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Identifying Knowledge Management Infrastructures to Reduce Employee Mental Absenteeism through Data Mining Techniques

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ABSTRACT

This research aims to identify the knowledge management infrastructure due to reducing employee absenteeism based on data mining. Examining the status and reports of employees using data recording systems, creating information dashboards, and applying data mining techniques is important for the transparency of the mental state of employees. The mixed research method (qualitative-quantitative) has been done in two phases. The first phase was conducted with a qualitative-inductive approach using the Delphi method and a semi-structured interview tool. In the second step, codes were grouped in a common axis and 13 axis codes based on the similarity and distinction between the extracted codes. The interview sample was 10 people selected using the purposeful sampling method. In the second phase, the quantitative research method was data mining; Then, according to the research literature and experts' opinion, the researcher-made questionnaire was designed with a five-point Likert scale. The data mining technique is based on neural networks and decision trees in Rosseta and Weka software. The results showed that knowledge management can increase the quality of organizational processes based on data, increase the empowerment of employees, and reduce absenteeism. The knowledge obtained from the data mining of organizational information dashboards is important for strengthening the mental health systems of employees and increasing productivity. ©authors

1. Introduction

Knowledge management is a field that holds significant promise for improving the mental health of employees in organizations (Santhosé & Lawrence, 2023).

In general, knowledge management refers to the systematic and coordinated creation, sharing, and application of knowledge to promote innovation and add value to organizations (Latilla et al., 2018). Knowledge management is increasingly facilitated by technological solutions, often referred to as knowledge management systems, to streamline organizational affairs.

Knowledge-based solutions vary, but many currently available products include features such as advanced search and retrieval capabilities, embedded content management workflows, and the use of artificial intelligence to identify related content and recommend it to users.

Studies have also shown that knowledge-based procedures and knowledge management techniques improve organizational health and reduce employee absenteeism (Chorney et al., 2023; Taher et al., 2021).

Although knowledge management is recognized as a crucial aspect of organizational processes, the use of knowledge management systems solutions has not been specifically applied to enhance employee well-being and empower human resources (Shahmoradi et al., 2017; Massaro et al., 2015; Sibbald et al., 2016). Paying attention to the development and implementation processes is important for the ultimate success of knowledge management system projects (Jackson et al., 2020). Factors such as the quality of technology, information, and system usability, as well as testers' motivation and leader support, influence the likelihood of adopting knowledge management systems and achieving positive outcomes (Delone et al., 2003). Knowledge analysis and implementation frameworks also emphasize the effectiveness of techniques for enhancing the psychological well-being of employees.

Mental absence refers to a state where employees are physically present but not

mentally engaged, resulting in reduced effectiveness and efficiency (Ishak, 2015).

Therefore, developing data-driven systems and career programs based on mindfulness can serve as a tool to overcome personal and professional challenges, improve the quality of work environments, create a happy and healthy atmosphere in the organization, and enhance the mental health of employees (Zamani et al., 2022).

Therefore, organizational systems should be designed to enhance employee motivation and concentration.

In the meantime, it is important to examine the status and reports of employees using data recording systems. Creating information dashboards and utilizing data mining techniques can help clarify the mental state of employees (Yasir et al., 2017).

The knowledge obtained from data mining organizational information dashboards is important for strengthening employees' mental health systems and increasing productivity.

In particular, programmatic and technical knowledge can be used not only to enhance the performance of the organizational system but also to improve the health of employees and empower them (Santhosé & Lawrence, 2023).

Knowledge management is an evidence-based approach that enables organizational managers to utilize the appropriate knowledge at the appropriate time in order to have a positive impact on employee health outcomes and decrease mental absenteeism (Wu et al., 2019).

In addition, evidence from the business sector can be utilized for knowledge management interventions that are based on data mining approaches. This can enhance organizational learning and management by empowering employees to create, maintain, and exchange knowledge within the organization (Taghvae Yazdi, 2022).

Strengthening the knowledge management capacity of organizations, particularly those in low- and middle-income countries, is a complex task. These organizations are often confronted with managerial and

programmatic challenges, as well as limited resources (Nguyen et al., 2019).

Therefore, the organizational weakness of the foundation undermines the employees.

The alienation of organizations from data mining procedures has hindered their ability to adapt to the rapidly changing world (Olafsen et al., 2021).

The progress of modern technology has changed the working environments of today's world, requiring people to have more mental and cognitive abilities compared to physical ones (Migdadi, 2020).

It is highly difficult to make career decisions and survive in a turbulent labor market, especially when individuals lack knowledge, skills, and experience negative thoughts and emotions related to their life and career situations (Fernandes et al., 2021).

Organizational procedures can be modified with transparent knowledge using technology-driven trends created entirely based on real data. Technologies such as artificial intelligence, cloud computing, and digital information dashboards are all available to employees to enhance their focus and improve the quality of their work (Nham et al., 2020). Hassanzadeh (2022) has stated that intelligent agents will soon encounter significant changes in numerous businesses and organizations.

Knowledge management in organizations in the digital age has become more attractive, and it is no longer dull and mindless.

The flow of knowledge in organizations, both in general and in private, is faster. Employees can perform organizational responsibilities with better accuracy and quality based on data-oriented systems (Joia et al., 2020).

Also, mindfulness has been shown to effectively improve work-related outcomes through the use of data mining techniques. These techniques include measuring job satisfaction, performance efficiency, and employee creativity, ultimately enhancing the quality of interactions among employees. It also enhances the cognitive flexibility of employees in the workplace (Al-Busaidi, 2017).

Important factors that often negatively affect knowledge management practices

include the lack of measurable data-driven performance indicators and benefits (Mehrez et al., 2020).

Inadequate management support, planning, design, coordination, and evaluation, insufficient skills of managers and knowledge workers, organizational culture problems, inappropriate organizational structure, and the intangibility of data mining techniques are all factors that can potentially lead to the failure of investing in knowledge management to reduce employee absenteeism and improve their psychological well-being (Abeyrathna et al., 2020).

Knowledge management interventions should align with the realities of the organization and its capacity to address existing gaps in employee mental well-being. This should take into account the organization's health information requirements, which are determined by its mission and the composition of its workforce (e.g., physicians, trainers, managers).

Therefore, in order to create a knowledge-oriented and intelligent system, it is necessary to identify the status and infrastructure of knowledge management.

This process can also be performed using data mining techniques. Therefore, this research aims to answer the question: What are the knowledge management infrastructures that can reduce employee mental absenteeism using data mining techniques?

2. Literature Review

Knowledge is the key to creating value within an organization and empowering its human resources. By relying on knowledge management methods, organizations can maintain their competitive advantage (Lam et al., 2021). Deepening organizational knowledge through the use of data dashboards and employing data-driven approaches to address issues like employee mental absenteeism and fostering a healthy work environment is a widely adopted practice (Dalkir, 2011).

Modeling from leading organizations has shown the importance of knowledge and data-oriented approaches. Understanding the health status of an organization lies in understanding its recorded data. Collecting,

analyzing, and making correct decisions based on the performance status of employees stems from the application of knowledge management in the organization.

Data mining approaches not only improve debilitating conditions such as employees' mental absenteeism but also empower employees by fostering a culture of continuous learning within the organization (Scherer et al., 2019).

In a study entitled "Personality States Mediate the Effect of Mindfulness Intervention Based on Knowledge-Based Techniques on Employees' Work Outcomes: A Randomized Controlled Trial," the researchers found that compared to control groups, a knowledge-based mindfulness intervention (which involved registering mental states and suggesting knowledge-based solutions) resulted in a significant increase in daily awareness and employee satisfaction.

Wang et al. (2021) conducted a study titled "Employee Mindfulness Using Smart Factors and Its Effect on Creativity and Customer Satisfaction." They found that employing mindfulness techniques can enhance employees' creativity and innovation.

Shahbaz and Parker (2021) demonstrated in a study titled "Workplace Awareness" that the digitization of organizations has led to increased diversity and complexity. Conversely, intelligent data-driven procedures have enhanced the focus and quality of organizational processes.

Maghareh Abed et al. (2021) conducted an analysis titled "The Effectiveness of a Mindfulness-Based Stress Reduction Program in a Group Setting on Quality of Life and Job Stress." They found that the use of patient information dashboards was effective in reducing mental absenteeism and improving the quality of life for individuals.

Rezaei Menesh et (2021) conducted a study titled "Investigating the Role of Mindfulness (2021) investigating Work Environment: Innovative Work Behaviors, Quality role Relationships, and Work Success." The study found showed that utilization use of technological and data-oriented enhances increases organizational flexibility enhances of employees' mindfulness.

Therefore, high levels of employee mental absenteeism cause instability in human resources, chaos in the work environment, a decrease in employee morale, and ultimately a significant decline in the quality of services provided (Safian et al., 2021). This point presents a challenge and problem that the organization faced, which prompted the researcher to conduct the present research.

However, no research has been conducted on the identification of knowledge management infrastructures to reduce employee mental absenteeism based on data mining techniques in the Iran Tobacco Company. Human resources play a crucial role in this field. The success of organizations is not solely dependent on employees fulfilling their administrative duties as written and dictated. Organizations that lack a supportive environment and engaged employees are likely to face failure and bankruptcy.

Therefore, the most basic characteristic of a healthy organization is to prioritize knowledge and information.

Knowledge discovery and data mining are new, interdisciplinary, and growing fields that combine various disciplines such as databases, statistics, machine learning, visualization, artificial intelligence, pattern recognition, and other related fields. To extract valuable information and knowledge hidden in a large volume of data.

enhance organizational efficiency organization decrease employee mental absenteeism, six steps are based on Gupta's (2019) model, as illustrated shown in Figure 1.

The sequence of these steps flexible, flexible sometimes it is necessary to go going back to previous or take alternative free paths steps. needed. The arrows in the figure indicate the most important and recurring dependencies between the steps.

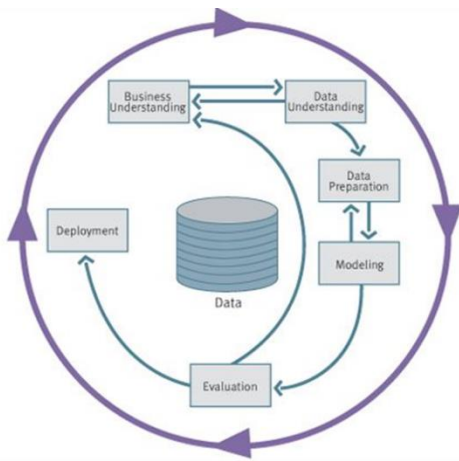


Figure 1. CRISP-DM process steps (Gupta, 2006)

Based on this model, this research is divided into two fundamental stages, each of which

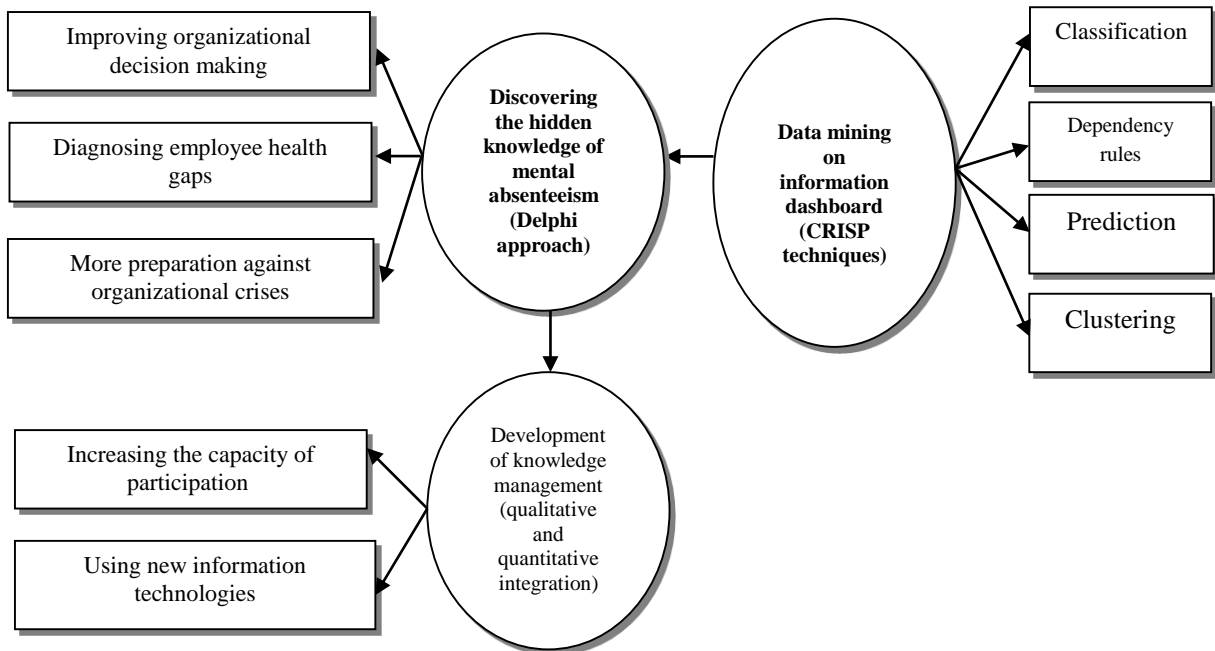


Figure 2. Conceptual model of research

3. Method

The mixed research method (qualitative-quantitative) has been conducted in two phases. The first phase was conducted using a qualitative-inductive approach, which involved the utilization of the Delphi method and a semi-structured interview tool. After the open coding process, 54 descriptive codes were extracted. In the second step, the extracted codes were grouped into a common axis and 13 axis codes based on their similarity and distinction. The sample to be interviewed consisted of 10 people selected using the purposeful sampling method. Additionally, a semi-structured, in-depth

interview with open-ended questions was conducted. All of these individuals were male and had over 15 years of work experience.

In the second phase, the quantitative research method used was data mining. In this study, factors contributing to absenteeism in the tobacco company were identified through interviews with managers, management elites, and individuals involved in absenteeism. Subsequently, a questionnaire was designed based on existing research literature and expert opinions. The questionnaire used in this study was created by the researchers, and participants were asked to respond to the questions using a five-

point Likert scale. The face, content, and construct validity of the instrument were confirmed, and its reliability was established using Cronbach's alpha. The statistical population studied in this research consisted of all the official and contractual employees of Iran Tobacco Company, totaling 681 people. From this population, a sample of 246 individuals was selected using the available sampling method. The data mining technique

is based on neural networks and decision trees in Rosetta and Weka software.

4. Findings

Based on the research objective of knowledge management infrastructures to reduce employee absenteeism, effective criteria have been identified and categorized. In this section, the fuzzy Delphi technique is used.

Table 1. Identification of knowledge management infrastructure factors in order to reduce absenteeism of employees

Components	Dimensions	Components	Dimensions
Organizational/management factors	Organizational strategy	Distractions	Individual factors
connections		tiredness	
Quality of working life	Job related strategy	exhaustion	Factors of group behavior
Job quality		Organizational citizenship behaviors	
Dimensions of workload and mindfulness	Career development strategy	Employee behaviors	Organizational factors
knowledge and skills		Lack of commitment and cooperation	
Increase psychological well-being	Individual results	Infrastructure	Environmental factors
Work and mental health		The principles governing our organization	
Effectiveness	Efficiency	organization`s performance	Environmental and physical substrate
Performance		Need for resources	
Improving the quality of interactions between employees	Group results Dimensions Organizational strategy	Workplace facilities and equipment	Individual factors
		Environmental factors	
		motivation	
		Skill	

The opinion of 10 experts about each indicator is shown in Table 2.

Table 2. Delphi survey in round one

Components	Expert 1	..	Expert 10
Distractions	(0.9, 1, 1)	..	(0.9, 1, 1)
tiredness	(0.75, 0.9, 1)	..	(0.9, 1, 1)
exhaustion	(0.9, 1, 1)	..	(0.9, 1, 1)
Organizational citizenship behaviors	(0.75, 0.9, 1)	..	(0.9, 1, 1)
Employee behaviors	(0.1, 0.3, 0.5)	..	(0.5, 0.75, 0.9)
Lack of commitment and cooperation	(0.9, 1, 1)	..	(0.9, 1, 1)
Infrastructure	(0.5, 0.75, 0.9)	..	(0.9, 1, 1)
The principles governing our organization	(0.9, 1, 1)	..	(0.9, 1, 1)
organization`s performance	(0.9, 1, 1)	..	(0.9, 1, 1)
Need for resources	(0.9, 1, 1)	..	(0.75, 0.9, 1)
Workplace facilities and equipment	(0.75, 0.9, 1)	..	(0.5, 0.75, 0.9)
Environmental factors	(0.9, 1, 1)	..	(0.75, 0.9, 1)

Components	Expert 1	..	Expert 10
motivation	(0.75, 0.9, 1)	..	(0.9, 1, 1)
Skill	(0.9, 1, 1)	..	(0.9, 1, 1)
Organizational/management factors	(0.75, 0.9, 1)		(0.9, 1, 1)
connections	(0.9, 1, 1)		(0.9, 1, 1)
Quality of working life	(0.9, 1, 1)	..	(0.9, 1, 1)
Job quality	(0.9, 1, 1)		(0.75, 0.9, 1)
Dimensions of workload and mindfulness	(0.75, 0.9, 1)		(0.75, 0.9, 1)
knowledge and skills	(0.75, 0.9, 1)		(0.5, 0.75, 0.9)
Increase psychological well-being	(0.75, 0.9, 1)		(0.9, 1, 1)
Work and mental health	(0.75, 0.9, 1)		(0.9, 1, 1)
Effectiveness	(0.9, 1, 1)		(0.9, 1, 1)
Performance	(0.9, 1, 1)	..	(0.9, 1, 1)
Improving the quality of interactions between employees	(0.9, 1, 1)		(0.75, 0.9, 1)

In order to de-fuzzify, the following formula was used:

$$\text{Crisp number} = Z * = \max(x_{max}^1, x_{max}^2, x_{max}^3)$$

The values do not differ much and are always close to M. Here, M represents the average result obtained by summing the

possible values of m from different triangular fuzzy numbers. However, the deterministic value of the largest calculation is considered. The result of defuzzification is shown in Table 3.

Table 3. definitive answer in the first round of Delphi

Operational definition	Component	Upper bound	Lower limit	Probable value	Final amount	Delphi final result
The number of repeated steps for the client	Distractions	0.977	0.771	0.917	0.977	Acceptance
Counting hourly holidays	tiredness	0.996	0.815	0.816	0.996	Acceptance
Resignation request	exhaustion	0.971	0.826	0.894	0.971	Acceptance
Recording customer feedback	Organizational citizenship behaviors	0.837	0.92	0.978	0.978	Acceptance
Number of group work and organizational participation	Employee behaviors	0.965	0.706	0.871	0.965	Acceptance
The number of cases of non-cooperation with employees	Lack of commitment and cooperation	0.977	0.788	0.923	0.977	Acceptance
The amount of information dashboard usage (data registration)	Infrastructure	0.89	0.844	0.798	0.89	Acceptance
The number of cases of disobedience to the organization	The principles governing our organization	0.898	0.796	0.756	0.898	Acceptance
Organizational process and goal matching report	organization`s performance	0.923	0.681	0.833	0.923	Acceptance
Assessing the needs of organizational financial and physical resources	Need for resources	0.996	0.833	0.956	0.996	Acceptance
Technology needs assessment and organizational intelligence	Workplace facilities and equipment	0.901	0.646	0.928	0.928	Acceptance
Examining the state of environmental competition	Environmental factors	0.997	0.887	0.927	0.997	Acceptance
Holding and participating in motivational meetings	motivation	0.953	0.734	0.725	0.953	Acceptance
Holding and participating in training sessions	Skill	0.923	0.759	0.897	0.923	Acceptance
Investigating organizational appreciation, financial encouragement	Organizational/management factors	0.965	0.81	0.871	0.965	Acceptance
The amount of communication media use	connections	0.925	0.956	0.865	0.956	Acceptance
Scoring based on the Likert scale	Quality of working life	0.977	0.911	0.923	0.977	Acceptance
Scoring based on the Likert scale	Job quality	0.867	0.621	0.769	0.867	Acceptance
Scoring based on the Likert scale	Dimensions of workload and mindfulness	0.925	0.706	0.85	0.925	Acceptance
Scoring based on the Likert scale	knowledge and skills	0.977	0.788	0.923	0.977	Acceptance
Scoring based on the Likert scale	Increase psychological well-being	0.867	0.621	0.769	0.867	Acceptance
Scoring based on the Likert scale	Work and mental health	0.767	0.838	0.958	0.958	Acceptance
Scoring based on the Likert scale	Effectiveness	0.969	0.868	0.898	0.969	Acceptance
Scoring based on the Likert scale	Performance	0.981	0.867	0.917	0.981	Acceptance
Scoring based on the Likert scale	Improving the quality of interactions between employees	0.996	0.977	0.967	0.996	Acceptance

Since all the final values are higher than 0.7, the Delphi technique is confirmed in one round. At this stage, the data mining technique has been performed based on the

obtained codes. At this stage, the following steps are followed. The details of these steps are given below.

- Data collection and selection
- Data integration

- Data cleaning (data reduction)
- Shaping and transforming data (modifying data)
- Data formatting (for modeling in the software)

In the previous stage, the target data was determined for collection and refinement. At this stage, the data related to the status of employees has been collected. This includes information on employee absences, delays, customer complaints, lack of group participation, and non-participation in in-service classes (educational and motivational).

In the continuation of the preparation process, two important operations, data reduction and data transformation, should be performed to clean and preprocess the data. In the first column of Table 3, the components involved in data mining techniques were identified in the operational definition. At this stage, the following steps are followed, and the details of each step are described below.

- Selection of modeling techniques
- Model making
- Model evaluation

For modeling, it is necessary to first choose the modeling technique. Considering that the purpose of this research is to apply various techniques to the data from the information system of the Tobacco Organization and analyze the results obtained from each technique, several data mining techniques were utilized. These techniques include clustering, dependency rules, decision tree, and generalized linear model. At first, each component was checked using Weka software. (See Figure 3).

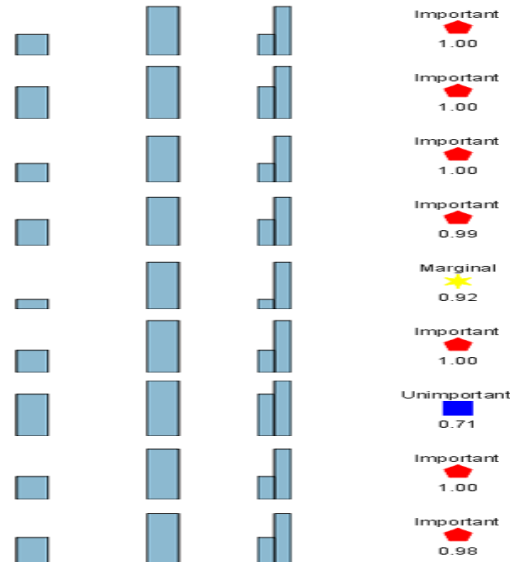


Figure 3. An example of checking the components in the software

In the following, based on the influence of the categorization, the state of absenteeism of the employees was determined.

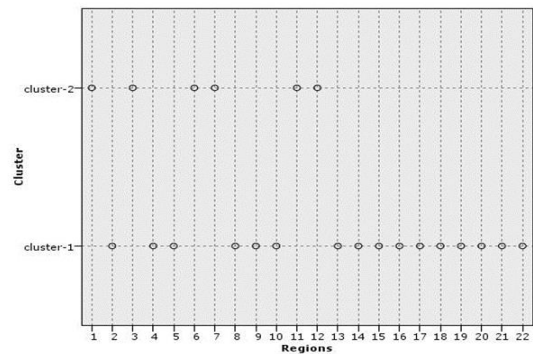


Figure 4. Primary classification of employees' status in terms of absenteeism

Results for output field CountOfCategoryName

Comparing \$G-CountOfCategoryName with CountOfCategoryName

'Partition'	Testing	Training
Minimum Error	-27.09	-23.389
Maximum Error	149.299	66.708
Mean Error	0.033	-0.021
Mean Absolute Error	3.457	3.345
Standard Deviation	7.56	5.654
Linear Correlation	0.539	0.551
Occurrences	2,848	4,414

Figure 5. Generalized linear model analysis

As mentioned, 40% of the data was used for testing, while the remaining 60% was used for model training. The minimum and maximum errors occurred in the separation of both groups. Due to the accuracy of the linear model and the impact of the components on the state of mental absence, the neural network technique was employed.

Analysis

Estimated accuracy: 97.741

Input Layer: 1 neurons

Hidden Layer 1: 19 neurons

Output Layer: 1 neurons

Build Settings

Use partitioned data: false

Calculate variable importance: true

Calculate raw propensity scores: false

Calculate adjusted propensity scores: false

Method: Multiple

Stop on: Default

Set random seed: false

Prevent overtraining: true

Sample %: 50.0

Optimize: Memory

Mode: Simple

Training Summary

Algorithm: Neural net

Model type: Approximation

Stream: C:\Stream1.str

As it is known, the accuracy of the fitted model is higher than 97%. This suggests that it performs better than the generalized linear model in terms of accuracy and prediction. However, it is important to note that neural network models are designed not only to identify the relationship between variables, but also to analyze indicators. Another one is not provided to assess the adequacy of the model. In order to obtain prediction results using this model, the desired information should be inputted into the neural network model. The output will then be displayed in the form of a table. In this section, similar to the evaluation of the generalized linear model, the neural network analysis tool has been utilized. The obtained results are as follows.

Results for output field CountOfCategoryName

Comparing \$N-CountOfCategoryName with CountOfCategoryName

Partition	Testing	Training
Minimum Error	-11	-11
Maximum Error	169	77
Mean Error	-0.234	-0.258
Mean Absolute Error	4.265	4.118
Standard Deviation	8.643	6.567
Linear Correlation	0.21	0.198
Occurrences	2,848	4,414

Figure 6. Neural network analysis

5. Discussion

The purpose of the current research was to identify the knowledge management infrastructure in order to reduce employee absenteeism using data mining techniques. After analyzing the interviews, we identified 13 general categories in the form of a paradigm. These categories include individual factors, group behavior factors, organizational factors, environmental factors, physical substrates, organizational strategies, job-related strategies, career development strategies, individual outcomes, effectiveness, and group results. The research process in the data mining technique has shown that implementing a knowledge management infrastructure improves the mental well-being of employees and reduces absenteeism. Considering the importance of employees' mindfulness, it is crucial to address the increasing stress levels in the work environment. High levels of stress can have negative consequences for employees, impacting their job performance and ability to adapt. By reducing stress, employees can enhance their readiness to perform job activities and duties optimally. There is a need to investigate the relationship between these variables among the employees of the Iran Tobacco Company. Also, distraction is a psychological phenomenon that has many implications. On the other hand, at the group level, it is more related to the study of leadership, power, norms, interpersonal communication, networks, and roles. An example of this scenario is a company that chooses to reward its employees for their exceptional efforts on a specific project. In some ways, this research is aligned with the findings of Nübold & Hülshager (2021), Maghareh Abid et al. (2021), Mirzaei Toosi et al. (2021), Bakhshi et al. (2018), Babamiri and Zemestani (2018), and Rajabpour (2020). Because they suggest strong links between job adaptability and important professional outcomes, such as increased work effectiveness and job performance, higher job satisfaction, reduced burnout and worry, improved job success, and enhanced quality of employment.

6. Conclusion

According to the research findings, it is suggested that managers in organizations should implement a salary and wage system that is sufficient to motivate employees. This approach will encourage individuals to perform their work to the best of their abilities. In addition, managers should consider providing appropriate spiritual and material rewards to employees who not only transfer knowledge but also generate the knowledge required by themselves or others in the organization. This will enhance the motivation of these valuable employees, as well as other members of the organization.

Also, the managers of this practice create shared moments that cultivate mutual respect and emotional connections among the organization, managers, and employees. In addition, motivators should consider the motivation of individuals in the motivational process. In the initial stage of the organization, it is important to implement a salary system that is sufficient to motivate employees.

It is important to consider both spiritual and material rewards for those who not only transfer knowledge but also produce the knowledge needed by themselves and others in the organization. These materials aim to increase the motivation of these valuable employees, as well as other employees. considered. Be taken.

Employees need to know that their managers appreciate their hard work. Giving well-deserved recognition not only increases self-esteem but also boosts enthusiasm and team morale.

Collaboration between teams within the company allows for the further development of ideas. Working with individuals who possess diverse skill sets will, in turn, lead to the generation of more innovative outcomes. In teams, there is power in numbers, and anyone experiencing a lack of motivation should be uplifted by the support of those around them.

It is also suggested that intelligent agents be implemented in organizational processes to improve the quality of organizational affairs. Smart technologies, such as artificial

intelligence and GPT chatbots, are becoming increasingly prevalent.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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