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RELATIONSHIP BETWEEN E-COMMERCE & KNOWLEDGE ECONOMY AND THEIR ROLE IN RISK ASSESSMENT PROCESS

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Abstract: Knowledge management is indeed not a new concept and has always been a critical side of intangible resource for the organizations. In today's modern and competitive world, there is a need for cost optimization and efficient output without which the organization will not be able to survive. The organizations focus more on building a better relationship with their customers who has to be reliable and trustworthy. This always has a positive effect on the image and reputation on the image of the organization. E-commerce is the delivery of products and services through the digital medium. Without e-commerce, the organizations will not be able to grow and survive in this digital era. If knowledge economy is collaborated with e-commerce, it will grow and evolve dynamically and it will become easier for them to meet the competitive edge and to reach its customers in any corner of the world connected virtually. E-commerce can be used as a tool to deliver services of knowledge economy by storing, transferring and sharing knowledge efficiently. It will help in reducing the task of generating the same knowledge again and again for individual organizations, belonging to different regions or for the individual units of a large organization. The different units may work together so that the same cycle of generating the same knowledge is not repeated and the cost incurred on such a process is reduced. The focus needs to be put on the knowledge workers as they play a major role in knowledge production. This model will help in throwing some light on the relationship between knowledge economy and e-commerce and how they are interconnected. If the factors related to e-commerce and knowledge in calculating the risk assessment for the organization can be displayed in the form of a matrix with a clear qualitative classification, the organization can focus on the areas that need proper attention and belong to a higher severity level.

Keywords: E-Commerce, Knowledge Economy, Knowledge Management, Risk Assessment.

INTRODUCTION

Knowledge consists of information and experiences both and knowledge management is synonymous to information management. The difference between knowledge management and information management exists only in the element of human presence. There are basically three steps in the concept of knowledge management:

- The knowledge asset of the organization and the intellectual capital has to be identified.
- Knowledge management has to be captured maintained
- There should be a repository in order to share and evaluate knowledge.

E-commerce as the name suggests is the dealing of products and services over electronic systems like internet or computer networks. The most widely used area where e-commerce exists and grows is the internet which itself exists at one or the other point of transaction. The growth of e-commerce can be made evident by the following facts:

- In the year 1996, a B2B marketplace with the name of IndiaMART was established.[1]
- In 2011, ebay acquired a company specialized in the field of creation, development and operation of online shopping sites. [2]
- In 2012, US e-commerce and online retail holiday sales reached \$33.8 billion(up by 13%).[3]

Technology is a field which is dynamic and progressive. What e-commerce does is that it opens the door of a new world for the customers to explore more and for the organizations to meet the needs of their customers irrespective of the limitation such as territorial limits and availability. The major reason for implementing e-commerce in knowledge economy is that the response time, the availability of services and a lot of new resources shall be made available for the customer side.

Knowledge economy is the use of technologies related to knowledge like knowledge management and knowledge engineering in order to produce both economic benefit and job creation. This concept is as old as 1966 when Peter Drucker[4] stated the difference between manual worker who work with hands and produce goods and services, and knowledge workers who work with their heads and produce ideas, knowledge and information.

The organizations are shifting their approach from being limited to product based and are now including customer and services in its purview. If any organization has to establish itself in today's competitive world, it has to provide its customers not only a better product but also an effective service and have to maintain a reliable and trustworthy relationship. If outsourcing is not done in an efficient manner, it will hamper the growth and existence of an organization and this problem can be solved by the concept of knowledge economy. [6]An organization should

not only focus on the product and the target markets but also on how to add value to the products. Knowledge is the most important element of a strategic resource of an organization. It adds value by creating customer support, development of products, evolving new ideas, working in ignored areas and deriving the future prospects of a product.

Risk management is not limited to just certain standards and statutes but it finds its importance in the modern corporate world. If the risk assessment approach does not meet the competent level of need, the existence of the organization can come in danger and it will start to decline slowly.[7]

Failure of security incident management for e-commerce risk management that leads to exposures that are unwanted. It includes planning and development and can help in cost optimization. Risk assessment includes identifying all the risks that an organization will face and classifying them according to the degree of their capability to cause loss to the organization.[8]

As evident above, knowledge is the central element in competitive factor and economic stability. OECD[6] has stated that knowledge accumulation has gained importance and its accumulation is no more different from accumulation of capital for any organization. The concept behind putting the idea of knowledge economy in e-commerce lies in the fact that there is a need to know how knowledge management can help in the growth and progress of an organization.

Knowledge is an intangible resource in economy and holds a place of utmost importance but is generally ignored. The reason for such ignorance is that knowledge management is not a traditional concept and has always been ignored by the stakeholders. By providing e-commerce as a driver in knowledge economy, the knowledge will flow between the organizations among those who need it and to those who deliver it without any boundaries. In order to understand the customer perspective, the organization should have an ability to use and deploy the technology effectively. The collaboration of e-commerce and knowledge management should be done in such a manner that maximum benefit is derived by knowledge economy.

LITERATURE REVIEW

The concept of knowledge economy was first given by Peter Drucker in 1966 in his book 'The Effective Executive' where he mentioned that there are two types of workers. One is the manual workers who use their hands and produce goods and services and the second are the knowledge workers who use their heads and produce knowledge etc.

E-commerce has information technology as its base and without the development of information technology; knowledge management will find no existence. It is therefore, necessary to emphasize the relationship between information technology and knowledge management. According to a publication by OECD [6], there is a need for the development of IT in order to meet the requirements of what to know and why to know. The digital era has linked the sources of information whether they are public or private which establishes the foundation stone of a collective and

easily accessible huge digital library. The digitization of knowledge has converted it into a commodity. Dealing with the role of information technology in knowledge based economy, the three functions were mentioned: knowledge production, knowledge transmission and knowledge transfer.

The goal of the latest knowledge economy has to be in arranging knowledge in such a form that ideas are used to create business and the competitive edge has to be met. In an article published by Bray J. Brockbank[11], it was stated that providing knowledge in the form of training to the employees is a cumbersome task for the organizations. The focus of an organization has to be on the field of making knowledge more accessible and it has to be managed centrally so that learning, training and knowledge become an easy task for the organizations. The concept of e-learning portals was also been given which will transform the nature of information economy into knowledge economy.

The expansion of e-commerce and the development of information technology are the factors that lead to transform knowledge management to a more tacit and complex structure. In an International conference [9] held in Washington in 2005, it was presented that how the interaction of information technology, strategy and changing economic and social conditions can be examined.

Knowledge economy and information technology exist in virtual world but they have the existence of the human factor behind every field. Denise A.D. Bedford [10] dealt with the concept of digital ecosystem. He stated that the most important and valuable factor in knowledge economy is the intellectual capital. He refers international capital as the knowledge of any organization contributed by its people, communities and resources dedicated specifically to knowledge. The relationship between knowledge and digital species can be made visible by the fact that the reason behind the growth of intellectual capital is the individual.

The role of government organizations have to be effective if there is a need to develop knowledge economy. The second thing that comes in picture is education and training. The importance of Information and Communication Technology cannot be ignored at this level also. They are a significant factor in the upliftment of the concept of knowledge economy. The drivers of knowledge economy include: Government Institutions and economic support, training and education focusing more on development of skills, ICT and organization infrastructure and last but not the least innovation. AdilKurlic and Sabina Donlagic (2012)[12] state that the basis of knowledge economy is knowledge and information as both of them are at the core of economic development. If knowledge economy has to be developed then, there has to be a change in several aspects of the economy.

But, modification of economy cannot be the only perspective in deriving a relation between e-commerce and knowledge management. There can be several issues such as providing an effective model for knowledge management. McAdam and McCreedy[13] constructed the theory of

'personalization strategy' and 'socially construct model' for knowledge management. Rachael McLean and Nigel M. Blackie in their work have identified two approaches for research on the internet. One is the information retrieval view and the other is the communication view. Since the time of evolution of the internet, the access to any information has noted a huge increase due to large number of websites in operation and this has resulted in information overload.

The different processes that are a part and parcel of knowledge management are:

- a. Knowledge creation, given by Nonaka (1994);[14]
- b. Knowledge transfer given by Huber in 1991 and restated by Zander and Kogut[15] in 1995;
- c. Knowledge integration stated by Grant in 1996[16];
- d. Knowledge leverage given by Spender in 1996[17].

The concept of knowledge management has to be looked carefully in order to develop it to a certain level and for this task, the focus has to be on the methods of transferring the knowledge as it is also an integral part of both knowledge management and e-commerce. Knowledge transfer capability is the ability of any organization to transfer its stored knowledge to different business units. According to Szulanski (1996)[18] and Zander and Kogut (1995)[15], it helps in giving a competitive edge to the organization. The knowledge leverage capability, on the other hand, is the realization of the potential of the current knowledge stock of an organization. According to Nobeoka and Cusumano (1997)[19], knowledge leverage capability has positive effects on any organization's sales growth.

The relationship between knowledge management and IT industry has been taken up by various researches in account. The factors defining the IT service industry were stated that include high competencies in technology, focus on business, style management, work culture of the knowledge workers and knowledge relationships in the IT service industry that inspires the elements of creativity and innovation. Emphasis on knowledge and knowledge management has changed the nature of IT service industry. The expectation of service delivery by the IT industry is higher as there is an availability of specialized skill at nominal costs.[5]

The concept of value addition by knowledge management in the IT service industry has been listed and it has been said that it comprises of one or combination of these elements. The list includes cost reduction- the information once produced can be stored for future use, thus reducing the cost of its re-generation. Quality improvement- if the processes are efficient then the quality will definitely improve by itself. Satisfied customer- the customer needs are met quickly and the requests can be interpreted fast by leveraging knowledge. Competitive edge- the available knowledge can be used to meet the competitive edge and Improved Production- when the best practices are shared there is an optimal delivery of performance.[21]

The identification of threats over the security in relation to the technological aspects of information as knowledge management and e-commerce both deal with the storage and

transfer of information itself. A mathematical model was given for security technology which focused on the decision making perspective of the organization. Various measures for security were used that identified different processes related to information and the potential threats.[22]

The major problem regarding the security of knowledge exists because of the diverse scope of knowledge and its existence in various forms. It has been stated by Earl Cox that knowledge is difficult to identify in its form of existence which makes the process of risk assessment on the basis of knowledge a tough task. Imprecision and vagueness in the parameter of knowledge is also one of the critical aspect to perform the risk assessment into an organization.[23]

Decision systems are used for the risk assessment into e-commerce. The potential risk into e-commerce has been generated by various factors and assigning them an extent of weight by taking the help experts. In the given work, the risk is calculated at the various levels of e-commerce and at the end, the risk is identified by defining the obtained risk and its extent.[24]

There are several growth factors of e-commerce that vary from technological, external and organizational. It is evident enough that the IT service industry depends on the knowledge workers for its existence and growth. Retaining knowledge is an important issue as the industry faces work force changes that are high. There is a need to use knowledge efficiently and to protect it accordingly within the organization as well as outside the organization.

Knowledge management and knowledge economy is not a new concept indeed but no work as per our knowledge has been done focusing specifically on how knowledge economics and e-commerce can be used together as a factor in the risk assessment process for an organization.

METHODOLOGY

The major problem with knowledge economy is that it is just an evolving concept and needs a lot of attention for its growth and recognition. E-commerce is therefore taken as a means to establish its recognition and widen its scope and they have been merged together to show how they can be used effectively in the risk assessment process in an organization.

For developing a better understanding of the model, it is very much necessary to understand the interrelationship between the major components of e-commerce and knowledge at the primary level which has been explained in the Figure 1. E-commerce is a place where people communicate with each other and share their knowledge with each other.

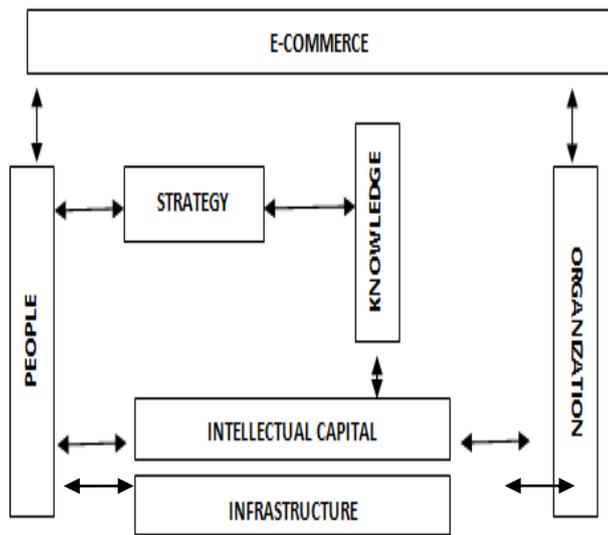


Figure 1: Interrelationship Between E-Commerce, Organization And Knowledge

This field also contains the organizations as e-commerce is a field where products and services are delivered through a digital medium. Knowledge is a form of intangible resource for the organization and is mostly attained by the people and stored by the organization for future use. Now people are a part of the infrastructure and are a valuable asset for the organization as they help in creating knowledge, building strategies and contribute in creating intellectual capital for the organization. This intellectual capital when used, shared, transferred in the digital medium gives rise to a new field of knowledge economy which is in its development phase.

E-commerce has two pillars- resources and information technology. Without resources it cannot be implemented and without information technology, it will find no existence. The reason behind the growth of e-commerce is the digital era where e-commerce finds its place to exist and evolve. Technology is the place where people come together and exchange their ideas and can share their knowledge worldwide. Without the resources, no platform would be available for them to establish the communication and store, transfer, share or collect knowledge anywhere and everywhere. Resources provide the base where e-commerce and people come together and work together. Information technology provides a means for this. Tim Berners Lee(1994) noted that WWW was developed to be arena of knowledge which will allow distant resources to share the ideas and other aspects of some common subject. According to Rowley(2000)[25], E-business covers all areas of using IT in business. It is not confined to only buying and selling but also includes providing services to customers and collaboration of business partners.

As has been stated earlier, without resources, no platform shall be available for knowledge management to find its existence. If we analyze knowledge related to Information Technology, it can broadly be divided into two broad categories:

- a. Knowledge carried by the employees;
- b. Knowledge gained by other means such as sharing, transfer and innovation etc.

Knowledge is an asset for the organization but we need to share and transfer it inside or outside the organization for cost reduction and increase in efficiency. Therefore, knowledge management requires ample resources for its establishment and management.

IT and knowledge management have a critical relation with the organization. The knowledge of IT exists in various forms in the organization as it is carried by the managers and it is often found in the infrastructure. It is not a short process for producing IT related knowledge but is a process that evolves in a long time period. The process of IT related knowledge development occurs during development, analysis and use of the organization's information technology systems. It always helps in achieving a better performance at the information technology level.

The role of beneficiaries in knowledge management is an integral part for its development. They belong to the external resources of the organization that are used for the development of the organization. Beneficiaries includes customer as a major resource for knowledge development and management. The rationale lies in the fact that the development of the products, the needs in the market and the requirements are derived from keeping customer in the center.

Coming to the 'strategy' element in the model, it encompasses in itself two components: customer feedback and innovation. The term customer feedback means simply the feedback given by the customers about the product and the service delivery. The organization should keep in mind the needs of the customers and the areas where the organization is unable to provide sufficient services. Feedback will help the organization to collect information and about the performance and service delivery of the organization. The enquiries generally made by the customers and the solutions thus provided shall be recorded and the focus should be made on those areas where the customers are left dissatisfied with the knowledge provided to them.

Innovation is a major element in the growth of an organization. Carrying the same concept time and again will not lead the organization further in its progress. Without developing any new concepts time to time the organization will find no place in the advanced technological era. The knowledge workers have always been a valuable asset for the organizations. If there will be no innovation, the traditional corporate concepts will certainly not be able to face the new technologically advanced society and will not find a place for its existence in the society. Innovation helps in building new ways and provides new methods for providing customer support and service delivery. They can emerge as new resources and providing new opportunities from the traditional business arena. Innovation is an important driver of knowledge economy and should not be confined to the private sector research and development activities find their basis in innovation itself. It has an effect on the production methods, the patterns of consumption and on the economic structure as well.

The organizational structure holds the most important place in knowledge management. It includes the work culture, infrastructure of the organization, the method and procedure of hiring the employees, the environment of the organization etc. every organization has its pre-defined goals that are based on the strategy. The strategy of the organization in turn is affected by what the organization wants to achieve and by what means. Without having any goal, the purpose of formation of an organization shall be frustrated. The goals of an organization have to be met by the collaboration of how the drivers of e-commerce can be used in the field of knowledge management. In case the organization is small, it should meet the demands of its customers by taking the help of other huge organization's knowledge base which will be governed under the arena of e-commerce and will be judged by the factors of knowledge economy. The goals of the organization have to be related to particular nature of its

knowledge management environment and should be made in relation with the perspective of the customer perspective. The development of e-commerce and knowledge economy should be done by carefully keeping the goals of the organization in mind. This will help in improving the overall performance of the organization and giving it a concrete base for establishment and means to move forward.

Goals are generally determined in accordance with the nature of the people the organization has. People here mean and includes the stakeholders who form a pillar for the organization, from managers to employees till the customers. The goals are indeed set by the managers but they should always be made with respect to the need of the customer, the nature of the business and in the interest of the organization

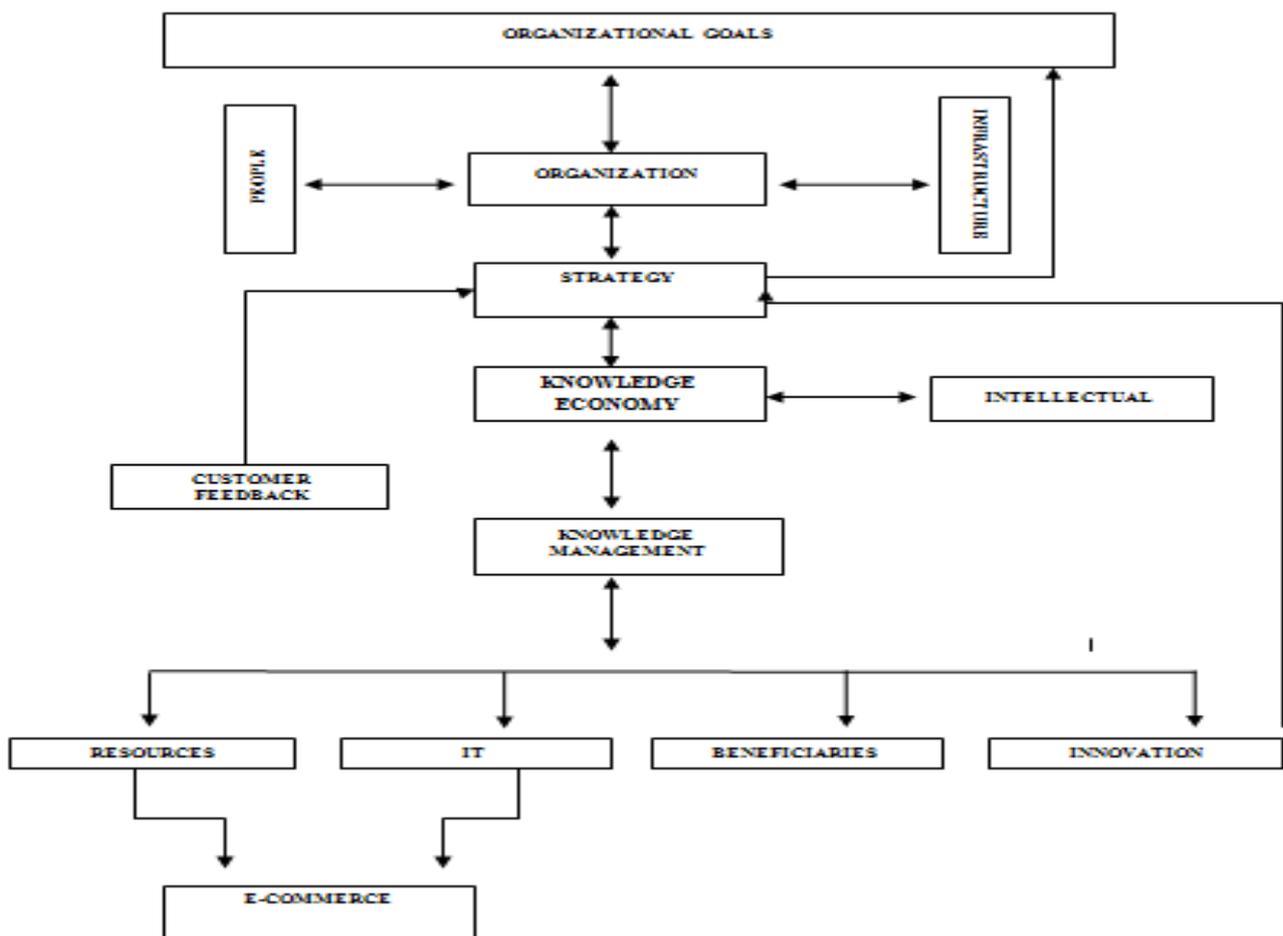


Figure 2: Model To Show The Relationship Of Knowledge Economy And E-Commerce

And its employees as well. If the established goals have to be met, the primary need is of the employees who have the required skills and knowledge in order to meet such expectations. Knowledge management and knowledge economy thus find their place here as they will help the organizations in its development which are lagging behind in one or more areas that have been stated above.

RISK ASSESSMENT PROCESS

In the process of risk assessment, for any organization, certain elements have to be considered both for knowledge

economy and e-commerce. In normal course, for risk assessment process in e-commerce the element of knowledge has always been ignored. But the following model will show how the element of knowledge can be used to derive risk assessment for an organization.

The risk assessment process shall be performed at two levels for improving the accuracy of the result in order to improve the effectiveness of decision making in the field of e-commerce. At the first level of risk assessment, e-commerce shall be taken as a whole.

The following elements can be listed for e-commerce [26]:

- a. Z_{im} which means Management. Here, Management includes Business and governance.
- b. Z_{is} which means collectively those elements from which the organization needs to be protected. It includes- consumers giving negative effect on the organization, environmental threat, competitors, and attackers.
- c. Z_{ia} which means information security and includes integrity, confidentiality, availability, authenticity and non-repudiation.
- d. Z_{ir} which means incident response and includes technology, backups, knowledge procurement and emergency response.

Now, considering all the factors mentioned above and initiating the risk assessment process,

$$Z_i = Z_{i1}, Z_{i2}, Z_{i3}, \dots, Z_{if} \dots (1)$$

Where, Z_{i1} is Management factor, Z_{i2} those elements that need to be protected, Z_{i3} are the information security auditing elements, Z_{i4} are the elements of incident response, and; $i=1$ to n and f is a factor.

Now the next thing is to weigh the criticality of factors belonging to e-commerce used in the decision making process for an organization. Here, the three time factors will also be included, viz. repair time, detection time and loss which is independent of time [22]. For each element described in equation (1) there will be a corresponding value of their weight as follows :

$$W_i = W_{i1}, W_{i2}, W_{i3}, \dots, W_{if} \dots (2)$$

Where, $\sum_{l=1}^n W_{il} = 1 \dots (3)$

The individual factor's output in e-commerce shall be denoted by I_i .

Now, when we calculate the output of each individual factor that are Z_{im} , Z_{is} , Z_{ia} , Z_{ir} on the basis of eq (1) and eq (2), the outcome can be written as:

$$Z_{if}^* = W_i * I_i \dots (4) \text{ And, } i=1 \text{ to } n \text{ and } f \text{ is a factor.}$$

Now, the output for level 1 in case of e-commerce business can be displayed in the form of a matrix as follows:

$$\ell^* = \begin{pmatrix} Z_{im}^* \\ Z_{is}^* \\ Z_{ia}^* \\ Z_{ir}^* \end{pmatrix} \cdot Z_i \dots (5)$$

The next level in the process includes the calculation of knowledge economy as a factor for risk assessment process. The similar procedure shall be followed for the risk assessment as was in the case of e-commerce. The factors that are included in the risk assessment process for knowledge economy can be stated as follows:

- a. Strategy denoted by K_{is} which includes knowledge workers, strategies developed at the workplace and the partners' participation in knowledge sharing, knowledge transfer and knowledge creation.

- b. Knowledge management denoted by K_{im} and includes criticality of human asset, necessity, skill development process, strategic alignment and training; and
- c. Prospects denoted by K_{ip} and include dangers, productivity, current situation and future trends.

Now performing the risk assessment process on the basis of the above discussed knowledge economy factors,

$$K = K_{i1}, K_{i2}, K_{i3}, \dots, K_{if} \dots (6)$$

And, $i=1$ to n and f is a factor.

Now the next thing is to weigh the criticality of factors belonging to e-commerce used in the decision making process for an organization. Here, the three time factors will also be included, viz. repair time, detection time and loss which is independent of time. For each element described in equation (6) there will be a corresponding value of their weight as follows:

$$W_i = W_{i1}, W_{i2}, W_{i3}, \dots, W_{if} \dots (7)$$

Where, $\sum_{k=1}^n W_{ik} = 1 \dots (8)$

The individual factor's output in e-commerce shall be denoted by I_i^* .

Now, when we calculate the output of each individual factor that are Z_{im} , Z_{is} , Z_{ia} , Z_{ir} on the basis of eq (1) and eq (3), the outcome can be written as:

$$K_{if}^* = K_i * I_i^* \dots (9)$$

And, $i=1$ to n and f is a factor.

Now, the output for level 2 in case of knowledge as a factor in an organization's risk assessment can be displayed in the form of a matrix as follows:

$$\Psi = \begin{pmatrix} K_{is}^* \\ K_{im}^* \\ K_{ip}^* \end{pmatrix} \cdot K_i \dots (10)$$

For displaying the total risk assessment for an organization for e-commerce and knowledge, equation 5 and equation 10 will be merged and the result can be written as:[27]

Result, $O^* = \{ \text{very high, high, medium, low, very low} \}$

The range for the entities shall be:

- Very high= $.80 \leq O^* < 1$
- High= $.60 \leq O^* < .80$
- Medium= $.40 \leq O^* < .60$
- Low= $.20 \leq O^* < .40$
- Very low= $0 \leq O^* < .20$

And a new matrix for mapping the risk assessment for the organization after merging the factors of e-commerce and knowledge shall be made to define the extent of risk in E-Commerce.

In this way, the factors of knowledge economy and e-commerce can be displayed in the form of matrix that can be used to display the actual outcome of the risk assessment process for an organization.

Without a particular strategy formulation, no goals can be achieved. In order to formulate a strategy, an organization needs a competent level of skilled employees, sufficient technology, infrastructure, resources, etc. if proper formulation of strategy is not done by keeping all the factors in mind, the goals can never be met and the purpose of the organization shall fail as a whole.

The collaboration of all the factors will help the e-commerce and knowledge management to grow and the factor of knowledge economy shall meet a new phase of progression. The major requirement of knowledge economy is for those organizations which lack in one or more than one of the drivers that have been stated in the model. E-commerce as a channel can be used by them so that the quality of service delivery is improved to a certain level where the organization can meet the requirements of customer satisfaction and establish a competitive edge.

CONCLUSION

The concept of knowledge economics is in a developing state and there is a need to evolve it in order to help the organization at times in need. The organizations can collaborate in the common field of e-commerce by sharing their knowledge with each other and reducing the time and cost incurred on a particular issue. Each and every factor has its own importance in this model but the major concern is of employees and the goals of meeting the customer requirements. Knowledge economy through e-commerce shall help in an effective service delivery for better customer support. If knowledge economy is taken as a whole, it will definitely improve the service quality of an organization and will help in its development and growth in today's world. There is a need to share knowledge and distribute it through e-commerce as it provides a means for service delivery irrespective of geographical boundaries. With the clear mapping of the factors of e-commerce and knowledge economy in the risk assessment process, an organization will get a clear view of what areas are there which need a lot of attention for the betterment of the security at the organizational level. The result in the final equation will give a clear report regarding the threats and vulnerabilities in the field of knowledge and e-commerce which will in turn help the organization to identify the existing problem in the current scenario.

FUTURE WORK

There is a scope of research for the determinants of the knowledge economy and how the effect of knowledge economy can be measured mathematically. This model shows the interrelationship between knowledge economics and e-commerce. There is also scope in defining more factors that govern the relationship of e-commerce and knowledge management. A quantitative approach can also be given by showing the calculation of the factors related to knowledge and e-commerce and how the matrix can be improved more in relation to its effectiveness.

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