Designing the model for training-based empowerment in industrial research organizations

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Abstract

The purpose of this research is to identify and design a model for training empowerment in research and industrial centers.To achieve the purpose of the research, which prioritizes the components of empowerment based on staff training,2 questionnaires were distributed based on the proposed hierarchical model extracted through library study and interview.Data collected from questionnaires 1 and 2 were used to prioritize the components of empowerment based on staff training using the combination of DEMATEL and ANP techniques.In sum, the results show, the criteria for empowerment, perception of employer support, sense of belonging to the organization, need for autonomy in decision making, need for employee participation, Trust in subordinates, the need to acquire new knowledge and the atmosphere of collaboration and teamwork are highly influential..Also among these criteria, the need to increase productivity is the most important in prioritizing the components of training-based empowerment.

Keywords: Empowerment, Training-Based Empowerment, In-Service Training, Empowerment in Research and Industrial Organizations.

Introduction

One of the realities facing today's organizations is the complex and dynamic competitive marketplace that is rapidly changing and evolving thanks to technology. These changes can be economic, social, political, and especially technological science; and they always present threats or opportunities to organizations as they emerge. Obviously, the greater the dependency of companies on these changes, the more they are at risk, and to avoid such a threat they must always try to keep themselves updated. These include research centers that generate income and

wealth from science and technology, and therefore, if they want to survive in such a changing and competitive environment, they must continually stream knowledge in their organization. And move forward with the environment.

In the meantime, there is a powerful workforce that can act as a lever with its high productivity and turn it into a competitive advantage for the company by saving time and energy. What Arabi and Fayazi say about this issue is that human resources should help the company achieve value-added capital, products and services sooner than

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competitors. If human resources create this value in a timely manner, they share the company's competitive advantage(Bascomb, 2020).For Drucker, economic growth is also attributable to empowering educated workers. Investing in employee training is a vital investment that leads to intra-organizational improvement, employee skills development and organizational success. Therefore, to succeed in a competitive environment in a country, empowering knowledge capital is essential(Dwivedi, Chaturvedi, & Vashist, 2020; Low, 2016).

Having a model in this regard helps us to empower our employees in a purposeful, orderly, systematic, orderly manner, taking into account the pros and cons of the important things in the process(Deane, 2019; Zahedi & Khanachah, 2020). It should be noted that research centers are not only exempt from this, but they are also more necessary to benefit from such a framework, because knowledge of the day in these companies is the engine of economic stimulus, and neglecting it, or making a mistake. In the process of transferring it to employees, it can eliminate the company from the competitive wheel(Alcaraz et al., 2020).

The purpose of this research is to identify and provide a framework for training empowerment in research and industrial centers, so that managers can timely identify, measure and provide appropriate training programs for their employees. Ensure that resources are appropriately allocated and that employees are able to achieve the desired capabilities at the right time.

Empowerment

Empowerment has many meanings and definitions that have been taken into consideration by talented individuals in their studies, approaches and characteristics. Most experts believe that there is no comprehensive definition of empowerment that can cover all its dimension(Appelbaum, Karasek, Lapointe, & Quelch, 2015). According to Melkote and Steeves(2015) Empowerment in the disciplines of psychology, sociology, and theology has its roots that go back to decades or even centuries. In the field of management, the term "empowerment" was not mentioned in classical thought, the increase in productivity, mass production, the use of methods and tools to increase production were considered, and there was also an instrumental view of man. After the human relations movement, issues such as job satisfaction, job enrichment, and democratic leadership were raised, and staff relations, teamwork, and collective practice were considered. This concept has been the focus of many researchers in the 1990s, as it can have very good results for employees; for example, empowerment results can increase employee satisfaction, increase organizational commitment, And increased customer satisfaction noted (Namasivayam et al, 2014; Putra & Rahyuda, 2019; Acharya & Siddiq, 2020).

What is Empowerment?

As mentioned, there are many definitions of empowerment in different areas. The commonality among all these definitions is that empowerment is a process rather than a goal and its application to people who have little power for various reasons. In addition, aspects such as power sharing, participatory management, and job enrichment are also common in many of the definitions provided(Feerrar, 2019; Sugri, 2020).

The importance of empowerment

In highly competitive markets, empowering employees to stay competitive, productive, and gain lasting competitive edge over other competitors is crucial. It is believed that employees should be given the opportunity to showcase their abilities because by empowering them the organization can provide a work environment that impacts their commitment. The commitment of its employees enables the organization to survive, grow its business, stand up to its competitors, and face the challenges ahead(Laverack, 2019). Many organizations use empowerment to motivate employees, allowing them to make the right decisions when needed and use their skills and knowledge to respond to changing circumstances (Henao-Zapata & Peiro, 2018). Therefore, managers should use empowerment activities to increase the efficiency of the organization.

Facilitators and Barriers to Empowerment in Organizations

Employee empowerment can be implemented at various levels; Sharman et al.(2020) As saying that the empowerment spectrum can range from "false or false empowerment" where low levels of empowerment are adopted to "high levels" of empowerment. Transfer of autonomy and responsibility "where there is a high level of empowerment is varied. But what are the factors that make empowerment levels different in different organizations? These factors can be grouped into three groups: employee-related factors, employer-related factors, and organizational-related factors. It should be noted that most of the time, the relevant factors fall into the third category, that is, the factors related to the organization, such as organizational culture, organization size, and hierarchy(Sharman et al., 2020; Hung, Martinez, Yakir, & Gray, 2015). Each of these factors can have a positive or negative impact on empowerment performance in an organization that on a large scale can even lead to the failure or victory of empowerment programs in organizations(Ihm & Lee, 2020).

Obstacles to empowerment

Contrary to the many benefits stated for empowerment, there is evidence that empowerment sometimes does not

work as expected. Many researchers have acknowledged that the integration of employees into organizations is dependent on the environment they support and the organizational culture that has the supportive agents and strategies of empowerment. Some of the barriers that can undermine the empowerment process in organizations include lack of management support for empowerment and distrust of subordinates, employee perceptions that empowerment policies are related to power adjustment, and creating inappropriate competitive environment between teams(Saremi, 2015; M Rezaul Islam & William J Morgan, 2012).

- Subordinate mistrust: Argyris states that empowerment sometimes remains superficial and rhetorical, and that it is still the managers who control and make decisions, which is why management distrusts employees in doing the right thing. Tasks are assigned(Jemielniak, 2012). Therefore Managers should be careful not to get caught in such a trap and trust their subordinates.
- Organizational Hierarchy: As the issue of empowerment revolves around subordinate authority and responsibility, and seeks their independence, it is clear that the greater the organizational hierarchy, the weaker the autonomy of employees in decision making(Eisenberg, 2017). It weakens the issue of empowerment. Accuracy suggests that empowerment is moving from a hierarchical decision-making system to managers, to a reduced hierarchy of control, and lower-level decision-making. The main purpose of empowerment is to reduce the traditional bureaucratic hierarchy (Sharma & Kirkman, 2015; Liszt, 2008). It can therefore be said that there is a negative relationship between empowerment and organizational hierarchy.
- Innovation: Innovation is a factor that researchers have yet to discover its exact relationship with empowerment. Some research, such as Baird and Wong's research, suggests a negative relationship between innovation and empowerment. Applebaum also argues that empowerment needs to be minimized in order to best implement empowerment. Whereas others, such as Choi et al (2016) showed a positive and direct relationship between these two variables(Choi, Goh, Adam, & Tan, 2016).

Benefits of Empowerment

Empowerment has very good effects on the organization(Hanaysha, 2016). The most important of these can be the reinforcement of desirable behaviors and characteristics such as job satisfaction, organizational commitment, loyalty to the organization, employee effectiveness and motivation. (Spritzer, 1995; Kirkman & Rosen, 1999; Koberg et al., 1999; Agburu & Abeng, 2000; Lachinger et al., 2001; Seibert et al., 2004) It should be noted, as Plate also stated, that mere authorization for It is not enough to ensure its benefits, as there are many other key variables, including employee motivation, access to education, communication and trust between supervisors and subordinates, Leadership model, the amount of feedback received by subordinates and etc (Schein, 2010).

Various behaviors are considered as impacts of empowerment, including promotion of organizational commitment, greater job satisfaction, and greater job participation(Seibert, Wang, & Courtright, 2011). Employee empowerment emphasizes that employee presence in the organization is very valuable and it can lead to commitment and job satisfaction. Hanaysha and Tahir (2016) showed that empowered employees had higher levels of job satisfaction, organizational loyalty, and motivation. In addition, Kirkman and Rosen also acknowledged that empowered employees with independence in decision making are often more satisfied with their job, and committed to their team and organization(Hanaysha, 2016).

Randolph's model of empowerment

Randolph identified three key factors in the successful implementation of empowerment in organizations:
Sharing or sharing information, enjoying appropriate independence through structure, replacing hierarchies with work teams.

Matthews et al model of empowerment

Matthews et al (2016) approach to empowerment is a motivational approach. In a three-stage survey, they found that three important organizational factors are involved in facilitating empowerment: the flexible organizational structure framework, control of workplace decisions, and information sharing. Flexible organizational structure framework When the organizational decision-making process is clearly defined by the guidelines issued by the organization. Workplace decision control occurs when employees are allowed to make decisions about all aspects of their professional career. And ultimately, sharing information or floating in information is achieved when all employees can access all the information about the organization (Matthews et al., 2016).

Ideal Nuller model

Khasanah and Astuti (2018) presented a 4-D model of empowerment. He views this model as ideal and states that we speak of empowering the individual or group of people to a certain degree of success while having the following conditions: People have full decision-making power, the responsibility to execute any decision Have full access to decision-making and implementation tools, and ultimately

have full responsibility for accepting the consequences of any decisions madel(Khasanah & Astuti, 2018).

Conger and Kanungo model of empowerment

Conger and Kanungo consider the empowerment process to include five essential steps. These 5 steps are as follows. The first step is to identify situations that make employees feel powerless and powerless. This step leads to the use of strategies to eliminate these situations by managers in the second step. Since resolving inappropriate conditions alone is not enough, step three is more important, providing employees with self-efficacy information. It means giving them information about the effectiveness of subordinates. This makes employees feel empowered, which is the fourth step. Finally, employees' internal feeling of empowerment leads to empowerment behaviors(Barnes, 2006).

The Thomas and Vothus model of empowerment

According to Kincheloe (2012) empowerment is not a long-term personality trait that manifests itself in different situations, but there are insights that lie within the context and context of the work. Empowerment reflects each employee's knowledge and understanding of himself or herself. They believe that empowerment is not just about evaluating employees 'tasks, but also on contextual factors such as employees' relationships with their supervisors, friends and subordinates. In a more sophisticated cognitive model, they defined empowerment as the motivation for internal tasks. The concept is expanded in three ways(Jarvis, 2015; Kincheloe, 2012):

1. Thomas and Walthus have defined it as the motivation for internal tasks rather than as Kangaroo and Kungo as empowerment in general.
2. Introducing a sense of self-efficacy as the only driver of empowerment, which involves evaluating three tasks.
3. By applying an interpretive style that employees can help them to evaluate their tasks (mentioned above).

Mishra's model of empowerment

Mishra's (1992) studies also added the "trust" dimension to the above dimensions, and five psychological dimensions of empowerment emerged that are of great use today. Trust (trust and security) means being confident that the power holders will not only hurt but also support them as a result of their jobs. Support and trust means (feeling secure). These people tend to get along with others, be honest, listen to others, resist change, and adhere to ethical standards. By the way, these people spend less on self-preservation and less on game politics(Searle, Weibel, & Den Hartog, 2011).

The Spritzer Model of Psychological Empowerment

According to Spritzer (2006) able-bodied employees are competent and influential people at work and the work environment and are likely to anticipate and handle their own responsibilities and problems independently. In his model empowerment, not as a process, but as one that is influenced by environmental, organizational, and individual factors on the one hand, and on the other, can act as a factor affecting organizational effectiveness, efficiency, and creativity, Looks. From this point of view, empowerment has an organizational function that, under the influence of community culture, can enhance the efficiency and effectiveness of the organization. He expanded the concept of empowerment from the perspective of Thomas and Volthus, and devised four mechanisms for evaluating the tasks of measuring scales(Abrahams, Spitzer, Szwed, & Thompson, 2006). In addition, he added further descriptions of the definitions of these four dimensions. He argues that these four parts are not separate, and the absence of any of these four dimensions undermines the accuracy of our overall experience of empowerment. For example, if an employee believes they have the skills needed for their job (later competence) but cannot influence the outputs (impact dimension), they feel a sense of individual empowerment(Ahmadi, Daraei, Khodaie, & Salamzadeh, 2012).

In line with the relationship between different dimensions of task evaluation and psychological empowerment, Zhang and Bartol (2010) studies showed that a company that, through its employee promotion programs, improved the four dimensions mentioned above, subsequently, on its employees' view of empowerment, Make a positive impact(Zhang & Bartol, 2010).

Cyboran's model of empowerment

In 2005, Cyboran attempted to recreate Spritzer's personal empowerment model with a new approach to psychological empowerment and presented a socio-structural model. To do this, he adds a new dimension to the model called personal reflection or reaction. Individual reaction means the examination and cognitive testing of experiences. This new dimension actually seeks to establish a link between the socio-structural dimension of the model and the psychological state of empowerment. Cybouran states that emotion in individuals depends on their response, and individuals' responses can be used to modify socio-structural goals (such as access to organizational resources, culture, etc.), and thus affect their emotion. . In his research, it was found that people who reacted to themselves could maintain or even improve the overall level of empowerment of the organization in times of danger(Appelbaum, Karasek, Lapointe, & Quelch, 2014).

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What is Education?

Training is a learning-based experience designed to bring about lasting change in the individual so that they can improve their abilities by doing the work (Marsick & Walkins, 2015).

Armstrong also defines education as a process designed to change people's knowledge, attitude, or skills through learning. This is done to achieve efficient performance in an activity or range of activities(Armstrong & Taylor, 2020).

Necessity of education

Mariam et al (2005) also argue that changes in the three areas make the problem of training in organizations inevitable, namely(Haile-Mariam, Koffenberger, McConnell, & Widamayer, 2005):

1. Demographic changes: One of the key demographic elements is the age problem. The aging of the population increases the demand for adult quality education. On the other hand, the rapid growth of cultural and ethnic diversity in countries is another variable demographic element. For example, most countries see the internal displacement of labor from one city to another, as well as their relocation to other countries. To make quick use of these valuable resources, employers must provide specific training to help these people prepare to work in the community.
2. Economic change: The disappearance of the constraints caused by geographical boundaries has brought different nations closer together. This has also made the field of economic competition go beyond national and local levels, and has expanded into a wider and wider global scope. Obviously, global competition needs to keep up with the changing world, and so companies around the world have to embrace the issue of training their employees and even pay subsidies to be able to compete and Increase the chances of survival in the global economy.
3. Technological changes: Advances in technology are among the factors that have facilitated the process of doing business, making organizations want to train their personnel to use the technology of the world. The direct consequence of technological advances has been to make learning a lifelong problem. Not only is it necessary to keep pace with this progress, but also to provide the opportunity for employees to not lose their jobs due to technological advances(Udedibia, 2020).

It has to be Shaner (2019) highlights in service tips in some countries as follows:

- In the United Kingdom, in-service training was seriously considered in the mid-20th century, but before that and in the 19th century there was an organization called Organized Teachers; however, in 1944 it was the first in-service training. Employee service was organized in an orderly manner(Rottmann, 2011).
- In France, in-service training in 1946 was considered. This year an institute called "Institute of Administrative Affairs" was established to handle the preparation, compilation and implementation of training programs at the level of government agencies. The main purpose of the institute was to improve the quality of government services and to reform it (Yun, 2008).
- In the United States, in-service training since 1949 has received special attention. Especially in the second half of the twentieth century, there was increasing development. To this credit in education in the 1960s, a large part of the workforce was covered by in-service training(Warner, 2016).
- In China, in-service education also has a long history and began in 1979 when the State Economic Commission formed the Beijing Training Center. These trainings were intended to provide educational services to government employees(Warner, 2016).

Method

The purpose of this study is applied research. And since descriptive research can characterize the community under study through survey, the present study is a descriptive survey. On the one hand, as the study present in the real life situation of an organization, the result of this research is in the field of field studies.

In order to identify the variables of this research, the criteria and sub-criteria affecting staff empowerment were selected using semi-structured interviews. The main criteria are employee-related criteria, common criteria between employees and employers, employer-specific criteria, job-related criteria, and organization-specific criteria. The table (1) shows the set of criteria and sub-criteria obtained from the research literature.

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Table 1: Criteria and sub-criteria selected

dependent variable	independent variables	
	CRITERION	Sub-criteria
Empowering employees	Employee Criteria	Feel the employees belong to the organization
		Get a sense of support from the employer by the employee
	Common between employee and employer	The need for independence in decision making
		Need to speed up tasks
		Need to increase productivity
	Client related	Need for delegation
		Trust in subordinates
		Employee participation required
	Job related	The rapid emergence of new tools and techniques
		Need to get new knowledge
		Requires rapid reaction to the environment
	Organization related	Have clear administrative instructions
		Need to respond quickly and eliminate administrative bureaucracies
		The atmosphere of cooperation and teamwork

This research has two statistical populations. The first community is related to the qualitative sector where experts were interviewed and important empowerment indicators were identified and evaluated. This community is comprised of knowledgeable areas of knowledge management and intellectual capital and education.

The second statistical population of this study is the knowledge capital of the study (one of the industrial, research organizations). This community was used to determine the priority and importance of sub-criteria relative to each other and to determine their weight. The sampling used in this study was in the first population of theoretical or judgmental sampling (of the purposeful sampling type),

meaning that we collected information only from people who were able to provide useful information, because they There are only those who can provide this information to the researcher. In the second population, individuals were selected from among the limited statistical population.

Hierarchical Model of Research

Since the purpose of this study was to identify and prioritize the effective factors on staff-based empowerment and provide a related framework, these factors were extracted and selected using library studies and expert opinion. The hierarchical model obtained is shown in figure (1).

Figure 1: Hierarchical Model of Empowerment Components Based on Staff Training

To achieve the purpose of the research, which prioritizes the components of empowerment based on staff training, 2 questionnaires were distributed based on the proposed hierarchical model extracted through library study and interview. The first questionnaire, designed based on DEMATEL technique, was distributed among 13 experts and managers of the study. The purpose of this study was to identify the relationships between the extracted criteria and network design. The second questionnaire was distributed among 8 experts and managers in order to extract the paired comparisons matrix. Data collected from questionnaires 1 and 2 were used to prioritize the components of empowerment based on staff training using the combination of DEMATEL and ANP techniques.

Network Modeling of Research and Prioritization of Components

The model of prioritizing the components of empowerment based on staff training in Super disicion software is shown in figure (2).
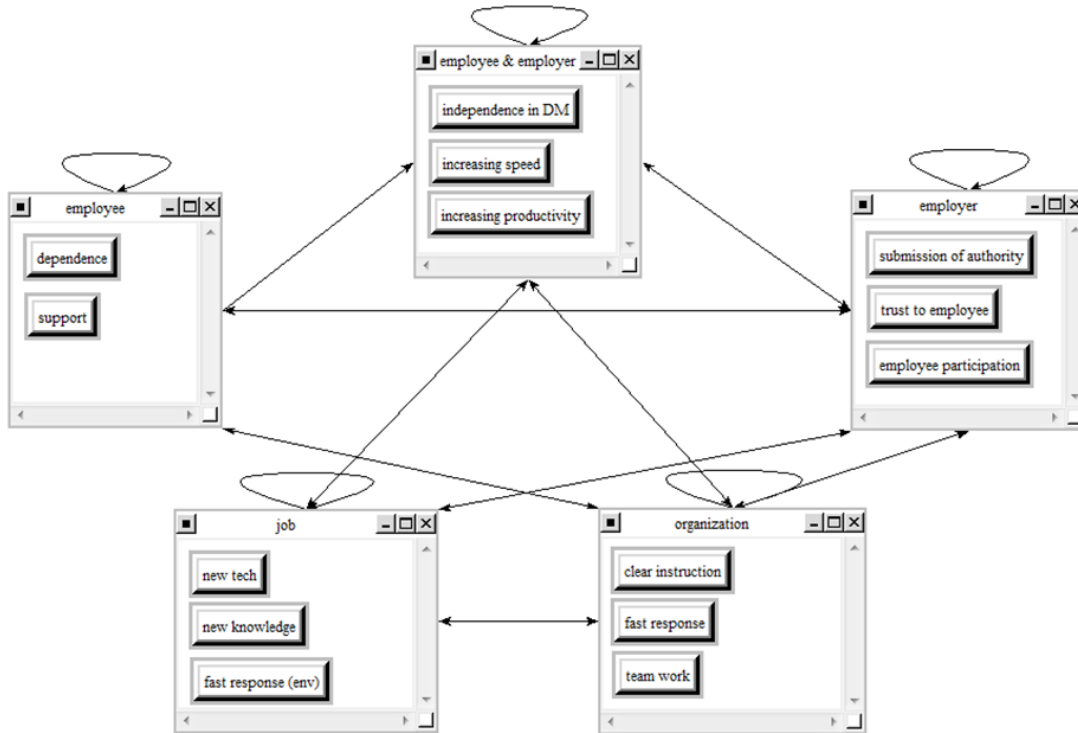

Figure 2: Network Model of Employee Training-Based Empowerment Components

We used the DEMATEL technique to obtain the internal relationships between employee empowerment criteria. So, first we'll start with the findings of the DEMATEL technique. Then, using the internal relations matrix of this technique and the matrix of paired comparisons, we will rank the empowerment components based on employee training.

DEMATEL Technique Findings

Questionnaire number (1) was designed based on DEMATEL technique and distributed among the respondents. Table (2) shows the average expert opinion on the impact of each of the criteria in the row on the criteria in the column.
It should be noted that for ease of writing in some tables and matrices instead of the full sub-criterion, equivalent abbreviations are used.

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Table 2: Direct Relation Matrix

E3	E2	E1	D3	D2	D1	C3	C2	C1	B3	B2	B1	A2	A1	
3.154	0.231	0.077	0.231	0.077	0.308	0.077	3.000	0.308	3.000	2.923	3.077	3.077	0.000	A1
2.154	0.154	0.077	0.077	0.154	0.077	2.077	1.231	3.000	1.154	1.000	1.000	0.000	3.154	A2
1.077	2.000	2.000	2.077	1.923	0.077	2.154	1.154	2.000	2.000	1.923	0.000	1.923	1.154	B1
1.077	2.846	2.923	1.154	1.923	2.077	2.077	2.000	1.923	3.077	0.000	1.154	0.077	0.077	B2
2.077	3.077	2.846	2.077	2.000	0.154	2.923	2.846	2.846	0.000	3.000	1.923	0.077	0.154	B3
2.000	1.000	1.923	1.000	1.846	1.154	2.154	2.154	0.000	2.923	1.923	2.923	3.000	3.000	C1
2.077	0.077	1.077	1.000	1.000	1.923	2.231	0.000	2.923	1.000	1.000	2.846	3.077	3.231	C2
2.154	1.000	1.923	1.000	1.000	0.077	0.000	3.077	2.923	3.000	2.846	1.923	2.154	2.077	C3
0.077	0.154	0.077	1.077	2.846	0.000	1.923	0.077	0.077	2.077	2.154	0.077	0.077	0.077	D1
1.000	0.077	0.077	1.077	0.000	3.077	2.000	0.077	0.077	2.154	2.077	0.077	0.077	0.231	D2
1.154	3.231	3.000	0.000	2.846	3.000	2.077	1.000	2.846	1.231	2.077	0.154	0.154	0.077	D3
1.000	0.308	0.000	0.077	0.077	0.077	1.923	1.077	3.077	1.923	2.077	0.077	0.154	0.154	E1
0.077	0.000	2.077	2.154	1.923	1.923	0.231	0.154	0.154	2.154	2.000	0.077	0.077	0.077	E2
0.000	0.077	1.923	1.000	1.923	0.154	2.923	3.077	2.846	2.000	1.923	1.000	2.154	3.154	E3

We use formulas (1) and (2) to normalize the matrix above.

Formula (1):

$$H_{ij} = \frac{z_{ij}}{r}$$

$$r = rmax_{1 \le i \le n}\left(\sum_{j=1}^{n} z_{ij}\right)$$

Table (3) shows the normalized matrix.

Where r is obtained from relation (2):

Formula (2):

Table 3: Normal matrix

E3	E2	E1	D3	D2	D1	C3	C2	C1	B3	B2	B1	A2	A1	
0.117	0.009	0.003	0.009	0.003	0.011	0.003	0.111	0.011	0.111	0.108	0.114	0.114	0.000	A1
0.080	0.006	0.003	0.003	0.006	0.003	0.077	0.046	0.111	0.043	0.037	0.037	0.000	0.117	A2
0.040	0.074	0.074	0.077	0.071	0.003	0.080	0.043	0.074	0.074	0.071	0.000	0.071	0.043	B1
0.040	0.105	0.108	0.043	0.071	0.077	0.077	0.074	0.071	0.114	0.000	0.043	0.003	0.003	B2
0.077	0.114	0.105	0.077	0.074	0.006	0.108	0.105	0.105	0.000	0.111	0.071	0.003	0.006	B3
0.074	0.037	0.071	0.037	0.068	0.043	0.080	0.080	0.000	0.108	0.071	0.108	0.111	0.111	C1
0.077	0.003	0.040	0.037	0.037	0.071	0.083	0.000	0.108	0.037	0.037	0.105	0.114	0.120	C2
0.080	0.037	0.071	0.037	0.037	0.003	0.000	0.114	0.108	0.111	0.105	0.071	0.080	0.077	C3
0.003	0.006	0.003	0.040	0.105	0.000	0.071	0.003	0.003	0.077	0.080	0.003	0.003	0.003	D1
0.037	0.003	0.003	0.040	0.000	0.114	0.074	0.003	0.003	0.080	0.077	0.003	0.003	0.009	D2
0.043	0.120	0.111	0.000	0.105	0.111	0.077	0.037	0.105	0.046	0.077	0.006	0.006	0.003	D3
0.037	0.011	0.000	0.003	0.003	0.003	0.071	0.040	0.114	0.071	0.077	0.003	0.006	0.006	E1
0.003	0.000	0.077	0.080	0.071	0.071	0.009	0.006	0.006	0.080	0.074	0.003	0.003	0.003	E2
0.000	0.003	0.071	0.037	0.071	0.006	0.108	0.114	0.105	0.074	0.071	0.037	0.080	0.117	E3

After calculating the above matrices, the matrix of the total relations is obtained according to formula (3).
Formula (3):

$$T = \lim_{k \to +\infty} (H^1 + H^2 + \cdots + H^k) = H \times (I - H)^{-1}$$

In this formula, the matrix I is the same. The results of the calculation of the T matrix are shown in Table (4)

Table 4: Total Relationship Matrix (T)

E3	E2	E1	D3	D2	D1	C3	C2	C1	B3	B2	B1	A2	A1	
0.284	0.141	0.186	0.133	0.165	0.120	0.226	0.303	0.244	0.333	0.321	0.267	0.259	0.162	A1
0.228	0.109	0.150	0.102	0.135	0.090	0.247	0.217	0.288	0.241	0.225	0.179	0.140	0.249	A2
0.212	0.206	0.257	0.198	0.233	0.126	0.293	0.236	0.297	0.311	0.299	0.154	0.210	0.190	B1
0.205	0.235	0.290	0.172	0.240	0.197	0.294	0.260	0.291	0.348	0.236	0.191	0.141	0.146	B2
0.277	0.271	0.331	0.228	0.275	0.159	0.367	0.333	0.374	0.295	0.383	0.253	0.180	0.188	B3
0.294	0.201	0.294	0.191	0.268	0.183	0.350	0.326	0.287	0.402	0.358	0.302	0.294	0.299	C1
0.275	0.145	0.234	0.170	0.216	0.189	0.321	0.226	0.352	0.307	0.294	0.282	0.286	0.295	C2
0.294	0.199	0.294	0.188	0.235	0.146	0.271	0.353	0.384	0.397	0.379	0.269	0.264	0.268	C3
0.088	0.082	0.101	0.105	0.189	0.070	0.181	0.101	0.115	0.197	0.196	0.076	0.065	0.067	D1
0.129	0.086	0.112	0.112	0.104	0.178	0.198	0.115	0.129	0.214	0.208	0.086	0.076	0.084	D2
0.199	0.240	0.284	0.125	0.269	0.231	0.286	0.216	0.308	0.284	0.301	0.147	0.135	0.138	D3
0.152	0.101	0.126	0.085	0.112	0.078	0.212	0.174	0.258	0.227	0.223	0.114	0.107	0.111	E1
0.092	0.083	0.180	0.148	0.169	0.145	0.135	0.107	0.129	0.209	0.202	0.077	0.065	0.067	E2
0.217	0.155	0.278	0.177	0.253	0.141	0.357	0.346	0.368	0.354	0.339	0.234	0.263	0.301	E3

The next step is to obtain the sum of the rows and columns of the T matrix. J and R are matrices n×1 and 1×n, respectively. The next step is to determine the importance of R + J indices and the relationship between R-J criteria. If R-J> 0 the relevant criterion is effective and if R-J <0 is the relevant criterion. Table (5) shows these values.

Table 5: Gaining Importance and Influencing Criteria

	Criterion	$R + J$	$R - J$
A1	Feel the employees belong to the organization	5.709292	0.577801
A2	Get a sense of employer support	5.083526	0.116021
B1	The need for independence in decision making	5.851364	0.589686
B2	Need to increase speed in performing assigned tasks	7.210137	-0.72088
B3	Need to increase productivity	8.033818	-0.20425
C1	Need for delegation	7.873079	0.226732
C2	Trust in subordinates	6.900755	0.279998
C3	Employee involvement required	7.678899	0.203624
D1	The rapid emergence of new tools and techniques	3.685821	-0.42003
D2	Need to get new knowledge	4.692654	-1.03317
D3	Need to respond quickly	5.295614	1.030242
E1	Have clear instructions	5.197995	-1.0384
E2	Need to respond quickly and remove administrative bureaucracy	4.063304	-0.44446
E3	The atmosphere of cooperation and teamwork	6.727632	0.837082

Figure (3) shows the importance and effectiveness of the measures between the criteria. The horizontal axis of the chart shows the importance of the criteria and the vertical axis of the impact or influence of the criteria.
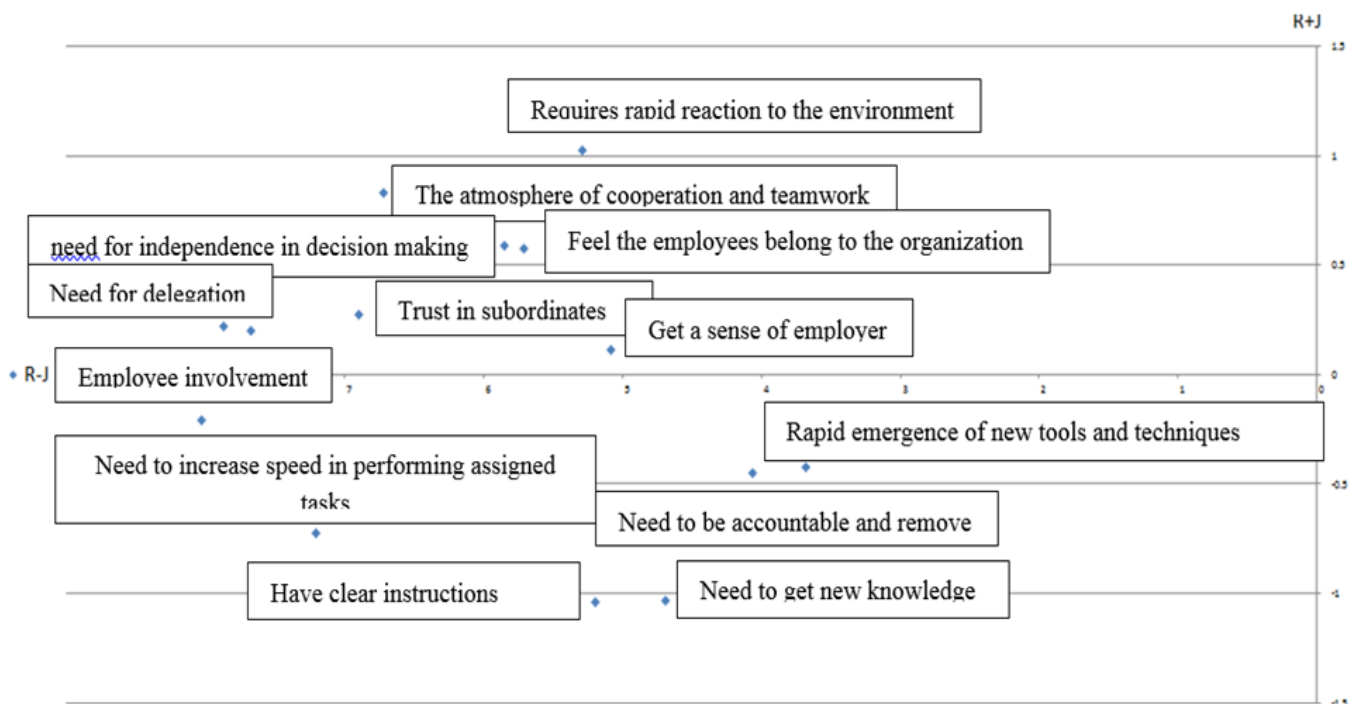
Figure 3: Causes and effects relationships of the criteria

As the results of figure (3) show, the criteria for delegating authority, receiving employer support, feeling employees belong to the organization, needing autonomy in decision making, need for employee involvement, trust in subordinates, need for new knowledge and atmosphere Collaboration and teamwork are on the positive side of the causal diagram. As a result, they are highly influential. The other six criteria are the rapid emergence of new tools and techniques, the need to acquire new knowledge, the need to speed up the execution of tasks, to have clear instructions, the need to increase productivity, and the need to respond quickly and eliminate bureaucracy in the negative. There are charts showing the high impact of these factors.

Prioritize training-based empowerment components with ANP techniques

Prioritize the components of empowerment based on employee training using the ANP technique. The ANP process has four main steps:

Step 1, Model building and model building: The problem should be clearly stated and broken down into a reasonable system as a network. Structure can be achieved by the opinions of decision makers. Based on the research literature and similar studies and expert opinion polls, the research model was formulated as follows.

Step 2, Pairwise Comparison Matrices and Priority Vectors: In ANP and AHP, the decision elements in each combination are compared in terms of their importance with

the control criteria and in pairs as well as in terms of their contribution to goal access. Decision makers are asked a set of comparisons in which two elements or two components at a time will be compared in terms of how they contribute to their specific criteria. In addition, if there is an intrinsic relationship between the elements of a component, pairwise comparisons should be used, and a special vector can be obtained for each element indicating its influence on the other elements. Relative significance values are determined by a scale of 1 to 9, in which score 1 indicates the same importance between two elements and score 9 indicates the extreme importance of the element in comparison (matrix row) with another element (matrix column). The reciprocal is assigned to the inverse comparison, where () indicates the importance of the i-th (j-th) element in comparison to the j-th (i-th) element. Pair comparisons in the ANP are similar to the AHP within a matrix. In this study, because multiple decision makers have been used instead of one decision maker, pairwise comparisons have been used in geometric mean group decision making by experts and decision makers.

Super Decisions software was used to calculate the incompatibility rate. Due to the use of the questionnaire completion guide on the one hand and the presence of the researcher when completing the questionnaire and providing the necessary explanations, all matrices had acceptable inconsistency rates (less than 0.1) if needed. It should be noted that the pairwise comparisons required after the network design were extracted from the super decision software.

Step 3, Formation of Supermatrix: The concept of Supermatrix is similar to the Markov chain process. To

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obtain the final priorities in a system affected by intrinsic dependence, local priority vectors are proportionally inserted into the matrix columns, known as supermatrices. First the supermatrix is changed to become a possible supermatrix, meaning that the sum of each column of the matrix is unified. The approach proposed by Hourly (1996) deals with the relative importance of clusters in the supermatrix with the cluster (block) as the controlling component. That is, the nonzero rows in their block in a column block are compared based on their effects on those column blocks. A special vector can be obtained by using the pairwise comparisons matrix of rows with corresponding columns. This process is performed to obtain the vector specificity of each column block. For each column block, the first special vector inserted in all the first blocks of the same block is multiplied, the second special vector is multiplied across all blocks of that column, and this continues until the end. The body through the blocks in the column of each supermatrix is weighted, and thus is called the weighted supermatrix that is probable. Having a matrix for each layer will have a relative long-term impact. To achieve the convergence of relative weights, the supermatrix is powered to 2k + 1, which is a large arbitrary k, and this new matrix is called the supermatrix boundary. The supermatrix boundary has the same shape as the supermatrix weight, but all the supermatrix columns are the same.

Table 6: Weighted super matrix table

	A1	A2	B1	B2	B3	C1	C2	C3	D1	D2	D3	E1	E2	E3
A1	0.00000	0.08681	0.00000	0.00000	0.00000	0.07595	0.07598	0.07491	0.00000	0.00000	0.00000	0.00000	0.00000	0.09964
A2	0.08681	0.00000	0.00000	0.00000	0.00000	0.05851	0.05849	0.05955	0.00000	0.00000	0.00000	0.00000	0.00000	0.03976
B1	0.35155	0.43104	0.27305	0.34278	0.34278	0.11684	0.05820	0.05117	0.15136	0.00000	0.00000	0.52525	0.00000	0.27496
B2	0.05024	0.08057	0.04540	0.07634	0.07634	0.09814	0.08119	0.08728	0.27578	0.00000	0.00000	0.21205	0.00000	0.08119
B3	0.10981	0.00000	0.10068	0.00000	0.00000	0.03768	0.11327	0.11421	0.00000	0.00000	0.00000	0.00000	0.00000	0.04157
C1	0.04616	0.04054	0.10219	0.11781	0.12186	0.04952	0.03649	0.04595	0.04078	0.00000	0.00000	0.00000	0.00000	0.08444
C2	0.03104	0.03560	0.08685	0.10828	0.11575	0.03749	0.04939	0.06759	0.03139	0.00000	0.00000	0.26269	0.00000	0.02751
C3	0.04100	0.04206	0.13436	0.09731	0.08579	0.05103	0.05216	0.02449	0.03139	0.00000	0.00000	0.00000	0.00000	0.02974
D1	0.00000	0.00000	0.03795	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
D2	0.00000	0.00000	0.02742	0.06537	0.06537	0.07248	0.07248	0.07248	0.12183	0.00000	0.00000	0.00000	0.00000	0.06550
D3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.12508	0.00000	0.00000	0.00000	0.00000	0.00000
E1	0.00000	0.00000	0.03811	0.09479	0.19211	0.07327	0.11841	0.12464	0.10657	0.00000	0.00000	0.00000	0.00000	0.05942
E2	0.00000	0.00000	0.09697	0.09732	0.00000	0.00000	0.00000	0.00000	0.11583	0.00000	0.00000	0.00000	0.00000	0.00000
E3	0.28338	0.28338	0.05703	0.00000	0.00000	0.32907	0.28394	0.27770	0.00000	0.00000	0.00000	0.00000	0.00000	0.19627

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Step 4, Choosing the Best Options: The weight of each of the training empowerment criteria is as follows:

Icon	Name		Normalized by Cluster	Limiting
No Icon	dependence		0.58616	0.034868
No Icon	support		0.41384	0.024617
No Icon	increasing productivity		0.62057	0.252316
No Icon	increasing speed		0.23656	0.096181
No Icon	independence in DM		0.14287	0.058088
No Icon	employee participation		0.31805	0.073080
No Icon	submission of authority		0.35837	0.082343
No Icon	trust to employee		0.32358	0.074351
No Icon	fast response (env)		0.17606	0.010493
No Icon	new knowledge		0.80013	0.047686
No Icon	new tech		0.02381	0.001419
No Icon	clear instruction		0.30868	0.075490
No Icon	fast response		0.15681	0.038348
No Icon	team work		0.53452	0.130720

Here are the priorities.

Figure 4: Weight of Training-Based Empowerment Criteria

Based on the results of the figure (4), prioritizing the components of training-based empowerment is as follows:

1. Need to increase productivity
2. The atmosphere of cooperation and teamwork
3. The need to speed up the execution of assigned tasks
4. Delegation
5. Having clear instructions
6. Trust in subordinates
7. Need for employee involvement
8. The need for independence in decision making
9. Need for new knowledge
10. Need for quick response and elimination of administrative bureaucracy
11. Employee feeling in the organization
12. Get a sense of employer support
13. Need to respond quickly to the environment
14. The rapid emergence of new tools and techniques

Findings

Summing up and concluding a research is an essential part of the research that shows the results of all the activities carried out during the research.

Results of answering research questions

Question 1: What are the components of empowerment based on staff training in industrial research organizations?

In response to this question, 14 components were identified by reviewing the literature and similar studies. After interviewing relevant experts and experts, these 14 sub-criteria were selected as training-based empowerment components and classified into 5 clusters as the main criteria. The criteria and sub-criteria are:

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Table 7: Table of training-based empowerment criteria and sub-criteria

| Criterion	Employee Criteria	Common Between Employee And Employer	Employer Criteria	Job Criteria	Organization Criteria
Sub-Criteria	Feel the employees belong to the organization	Need for independence in decision making	Need for delegation	The rapid emergence of new tools and techniques	Have clear administrative instructions
	Get a sense of support from the employer by the employee	Need to speed up tasks	Trust in subordinates	Need to get new knowledge	Need to respond quickly and eliminate administrative bureaucracies
		Need to increase productivity	Employee participation required	Requires rapid reaction to the environment	The atmosphere of cooperation and teamwork
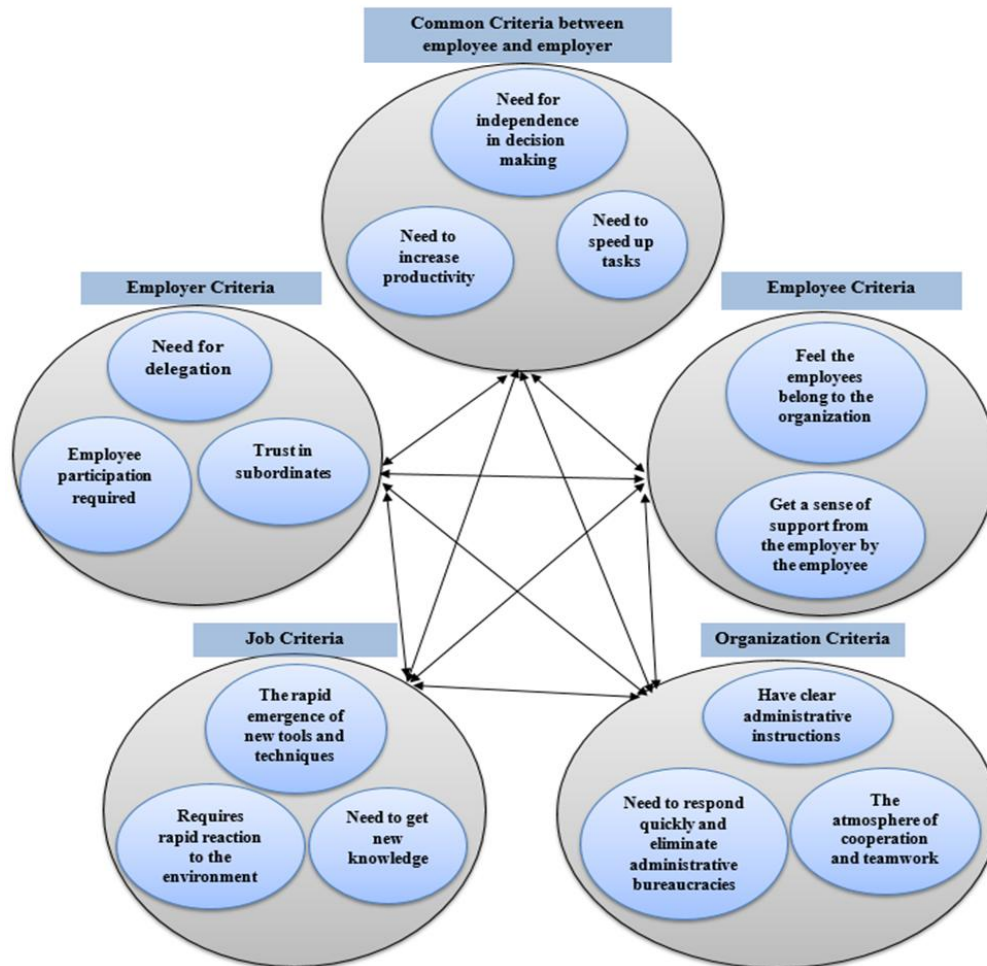
Figure 5: Network Modeling of Training-Based Empowerment Components

Question 2: What is the relationship between these components?

In the third chapter, a hierarchical model of the components of training-based empowerment was presented. As mentioned in this chapter, the model has three levels:

Level 1: Training-based empowerment
Level 2: Criteria: Employee-related factors, employee-employer shared factors, employer-related factors, job-related factors, and organization-related factors
Level 3: Sub-criteria as shown in the table above.

By using the complementarity matrix and determining the degree of influence of the components on each other, the influential and influential variables and the relationship between the criteria were identified by the experts and the mean of the experts and the DEMATEL method.

Question 3: How are these components prioritized?

In the proposed research model, the importance of training-based empowerment components is determined. So in this model there is a bottom-up relationship. On the one hand, in the proposed model of research, the criteria are influenced by each other, so that their internal relevance must be considered in determining their weight and importance. Therefore, based on the proposed model, the pairwise comparison tables to prioritize the components of training-based empowerment are:

Pairwise comparisons of criteria to goal and pairwise comparison of sub-criteria to criteria and to each other are needed to determine internal relationships. The process of the above pairwise comparisons is the process of network analysis technique (ANP). In the present study, the DEMATEL technique was used to determine the internal relationships of the criteria. The combination of DEMATEL and ANP techniques reduces the number of pairwise comparative tables in determining the intrinsic relationships and enhances the efficiency of the ANP technique.

The results indicate that the need to increase productivity among the identified components is the most important component in training-based empowerment. Prioritize the components as follows:

1. Need to increase productivity
2. The atmosphere of cooperation and teamwork
3. The need to speed up the execution of assigned tasks
4. Delegation
5. Having clear instructions
6. Trust in subordinates
7. Need for employee involvement
8. The need for independence in decision making
9. Need for new knowledge
10. Need for quick response and elimination of administrative bureaucracy

11. Employee feeling in the organization
12. Get a sense of employer support
13. Need to respond quickly to the environment
14. The rapid emergence of new tools and techniques

Conclusion

Today, human resource empowerment is considered one of the key management issues. In fact, empowerment is a response to the ever-changing business environment of the current institutions. Changes in management practices are necessary and inevitable. All institutions need empowerment methods to survive and grow and adapt to changing competitive environments. Therefore, given the scarcity of organizational resources, empowerment based training is of the utmost importance. This study was conducted in line with this topic and presented a consolidated model to prioritize the components of training-based empowerment in industrial-research organizations. To obtain the results of the research, expert opinion polls and evaluation of selected criteria were conducted. The important point in the evaluation process is that if the number of evaluation tables is exceeded, the accuracy of the respondents will be reduced and this will result in incorrect results. On the other hand, the existence of bottom-up and internal relationships of criteria in the proposed research model justifies the use of ANP technique for this research. For this purpose, DEMATEL technique was used in this study to reduce the paired comparative evaluation tables in ANP technique. This in turn reduced the number of pairwise comparison tables in the present study and on the other hand made it possible to classify the criteria into two causes and effects.

In sum, the results of the integrated approach of prioritizing the components of training-based empowerment indicated that the criteria for empowerment, perception of employer support, sense of belonging to the organization, need for autonomy in decision making, need for employee participation, Trust in subordinates, the need to acquire new knowledge and the atmosphere of collaboration and teamwork are highly influential. The other six criteria are the rapid emergence of new tools and techniques, the need for new knowledge, the need to speed up the execution of tasks, the need for transparent guidelines, the need to increase productivity and the need to respond quickly and eliminate bureaucracy from influential factors.

Also among these criteria, the need to increase productivity is the most important in prioritizing the components of training-based empowerment.

Suggestions for future research

The purpose of this study was to prioritize training-based empowerment components using ANP and DEMATEL techniques. In this regard, suggestions for further research from the author's perspective are stated below.

- Applying the proposed fuzzy model integrated research model
- Identification of evaluation criteria using fuzzy Delphi technique
- Comparison of Multi Criteria Decision Making Techniques to Prioritize Training-Based Empowerment Components

References

Abrahams, R. D., Spitzer, N., Szwed, J. F., & Thompson, R. F. (2006). *Blues for New Orleans: Mardi Gras and America's Creole Soul*. University of Pennsylvania Press.

Acharya, G. & Siddiq, A. (2020). "Employee Empowerment and job satisfaction" in the hospitality industry"-A Study with special reference to DK District of Karnataka. Our Heritage, 68, 11307-11321.

Ahmadi, A., Daraei, M. R., Khodaie, B. & Salamzadeh, Y. (2012). Structural equations modeling of relationship between psychological empowerment and knowledge management practices (A case study: Social security organization staffs of Ardabil Province, Iran). International Business Management, 6, 8-16.

Alcaraz, K. I., Wiedt, T. L., Daniels, E. C., Yabroff, K. R., Guerra, C. E., & Wender, R. C. (2020). Understanding and addressing social determinants to advance cancer health equity in the United States: a blueprint for practice, research, and policy. *CA: a cancer journal for clinicians*, *70*(1), 31-46.

Alsawaier, R. S. (2018). The effect of gamification on motivation and engagement. The International Journal of Information and Learning Technology.

Appelbaum, S. H., Karasek, R., Lapointe, F. & Quelch, K. (2014). Employee empowerment: factors affecting the consequent success or failure–Part I. Industrial and commercial training.

Appelbaum, S. H., Karasek, R., Lapointe, F. & Quelch, K. (2015). Employee empowerment: factors affecting the consequent success or failure (Part II). Industrial and commercial training.

Armstrong, M. & Taylor, S. (2020). Armstrong's handbook of human resource management practice, Kogan Page Publishers.

Barnes, K. J. (2006). The relationship between perceived organization structure and perceived technology and individual psychological and group empowerment, State University of New York at Albany.

Bascomb, J. (2020). *Qualitative Case Study Exploring the Factors to Improve Employee Satisfaction and the Organizational Citizenship Behavior of Cybersecurity Professionals in the Department of Defense* (Doctoral dissertation, Northcentral University).

Cho, Y. J. & Park, H. (2011). Exploring the relationships among trust, employee satisfaction, and organizational commitment. Public Management Review, 13, 551-573.

Choi, S. L., Goh, C. F., Adam, M. B. H., & Tan, O. K. (2016). Transformational leadership, empowerment, and job satisfaction: the mediating role of employee empowerment. *Human resources for health*, *14*(1), 1-14.

Deane, P. (2019). *Facilitating Adult Church Leaders to Develop the Key Elements for a Design-Based Personal Life Mission Statement* (Doctoral dissertation, Faith International University).

Dwivedi, P., Chaturvedi, V., & Vashist, J. K. (2020). Transformational leadership and employee efficiency: knowledge sharing as mediator. *Benchmarking: An International Journal*.

Edmondson, A. C. (2012). Teaming: How organizations learn, innovate, and compete in the knowledge economy, John Wiley & Sons.

Eisenberg, M. A. (2017). Legal models of management structure in the modern corporation: Officers, directors, and accountants. Corporate Governance. Gower.

Feerrar, J. (2019). Development of a framework for digital literacy. Reference Services Review.

Haile-Mariam, T., Koffenberger, W., McConnell, H. W., & Widamayer, S. (2005). Using distance-based technologies for emergency medicine training and education. *Emergency Medicine Clinics*, *23*(1), 217-229.

Hanaysha, J., & Tahir, P. R. (2016). Examining the effects of employee empowerment, teamwork, and employee training on job satisfaction. *Procedia-Social and Behavioral Sciences*, *219*, 272-282.

Hanaysha, J. (2016). Examining the effects of employee empowerment, teamwork, and employee training on organizational commitment. Procedia-Social and Behavioral Sciences, 229, 298-306.

Henao-Zapata, D. & Peiró, J. M. (2018). The importance of empowerment in entrepreneurship. Inside the Mind of the Entrepreneur. Springer.

Hung, D., Martinez, M., Yakir, M. & Gray, C. (2015). Implementing a lean management system in primary care: facilitators and barriers from the front lines. Quality management in health care, 24, 103-108.

Ihm, J. & Lee, S. (2020). How Perceived Costs and Benefits of Initial Social Media Participation Affect Subsequent Community-Based Participation. VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations, 1-12.

Islam, M. R. & Morgan, W. J. (2012a). Agents of community empowerment? The possibilities and limitations of non-governmental organizations in Bangladesh. Journal of Community Positive Practices, 703-725.

Islam, M. R. & Morgan, W. J. (2012b). Non-governmental organizations in Bangladesh: their contribution to social capital development and community empowerment. Community Development Journal, 47, 369-385.

Jarvis, R. (2015). The Romantic Period: The Intellectual & Cultural Context of English Literature 1789-1830, Routledge.

Jemielniak, D. (2012). The new knowledge workers, Edward Elgar Publishing.

Khasanah, U., & Astuti, D. (2018). Developing Mathematics Learning Model of Thinking Empowerment by Question (TEQ) with TAI Setting to Improve Students Metacognition Ability. *International Journal of Active Learning*, *3*(2), 80-85.

Kiraly, D. (2014). A social constructivist approach to translator education: Empowerment from theory to practice, Routledge.

Kincheloe, J. L. (2012). *Teachers as researchers (classic edition): Qualitative inquiry as a path to empowerment*. Routledge.

Laverack, G. (2019). Public health: power, empowerment and professional practice, Macmillan International Higher Education.

Liszt, A. R. (2008). Perceiving empowered leadership: A qualitative exploration of New York City principals' experience with decision-making authority in empowerment schools. Teachers College, Columbia University.

Low, M. P. (2016). Corporate social responsibility and the evolution of internal corporate social responsibility in 21st century. Asian Journal of Social Sciences and Management Studies, 3, 56-74.

Marsick, V. J. & Watkins, K. (2015). Informal and incidental learning in the workplace (Routledge revivals), Routledge.

Masri, H. A. (2016). Assessing Green Human Resources Management Practices in West Bank: An Exploratory Study.

Melkote, S. R. & Steeves, H. L. (2015). Communication for development: Theory and practice for empowerment and social justice, SAGE Publications India.

Menell, P. S. (2017). Tailoring a Public Policy Exception to Trade Secret Protection. Calif. L. Rev., 105, 1.

Namasivayam, K., Guchait, P. & Lei, P. (2014). The influence of leader empowering behaviors and employee psychological empowerment on customer satisfaction. International Journal of Contemporary Hospitality Management.

Ocloo, J., & Matthews, R. (2016). From tokenism to empowerment: progressing patient and public involvement in healthcare improvement. BMJ quality & safety, 25(8), 626-632.

Pandey, A. (2013). The road less traveled: The moderating effects of relational coordination on the relationships among human capital, employee behaviors and performance.

Putra, P. E. D. & Rahyuda, A. G. (2019). The role of job satisfaction in mediating relationship between psychological empowerment and lecturer performance. Vol. 7, No. 3

Rottmann, C. (2011). Organized leadership for equitable change: Union-active teachers dedicated to social justice.

Saremi, H. (2015). Empowerment as a New Approach in the Management. Proceedings of the International Conference on Global Business, Economics, Finance, and Social Sciences (GB15_Thai Conference), in Bangkok, Thailand, on, 2015. 20-22.

Schein, E. H. (2010). Organizational culture and leadership, John Wiley & Sons.

Searle, R., Weibel, A. & Den Hartog, D. N. (2011). Employee trust in organizational contexts. International review of industrial and organizational psychology, 26.

Seibert, S. E., Wang, G. & Courtright, S. H. (2011). Antecedents and consequences of psychological and team empowerment in organizations: A meta-analytic review. Journal of applied psychology, 96, 981.

Shakya, A. (2018). Organisational learning and performance in Nepalese services sector.

Sharman, J. P., Egyed, M., Jurczak, W., Skarbnik, A., Pagel, J. M., Flinn, I. W., & Byrd, J. C. (2020). Acalabrutinib with or without obinutuzumab versus chlorambucil and obinutuzmab for treatment-naive chronic lymphocytic leukaemia (ELEVATE TN): a randomised, controlled, phase 3 trial. The Lancet, 395(10232), 1278-1291.

Shaner, W. W. (2019). Farming systems research and development: Guidelines for developing countries, Routledge.

Sharma, P. N. & Kirkman, B. L. (2015). Leveraging leaders: A literature review and future lines of inquiry for empowering leadership research. Group & Organization Management, 40, 193-237.

Shaw, G. & Williams, A. (2009). Knowledge transfer and management in tourism organisations: An emerging research agenda. Tourism Management, 30, 325-335.

Sugri, I. (2020). Prevalence, Perception and Participatory Management of Aflatoxins in Groundnut with Emphasis on Northern Ghana. Acta Scientific Nutritional Health, 4.

Udedibia, U. J. (2020). Short-term informal leadership learning: a critical realist case study. Lancaster University.

Warner, M. (2016). How Chinese managers learn: Management and industrial training in China, Springer.

Yun, H. A. (2008). 13. Evolving Singapore: The Creative City. Creative cities, cultural clusters and local economic development, 313.

Zahedi, M. R., & Khanachah, S. N. (2020). The effect of knowledge management processes on organizational innovation through intellectual capital development in Iranian industrial organizations. *Journal of Science and Technology Policy Management*.

Zhang, X., & Bartol, K. M. (2010). Linking empowering leadership and employee creativity: The influence of psychological empowerment, intrinsic motivation, and creative process engagement. *Academy of management journal*, *53*(1), 107-128.