A Multi-Criteria Decision-Making Model for Selecting Knowledge Management Outsourcing Providers: A Case Study in Insurance Industry

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ABSTRACT

Outsourcing is a recommended strategy for enhancing competitive advantages. Many foreseeable issues within organizations can be mitigated by eliminating inefficient internal activities from the Knowledge Management (KM) process. One effective approach is to outsource parts of the KM process to an external third party. A key aspect of outsourcing is the selection of appropriate service providers. This study identifies and evaluates the criteria and dimensions for selecting KM outsourcing providers within an insurance company by reviewing the prior research and validating the findings with both industry and academic experts. A framework consisting of nine factors and 35 indicators was developed and validated using the Fuzzy Delphi method. Subsequently, the Fuzzy Analytic Network Process (FANP) and the DEMATEL technique were employed to analyze the data and provide a comprehensive decision-making framework for selecting the most suitable KM outsourcing providers. The findings indicated that "quality" is the most influential criterion in the system, while it is the least influenced by other factors. Conversely, "specialized organizational features" are significantly affected by other criteria. According to FANP results, "experience" holds the highest importance with a weight of 0.30773, whereas "organizational culture" ranks lowest with a weight of 0.02716. Finally, the outcomes of the Fuzzy Delphi and DEMATEL methods were applied in a real-world case within an insurance company to select the optimal KM service provider from two candidate firms.

KEYWORDS

Multicriteria decision-making (MCDM), Knowledge Management, Outsourcing, Fuzzy Delphi, Fuzzy Analytic Network Process (FANP), DEMATEL.

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Introduction

Given the significance of Information Technology (IT) in today's competitive environment, organizations must identify the most effective strategies to meet their IT requirements in a cost-efficient manner while maximizing available opportunities (Mahdavian et al., 2014; Wei et al., 2021). Outsourcing is one of the key approaches used to address IT-related needs within organizations (Aleman, 2014; Mokrini & Aouam, 2020). Under this model, organizations concentrate on their core activities while delegating non-core tasks to extensive networks of external providers (Zarbakhshnia et al., 2020).

Outsourcing complex and advanced tasks has become a strategic tool for organizations aiming to achieve global competitiveness by accessing cross-border knowledge flows and external intellectual resources (Leslie & Willcocks, 2013). In contrast, knowledge management (KM) has traditionally been considered an internal strategy, focused on the development and use of knowledge within the organization. However, the concept of knowledge outsourcing is relatively new (Lam & Chua, 2009).

Outsourcing can offer several short-term competitive advantages, including cost reduction, enhancement of core competencies, increased productivity and quality, improved flexibility, access to external expertise, capital preservation, and the promotion of innovation (Hanafizadeh & Ravasan, 2018; Uygun et al., 2015). Nevertheless, companies must be mindful of the risks associated with outsourcing. Some key concerns that may negatively impact its success include diminished information security, reduced managerial control, and ethical or personnel-related issues (Yang et al., 2007; Zhang et al., 2018).

Once the decision to outsource has been made, selecting the appropriate outsourcing provider becomes a critical next step (Büyüközkan & Çifçi, 2012; Wibisono et al., 2018). While outsourcing offers considerable potential benefits, it may lead to unfavorable outcomes if not supported by well-defined standards, clear conditions, and a coherent scientific and strategic framework. According to statistics, one in every four outsourcing projects ends in failure (Hanafizadeh & Ravasan, 2018).

Because outsourcing providers may not be able to meet all required selection criteria simultaneously, identifying the most suitable provider is inherently a complex task (Cheng & Lin, 2002). Previous studies on knowledge outsourcing have shown that, in most cases, standardized processes are typically outsourced. However, many organizations also choose to outsource processes that are critical to value creation. These are referred to as knowledge processes, which require competitive expertise, analytical and critical thinking, and a high level of specialization (Lam & Chua, 2009).

As different components of products or services evolve along the value chain, the knowledge management (KM) process must also adapt accordingly (Grimsdottir & Edvardsson, 2018). In this context, outsourcing can act as a mechanism for organizational learning. Numerous studies suggest that, to achieve competitive advantages, managers must carefully evaluate the benefits and risks of outsourcing and align outsourced processes with their intrinsic characteristics and with the most

relevant criteria for selecting an optimal provider (Liou & Chuang, 2010; Zhang et al., 2018).

IT outsourcing has evolved significantly over the past three decades and has been extensively examined in numerous studies. The primary issues addressed in IT outsourcing include motivation, scope, efficiency, contractual risks, and stakeholders' participation (Wei et al., 2021). Depending on the capabilities of the outsourcing provider and the organization's strategic objectives, companies can select the most appropriate service provider (Mokrini & Aouam, 2020).

Given the growing emphasis in recent research on various aspects of outsourcing, developing a robust model for selecting an appropriate outsourcing provider—grounded in the analysis of both qualitative and quantitative indicators—has become essential. In this context, considering the critical role of knowledge management (KM) in achieving organizational success and competitive advantage, as well as the strategic value of outsourcing in boosting competitiveness, this study aims to propose a framework for selecting KM outsourcing providers.

To achieve this objective, prior research was reviewed to identify the relevant dimensions and evaluation criteria. A comprehensive list of these dimensions and criteria was then compiled and validated through consultation with both industry practitioners and academic experts. The Fuzzy Delphi method was applied to confirm the proposed criteria.

Subsequently, the DEMATEL method was used to determine the causal relationships among the primary selection criteria. Based on these relationships, the local weights of the criteria and sub-criteria were calculated using the Fuzzy Analytic Network Process (FANP). The proposed model was then implemented in a real-world case study involving an Iranian insurance company.

Literature Review

Previous studies indicate that, in most cases, standardized knowledge management (KM) processes are outsourced. However, many organizations choose to outsource the processes that are critical to value creation. These are referred to as knowledge processes and typically require competitive expertise, analytical and judgment-based thinking, and highly specialized skills (Lam & Chua, 2009).

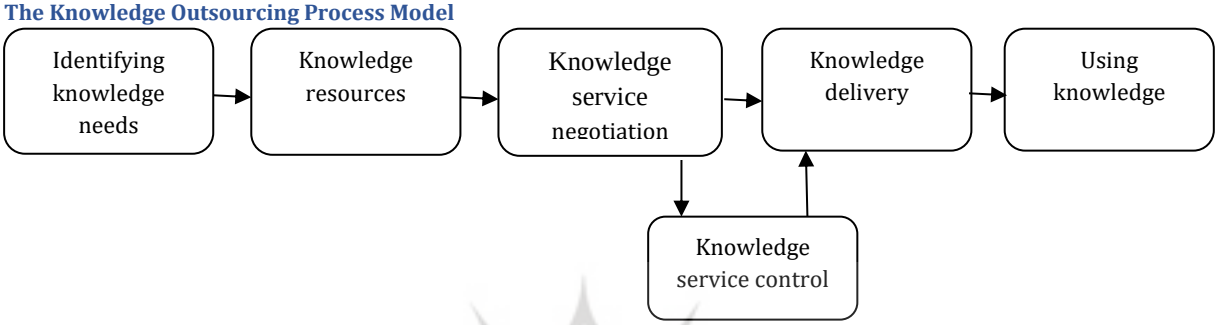
As various components of products or services evolve within the value chain, corresponding changes also occur in KM processes (De Vita & Tekaya, 2015). In this context, outsourcing can serve as a mechanism for organizational learning.

Nevertheless, numerous studies emphasize that managers must carefully evaluate both the advantages and disadvantages of outsourcing, ensuring that outsourced processes are aligned in a way that enhances the organization's competitive position. This objective can only be achieved if managers select outsourcing providers that are optimally suited to the nature and requirements of the processes involved (Liou & Chuang, 2010).

In knowledge outsourcing, external experts deliver knowledge-based assets that are subsequently internalized by the organization. Rather than relying solely on internal capabilities, knowledge outsourcing enables organizations to generate knowledge through external sources.

The knowledge outsourcing process model, illustrated in Figure 1, comprises several stages that define the interaction between the knowledge service consumer and the knowledge service provider.

Figure 1.
The Knowledge Outsourcing Process Model



(Source: Lam & Chua, 2009)

The knowledge outsourcing process begins with identifying the organization's knowledge needs, including the type and scope of the knowledge required. The next step involves identifying relevant knowledge resources, which may include various tools aligned with those needs. At this stage, the potential knowledge providers are also identified and evaluated.

This is followed by a negotiation phase between the client and the knowledge provider. If successful, the process results in a formal contract outlining the terms, costs, licensing conditions, and intellectual property rights. Knowledge delivery then takes place, involving the transfer of knowledge from the provider to the client in various forms.

The quality of the delivered knowledge is monitored through a parallel evaluation process. This ensures that the timeliness of delivery and the characteristics of the knowledge align with the terms agreed upon in the contract. Ultimately, the knowledge assets delivered by the provider are internalized and applied by the client (Lam & Chua, 2009).

Following the outsourcing decision, the next critical step is selecting an appropriate outsourcing provider. Several factors must be taken into account during this process (Büyüközkan & Çifçi, 2012). Outsourcing spans a wide range of functions, including research and development, design, manufacturing, and marketing (Bierly et al., 2002).

In the context of knowledge outsourcing, external experts generate knowledge-based outputs that are subsequently integrated into the client organization. Thus, rather than relying solely on internal capabilities, knowledge outsourcing leverages external sources for knowledge creation (Lam & Chua, 2009; Quinn, 1999).

Within the outsourcing model, the selection of a suitable provider is one of the most

critical factors influencing the success of the initiative. Accordingly, many studies consider provider selection as a multi-criteria decision-making (MCDM) problem. To ensure the optimal performance of the selected provider, organizations must develop a robust evaluation framework that incorporates both quantitative and qualitative criteria (Kumar et al., 2014).

Fathi et al. (2025) conducted an in-depth investigation into the barriers hindering the implementation of Internet of Things (IoT) technology within food supply chains. By integrating findings from a comprehensive literature review and expert interviews, and employing the Decision-Making Trial and Evaluation Laboratory (DEMATEL) method, the study identified eleven critical barriers. These barriers were systematically classified into five overarching categories of technological, financial, human capital, regulatory, and infrastructural.

Wei et al. (2021) applied a two-stage fuzzy optimization approach to identify the most influential factors in selecting outsourcing retailers in e-commerce sector. Their findings indicated that "lead time," "customer's voice," "cost," "delivery and service," and "quality" were the dominant drivers in the selection process.

Ortiz-Barrios et al. (2020) proposed a hybrid multi-criteria decision-making (MCDM) approach to select the most suitable supplier of forklift filters. In their study, the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) was employed to rank the suppliers. The results demonstrated that "quality" was the most critical factor in selection of the supplier.

Mokrini and Aouam (2020) employed a combination of fuzzy TOPSIS, Analytic Hierarchy Process (AHP), and PROMETHEE methods to evaluate the risks associated with healthcare logistics outsourcing in Morocco. Their findings supported the healthcare policymakers in setting effective priorities for implementing preventive and mitigation strategies.

Ariya and Puritat (2020) developed an MCDM model for selecting a suitable Enterprise Resource Planning (ERP) system, focusing on small and medium-sized enterprises (SMEs) in Northern Thailand. The results were used to design a decision-support system that automates the ERP selection process by integrating quantitative analyses across different ERP evaluation categories.

Hassanain et al. (2015) proposed an MCDM framework to assist the maintenance managers in Saudi Arabia to make informed outsourcing decisions. They identified and classified the influencing factors into six groups of strategic, managerial, technological, quality-related, economic, and functional characteristics.

Phochanikorn and Tan (2019) introduced an integrated MCDM method for selecting the green supplier in palm oil industry. Their approach employed the Fuzzy Decision-Making Trial and Evaluation Laboratory (Fuzzy DEMATEL) method to examine causal relationships, followed by the Fuzzy Analytic Network Process (Fuzzy ANP) to assign weights to the criteria. The results of sensitivity analysis and comparative evaluations confirmed that the model was both robust and practical.

Promsivapallop et al. (2015) categorized the evaluation of outsourcing providers into

four main dimensions ofcompatibility, risk, cost, and quality—each encompassing several specific criteria.

Fanny et al. (2003) identified twelve key competencies for screening outsourcing providers, which are classified into three major categories:

- Delivery competency: the provider's ability to meet the customer's operational requirements;
- Communication competency: the provider's willingness to align with the customer's strategic goals over time;
- Transformation competency: the provider's capacity to adapt and respond to the customer's evolving needs.

Additional capabilities highlighted in the study include technological efficiency, resource availability, domain expertise, organizational structure, leadership quality, and governance mechanisms.

A review of literature on the process of contractor selection in knowledge management reveals that most existing models and approaches rely on general and broad assumptions, with insufficient attention to the specific needs of the insurance industry. Due to its unique characteristics and challenges, this industry requires tailored decision-making models to select contractors more accurately and efficiently.

Fuzzy logic can play a significant role in this context, as it offers the ability to handle uncertainties, complexities, and multi-faceted judgments inherent in decision-making processes. Its main advantages—such as managing incomplete or ambiguous data and providing flexibility across various parameters—can lead to notable improvements in criteria for contractor selection and enhance the accuracy and effectiveness of decision-making in the insurance sector.

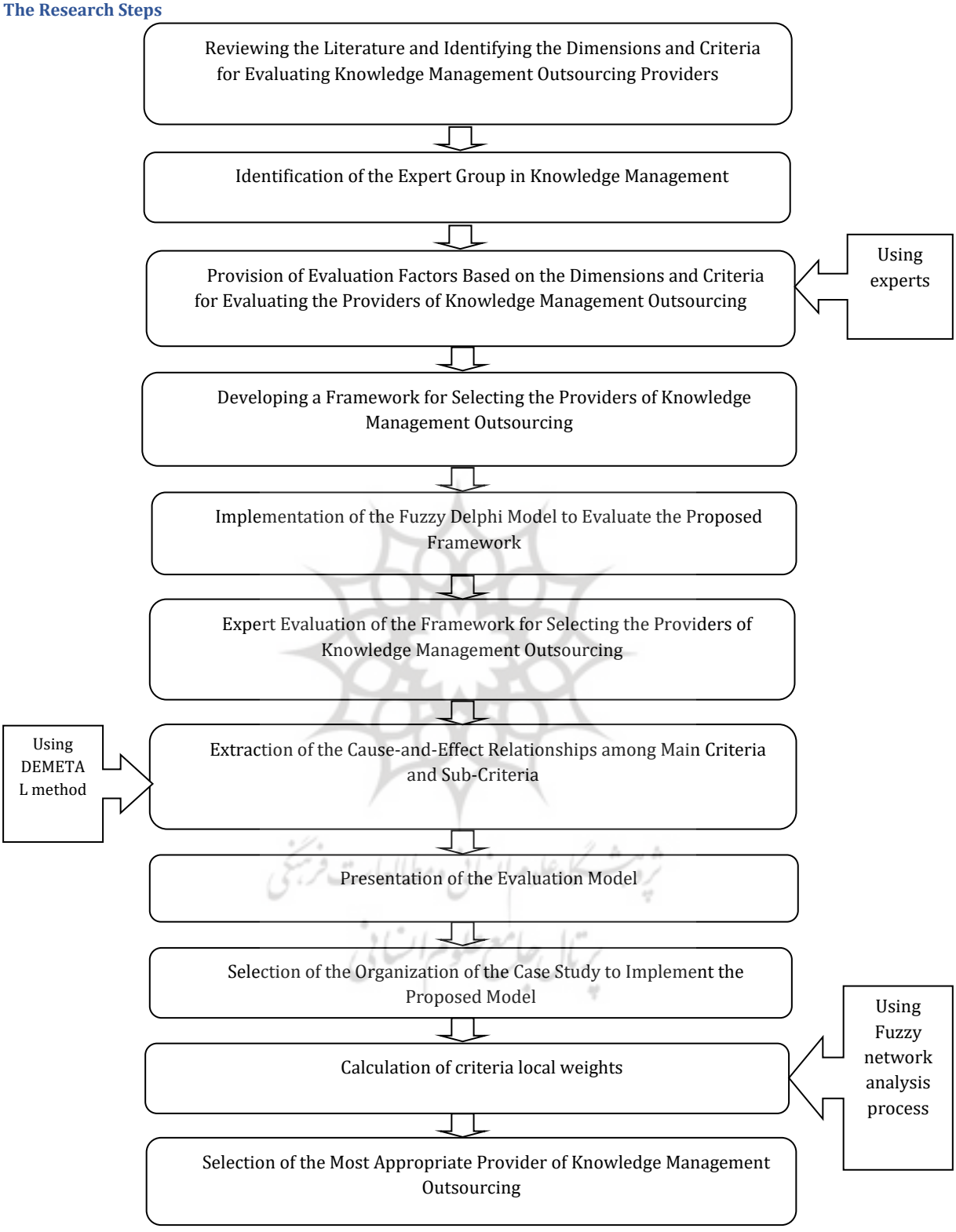
Therefore, developing fuzzy logic–based decision-making models that consider the specific features of this industry is essential to optimize the process of contractor selection and achieve more effective results.

Methodology

The research steps are shown in Figure 2.

Based on the criteria extracted from the literature and previous studies, the Fuzzy Delphi method was employed to gather expert opinions on dimensions and criteria influencing the selection of knowledge management outsourcing providers. The statistical population for this stage consisted of knowledge management experts. A snowball sampling technique was used to identify the participants, and data were collected using a structured questionnaire. In this phase, nine individuals collaborated on the research. They included four university professors at the rank of associate professor or higher, each with numerous academic publications in the field of knowledge management, and five industry managers and experts from the insurance sector, who possess specialized expertise in knowledge management.

Figure 2.
The Research Steps



(Source: The Researcher's Findings)

The validity of the questionnaire was assessed by subject matter experts, while its reliability was calculated using Cronbach's alpha coefficient.

The Delphi technique was initially based on conjecture, expert judgment, and

intuition. Over time, it evolved into a more scientific method. It was first developed by the RAND Corporation in the late 1950s as part of a military defense project aimed at systematically collecting expert opinions. However, due to security considerations, the method was not publicly disclosed until twelve years later (Kuo & Chen, 2008).

The key prerequisites for applying the Fuzzy Delphi method include reliance on expert judgment and broad-based expert input; group consensus to derive results; the presence of complex, large-scale, or interdisciplinary problems; disagreement or gaps in the existing knowledge; geographic dispersion of experienced experts; and the need for anonymity in data collection. Therefore, when using the Fuzzy Delphi technique, it is important to distinguish between two types of qualitative research. This method is particularly suitable for exploratory qualitative studies aimed at identifying and understanding the underlying nature and fundamental elements of a phenomenon (Azar & Faraji, 2010).

Among the most prominent applications of the Fuzzy Delphi method are item screening in operations research and integration with multi-criteria decision-making (MCDM) techniques. The core components of the Fuzzy Delphi process include iteration, structured questionnaires, subject-matter expertise, time management, results analysis, anonymity, consensus-building, coordination teams, and controlled feedback mechanisms (Powell, 2003; Van et al., 2006).

Repetition in the Fuzzy Delphi method is conducted systematically, in a process-oriented and documented manner, through a series of questionnaires that continue until the expert consensus is achieved (Van et al., 2006). The participants in the Fuzzy Delphi process are selected experts who possess the relevant knowledge and experience in the subject matter, demonstrate willingness to participate, have sufficient availability, and possess effective communication skills (Motadel et al., 2012; Powell, 2003).

Controlled feedback provides the participants with an opportunity to reconsider their judgments and evaluate the opinions of others—an essential element for progressing toward consensus (Rowe & Wright, 1999). In the Delphi method, information is exchanged without face-to-face interactions, and participants generally remain anonymous to each other; at a minimum, individual responses are kept confidential.

One limitation of the traditional Delphi method is the lack of a standardized procedure for analyzing and managing both qualitative and quantitative data. This gap has led to diverse interpretations and reporting styles, which can compromise the method's coherence and consistency (Windel, 2004).

In this context, consensus refers to a shared agreement among participants on a particular idea. It does not imply identifying a "correct" answer, but rather achieving a sufficient level of agreement on the issue under consideration (Powell, 2003).

The questionnaire used in the Fuzzy Delphi method was designed electronically and structured around nine dimensions, each consisting of a set of evaluation criteria. The questions employed a Likert scale, a structured series of statements arranged in a specific order, where respondents indicate their level of agreement by selecting an item on the scale.

In the first round of the Fuzzy Delphi process, responses were collected from nine experts. After calculating the average response for each item, these averages were compared with those of subsequent rounds. This process continued until the responses stabilized.

In this study, all expert responses reached the required level of stability after two rounds.

Based on the dimensions and criteria obtained using the Fuzzy Delphi method, a DEMATEL questionnaire was used to identify and analyze the cause-and-effect relationships among the factors.

DEMATEL is an effective analytical tool that consolidates expert knowledge to examine interrelationships among the components of the system. One of its most prominent applications is in multi-criteria decision-making (MCDM), where it helps establish structured relationships and hierarchies among identified factors (Hassanpour et al., 2011).

The DEMATEL process includes the following steps:

i. Establishing the initial direct-relation matrix: A group of experts assesses the influence and direction between factors using a rating scale of 0, 1, 2, 3, and 4, representing "no impact", "low impact", "medium impact", "high impact", and "very high impact", respectively. This evaluation results in a $n \times n$ matrix for each expert, where $X\_ij\hat{}k$ represents the opinion of the kth expert on the level of influence of the ith factor on the jth factor.
ii. Normalizing the direct-relation matrix and obtaining the total-relation matrix.
iii. Calculating the distributor and receiver groups (Oygan et al., 2014; Wu, 2012).

The Fuzzy Analytic Network Process (FANP) method was employed to rank the most influential dimensions and criteria in selecting a provider of knowledge management outsourcing. Subsequently, expert opinions from the knowledge management team of the case study organization—Iranian Saman Insurance Company—were gathered to evaluate two candidate service providers: Nadak Engineering Consulting and Future Development Consultants.

As the first Iranian insurance company recognized as a knowledge-based enterprise, Saman Insurance has undertaken substantial initiatives in digital transformation and implementation of knowledge management. However, this journey has been marked by some challenges—such as inadequate organizational preparedness, fragmented knowledge-based processes, and a pressing need for training the human resource—that elevate the selection of an appropriate knowledge management outsourcing partner to a strategic imperative.

The Analytic Network Process (ANP), a generalization of the Analytic Hierarchy Process (AHP), was developed by Saaty to address the complex decision-making problems by accounting for interdependencies among criteria and alternatives.

The ANP consists of five main steps (Cheng & Lin, 2002):

i. Identifying the decision-making criteria: These criteria are defined by senior managers, key decision-makers, or expert staff with comprehensive knowledge of the system.

ii. Constructing the network: Certain criteria serve a controlling function within the system. At this stage, such control-related criteria are identified and categorized, as they are essential for monitoring and regulating the outsourcing process.

iii. Conducting pairwise comparisons and deriving the priority vector: Comparisons between categories and their respective elements are conducted using Saaty's 9-point scale, which ranges from 1 to 9, representing levels of importance from equal (1) to extreme (9) (Kardaras et al., 2013). These comparisons help determine the degree of interaction among the categories and establish their relative priorities.

Category comparisons are meaningful only when there are at least three categories. If no comparisons are made, equal weights should be assigned to the categories in subsequent calculations. The phrasing of the comparison question is particularly important. For example, when comparing criterion B with criterion C in relation to criterion A, two distinct perspectives must be considered: (1) The degree to which B is influenced by A versus the degree to which C is influenced by A; (2) the effect of B on A versus the effect of C on A.

To compare the elements, each control criterion is considered individually, and the affected elements within a category are compared accordingly. In a comparison matrix with n criteria, a total of $n(n-1)/2$ pairwise comparisons are required.

The eigenvector derived from the pairwise comparison matrix of the elements in category A, with respect to control criterion C, represents the relative importance of the elements in category A as influenced by C.

i. Calculation of Supermatrices: This step involves computing both the unweighted and weighted supermatrices.

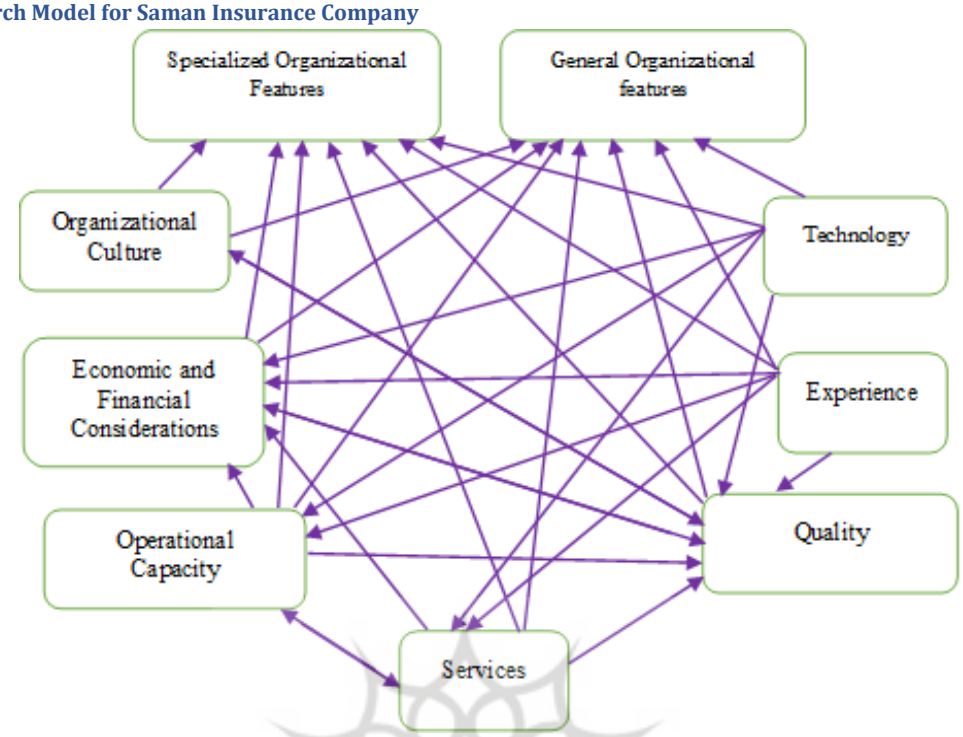
ii. Selection: Based on the calculated weights of the alternatives in the limited supermatrix, the row with the highest weight is selected as the preferred alternative (Rowe & Wright, 1999).

By following the above-mentioned steps, the evaluation factors for selecting a provider of knowledge management outsourcing were extracted from the previous research and structured using carefully designed questionnaires. Through the aggregation of expert opinions during the Fuzzy Delphi iterations, a comprehensive framework was developed to identify the most suitable provider.

The output of the Fuzzy Delphi method served as the input for the DEMATEL technique, which was employed to determine the cause-and-effect relationships among the criteria and sub-criteria within the evaluation framework. Subsequently, the Fuzzy Analytic Network Process (FANP) was used to rank the factors influencing the selection process.

As a case study, the proposed model was implemented at Iranian Saman Insurance Company to evaluate and rank the candidate providers identified by the organization. The relationships among the main criteria for Saman Insurance Company are illustrated in Figure 3.

Figure 3.
The Research Model for Saman Insurance Company



(Source: The Researcher's Findings)

To assess the reliability of the questionnaire, Cronbach's alpha was calculated using SPSS software (SPSS Statistics 30.0, 2023 version). The results confirmed that the questionnaire was reliable and demonstrated strong internal consistency.

The DEMATEL method was implemented using MATLAB R2024b (version 24.2), while the Fuzzy Analytic Network Process (FANP) was conducted using Super Decisions software (version 2.10, released in 2021).

Findings

The fuzzy mean of each indicator was calculated separately in two steps using the Fuzzy Delphi method. Table 1 presents the results of the Delphi calculations for both steps.

In the Fuzzy Delphi method, a threshold value of 3 was set to determine the acceptance or rejection of evaluation factors. Table 2 presents the final dimensions and criteria for evaluating the providers of knowledge management.

Table 1.
The Fuzzy Delphi Method for Validation of the Indicators

Feature	Criteria	Mean of Fuzzy Numbers, step one			Mean of Fuzzy Numbers, step two		
General Organizational Features	Suitability of the organizational structure of provider of knowledge management outsourcing	3.89	6.39	7.22	3.89	6.39	8.89
	Size of the organization for the provider of knowledge management outsourcing	1.68	4.17	5	0.83	3.33	5.83
	Level of the knowledge of provider of knowledge management outsourcing	6	4.54	4.12	5	7.50	9.44
Specialized Organizational Features	Managerial capabilities of provider of the knowledge management outsourcing	7.22	9.72	10	6.67	9.17	10
	Team experience of provider of the knowledge management outsourcing	6.11	7.61	10	6.67	9.17	10
	Flexibility of provider of the knowledge management outsourcing	5.83	8.33	9.44	3.89	6.39	8.89
	Level of confidence in provider of the knowledge management outsourcing	6.67	9.17	10	7.22	9.72	10
	Research and development capability of provider of the knowledge management outsourcing	6.67	9.17	10	5.56	9.06	9.72
	Adequate number of specialist personnel in the knowledge management outsourcing provider organization	5.56	8.06	9.72	5	7.50	9.44
Technology	New technologies utilized by provider of the knowledge management outsourcing	4.44	6.94	9.44	7.22	9.72	10
	Facilities and capabilities utilized by provider of the knowledge management outsourcing	5.56	8.06	10	6.67	9.17	10
	Knowledge management system development tools used by provider of the knowledge management outsourcing	5.83	8.33	9.72	5.56	8.06	10
	Information security techniques utilized by provider of the knowledge management outsourcing	6.39	8.89	10	5.28	7.78	10
	Hardware and software capacity of provider of the knowledge management outsourcing	5	7.50	9.44	5.56	8.06	10
Experience	Number of knowledge management projects completed by provider of knowledge management outsourcing	6.11	8.61	10	6.67	9.17	10
	Years of operation of provider of the knowledge management outsourcing in the field of knowledge management	5.56	8.06	10	5.56	7.78	8.89
	Degree of success in knowledge management projects completed by provider of the knowledge management outsourcing	7.22	9.72	10	6.67	9.17	10
Operational Capacity	Professional ability of provider of the knowledge management outsourcing	3.61	6.11	8.61	5.56	8.06	10
	Capacity of provider of the knowledge management outsourcing in managing special projects	4.72	7.22	9.72	7.22	9.72	8.89
	Duration of the project	4.72	7.22	9.17	3.89	6.39	8.89
Services	Volume of knowledge management system-related services provided by provider of the knowledge management outsourcing	5.56	8.06	9.72	5.28	7.78	10
	Ability to provide knowledge management consulting services	5.28	7.78	10	3.89	6.39	8.89
	Extent of system customization offered by provider of the knowledge management outsourcing	5.56	8.06	9.17	6.11	8.61	10
Quality	Knowledge and skills of provider of the knowledge management outsourcing	5.56	8.06	9.72	7.22	9.72	10
	Satisfaction of previous customers with provider of the knowledge management outsourcing	6.94	9.44	10	6.11	8.61	10
	Quality of services provided by provider of the knowledge management outsourcing	6.67	9.17	10	5.83	8.33	9.72
	Adherence to the established schedule by provider of the knowledge management outsourcing	5.28	7.78	9.44	3.89	6.39	8.89
	Time taken to respond to the customer requirements	4.72	7.22	9.17	3.89	6.67	9.44
Economic and Financial Considerations	Financial stability of the organization for provider of knowledge management outsourcing	3.06	5.56	8.06	3.61	6.11	8.61
	Total cost of the system provided by provider of the knowledge management outsourcing	4.17	6.67	9.17	6.11	8.61	10
	Amount ofc reduction	4.72	7.22	9.17	6.11	8.61	10
Organizational Culture	Level of innovation	4.17	6.67	8.89	5.56	8.06	10
	Extent of information sharing between provider of the knowledge management outsourcing and the organization	6.11	8.61	9.72	6.39	8.89	10

(Source: The Researcher's Findings)

Table 2.
The Final Dimensions and Criteria of Evaluating the Providers Knowledge Management

The Evaluation Criteria and Dimensions for the Providers of Knowledge Management Outsourcing			
Technology	New technology utilized by providers of the knowledge management outsourcing	Suitability of the organizational structure of the knowledge management outsourcing provider	General organizational features
	Facilities and capabilities utilized by provider of the knowledge management outsourcing	Level of knowledge of provider of knowledge management outsourcing	
	Knowledge management system development tools used by provider of the knowledge management outsourcing	Managerial capabilities of provider of the knowledge management outsourcing	Specialized Organizational features
	Information security techniques utilized by provider of the knowledge management outsourcing	Team experience of provider of the knowledge management outsourcing	
	Hardware and software capacity of provider of the knowledge management outsourcing	Degree of flexibility of provider of the knowledge management outsourcing	
Experience	Number of knowledge management projects completed by provider of the knowledge management outsourcing	Level of understanding of knowledge management processes by provider of the knowledge management outsourcing	
	Years of operation of provider of the knowledge management outsourcing in the Field of knowledge management	Level of confidence in provider of the knowledge management outsourcing	
	Degree of success in knowledge management projects completed by provider of the knowledge management outsourcing	Research and development capability of the of provider of the knowledge management outsourcing	
Quality	Knowledge and skills of provider of the knowledge management outsourcing	Adequate number of specialist personnel in organization for the knowledge management outsourcing provider	
	Satisfaction of the previous customers with provider of the knowledge management outsourcing	Alignment of knowledge management strategies of provider of the knowledge management outsourcing with the organization objectives	
	Quality of provider services of the knowledge management outsourcing	Number of knowledge management system-related services provided by provider of the knowledge management outsourcing	Services
	Adherence to the established schedule by provider of the knowledge management outsourcing	Ability to provide consulting services in knowledge management	
	Time taken to respond to customer requirements	Extent of system customization provided by provider of the knowledge management outsourcing	
The ethical and financial considerations	Financial stability of organization for the knowledge management outsourcing provider	Professional capability of provider of the knowledge management outsourcing	Operational capacity
	Total cost of system provided by provider of the knowledge management outsourcing	The capacity of knowledge management outsourcing provider for managing special projects	
	Amount of cost reduction	Duration of the project	
Extent of information sharing between the provider of knowledge management outsourcing and the organization		Level of innovation	Organizational culture

(Source: The Researcher's Findings)

To extract the relationships among the criteria using the Fuzzy DEMATEL method, the first step is to generate a direct-relation matrix. This matrix, derived from the pairwise comparison of the main criteria, is presented in Table 3.

Table 3.
The Direct-relation Matrix of the Main Criteria

	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Criterion 6	Criterion 7	Criterion 8	Criterion 9
Criterion 1	0	0	0	0	0	0	0	0	0
Criterion 2	1.5	0	0	0	0	0	0	0	0
Criterion 3	1.75	3	0	0	3.51	1.86	3.63	2.91	0
Criterion 4	2	3.25	0	0	4.10	1.59	1.97	1.78	0
Criterion 5	1.95	2.88	0	0	0	0.98	0	4.31	1.95
Criterion 6	2.11	2.69	0	0	4.20	0	1.79	3.12	0
Criterion 7	1.98	3.24	0	0	3.66	2.79	0	2	0
Criterion 8	2.30	2.70	0	0	1.89	0	0	0	0
Criterion 9	2.15	2.90	0	0	3.21	0	1.12	0	0

(Source: The Researcher's Findings)

In the second step, the direct-relation matrix was normalized. The normalized direct-relation matrix for the main criteria and the total-relation matrix are presented in Tables 4 and 5, respectively.

Table 4.
The Normalized Direct-relation Matrix of the Main Criteria

	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Criterion 6	Criterion 7	Criterion 8	Criterion 9
Criterion 1	0	0	0	0	0	0	0	0	0
Criterion 2	0.0729	0	0	0	0	0	0	0	0
Criterion 3	0.0851	0.1458	0	0	0.1706	0.0904	0.1765	0.1415	۰
Criterion 4	0.0972	0.1230	0	0	0.1993	0.0773	0.0958	0.0865	۰
Criteria n5	0.0948	0.1400	0	0	0	0.0476	0	0.2095	0.0948
Criterion 6	0.1026	0.1308	0	0	0.2042	0	0.0870	0.1517	0
Criterion 7	0.0963	0.1575	0	0	0.1779	0.1356	0	0.0972	0
Criterion 8	0.1118	0.1313	0	0	0.0919	0	0	0	0
Criterion 9	0.1045	0.1410	0	0	0.1561	0	0.0544	0	0

(Source: The Researcher's Findings)

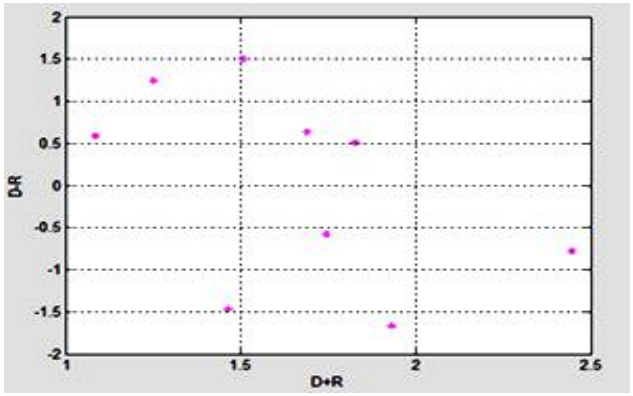
Table 5.
The Total-relation Matrix

	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Criterion 6	Criterion 7	Criterion 8	Criterion 9	D
Criterion 1	0	0	0	0	0	0	0	0	0	0
Criterion 2	0.0865	0.0179	0	0	0.0164	0.0014	0.0059	0.0044	0.0016	0.134
Criterion 3	0.2251	0.3141	0	0	0.3039	0.1377	0.2452	0.2518	0.0288	1.507
Criterion 4	0.2147	0.2657	0	0	0.3044	0.1136	0.1437	0.1805	0.0289	1.251
Criterion 5	0.1646	0.2083	0	0	0.0590	0.0564	0.0174	0.2292	0.1004	0.835
Criterion 6	0.2102	0.2552	0	0	0.2867	0.0268	0.1227	0.2314	0.0272	1.160
Criterion 7	0.2077	0.2882	0	0	0.2752	0.1644	0.0329	0.1738	0.0261	1.168
Criterion 8	0.1700	0.2047	0	0	0.1410	0.0085	0.0122	0.0320	0.0134	0.582
Criterion 9	0.1859	0.2451	0	0	0.2252	0.0195	0.0807	0.0603	0.0214	0.838
R	1.4647	1.7990	0	0	1.6119	0.5284	0.6606	1.1634	0.2476	

(Source: The Researcher's Findings)

The decision-maker selects only the values greater than the threshold, which are considered to represent cause-and-effect relationships. The cause-and-effect diagram is obtained using a vector map of (D + R, D – R), where the horizontal and vertical axes represent D + R and D – R, respectively.

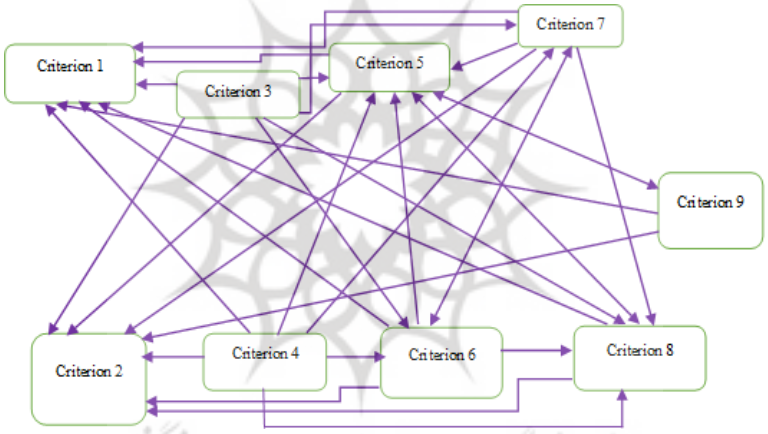
Figure 4.
The Cause-and-effect Diagram of the Main Criteria



(Source: Researcher's Findings)

Based on the threshold value of 3 and the identified relationships, the network model illustrating the connections among the main criteria is shown in Figure 5.

Figure 5.
The Connection Network of the Main Criteria



(Source: The Researcher's Findings)

In this step, the criteria were weighted using Super Decisions software, based on the relationships identified using the DEMATEL method. According to the results obtained from the fuzzy network analysis technique, the rankings of the criteria based on their assigned weights are presented in Table 6.

Table 6.
The Rankings of the Criteria Based on Weights

Criteria	Weight
Experience	0.30773
Economic and Financial Considerations	0.19052
Specialized Organizational Features	0.13793
Services	0.09371
Technology	0.07237
Quality	0.06993
Operational Capacity	0.05821
General Organizational Features	0.04244
Organizational culture	0.02716

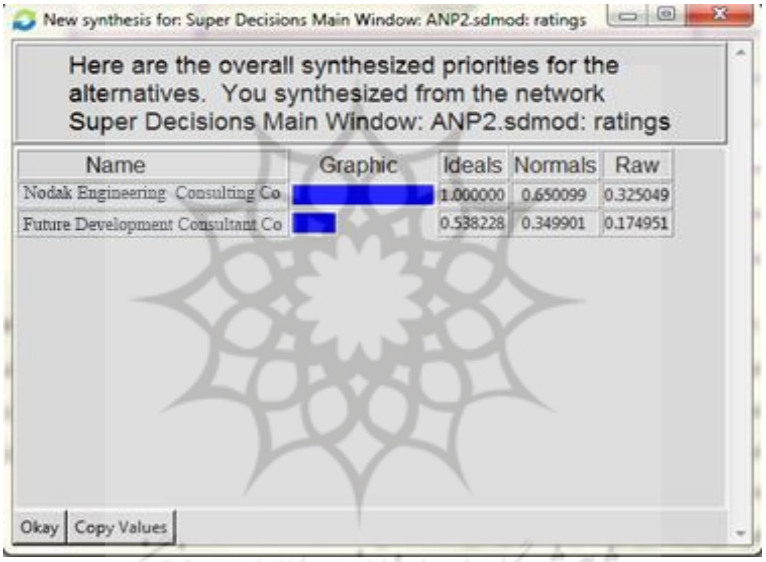
(Source: The Researcher's Findings)

Based on the results of the Fuzzy Analytic Network Process, 'experience'—with an effective weight of 0.30773—was identified as the most important criterion, while 'organizational culture,' with an effective weight of 0.02716, was deemed to be the least important.

The criteria were ranked in descending order of importance as follows: economic and financial considerations, specialized organizational features, services, technology, quality, operational capacity, general organizational features, and organizational culture.

In the case study, two companies—Nodak Engineering Consulting and Future Development Consultants—were evaluated as candidates for knowledge management outsourcing. Based on the weighted sub-criteria, Nodak Engineering Consulting received a higher overall ranking. The results are shown in Figure 6.

Figure 6.
The Results of Selection in Super Decision



(Source: The Researcher's Findings)

In insurance industry, Iranian companies typically consult one another when selecting contractors and share their experiences. Therefore, if a management consulting firm has experienced working with insurance companies, it is considered a significant advantage. Notably, the results showed that the factor of "experience" ranks even higher than economic and financial considerations for these companies.

Conversely, "organizational culture" of the contractor company is given the lowest priority. Previous studies have also largely overlooked this aspect, and it received a similarly low score in this case study. This suggests that operational and experiential factors carry more weight than cultural factors in the decision-making process within this context.

Conclusion

This study identified and prioritized the key criteria influencing the organizations' selection of knowledge management (KM) service providers. Using the Fuzzy Analytic

Network Process (FANP) and DEMATEL methods, the findings revealed that "experience" and "economic and financial considerations" are the most critical factors in selecting a KM outsourcing partner. These results align with previous studies, including those by Uygun et al. (2015) and Modiri and Ansari (2013), which also emphasized the importance of financial aspects.

Additionally, the study highlighted the significant role of specialized organizational features, consistent with the findings of Motadel et al.'s study (2012). Given that knowledge management is widely regarded as a strategic enabler of competitive advantage, organizations must approach the selection of KM service providers with care and strategic insight.

In light of the importance of service quality and alignment with operational and software development standards, implementing software quality assurance standards is also recommended. To enhance decision-making accuracy and comprehensiveness, future studies are encouraged to apply alternative multi-criteria decision-making (MCDM) methods.

Finally, while the criteria used in this research study were drawn from previous literature, organizations are advised to tailor these criteria according to their specific characteristics and strategic needs. Customizing the evaluation framework will lead to a more effective and aligned selection of KM outsourcing providers.

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