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Int. J Sup. Chain. Mgt   Vol. 9, No. 4, August 2020

Extent of Employee Turnover in Humanitarian Logistics: An Interpretive Structural Modelling Approach

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Abstract - **Following a disaster, humanitarian logistics service providers (HLSP) noted that besides their challenging job they are also facing high employee turnover. The main purpose of this article is to extend a precise assessment platform and provide a theoretical basis for increasing the understanding of the turnover of staff in humanitarian logistics (HL). Based on the identified variables leading to turnover of employee, this paper analyzes these variables affecting turnover of an employee in HL, using interpretive structural modeling (ISM) approach to evolve a model of hierarchy and categorized the interrelationships among these variables. In line with research conducted previously, the study identified and updated 16 imperative employee turnover variables out of 24 as a key performance evaluation of HL. These variables can be categorized into eight levels, which denote the driving power from higher to lower. The study findings indicate that not all variables to employee turnover in HL require the same level of concentration. Out of 16 variables, there is a group of eight variables that have high driving control and low reliance, these variables are of strategic importance and require maximum attention. Also, another group contains six variables they have a low driving power but high reliance, whereas the one variable is in the linkage category between lower and upper-level variables. This categorization will help relief agencies to distinguish between dependent and independent variables that are imperative for improving the issue of employee turnover in HL. This article is the first to discuss employee turnover using ISM in the context of HL. The developed framework herein provides a precise guideline for HL to enhance their performance, as well as to promote the efficient application of resources through employee retention.**

Key Words— Humanitarian logistics, Employee turnover, Job performance, Labor Market, Unemployment rate, Interpretive structural modeling (ISM).

1. Introduction

Human suffering has increased recently owing to increase both frequency and intensity of calamities, which are expected to rise more in the future due to climate change.

Helping people during this painful time of hazards needs instant action [1]. The numerous relief agencies, asses the victims in the form of cash, water, foods, shelters, engineers, medicine, medical teams, sanitation, equipment, support personnel [2] and relief packages [3]. Most importantly, poor relief distribution and misallocation of the donors' funds happen due to a number of reasons such as logistical insufficiencies [4], lack of expert logisticians [5] and employee turnover [6]. The poor distribution leads to devastates vulnerable people [7] and impacts on the people affected by disaster.

For a mixed array of calamity operations, HL is an umbrella [8] and the technical term. It includes transportation, procurement, and warehousing from the origin point to the location of beneficiaries. Therefore, HL is one of the key activities in times of hazards. The scholars [6] have revealed that logistics play a vital role in the success of disaster relief operation (DRO). Because of the cost and participation of logistics account for around 80% of DRO [6]. Nevertheless, humanitarian organizations (HOs) have not even recognized and defined this reality. Hence, HL mostly has a lower priority within HOs, regardless of being a factor that may determine the success or failure of DRO. Moreover, about 40% waste is occurred [9] due to a number of reasons including lack of expert logisticians [5] and employee turnover [6]. It is also reported that relief agencies do not keep in their staff enough logisticians. Same like, they do not provide proper training to make them effective humanitarian logisticians [9]. On the other hand, HL has not been identified as the esteemed path of career. Therefore, HOs are faced by the high turnover of employee. Furthermore, shortage of expert logisticians and that ambiguous path of career,

making human resource management (HRM) cumbersome [6].

Although natural disaster risks to people cannot be completely eliminated, they can be decreased through effective and efficient HL. Moreover, the effectiveness, efficiency, and performance of HL cannot be increased as a whole. Due to multiple situations arise depend on the type, location, and intensity of the calamities. Therefore, it is vital that the HLSP modify, reconfigure and adjust their HL by increasing their efficiency, performance, and effectiveness to the circumstances arising from the disasters. These factors as whole lead scholars to think concerning the problem from several angles with the intention to provide some contributions to enhance the HL effectiveness. As noted, along with other factors after striking a disaster that affects the suffering of victims, employee turnover can devastate vulnerable people [6]. Human resources (HR) is the essence of any organization. It is widely acknowledged that HR is an invaluable organizational asset. Hence it should be assumed that during HL the fluctuation of HR significantly negatively affects the performance of the organization [10]. [11] reported that high employee turnover became a hurdle in the way of HL operation following the 2004 Indian Ocean tsunami. [12] reported that employee turnover in HL has been a problem which occurred constantly while following a disaster. Unfortunately, employee turnover is a common phenomenon in DRO is being realized.

This study's aim is to focus on the reasons for staff turnover in HL. In organizational research turnover of the employee, has attracted extensive attention [10, 13-17]. On the other hand, very little research has been conducted on employee turnover, as they poorly touched the factors in the context of HL [2, 18, 19]. Therefore, the employee turnover in HL has remained relatively unexplored. What is not clear from the existing literature, in this sense, this study raises some questions:

1. Which factors and construct have a substantial influence on a turnover in HL?
2. What are the main reasons behind staff to remain/leave in their organizations?
3. Which variables require more attention?
4. What kind of structural relationships exists among the identified variables?
5. How can practitioners easily identify and design employee turnover improvement planning for a higher level of effective HL and competitive advantage?
To fulfill this, gap the study main objectives are:
1. To identify and highlight key employee turnover variables for the operationalization of HL practices that are appropriate both theoretically and empirically.
2. To know the interdependent and interrelationships among these variables, and to provide managerial guidance in achieving effective HL.

To fulfill these objectives, this study adopts a graph-based ISM approach to visually identify interdependently

and control powers of employee turnover variables. More specifically, the key purpose of this research is to classify and identify the interrelationship among, staff turnover variables. The finding indicates the resulting interdependent structural relationships and the interactions among employee turnover variables in the HL context. The methodology of the study and employee turnover in HL contributes to the stream of literature by providing (i) updates and support to the previous study that examined the HL effectiveness (ii) complementary classifications of control powers of employee turnover in HL. (iii) Practical implications are presented, and research gaps are explored for future research studies to develop more effective HL operations. To the best of our understanding, there has been no study that has systematically analyzed the interaction of employee turnover variables in the field of HL.

The rest of this study organizes as follows: The research materials and methods are presented in Section 2. The study analysis and research findings are provided in Section 3. The discussion, contributions, and scope for future research are given in Section 4. Finally, section 5 lays out the study conclusion.

2. Materials and Methods

This article attempts to use interpretive structural modeling (ISM) to extend a precise framework that can increase our understanding of employee turnover in humanitarian logistics (HL). As observed in the literature that there are several variables that influence employee turnover in HL, and HOs would be interested in knowing the relationship among these variables. This can be achieved by using ISM methodology, which can effectively show in the form of a model of these relationships. Through brainstorming method, the relationship among these variables is decided which further developed a structural model using graphics as well as words.

2.1. Building the ISM model

ISM as a beneficial tool in systematically getting information about a given theme and organizing the findings. ISM has also attained reliability as an effective approach for identifying both hierarchical and interactivities structures based on the consensus of experts. It is effective in identifying the different levels of a problem. This approach of modeling was created initially to structure order of contextual relationship of variables, and to help policy makers in considering complex systems, thus making proper plans. The methodology of ISM has obtained popularity for two reasons in research. Firstly, for picking out of sequence and direction in a complex system. Second, as a means to reveal critical practices or variables that are better in determining other ones [20]. This study intended to give employee turnover variables in proper sequence for identification of dependent and independent variables. More specifically, the set of variables will be

divided into different categories and levels, as provided by the study of [21].

The variables to be structured and defined by the experts (group) during the brainstorming session of ISM. For this study, the group of experts also give a relational description that defines and explains the mutual relationships among variables [22]. The ISM approach is interpretive as it is the judgment of the group that agrees whether and how the identified variables are a mutual relationship. The approach is also structural because based on the relationship from the complicated set of variables, a whole structure is established. ISM is a modeling approach in which the relationship among all identified variables in the form of a digraph for discussion. ISM is a technique of group learning nevertheless also a single person can apply.

ISM approach contains in the following eight steps:

Step i. This step is the identification of 16 variables for this study through the brainstorming method (See section 2.1 to 2.1.16)

Step ii. The second step for this study is also during the last session of brainstorming method which is a contextual relationship among the identified variables (See subsection 2.1 the brainstorming method)

Step iii. A structural self-interaction matrix (SSIM) is structured for identified variables, revealing pair-wise interrelationships of the variables as seen in Table 1.

Step iv. In this step, the SSIM leads to structure of a reachability matrix and examined for transitivity. The key presumption made in this study for the transitivity of the appropriate relationship as if an X variable is relevant to Y and Y relevant to Z, at that point there is a clear relationship between X and Z. (see in Table 2).

Step v. In this article, the reachability matrix of Table 2, is subdivided into eight levels as seen in Table 3 to Table 10 Iteration i-viii.

Step vi. In this step on the basis of the mutual relationship in Table 2, draw a digraph that contains four different quadrants whereas the links of transitive were removed as seen in Figure 2.

Step vii. The second last step is dedicated to the core of the study which is the structuring of the ISM model. In this step, the resultant digraph of figure 2 was transformed into ISM by showing the relationship among variables through arrows.

Step viii. The ISM model was checked for any modification and improvement.

2.2. Identification of variables to employee turnover

In this section of the study presented the identification and underlying mutual relationship of employee turnover variables based on brainstorming technique in the HL context. Furthermore, the variables are also explained individually considering the available literature. The proposed methods and measures are addressed to develop an understanding of the factors and offer a guideline for evaluating HL performance.

It is observed that on a daily, monthly and yearly basis a fraction of population moves from one activity of employment to another. Some are fired and look for another job or they resign to get into new jobs. Youth leave school and seek a job whereas some employee due to disability or duty at home leaves the workforce. Therefore, it can be stated that the number or percentage of an employee leaving an organization and replace by new workforce is employee turnover. Employee turnover has two types: voluntary, when an employee decides to leave e.g. quits or resigns and involuntary when the employer decides for the employee to leave e.g. is fired. Whether an employee is fired or resigns, the absence of an employee affects the organization's performance. Having to pay to continue benefits or severance pay, attached with the hiring cost to take their place, consequently in lost productivity which further leads to lost revenue.

Employee turnover has received substantial attention not only from academia but also from the practitioner and is a much-considered phenomenon. Nevertheless, there is no specific reason why people want to leave an organization. Most of the time employees choose to leave an organization voluntary, instead of involuntary that concern management. Voluntary employee turnover incurs substantial cost both directly such as replacement, temporary staff, recruitment, selection and time of management, and indirectly e.g. pressure on the remaining employee, employee training costs, concern for the quality of product and service and social capital losses [23]. Similarly, these costs also occur during involuntary turnover such as fired or downsizing. As observed that mostly turnover is voluntary. It must be noted that during downsizing programs, the organization retains the most competent employees. It happens mostly that the competent worker also leaves the organization as a voluntary turnover. [24] stated that the key role is playing by job performance in turnover. Satisfaction of customers leads to low employee turnover which further increases sales, revenue, and good decision-making process. If an organization lost an employee during the tactical level will confront 100% cost of the concern employee salary where at in strategic level the cost will be double. [25] reported that if the employees are not up to the expectations of the customers, they may switch their business somewhere else. However, there are no such rules or standard platform for knowing the turnover process as a whole.

Multiple reasons along with job satisfaction can be considered causes of turnover. Furthermore, the reasons behind maybe significantly different for HL. Along with other challenges, employee turnover in HL has been one of the key elements behind the failure of DRO [10]. High turnover is one of the crucial issues facing management during HL following a disaster.

Currently, in the context of HL, employee turnover has become a challenge for management. They are always in big pressure to provide strategies for a turnover. So, it is imperative to investigate variables and to develop strategies to mitigate them in terms of HL. Identification of reasons behind employee turnover is not an easy task but much more difficult. A great number of variables have been noted useful when it comes to evaluating employee turnover e.g. job satisfaction, commitment in different forms, equity, market variables and so on.

2.3. The brainstorming method

In the ISM approach, the first step is the brainstorming technique. Expert was consulted to participate in a brainstorming session, for identification of the mutual relationship among the employee turnover variables in HL. They were scholars with a research interest in HRM and some employees working with HOs. An initial informal visit to the offices of the selected experts was commenced to know their perception regarding the employee turnover in HL. The formal invitation was sent to these experts for participation in this workshop, organized in Pakistan in December 2019. Out of 24, only 14 experts participated, whereas the rest of them apologies from coming, due to their busy schedules. The participants consisted of research scholars in business and managers and supervisors involved in managing HR of their respective organizations.

In preparation for the workshop, literature related to employee turnover and HL was sent to participants to know regarding the employee turnover in HL and made a special request to experts to focus on the obtained variables in the study of [10]. Because the base of this article is firmly grounded in the identified variables of [26] and adopted by [10]. At that time, they were asked to identify and define employee turnover in HL. Subsequently, the decision and three brainstorming sessions, 24 variables from the study [10] reduced to 13 were agreed upon, which were increased finally to 16 by adding three additional variables. As seven variables were dropped six were merged into three, and two were overlapping so, considered only one and added important three more variables. Such as satisfaction with promotional opportunities, the number of dependents and employment perceptions were merged into satisfaction with work itself, marital status and behavioral intention respectively. Pay was dropped due to overlapping with satisfaction with pay. Tenure, biographical information, aptitude and ability, intelligence, net expectations, accession rate, and union presence were dropped and added labor market, performance related pay and level of control. After finalization of the first session, then the participants were requested to choose the interrelationship among these 16 variables.

In this session as considered the second step in ISM methodology, the categorization of variables for diagram was recognized. After successfully completing this step, the list was circulated among experts for any improvement denoting the mutual relationship. Some discrepancy was found among the contextual relationship of variables during the start of the discussion. Finally, through mutual consensus among participants, final mutual relationships developed among these identified variables. Subsequently, these variables were applied to evolve the ISM model based on the study methodology. The identified variables are discussed briefly hereafter.

2.3.1. Labor market

The labor market is the availability of jobs and worker, in terms of supply and demand [27]. Workers from the internal market usually experience lower employee turnover. As in the external market offer of salary is lower as compared to the internal market [28]. Cost control is very necessary as [29] stated that low labor cost provides competitive advantages in any industry. The labor market in terms of HL is very crucial. Due to a large amount of work and also the existing of HOs in huge number for speedy work owing to the nature of disaster required staff. The increasing number of demand and the shortage of workers especially with experience is a big challenge not only for HOs but also for all other stakeholders. Due to greater demand, the worker will look for a high satisfying job which leads to employee turnover.

2.3.2. Unemployment rate

Any treatment of turnover and unemployment must differentiate between the role of events outside the individual control and the role of his response to the environment of economic. Fluctuations in the demand for the worker are the imperative external source of disturbance not only for the career of the individual but also for organization. Therefore, it is traditional to differentiate between the demand side and the supply side of the problem. Employee turnover is the traditional description of frictional unemployment, which exists in every economy to some extent [30]. [28] proposed that higher unemployment rates are related to higher turnover. On the other hand, employee turnover is high where there are high job opportunities especially in HL.

2.3.3. Level of control

[31] found that control of organization just accounts for 16% of the variance in satisfaction of the job. In fact, organizational structure and supervision interactions can be considered demographic variables that impact employee turnover [32]. This effect can be in terms of the control level of the organization the desire for control and power that the employee might desire to exercise. [31] affirms that most individuals will, and desire power to become displeased when they cannot exercise control power and lead to employee turnover. On the other hand, [33] stated that some employees, who might love to work individually and they fell satisfaction where they have to exercise very little control power. Therefore, it is clearly that some individuals are more power distance tolerance

than others. As mentioned, many jobs available after a disaster struck, the employee will quit the job if any dissatisfaction occurs.

2.3.4. Task repetitiveness

Some studies suggest that job position of employees is expected to affect performance perceptions and expectations. Job characteristics, competitiveness of employees, rewards, and self-efficacy can affect positively work engagement [34]. Due to task repetitiveness some time it leads to employee turnover. Such as if the job is boring or hard for the employee so the employee will try to find a job somewhere else. On the other hand, changes employees frequently if they do not want to change their position also lead to staff turnover especially in the case of HL.

2.3.5. Role clarity

[35] indicates that staff's perceived directly negative impact on the employee's intention of turnover. The effect of role clarity on turnover intention seems to be mediated by employees' perceived service quality. Role clarity is regarding the perception of employee specifically related to their job conditions and have a positive impact on job performance. More specifically, role clarity is a key variable that not only affects the relationship to employees' quality of perceived service directly but also impacts employee turnover indirectly [35].

2.3.6. Job performance

Some scholars [36, 37] have indicated the influence of job performance is effecting turnover. The argument of job performance may not be applied at the general level means performance as a whole of the organization, but it may well trigger on the individual performance of the employee intentions to leave. The occurrence of performance is in a defined situation and generally is connected to particular situations. Performance is not always related to the general skill of the employee therefore, with any specific skill increase the morale of the employee in looking for a similar job elsewhere. Anyhow, generally job performance cannot be the main reason to leave an organization by an employee. Because employee generally knows the indirect attributes which can enhance performance and may not use performance as a tool of the criteria in shaping their decision to leave. Furthermore, the impact of performance on turnover of employees potentially does not equally apply to all employees within the organization [33]. In terms of HL job performance, on the one hand, is good for HOs whereas on the other may lead to employee turnover due to labor market position.

2.3.7. Performance related pay

The performance related pay approach mostly based on individual performance, but group incentive as well as evidenced in a different organization. One study [38]

found that in fitting car company out of 44% increase in productivity in which half occurred due to hourly fixed rate incentive effect. The incentive at the group level is not very successful. It must be noted that some workers are earning more due to performance related pay, they may face resistance from other coworkers who prefer flat rate wages rather than any incentive scheme. Those workers who try to qualify for such a scheme, and potentially fail, suffer from emotional and psychological problems and seek a job somewhere else. Furthermore, the resistance confronting to the employees who qualify for such a scheme, suffer psychologically and also lead to employee turnover.

2.3.8. Satisfaction with pay

The predominant reason for employee turnover is salary [34]. If an employee is not happy with the salary is receiving, will look for an alternate organization where can get satisfied salary. Employees of line level are more expected to seek employee in another organization rather than supervisors [34] due to salaries differences. In term of HL satisfaction with pay of employee can prevent HOs from high employee turnover.

2.3.9. Satisfaction with work itself

Satisfactory job environment, unsatisfactory pay or unsatisfactory performance cause high employee turnover. The challenges and poor career opportunities, which is common in HL, collusion with management or limited job-scope have been considered of high turnover [25]. Furthermore, the dissatisfaction of customers is also considered as the cause of employee turnover. The customer who is dissatisfied making the work environment also less satisfied, consequently causing employee turnover [39].

2.3.10. Overall job satisfaction

Job satisfaction as a whole has frequently been found to be related negatively to employee turnover [33]. [40] states that roughly there are three groups of variables which impact on turnover of the employee, these are the (i) organizational environment, (ii) intention, and behavior of employee and (iii) task of an employee within the organization. Furthermore, HL has not been identified as a respected path of career. Because of HOs are faced by high turnover of the employee, due to the ambiguous path of the career of logisticians.

2.3.11. Organizational commitment

The term organizational commitment denotes the mutual relationship between the employee with the overall system of the organization [33]. Organizational commitment and Job satisfaction can be observed while studying employee turnover. [24] stated that job-related attitude comparatively a small role in employee turnover. [41] find that except organizational commitment other variables are vital for considering employee turnover.

2.3.12. Behavioral Intention

The intention of turnover states the employee behavioral attitude to resign from the organization, whereas turnover described the action of the employee to leave an organization. It is suggested that supervisors should engage the employees in the workplace for improving employee and stakeholder satisfaction, which further improved long term strategic success. Multiple studies reported that much employee engagement within organization show less intentions to leave the job. Organizational commitment and overall job satisfaction can change the behavioral intention of employees [34]. Furthermore, perceptions and personal styles of the employee, the organizational work environment play an imperative role in employee turnover [33].

2.3.13. Education/Training

Education and training play in important role in the development of any sector. For example, the Irish government recognizes the importance of education, and it is trying to sustain it by further investing in education [42]. On the other hand, education plays an important role in employee turnover. Employees who are well qualified and have job training experience less turnover. likewise, employee in managerial and professional experience exercise lower turnover [28]. It is also noted that particularly relief agencies do not keep in their team a sufficient number of logisticians and also do not provide proper training to make them effective humanitarian logisticians [9]. Therefore, employee turnover has noted higher in HL.

2.3.14. Marital status

Marital status and the number of children effects employee turnover. Unmarried and married employees with young children are observed to exercise more employee turnover. Moreover, married employees with or without children are less expected to experience turnover [28]. The main reason for employee turnover is also the number of dependents. If the number of dependents is more and the salary is less so the one will try for another job. On the other hand, if the number of dependents is more, the individual will work hard and also will not take the risk to leave the permanent job where they are working.

2.3.15. Age

In some specific age, individual is felling emotional, mutual relationship between emotional employees and intentions of leaving is mediated by job satisfaction. The satisfaction of deep acting job association is mostly for younger workers instead of aged workforce. It means older employees can control their outward displays and emotions better than the younger workforce. Therefore, in the case of deep acting affects positively younger workers which in turn leads to employee turnover [43].

2.3.16. Gender

In some specific situation gender play in imperative role in employee turnover. Therefore, mutual relationship between emotional employees (male) and intentions of leaving is mediated by job satisfaction. The satisfaction of deep acting job association is mostly for male workers instead of female workforces. On the other hand, the satisfaction of surface acting job association is negative for female workers rather than for male workforce. Therefore, in the case of deep acting job positively affect male workers which in turn lead to employee turnover, on the other hand in case of surface acting job effect on female workers which further lead to employee turnover [43]. Furthermore, in term of the pressure effect on employee, the male can bear more pressure as compared to female workers [25]. Generally, female employees mostly experience higher turnover than male employees such as rearing and childbirth [28].

3. Analysis and Research Findings

3.1. Structural self-interaction matrix (SSIM)

After brainstorming the third step is the application of the SSIM method. For analyzing the identified employee turnover 16 variables in the context of HL, a unique mutual relationship was chosen. Considering the appropriate interrelationship between any two variables (i and j), also the relevant path of the connection is evaluated. To fulfill this objective, four signs are using to reveal the direction of the interrelationship between the (i and j) variables:

➢ V—i variable can help to achieve j variable;

➢ A—j variable can be achieved by i variable;

➢ X—variable i and j can help to achieve each other; and

➢ O—variable i and j are independent.

Subsequently, in Table 1, the incorporating of the above mentioned four signs reveals the nature and presence of mutual relationships around these 16 variables. The following example would explain the application of these signs:

Variable 1 (labor market) would support variable 2 (unemployment rate). When the number of workers more or less in the labor market it will affect the unemployment rate. This relationship in Table 1, is representing by a symbol V. Variable5 "role clarity" is achieved by barrier 15 "age". Age will affect the level of role clarity, as the relationship is represented by A. Variable 6 "job performance" and variable7 "performance-related pay" intensify and effect on each other. This relationship is represented by sign X. Variable3 "level of control" and variable14 "marital status" are independent, O sign is used for independent variables.

Table 1. Structural self-interaction matrix (SSIM)

pi Barrier	pj Barriers															
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
1.Labor Market	V	V	V	A	V	V	V	V	V	V	V	V	V	V	V	1
2.Unemployment Rate	V	V	V	X	V	V	V	V	V	V	V	V	V	V	1	
3.Level of Control	V	V	O	A	V	A	V	X	A	A	X	X	X	1		
4.Task Repetitiveness	V	V	O	A	A	X	V	V	V	V	V	X	1			
5. Role Clarity	A	A	A	A	O	A	V	V	O	O	V	1				
6. Job Performance	A	A	A	X	A	A	X	X	X	X	1					
7.Performance Related Pay	A	A	A	X	V	A	V	V	V	1						
8.Satisfaction with Pay	A	A	A	A	V	V	V	X	1							
9.Satisfaction with Work Itself	A	A	A	A	A	A	X	1								
10.Overall Job Satisfaction	A	A	A	A	A	A	1									
11.Organizational Commitment	A	A	A	V	V	1										
12.Behavioral Intention	A	A	A	V	1											
13.Education/Training	V	V	A	1												
14. Marital Status	X	X	1													
15.Age	X															
16.Gender	1															

3.2. Reachability matrix

The fourth step in this study is the transformation of the SSIM into a binary matrix, to structure a primary reachability matrix from SSIM. For this purpose, the four signs in Table 1, was replaced by 1s or 0s. The rules for replacing are as follows and available in Table 2;

1. In the SSIM in Table 1, if the sing of (i, j) is V, then in the reachability matrix in Table 2, the (i, j) number must be 1 and the (j, i) number must be 0.

2. if the sing of (i, j) in Table 1, is A, then the number of Table 2, the (i, j) must be 0 and the (j, i) must be 1.

3. If the (i, j) sign in Table 1 is X, then in Table 2, both of the (i, j) and (j, i) number becomes 1.

4. if the (i, j) sing in the SSIM is O, then in the reachability matrix both of the (i, j) and (j, i) number becomes O.

Following the rules to structure final reachability matrix, subsequently incorporating the transitivity (as if a variable X is interrelated to Y and Y interrelated to Z, then X and Z are definitely interrelated), this matrix is presented in Table 2.

Table 2. Final reachability matrix

pi Barriers	pj Barriers																Driver
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1.Labor market	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	15
2.Unemployment rate	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
3.Level of control	0	0	1	1	1	1	0	0	1	1	0	1	1	0	1	1	10
4.Task repetitiveness	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	10
5. Role clarity	0	0	0	1	1	1	0	0	1	1	0	0	0	0	0	0	5
6. Job performance	0	0	0	0	0	1	1	1	1	1	0	0	1	0	0	0	6
7.Performance related pay	0	0	1	0	0	1	1	1	1	1	0	1	1	0	0	0	8
8.Satisfaction with pay	0	0	1	0	0	1	0	1	1	1	1	1	0	0	0	0	7
9.Satisfaction with work itself	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	4
10.Overall job satisfaction	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	3
11.Organizational commitment	0	0	0	1	1	1	1	0	1	1	1	1	1	0	0	0	9
12.Behavioral intention	0	0	0	1	0	1	0	0	1	1	0	1	1	0	0	0	6
13.Education/Training	1	1	0	1	1	1	1	1	1	1	0	0	1	0	1	1	12
14. Marital status	0	0	0	0	1	1	1	1	1	1	1	1	0	1	1	1	11
15.Age	0	0	0	1	1	1	1	1	1	1	1	1	0	1	1	1	11
16.Gender	0	0	0	1	1	1	1	1	1	1	1	1	0	0	1	1	11
Dependence	2	3	5	10	10	16	10	11	16	16	8	7	8	5	8	8	

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Table 2, is presented by the driver and the dependence for each variable. The driver for each is the sum of the total variables which may impact including itself. Likewise, dependence is the sum of all variables which may be affecting including itself.

Both of these powers will be used in the Matrices d'Impacts croises-multiplication appliqúe a classment (MICMAC) (cross-impact matrix multiplication applied to classification) examination, where these variables will be classified into four diverse groups namely; autonomous, linkage, dependent and independent.

Table 3. Iteration i

Barrier pi	Reachability set R(pi)	Antecedent Set A(pi)	Intersection set R(pi) ∩ A(pi)	Level
1	1,2,3,4,5,6,7,8,9,10,11,12,14,15,16	1,13	1	
2	2,3,4,6,5,7,8,9,10,11,12,13,14,15,16	1,2,13	2,13	
3	3,4,5,6,9,10,12,13,15,16	1,2,3,7,8	3	
4	4,5,6,7,8,9,10,11,15,16	1,2,3,4,5,11,13,14,15,16	4,5,11,15,16	
5	4,5,6,9,10	1,2,3,4,5,11,13,14,15,16	4,5	
6	6,7,8,9,10,13	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16	6,7,8,9,10,13	I
7	3,6,7,8,9,10,12,13	1,2,4,6,7,11,13,14,15,16	6,7	
8	3,6,8,9,10,11,12,	1,2,4,6,7,8,9,13,14,15,16	6,8,9	
9	6,8,9,10	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16	6,8,9,10	I
10	6,9,10	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16	6,9,10	I
11	4,5,6,7,9,10,11,12,13	1,2,4,8,11,14,15,16	4,11	
12	4,6,9,10,12,13	1,2,3,7,8,11,12	12	
13	1,2,4,5,6,7,8,9,10,13,15,16	2,3,6,7,11,12,13,14	2,6,7,13	
14	5,6,7,8,9,10,11,13,14,15,16	1,2,14,15,16	14,15,16	
15	4,5,6,7,8,9,10,11,14,15,16	1,2,3,4,1314,15,16	4,15,16	
16	4,5,6,7,8,9,10,11,14,15,16	1,2,3,4,13,14,15,16	4,14,15,16	

3.3. Level partitions

In the fifth step in the ISM approach is the attaining of driver and antecedent for each set of variables in Table 2. The set of reachability comprises the variables itself and other variables that it may affect. Hence, for every variable (pi), reachability can be described as set R (pi) as the variables set reachable from pi. R (pi), should be determined by evaluating the row of the specific set Table 2, concerning to the pi.

Likewise, the variable that the column reveals is then contained an appropriate row in R (pi) column in Table of iteration. On the other hand, the antecedent contains the variables that may influence including itself. For each variable (pj), and antecedent set a (pj) can be described, as the variables set that approaches (pj). A (pj) should be determined by evaluating the concerned column (pj). For every row that in A (pj), and for all variables when i=j, A (pi) – A (pj).

Table 4. Iteration ii

Barrier pi	Reachability set R(pi)	Antecedent Set A(pi)	Intersection set R(pi) ∩ A(pi)	Level
1	1,2,3,4,5,7,8,10,11,12,14,15,16	1,13	1	
2	2,3,4,5,7,8,11,12,13,14,15,16	1,2,13	2,13	
3	3,4,5,12,13,15,16	1,2,3,7,8	3	
4	4,5,7,8,11,15,16	1,2,3,4,5,11,13,14,15,16	4,5,11,15,16	
5	4,5	1,2,3,4,5,11,13,14,15,16	4,5	
7	3,7,8,12,13	1,2,4,7,11,13,14,15,16	7	
8	3,8,11,12,	1,2,4,7,8,13,14,15,16	8	II
11	4,5,7,11,12,13	1,2,4,8,11,14,15,16	4,11	
12	4,12,13	1,2,3,7,8,11,12	12	
13	1,2,4,5,7,8,13,15,16	2,3,7,11,12,13,14	2,7,13	
14	5,7,8,11,13,14,15,16	1,2,14,15,16	14,15,16	
15	4,5,7,8,11,14,15,16	1,2,3,4,1314,15,16	4,15,16	
16	4,5,7,8,11,14,15,16	1,2,3,4,13,14,15,16	4,14,15,16	

The top-level variables of the hierarchy cannot reach any variables directly above their own level. Accordingly, the set of reachability for a top-level variable pi should contain the variable itself and any other variable within the similar level which the variable can reach, like variables of a strongly interconnected subset. Subsequently, the intersection of these sets of variables is attained for the complete variables and levels of various variables are determined. The variables for

which the reachability sets and intersection are similar captures the top level in ISM hierarchy. As seen in Table 3, variables 6, 9 and 10 are the top-level variables, as these variables do not influence the other variables directly above their own level in the hierarchy. Consequently, the top-level variable the antecedent contains the variable itself, variables which reach it from lower levels as well any variable of an intensely interconnected subset consistent pi in the top-level.

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Accordingly, the intersection of the reachability sets and antecedents will be similar as the reachability set is at the top-level.

Table 5. Iteration iii

Barrier pi	Reachability set R(pi)	Antecedent Set A(pi)	Intersection set R(pi) ∩ A(pi)	Level
1	1,2,3,4,5,7,11,12,14,15,16	1,13	1	
2	2,3,4,5,7,11,12,13,14,15,16	1,2,13	2,13	
3	3,4,5,12,13,15,16	1,2,3,7	3	
4	4,5,7,11,15,16	1,2,3,4,5,11,13,14,15,16	4,5,11,15,16	III
5	4,5	1,2,3,4,5,11,13,14,15,16	4,5	III
7	3,7,12,13	1,2,4,7,11,13,14,15,16	7	III
11	4,5,7,11,12,13	1,2,4,11,14,15,16	4,11	
12	4,12,13	1,2,3,7,11,12	12	
13	1,2,4,5,7,13,15,16	2,3,7,11,12,13,14	2,7,13	
14	5,7,11,13,14,15,16	1,2,14,15,16	14,15,16	
15	4,5,7,11,14,15,16	1,2,3,4,1314,15,16	4,15,16	
16	4,5,7,11,14,15,16	1,2,3,4,13,14,15,16	4,14,15,16	

It must be considered that if the variable in question was not a variable of top-level, the set of reachability could contain variables from greater levels, and the intersection of the reachability sets and antecedents would differ from the reachability set. However, a variable pi is a variable of top-level if R(pi) = R(pi) ∩ A(pi). As can be seen, the top level of variables in Table 3, which are 6,9 and 10 are removed from the matrix in the Table 4. The same is for variable 8 which is removed in Table 5. The variables of the top levels were removed one by one until we reached level eight as seen at all levels from Table 3 to Table 10. With the help of these levels finally, we reach to make digraph and the ISM model.

Table 6. Iteration iv

Barrier pi	Reachability set R(pi)	Antecedent Set A(pi)	Intersection set R(pi) ∩ A(pi)	Level
1	1,2,3,11,12,14,15,16	1,13	1	
2	2,3,11,12,13,14,15,16	1,2,13	2,13	
3	3,12,13,15,16	1,2,3	3	
11	11,12,13	1,2,11,14,15,16	11	IV
12	12,13	1,2,3,11,12	12	
13	1,2,13,15,16	2,3,11,12,13,14	2,13	IV
14	11,13,14,15,16	1,2,14,15,16	14,15,16	
15	11,14,15,16	1,2,3,1314,15,16	15,16	IV
16	11,14,15,16	1,2,3,13,14,15,16	14,15,16	1V

Table 7. Iteration v

Barrier pi	Reachability set R(pi)	Antecedent Set A(pi)	Intersection set R(pi) ∩ A(pi)	Level
1	1,2,3,12,14	1	1	
2	2,3,12,14	1,2	2	
3	3,12	1,2,3	3	
12	12	1,2,3,12	12	V
14	14	1,2,14	14	

Table 8. Iteration vi

Barrier pi	Reachability set R(pi)	Antecedent Set A(pi)	Intersection set R(pi) ∩ A(pi)	Level
1	1,2,3,14	1	1	
2	2,3,14	1,2	2	
3	3	1,2,3	3	VI
14	14	1,2,14	14	VI

Table 9. Iteration vii

Barrier pi	Reachability set R(pi)	Antecedent Set A(pi)	Intersection set R(pi) ∩ A(pi)	Level
1	1,2	1	1	
2	2	1,2	2	VII

Table 10. Iteration viii

Barrier pi	Reachability set R(pi)	Antecedent Set A(pi)	Intersection set R(pi) ∩ A(pi)	Level
1	1	1	1	VIII

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3.4. Building the ISM-based model

For a challenging problem as the employee turnover in HL, there are 16 variables that need to be classified properly. Nevertheless, the interrelationship between variables either direct or indirect is stated in the present situation instead of any single variable is taken individually. ISM approach is suitable for structuring the interrelationship among multiple variables. It also transforms invisible,

poorly structure proposed model into a visible, well-defined and complete structure through graph model. From Table 2, the structural model is derived via lines of edges and vertices or nodes. This is presented in Figure 2, called a digraph or directed graph. Afterward accounting for the transitivity as reported in the methodology, finally, the digraph converted into the ISM which is step 7 in this study as seen in figure 1. The interrelationship between the variables j and i is indicated by an arrow.

Figure 1. ISM-based model for variables to employee turnover in HL
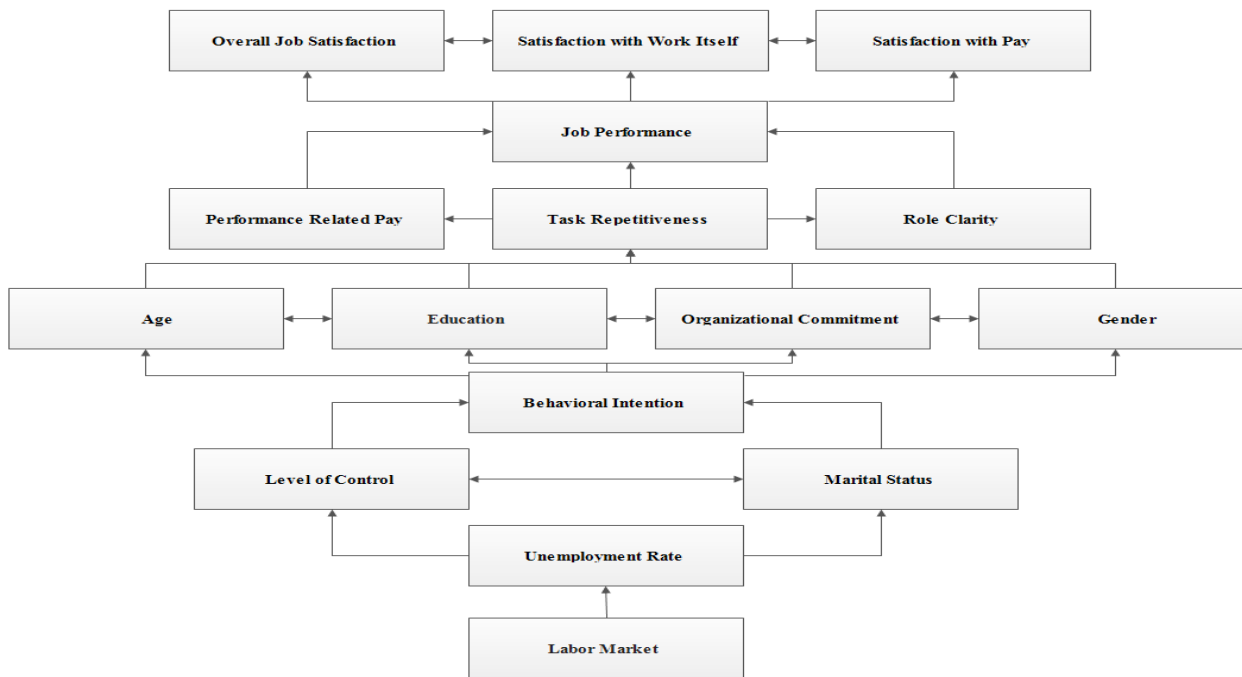
3.5. MICMAC analysis

The key purpose of MICMAC analysis is to know the identified variables' driver power and the reliance [22, 44].In this study, the variables are categories into four groups exhibited in Figure 2. The 1st group is of the self-reliant variables that have a weak drive power and also low reliance. These variables are relatively detached in the system from other variables, and have merely few links, even though these links may be strong enough. The 2nd group is of the dependent variables; they have very strong reliance, nevertheless very weak driver power. The 3rd, group is of the linkage variables they have not only very strong driving power but also very strong dependence. These types of variables are very unique because any effect on these variables will have an influence on other variables above them and also a reaction on themselves. Lastly, the fourth, group contains the independent variables. They have very strong driving power but on the other hand, very weak dependence. It is reported that those variables which have a strong driving power either in the third or fourth quadrant are considering the key variables in the system. The variables driver and the dependence are exhibited in Table 2. In Table 2, the entry is of "1" both the rows and columns reveal the driver and dependence respectively.

Figure 2. Driver power and dependence diagram

Driver power \ Dependence	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
16																
15	1	2														
14																
13																
12			IV					13				III				
11						14		15,16								
10				3						4						
9								11								
8										7						
7											8					
6							12									6
5										5						
4				I								II				9
3																10
2																
1																

Dependence

From Table 2, the above Figure 2, of driver power and dependence diagram is structured. As seen in Figure 2, out of 16 variables only one variable falls in group 1, 6 variables in group 2, 1 in group 3 and the remaining 8 variables fall in group 4. It means that half of the variables have a strong driving power. A discussion will be in the afterward section.

4. Discussion

Presently, the number of disasters is increasing due to climate change. In disasters, logistics plays a very important role. As reported [6] that around 80% of participation and expenses in DRO is due to logistics. On the one hand, HOs are increasing pressure for effective HL. Moreover, employee turnover is confronting during HL following a disaster. HR is the essence of any organization. It is widely acknowledged that HR is an invaluable organizational asset. Furthermore, the movement of this useful asset in terms of employee turnover plays a significant negative role in organizational performance. The proper utilization of HR lead to fast, fair and safe HL, which further have a positive effect on donors' funding and image building of the HOs [18]. Nevertheless, along with other challenges employee turnover play a key role and enhances the challenges for HL following a disaster.

The key goal of the paper is to develop constant improvement within HL through the identification of the variables to employee turnover and to form employee turnover regarding the effectiveness and efficiency of the new operating model. HL is constantly in maturity and is being investigated progressively. This article has tried to structure a model into practice. Importantly, the article is revealed employee turnover variables sets with HL. The article findings are the confirmation that employee retention may enhance through work on the study variables in the HL context. This finding is vital since it validates the variables to employee turnover in an easy way than that of previous studies. Academicians and practitioners need to take a more dynamic view of employee turnover variables in this article for effective HL.

To address the gap and attain the objectives of the study is applied to the ISM approach. The driver and dependence diagram in Figure 2, is used to classify the identified variables of employee turnover in HL. There is a single variable in the autonomous group, which denotes that behavioral intention variable can be considered as detached from the whole system, anyway there must be some important linkage with the system. The second group of identified variables is mostly dependent variables. These are six variables namely role clarity, job performance, performance related pay, satisfaction with pay, satisfaction with work itself and overall job satisfaction. These variables have high dependence but low control power and this is particularly true for role clarity and job performance variables. The variables exhibit that the HRM require to recognize how these variables can be deal by understanding their reliance on the variables at lower-level in the ISM model. Organizational commitment falls in the group of linkage variables. This is also the most essential and unique variable because it is influenced by lower-level variables, on the other hand, it influences on the variables above it in the hierarchy. Importantly, any variation in the quadrant 2 variables can bring

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changes not only in quadrant 3 but also in quadrant 4. In this study, the fourth quadrant of variables consists of eight variables. These are the labor market, unemployment rate, level of control, education, marital status, age, and gender. These variables are the highest driving power comparatively however have lowest dependence. Owing to strong driving power these variables have great importance in the system. Furthermore, these variables are not only important but also, they are the root cause and originators of the employee turnover as the same indication was also found from the literature.

4.1. Theoretical Contributions

The article findings may contribute to many ways in the literature. First, the ISM methodology and models and the study digraph boost and contribute to the literature, which can assist advance further theories not only in the field of HL but also in HRM. However, the article is the first to examine the gap of employee turnover variables in the HL context while using ISM methodology. The variables of employee turnover are complex phenomena. Anyhow, this article achieves this milestone and vital contribution lies in identifying the proposed employee turnover gap. Second, the proposed ISM model of this study can be extended in many directions based on the available information on employee turnover in HL considering the real-life constrain and characteristic of the employee turnover. Third, HR is the essence of any organization. Hence, effective HL is also dependent on the HR, experts and in a greater number of logisticians can lead to effective HL, which further can decrease the strength of casualties and the human suffering following a disaster. The interrelationship of these variables together enriches significantly this study approach to both HRM theory and practice. Furthermore, the interrelationship of the identified variables allows the researchers to spread the HL literature by providing a wider view of the values of the variables in managing HL process. Finally, in Figure 1, the ISM model "labor market" is the key issue in employee turnover. This variable is the root cause of employee turnover because due to disaster, the number of HOs are increasing at the disaster location while the supply of labor is decreasing in the market. Therefore, this issue can be considered on priority bases and the HOs can apply the mentioned variable as a competitive advantage for effective HL. Hence, the model contributes a lot in terms of an academic point of view.

4.2. Practical implications

In HL after following a disaster, high employee turnover is a great challenge for management. Therefore, this research has some valuable implications. First, the main goal of this study is to identify employee turnover variables, their interrelationship, and importance in the system. This issue in the context of HL is very important and severely negatively impacting the effectiveness of HL which in turn affects the wellbeing of disaster survivors. Therefore, for effective HL the concern authorities can get help from the study findings. Second, the findings are beneficial for all stakeholders, especially HOs as they are constantly confronting this challenging issue after following a disaster. HOs are also seeking strategies to overcome this challenging issue to help victims during this difficult time of disaster. Hence, they can evaluate and overcome employee turnover on the basis of the findings presented in the article Third, the article highlights the mutual relationship among these identified 16 variables and emphasize the need to concentrate on the most key issues that need a planning orientation and implementation. HOs can increase their effectiveness, performance, and efficiency by overcoming the employee turnover for proper implementation in HL. Fourth, the ISM model gives a mode to prioritize variables. The resultant model enables the policymaker to implement appropriate strategies to distribute donated funds in an effective and continuing manner. The hierarchy model can also support control of the situation during a disaster. More specifically, the confirmed hierarchy can support to gain effective planning concerning employee turnover of the organization. Fifth, HR is the basic to operate the HL and it levels high because, without HR, HL is impossible. The article provides an understanding of a special issue of employee turnover during HL. The study methodology would serve as a road map to HOs to consider the variables that have to be managed on priority bases in the HL. Lastly, the article applied the methodology of ISM which has never been applied in the HL while considering employee turnover. This exhibits importance and mutual relationship between variables. Hence this is easy and simple to understand.

4.3. Limitations and Future Research Directions

The study found contributes to the field of research in the following several ways: First, since the employee turnover issue is more serious in HL than

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other fields, researchers can benefit from the study findings and may apply in their future observations. Second, even though employee turnover in HL has been studied poorly in the literature. This article opens new insight into this topic and contributes a new perspective to the literature. Yet, the article has not completely explained the employee turnover challenges in HL. Therefore, future work may apply quantitative data to elucidate statistically the current state of employee turnover challenges to HL. Third, although international and local HOs as a whole want to assist disaster victims, obstacles occur in the path of HL process, as particularly relief agencies do not keep in their team a sufficient number of logisticians and also do not provide proper training to make them effective humanitarian logisticians [9]. Furthermore, HL has not been identified as a respected path of career. HOs are faced by high turnover of the employee, shortage of expert logisticians and that ambiguous path of career, making the HRM cumbersome. The significance and impact of the HL process have been studied thoroughly but very little focus has been given in this context at employee turnover in HL, which should be further examined. Fourth, the ISM model developed in this article provides mutual relationships among the selected variables of employee turnover. Further investigation may take into account a graph-theoretic methodology to evolve a numerical index to measure employee turnover in HL. Fifth, the government can also support the process of HL by facilitating HOs with staff. The government is responsible for disaster management to give proper training and education in colleges and universities level. The related issues of employee turnover with the focus of training and education to the students as well public should be addressed in future lines of research on a priority basis. Sixth, the study model requires validation statistically. Lastly, this article was based on the study of [26] and [10] applied an ISM methodology. More variables may be investigated, and also mixed methods should be applied to contribute to the literature.

5. Conclusion

Human resources (HR) is the essence of any organization. It is widely acknowledged that HR is an invaluable organizational asset. Hence it should be assumed that the movement of this valuable asset "employee turnover" severely negatively affects the performance of HL, which further affects the wellbeing of disasters victims. Most importantly, high staff turnover is a crucial problem, distinctively for HOs. Further research and its implication are the possible way to overcome this issue. Despite the greater challenge of employee turnover in HL, a little systematic research has been performed to determine the interrelationship among employee turnover variables. This article provides a strong contribution to the stream of literature by investigating the mutual relationships between employee turnover variables in the context of HL. Furthermore, to some valuable academic contributions, the present research contributes significantly by providing HOs guidelines for understanding the imperative issue that may enhance HL effectiveness. As they are always seeking strategies for effective HL. In addition, the finding of the study is likely to offer HOs with guidelines to know properly employee turnover to enhance the performance of HOs through overcome this crucial issue and also raises the understanding of the need to wisely assess decisions related to the employee turnover. Still, the study findings have some limitations, the subsequent recommendations contribute to the related area of research by encouraging future research.

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