the implementation of the network management of the organization in order to identify the input and output variables and draw the relationships between them
- Defining qualitative variables using linguistic constraints and assigning fuzzy numbers and sets and membership functions to them
- Designing an intelligent system based on the definitions and designs made using MATLAB software: This step includes extracting expert rules and evaluating them by experts and creating a fuzzy rules database as well as designing an inference engine with access to fuzzy rules.
- User interface design and how to display options and how to use the designed intelligent system

- Selecting a method for fuzzy decoupling in order to convert fuzzy numbers and sets to a definite value in order to actually evaluate the performance of the system

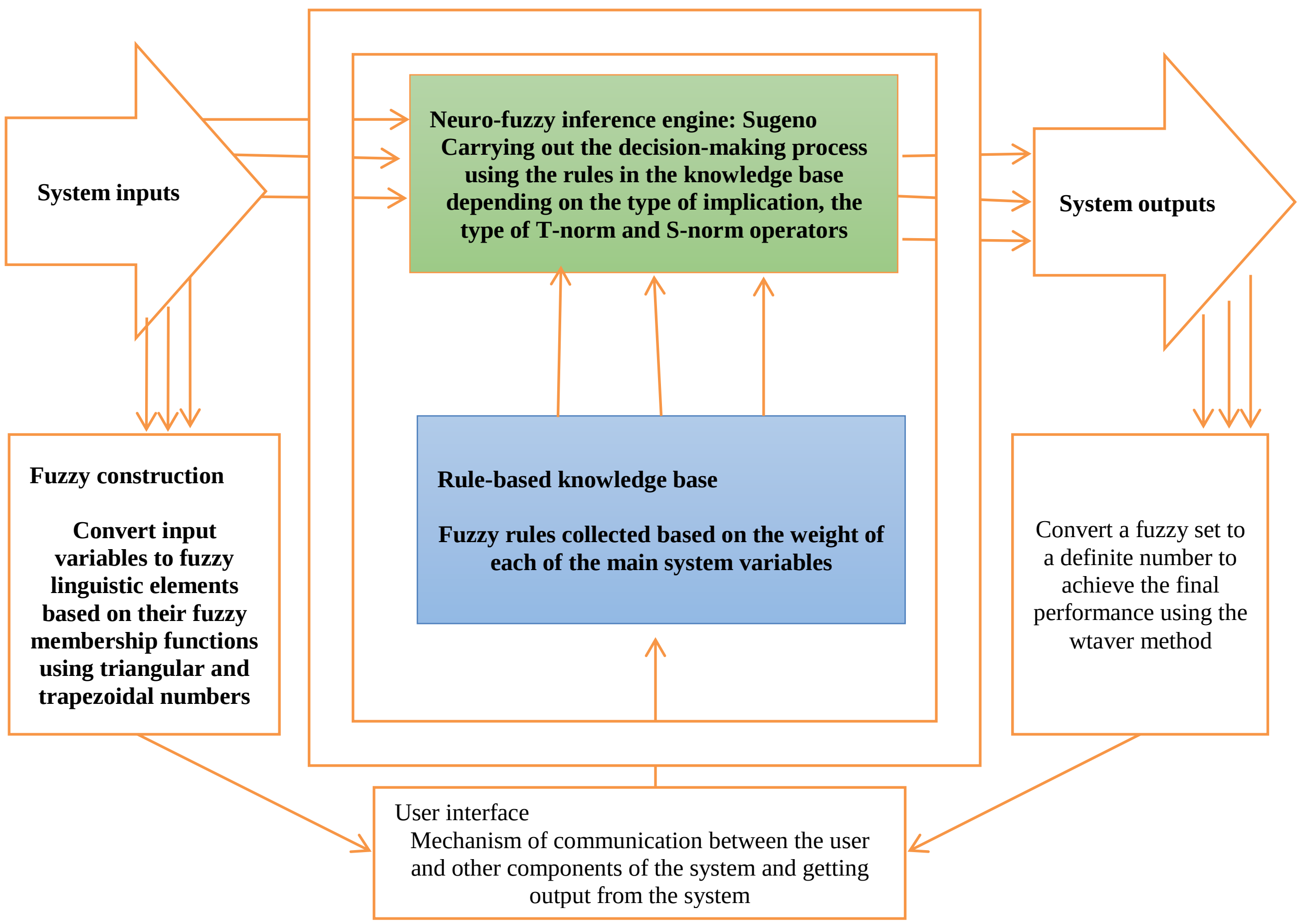


Figure 1. Structure of Intelligent Research System

The following table shows the intelligent system validation tool for the successful implementation of the organization's network management (EA-NETWORK.SWOT) in order to evaluate the responses of the article system.

Table 5.
Intelligent System Validation Tool

	Intelligent system output component	Intelligent system input components					
analyze	Status of successful implementation of organization network management	Network management based on the EA service quality layer	Network management based on the EA data preparation layer	Network management based on the EA core component layer	Network management based on the EA data source layer	Network management based on the EA application layer	Rule number (Rule)
							.
							.
							.

Findings

The study population can be divided into two general groups: The first group includes 10 expert professors, the second group includes experts working in organizations responsible for combating smuggling of goods and currency or similar positions in organizations responsible for combating smuggling of goods and currency. Finally, after distributing 100 questionnaires, the sample size of this study is equal to 96 available and cooperative experts who were selected by a combination of two methods of non-probability targeted (judgmental) sampling and snowball sampling. Data related to measurement tool No. 1 (research modeling tool) were collected in the early summer of 1399 and data related to measurement tool No. 2 ("Intelligent Research System" validation tool) were collected in late summer of 1399. Based on the opinions and professional experience of managers and senior experts of organizations in charge of combating commodity and currency smuggling, as well as the opinions of university professors, the most important criteria for the variable "Network management based on EA application layer (X1)" are: internal applications of the organization with average With 5.80 and the organization's business applications with an average of 5.91; The most important criteria related to the variable "Network management based on the layer of EA (X2) data sources" are: the up-to-dateness of the organization's database with an average of 5.93 and the speed of data transfer in the organization's database with an average of 5.92; The most important criteria related to the variable "Network management based on the central component layer of EA (X3)" are: the organization's hardware infrastructure with an average of 5.91 and the organization's software infrastructure with an average of 5.95; The most important criteria related to the variable "Network management based on EA (X4) data preparation layer" are: data preparation based on external network with an average of 5.83 and data preparation based on internal network with an average of 5.76; The most important criteria related to the variable "Network management based on EA (X5) service quality layer" are: service quality for legal customers with an average of 5.91 and service quality for real customers with an average of 5.91. On the other hand, the ranking of research variables based on the weighted average of the ideal importance of their indicators are: network management based on the layer of EA data sources with a weighted average of 5.765, and network management based on the central component layer of EA equal to the average 5.730, network management based on EA service quality layer with weighted average of 5.703, network management based on EA application layer with weighted average of 5.690, network management based on EA data preparation layer with weighted average of 5.68; While the research variables based on the weighted average of the functional status of their indicators are: network management based on the central component layer of EA with the weighted average of the status of 4.903; Network management based on the EA data source layer with a weighted average of 4.752; Network management based on the quality layer of EA service with a weighted average of 4.683; Network management based on the EA data preparation layer with a weighted average of 4.577; And network management based on the EA application layer with a weighted average of 4.562; Were determined. The table related to the reliability statistics of research variables shows high reliability of the data collection tools of this article.

Table 6.
Information on the Reliability Statistics of Research Variables

Research variables	Cronbach's alpha	Number of items
Network management based on EA application layer (X1)	0.916	6
Network management based on EA data source layer (X2)	0.909	6
Network management based on the central component layer EA (X3)	0.924	6
Network management based on EA data preparation layer (X4)	0.863	6
Network management based on EA service quality layer (X5)	0.926	6
Overall reliability of research variables	0.983	30

Here, the average Cronbach's alpha for the research variables is more than 0.9, which indicates that the reliability of the research modeling tool is in excellent condition. In the present article, an intelligent system is a system whose input information can be inaccurate, ie the input information of a fuzzy system is in the form of fuzzy sets or fuzzy numbers. On the other hand, the processing of a fuzzy system can be done inaccurately. One of the most well-known and widely used inaccurate processes in fuzzy systems is the use of a fuzzy law database. In the fuzzy law database, each law is defined by an "if-then" structure. According to the application of intelligent system designed in this research, at the end of the five steps for designing intelligent research system were considered, which are:

Step 1 - Identifying the input and output variables of the system: After finalizing the proposed model of intelligent research system, the input and output variables of the intelligent system were defined. The intelligent system input variables in order to successfully implement the organization's network management are: network management based on the EA application layer; Network management based on the EA data source layer; Network management based on the EA core component layer; Network management based on EA data preparation layer and network management based on EA service quality layer. The output variable of the intelligent system is "Successful implementation of the organization's network management". According to the proposed model of the article and also applying the opinions of experts in order to evaluate that model, the input and output variables of the intelligent system can be entered into the system.

Step 2: Define qualitative variables using language constraints and assign fuzzy numbers and sets and membership functions to them. The table and format of linguistic variables show the fuzzy values as well as the membership functions of triangular numbers and trapezoids related to the input and output variables of the intelligent article system within the triple and fifty ranges (Triangular membership functions are used because maximum membership occurs at only one point):

Table 7.
Linguistic Variables Related to the Input Variables of the Module "Success of Implementing Network Management in the Organization"

Triangle number membership functions (These values are calculated in relation to the input variables)	Linguistic variable
(0/30/150)	Low
(0/70/3)	Medium
(10/850/7)	High

ANFIS system training data (These values are calculated in relation to the input variables)
0,0,0,0,0,0
0-0.05,0-0.05,0-0.05,0-0.05,0-0.05,0.1
0.05-0.15,0.05-0.15,0.05-0.15,0.05-0.15,0.05-0.15,0.2
0.15-0.30,0.15-0.30,0.15-0.30,0.15-0.30,0.15-0.30,0.3
0.3-0.4,0.3-0.4,0.3-0.4,0.3-0.4,0.3-0.4,0.4
0.4-0.5,0.4-0.5,0.4-0.5,0.4-0.5,0.4-0.5,0.5
0.5-0.6,0.5-0.6,0.5-0.6,0.5-0.6,0.5-0.6,0.6
0.6-0.7,0.6-0.7,0.6-0.7,0.6-0.7,0.6-0.7,0.7
0.7-0.8,0.7-0.8,0.7-0.8,0.7-0.8,0.7-0.8,0.8
0.8-0.9,0.8-0.9,0.8-0.9,0.8-0.9,0.8-0.9,0.9
0.9-0.95,0.9-0.95,0.9-0.95,0.9-0.95,0.9-0.95,0.95
0.95-1,0.95-1,0.95-1,0.95-1,0.95-1,0.99
1,1,1,1,1,1

The training and checking data sets are collected based on observations of the target system and are then stored in separate files. Data related to research variables in the ratio of 60 to 40 were used for network training and testing. To specify validation data when using the:

- ANFIS function, create an ANFIS Options object, and set the Validation Data option.
- Neuro-Fuzzy Designer, in the Load data section, selected Checking.

The array and file formats for the checking data are the same as those for the training data.

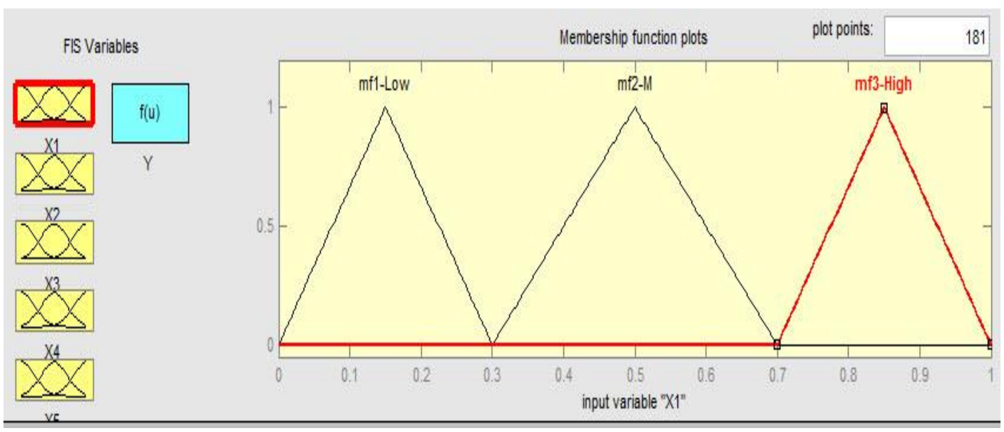


Figure 2. Separation of intelligent system input variable - fuzzy values associated with linguistic variables (membership functions of triangular numbers)

Step 3: Designing an Intelligent System Knowledge Base - This step involves extracting expertise rules and evaluating them by experts and creating a fuzzy rule database. The fuzzy rule database is a set of "if-then" rules that are at the heart of the intelligent system because other components of the fuzzy system are used to implement these rules effectively and efficiently. Here, the probability of occurrence of different states between the main variables of the same intelligent system is considered. The starting point for building a knowledge base in a fuzzy system is to obtain a set of rules. If the fuzzy is then the knowledge of experts or the knowledge of the field under study, the next step is to combine these rules into a single system. How to generate the rules of the knowledge base of the main module of the intelligent system is as follows.

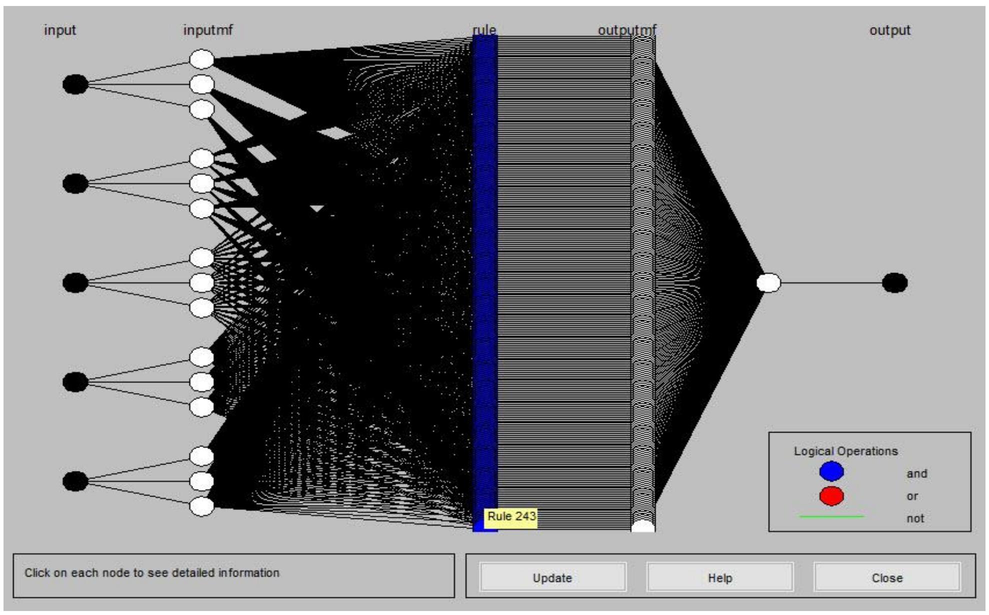


Figure 3. Automatic production of neural rules of the knowledge base of this intelligent system automatically by ANFIS toolbox

Due to the nature of the intelligent system input variables in order to successfully implement the organization's network management, here the probability of occurrence of different situations between the main variables of the intelligent system are considered the same. Using fuzzy logic calculations and artificial neural network, all the rules of the database of this intelligent system were automatically generated by the ANFIS toolbox of MatLab software. Finally, the number of fuzzy rules of the module "Success of implementing network management in the organization" of the intelligent system is equal to 243 due to the existence of 5 main variables, each of which has 3 modes. The figure for the fuzzy rules databases of the intelligent system module is as follows.

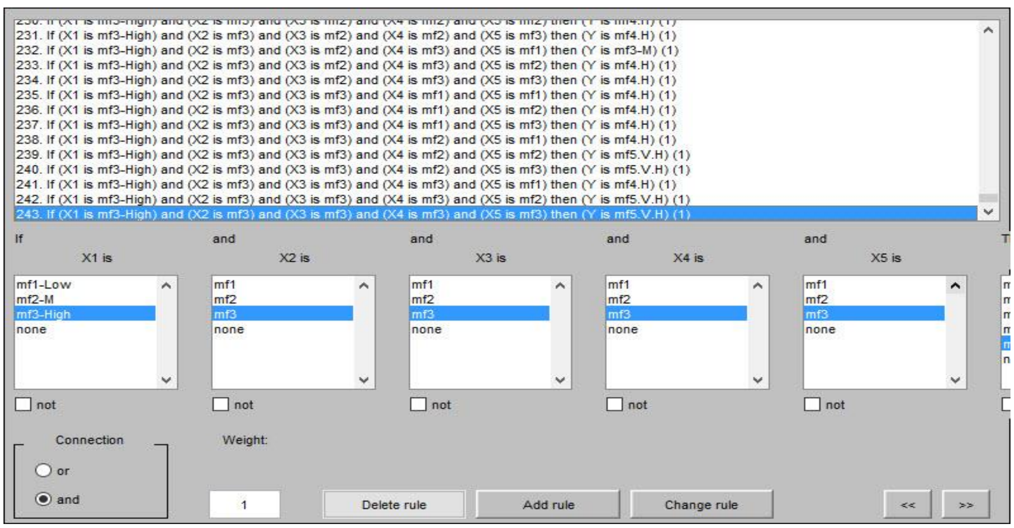


Figure 4. Fuzzy rules within the system module knowledge base

Step 4: Designing the Intelligent System Inference Engine - In this step, the wtavar method for fuzzy decoupling has been selected in order to convert fuzzy numbers and sets to a definite value in order to actually evaluate the system performance. The following figure shows the inference engine of the intelligent system.

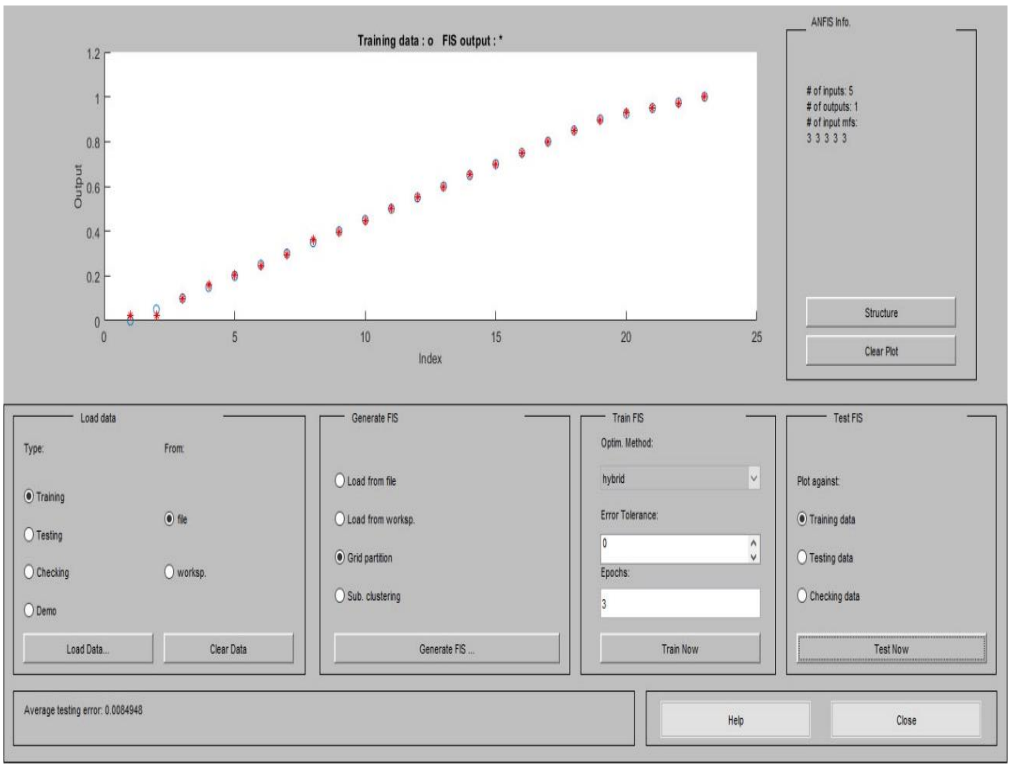


Figure 5. Intelligent system inference engine

Using MATLAB software, inference can be made based on the rules in the intelligent system knowledge database. Using MATLAB software, inference can be made based on the rules in the intelligent system knowledge database. The average error of test data in the inference engine of intelligent system in order to "design and implement organizational architecture to improve the management of organizational networks with SWOT approach, is equal to 0.0085 (less than 1%) which is very high accuracy of neural network calculations and fuzzy logic. In fact, the most important reason for using Sugeno (instead of Mamdani) inference engine is that in Mamdani inference engine, the choice of type of implication and fuzzy rule aggregation style (in order to collect fuzzy rules for inference and inference) is not fixed. Selecting the type of request in MATLAB software uses Min because the Prod operator shortens and incomplete the output fuzzy set.The non-fuzzy instrument in the intelligent system converts the fuzzy output to a definite number. Is used because this non-fuzzy helps reduce the complexity of the problem and also reduces computation time. Here, due to the fuzzy rules of the system being connected using the "And" operator, in MATLAB software the fuzzy rules aggregation style "Max" Select Menu in this case, the more precise sum of each output set of rules is considered, not part of them.

Step 5: Describe how to use the intelligent system designed and analyze its outputs - In order to analyze the variable behavior of the output system "Successful implementation of the network management of the organization" The intelligent system can analyze the output of the intelligent system numerically (accurately) and linguistically. In order to determine the weight of the system input values, information about the ideal weight and performance of each of the main variables of the research is provided.

Table 8 (a)

Information about the Ideal Weight of Each of the Main Variables of the Research

Fuzzy weight	**Weight average**	**Research variables**
0.813	5.690	"Network Management Based on EA Application Layer (X1)"
0.824	5.765	"Network management based on EA data source layer (X2)"
0.819	5.730	"Network Management Based on EA (X3) Central Component Layer"
0.812	5.682	"Network Management Based on EA Data Preparation Layer (X4)"

0.815	5.703	"Network Management Based on EA Service Quality Layer (X5)"

Table 8 (b)

Information about the performance weight of each of the main variables of the research

Fuzzy weight	**Weight average**	**Research variables**
0.652	4.562	"Network Management Based on EA Application Layer (X1)"
0.679	4.752	"Network management based on EA data source layer (X2)"
0.701	4.903	"Network Management Based on EA (X3) Central Component Layer"
0.654	4.577	"Network Management Based on EA Data Preparation Layer (X4)"
0.669	4.683	"Network Management Based on EA Service Quality Layer (X5)"

The following figures analyze the behavior of the input and output variables of the intelligent system module:

Figure 6 (a). Analysis of the Important (ideal) Behavior of the Output Variable in the Module "Success of Implementing Network Management in the Organization" Uumerically and Linguistically

Figure 6 (b). Analysis of the situational (functional) behavior of the output variable in the module "Success of implementing the network management of the organization" numerically and linguistically

After designing the intelligent research system, the outputs and responses of the intelligent system of this article were compared with the opinions of 18 experts in a separate measurement tool. Since the opinions of experts are expressed based on the output variable membership functions (with 5 MF), in order to test the hypothesis of system output, we can use the percentage difference between the intelligent system outputs of this article, ie EA-NETWORK.SWOT with the average of experts' opinions. The final difference between the intelligent system outputs of the article and the average of the experts' opinions is not significant and is equal to 0.065. Since there is not enough reason to accept the null hypothesis, the opposite hypothesis is accepted, ie there is no significant difference between the average opinions of experts and the outputs of the "smart system".

Conclusion

One of the most important results of the article "Designing an intelligent system in order to successfully implement the organization's network management" is that according to the rules of the knowledge base of the main module of the intelligent system based on calculating the weight of each of the main variables using expert opinions; And using the intelligent system designed in this research, the status of "success of the organization's network management" can be analyzed numerically and more accurately:

In terms of ideal importance, if; "EA (X1) Application Layer" is good for "0.813" and "EA (X2)" is for "0.824" and "EA (X3) is for" EA (X3). "OK means exactly 0.819" and "Network management based on EA (X4) data preparation layer" "Good means exactly 0.812" and "Network management based on EA (X5) service quality layer" in good condition means exactly 0.815; Then; The "Successful Implementation of Organizational Network Management" status is at the "excellent (fifth level)" level, which is exactly 0.952. According to the membership functions of language variables by experts in the previous tables, the value is 4.76 within a range of 5 values in the range defined for the "excellent" language variable, ie the success status of the organization's network management, with programming code [0.813; 0.824; 0.819; 0.812; 0.815] is calculated exactly 0.952. On the other hand, in terms of functional status, if; "EA (X1) Application Layer" mode average means exactly 0.652 and "EA (X2) Data Management Layer" mode means exactly 0.679 and "EA Central Component Layer" (X3) "Well, it means exactly 0.701" and "Network management based on EA (X4) data preparation layer" is average, ie exactly 0.654, and "Network management based on EA (X5) service quality layer" is average, ie 0.669; Then; The status of "successful implementation of the organization's network management" is at the "intermediate (third level)"

level, ie exactly 0.468. According to the membership functions of language variables by experts in the previous tables, the value is 2.34 within a 5-value range in the range defined for the "average" language variable, ie the success status of the organization's network management, with programming code [0.652; 0.679; 0.701; 0.654; 0.669] has been calculated exactly 0.468.

The following are suggested to improve the management of the organization's networks:

- Change Request Management: Refers to the organizational infrastructure needed to evaluate the cost, timing, and impact of a requested change on an existing product. It also refers to the work of the review team and the change control committee.
- Configuration Management: Describes the structure of the product and identifies the configuration items that make it up. Configuration items are considered as individual entities that can be copied in the configuration management process. Configuration management also defines the configurations, builds and labels and collects the copied products within the product assemblies and maintains tracking between these versions.
- Assessment of configuration status (measurement): means describing the status of the product based on the type, number, rate and severity of errors detected and resolved during product development. The metrics that are extracted from this perspective, both raw and through auditing, are useful for determining the status of project completion.
- Trace changes: means we can determine what has been done on the items and for what reason and when. This information plays a role in the history and logic of change.
- Version selection: The purpose of version selection is to ensure that the correct version of the configuration items is selected for

modification or implementation. Version selection is based on solid "configuration recognition".

- Product manufacturing Software: Covers the need to automate the compilation and testing and packaging of the product for distribution.
- Backup: Reduces the risk of losing any of the products, such as written code, different product versions, change requests, change records, test results, and overall results of the project team.

The most important recommendations and suggestions for further research can be expressed as follows:

- Using fuzzy ontology to comprehensively model the success of the organization's network management implementation.
- Using fuzzy multi-criteria decision making (MCDM) techniques to network the relationships between the success model of the organization's network management implementation.
- Applying data envelopment analysis (DEA) methodology to model the success of the implementation of the organization's network management.
- Application of Dynamics system technique (Vensim) for dynamic modeling of the success of the organization's network management.

References

Abraham, A. (2005), "Adaptation of Fuzzy Inference System Using Neural Learning", in Nedjah, Nadia; de Macedo Mourelle, Luiza, Fuzzy Systems Engineering: Theory and Practice, Studies in Fuzziness and Soft Computing, 181, Germany: Springer Verlag, pp. 53–83, doi:10.1007/11339366_3

Ahlemann, Frederik, et al. 2020. A resource-based perspective of value generation through enterprise architecture management. Information & Management In press, corrected proof Available online 23 January 2020Article 103266

Alahyari, M., & Pilevari, N. (2021). CO-Active Neuro-Fuzzy Inference System Application in Supply Chain Sustainability Assessment Based on Economic, Social, Environmental, and Governance Pillars. Journal of System Management, 6(3), 265-287.

Alwadain, Ayed, et al. 2016. Empirical insights into the development of a service-oriented enterprise architecture. Data & Knowledge EngineeringVolume 105September 2016Pages 39-52

Azar, Adel and Hojjat Faraji. 2010. Fuzzy Management Science. Kind Book Publishing Institute. Iran Center for Management and Productivity Studies (affiliated to Tarbiat Modares University). fourth edition.

Azzedin, F., & Ghaleb, M. (2019). Towards an architecture for handling big data in oil and gas industries : Service-oriented approach. International Journal of Advanced Computer Science and Applications (IJACSA), 10(2).

Bhattacharya, Prithvi. 2018. Aligning Enterprise Systems Capabilities with Business Strategy: An extension of the Strategic Alignment Model (SAM) using Enterprise Architecture. Procedia Computer Science Volume 1382018Pages 655-662.

Cap, Jan-Patrick, et al. 2019. Multi level network management – A method for managing inter-organizational innovation networks. Journal of Engineering and Technology ManagementVolume 51January–March 2019Pages 21-32

Castillo, Ricardo Pérez, et al. 2020. A decision-making support system for Enterprise Architecture Modelling. Decision Support SystemsIn press, corrected proof Available online 20 January 2020Article 113249

Dantu, Bharath & Eric Smith. 2011. Medical Process Modeling with a Hybrid System Dynamics Zachman Framework. Procedia Computer Science, Volume 6, 2011, Pages 76-81.

Dumitriu, Dan, et al. 2020. Enterprise Architecture Framework Design in IT Management. Procedia Manufacturing2020.

Griffo, Cristine, et al. 2019. Service contract modeling in Enterprise Architecture: An ontology-based approach. Information SystemsIn press, corrected proof Available online 18 October 2019Article 101454.

Hinkelmann, Knut, et al. 2016. A new paradigm for the continuous alignment of business and IT: Combining enterprise architecture modelling and enterprise ontology. Computers in Industry, Volume 79, June 2016, Pages 77-86.

Huang, Mingfeng, et al. 2020. An effective service-oriented networking management architecture for 5G-enabled internet of things. Computer Networks22 May 2020.

Izadi, M., Noorossana, R., Izadbakhsh, H., Saati, S., & Khalilzadeh, M. (2020). Z-Cognitive Map: An Integrated Cognitive Maps and Z-Numbers Approach under Cognitive Information. Journal of System Management, 6(2), 81-102.

Kandjani, Hadi, Lian Wen & Peter Bernus. 2012. Enterprise Architecture Cybernetics for Collaborative Networks: Reducing the Structural Complexity and Transaction Cost via Virtual Brokerage. IFAC Proceedings Volumes, Volume 45, Issue 6, 23–25 May 2012, Pages 1233-1239.

Lapalme, James, et al. 2016. Exploring the future of enterprise architecture: A Zachman perspective. Computers in Industry, Volume 79, June 2016, Pages 103-113.

Lin, Chin-Teng & C. S. George Lee. 1996. Neural Fuzzy Systems: A Neuro-Fuzzy Synergism to Intelligent Systems Hardcover –Publisher: Prentice Hall; Har/Dskt edition (May 1, 1996).

Manikannan, K & V Nagarajan. 2020. Optimized mobility management for RPL/6LoWPAN based IoT network architecture using the firefly algorithm. Microprocessors and MicrosystemsSeptember 2020.

Marchiori, Danilo & Mário Franco. 2020. Knowledge transfer in the context of inter-organizational networks: Foundations and intellectual structures. Journal of Innovation & KnowledgeVolume 5, Issue 2April–June 2020Pages 130-139

Mirsalari, Seyedeh Reyhaneh & Mina Ranjbarfard. 2020. A model for evaluation of enterprise architecture quality. Evaluation and Program Planning December 2020.

Mishra, Rabi Narayan & Kanungo Barada Mohanty. 2016. Real time implementation of an ANFIS-based induction motor drive via feedback linearization for performance enhancement. Engineering Science & Technology, an International Journal, In Press, Corrected Proof, Available online 28 September 2016.

Moayer, Sorousha & Parisa A. Bahri. 2009. Hybrid intelligent scenario generator for business strategic planning by using ANFIS. Expert Systems with Applications, Volume 36, Issue 4, May 2009, Pages 7729-7737

Namugenyi, Christine, et al. 2019. Design of a SWOT Analysis Model and its Evaluation in Diverse Digital Business Ecosystem Contexts. Procedia Computer Science 2019.

Närman, Per, et al. 2013. Using enterprise architecture analysis and interview data to estimate service response time. The Journal of Strategic Information Systems Volume 22, Issue 1March 2013Pages 70-85.

Newman, Mark. 2018. Networks-Second Edition. University of Michigan. DOI: 10.1093/oso/9780198805090.001.0001

Randolph, Robert V. et al. 2020. Better the devil you know: Inter-organizational information technology and network social capital in coopetition networks. Information & ManagementVolume 57, Issue 6 September 2020 Article 103344.

Sanjotvar Rajaskaran, Viji Alakshmi Pai, Mahmoud Keshavarzmehr (translator). 2012. Neural Networks, Fuzzy Logic, Genetic Algorithm: Composition and Application. Publisher: Nov Pardazan. ISBN: 978-964-975-162-7.

Stoller, James K. 2020. A Perspective on the Educational "SWOT" of the Coronavirus Pandemic. ChestIn press, uncorrected proof Available online 18 September 2020.

Takeuchi, Hironori & Shuichiro Yamamoto. 2019. AI Service System Development Using Enterprise Architecture Modeling. Procedia Computer Science Volume 1592019 Pages 923-932.

Wang, Qianjin, et al. 2020. Driving amount based stochastic configuration network for industrial process modeling. Neurocomputing Volume 39421 June 2020 Pages 61-69.

Xie, Jin & Ping Zhou. 2020. Robust stochastic configuration network multi-output modeling of molten iron quality in blast furnace ironmaking. Neurocomputing Volume 38728 April 2020 Pages 139-149.

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