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Cognitive Transformation Reflections Based on the Supply Chain Management and 5s Requirements (An Analytical Descriptive Study of a Sample of Workers in Zaki / Iraq Factory in the Province of Dohuk)

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Abstract- **The organizations work in the face of competitive and environmental challenges that are intertwined and rapidly changing, as well as the information and technology revolution and the great development in all fields. These challenges require that these organizations should overcome the competition strategy of the logic of the cost to move to the strategy of competition in the logic of excellence in achieving their specific objectives. In this light the need for the use of new methods such as 5 s and supply chain managements by organizations are necessary. The importance of the study stems from the fact that it is related to the book's call for knowledge management to take into consideration the transformation of knowledge, which is linked to the philosophy of the five steps 5s in Zaki plant to achieve the production plan in time. The study is important in trying to provide a theoretical and field framework that links the transformation of knowledge and philosophy of the five steps 5s in the plant under study. In light of the problem of the study and its importance, the objective of the study is mainly to achieve the implications of cognitive transformation and knowledge of the ability to meet the requirements of 5s under study, the researchers considered that the transformation of knowledge independent variable and the philosophy of steps 5s adopted variable. The content of this research includes a description of the nature of the variables of the study as perceived by the individuals in the plant. To achieve this, (SPSS 19)* was used to deduce the computation, standard deviations, frequencies, percentages and response ratio to the area of the scale. The analysis of the data of this relationship was based on the hypothesis of the study, which states that " Combined knowledge and the five steps combined in the plant under study. " The study was able to arrive at a set of conclusions, the most important of which was the existence of a correlation relationship and a significant effect between knowledge mobility and the five steps. This shows the important role driven by knowledge mobility towards the five steps. In order to complete the requirements of the methodology and based on the findings of the two researchers, a number of recommendations were made. The most important of these recommendations were to raise awareness among the decision makers at the Zaki Iraq factory about the concept of transformation and distance of knowledge as well as the five steps and elements. On the one hand, to deepen awareness about the correlation and influence between knowledge mobility and the five steps.**

Keywords- *organization efficiency, decision making, supply chain management, 5s strategy*

1. Introduction

The quarter final of the last decade has witnessed successive developments in all fields of life including knowledge management, planning systems and monitoring. As a result, ideas of Dynamic Theory have been emerged to establish organizational knowledge which was developed by researchers. Organizational knowledge has a great contribution in developing knowledge management. The process of generating knowledge inside the organization has a beginning and does not have an end and updating itself continuously. Product quality represents one of the effective strategies aims that organizations, which adopt new administrative conceptions and techniques to improve work conditions within the company, adopt them. The accessibility of data patterns enables

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the organization to get into modern business world characterized with dynamism. The present study aims at submitting a new viewpoint on establishing basic foundations to adopt certain conceptions link newly-made relations between cognitive transformation and five steps. The two researchers use personal interviews with some samples in the organization to clarify points of the questionnaire just in case to ensure appropriate answers. The researchers adopt (45) applications which are essential tool in collecting data. The two researchers utilize Cronbach's Alpha to measure degree of credibility of questionnaire's points. The test results (0.925 %) and table (1) illustrates Cronbach's Alpha test in the organization.

Table1. Results of Cronbach's Alpha Test in factory under consideration

Variables		Phrases	Cronbach's Alpha Value
Cognitive transformation	Socialization	1 – 5	0.893
	Externalization	6 – 10	0.766
	Combination	11 – 15	0.667
	Internalization	16 – 20	0.875
Five Steps	Filtering	1 – 3	0.880
	Organization	4 – 6	0.884
	Cleanliness	7 – 9	0.797
	Standardization	10 – 12	0.701
	Self-discipline	13 – 15	0.714
Questionnaire in general			0.925

Source: the table prepared by the two researchers

The researchers utilize a set of statistical tools, including repetitions, percentages, arithmetic and standard deviations, to describe and diagnose variables of the study. Responses were measured to identify respondents' attitudes towards variables of the study and according to the following formula:

1. Responses measurement: to identify respondents' attitudes towards variables of the study according the following formula:

Response rate to scale distance = $\frac{arethmetic\ of\ individuals' responses}{number\ of\ scale's\ degrees} \times 100$

2. Variance factor: to identify the extent to which respondent's responses are consistent to variables of the study according to the following formula:

Variance factor = $\frac{arethmetic}{standard\ criterion} \times 100$

2. Chapter One

[1] defines cognitive transformation as a process affected by (group, department, administration) an experience or another unit experience. [2] define cognitive transformation as a process in which individuals exchange tacit and explicit knowledge through many interactive rings. They share their experiences, values and ideas to generate a new kind of knowledge. While [3] points that it is a dynamic process depends on organization ability to contain, integrate and exchange unique information to establish new kind of knowledge. [4] describes cognitive transformation as organizational practices that the organization adopt to move individuals from one department to another as they are active carriers of explicit and tacit knowledge. Accordingly, information can be restructured and applied in different contexts. [5] describes it as a kind of social interaction forms that allows to learn from others' experiences by repeating their practices and apply them to improve organization performance. [6] points out that cognitive transformation is a dynamic process of transferring knowledge between source and receiver. In view of the foregoing, it can be point out what is the meaning of cognitive transformation by a set of practices through which visions, ideas and experiences are exchanged. It also connects with individual's ability to learn, his/ her readiness for dialogue and present viewpoint to generate ideas and get to new knowledge. Cognitive transformation has many forms including:

1. Cognitive transformation according to [7]

[7] present a model known as SECI which is expressed by the following terms (Externalization, Combination, Internalization, Socialization). The model reveals an interactive spiral movement between explicit and tacit knowledge followed by four cognitive transformational processes started from socialization, Externalization then Combination

and Internalization. These processes work by ascendant movement, means that each process based on the previous one in generating and constructing knowledge according to three major levels: individuals, groups and organization[8]. Figure (1) illustrates dynamism of cognitive transformation.

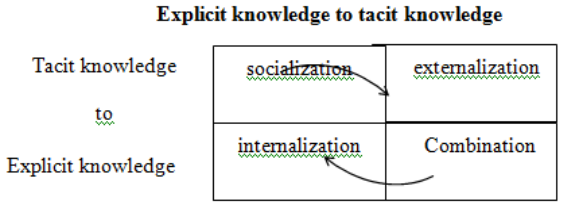

Figure1. Dynamism of Cognitive Transformation
Source: Finley, [9], Nonaks SECI Framework: Case Study Evidence and an Extension, Kindal Management Review Vol.1, No.3.p.60.

According to SECI model, knowledge emerges through transformation between Tacit knowledge and Explicit Knowledge. The result is cycle of knowledge innovation. It includes four transformation processes [9]:

A. Socialization (transforms tacit knowledge into new tacit knowledge)

The transformation of tacit knowledge into new tacit knowledge through direct interaction between workers inside the organization or with clients and importers outside the organization through exchanging acquired experiences, thoughts and skills [10]. While [2] say that tacit knowledge transformation between workers achieved by joint experiences and wide space that allow thoughts exchanging and viewpoints presentation. It takes other forms such as brainstorming, informal meetings, discussions, dialogue and monitoring.

[9] add that interaction with work environment, known as management by walking around (MBWA), can give an image of nonverbal communication enables individuals to read lots of data and contents which are hard to be expressed by talking.

B. Externalization (transforms tacit knowledge into explicit knowledge)

This process starts after a set of useful dialogues which lead to establish a mechanism of group interaction that allows exchanging thoughts, models, measurements and hypotheses [11]. [12] points out that tacit knowledge transformation into explicit knowledge takes place through group dialogue and thinking. It is regarded as a driving force to express what is going on inside individuals' mind and can establish new conceptions, models and encourage joint discipline to adopt creative thoughts.

C. Combination (transforms explicit knowledge into explicit knowledge)

It is a process of reunification and rearrangement of explicit knowledge through combining general data from different sources or through phone conversations, video conferences and internet. Considering the critical role of central administration in finding and producing new knowledge as it has a large set of data base. In addition, it represents a link between supreme administration and executive administration [12]. [13] add that transformation mechanism based on nature of existing relationships among work groups characterized as clear and transparent.

D. Internalization (transforms explicit knowledge into tacit knowledge)

This process includes transforming of explicit knowledge into tacit knowledge by sharing experiences of individuals, dialogue and learning communities online and transfer it into tacit knowledge additional to their knowledge storage [14]. [15] mentions that explicit knowledge transformation into tacit knowledge takes place by exchanging new values, ideas and visions between technical administrations and product development teams through active participation, coordination of activities and ongoing communication. Takeuchi & Nonaka theory, related to cognitive transformation, points out the existence two dimensions to generate knowledge, epistemological dimension and ontological dimension. According to these dimensions, spiral movement takes place to generate knowledge spiral as a result of interaction among the four models to transform knowledge [16]. Figure (2) illustrates interaction mechanism among the four models based on their movement from individual towards group then organization.

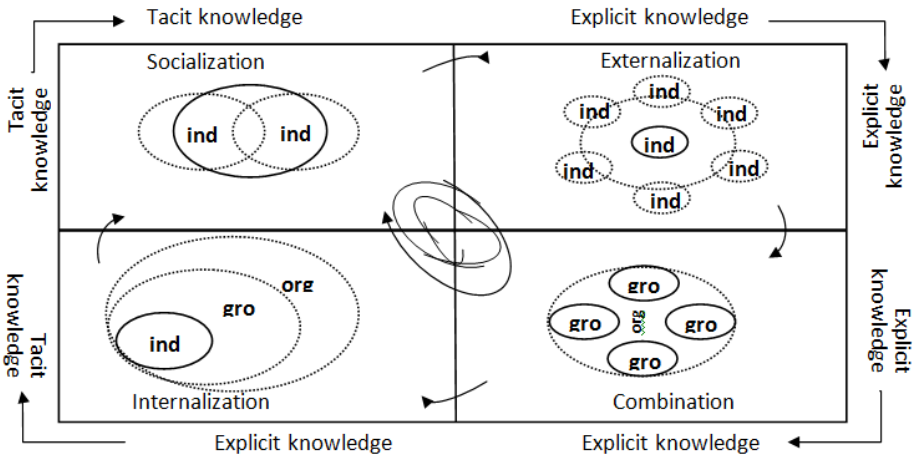

Figure2. Illustrates interactive mechanism among cognitive transformation processes
Source: [17] The Concept of "Ba" Building of Foundation for Knowledge Creation, Calfonia Management Review, Vol 40., No3. p43

2. Cognitive transformation according to dynamism of typical knowledge

A group of researchers, Josemilio Navas Lopez, Pedro Lopez, De Castro, Gregorio Martin, Raques Galindo Dorado, present an extended model for (Nonaka SECI) by using epistemological dimension and ontological dimension to generate dynamic movement on four level; individual, group, organization and among organizations. The name of the model comes from (E) epistemological dimension and (O) ontological dimension and the letters SECI are the abbreviation of (S) Socialization, (E) Externalization, (C) Combination and (I) Internalization [18].

The two researchers identify a set of characteristics for this extended model [19]:

1. Considering Ontological dimension, there are four cognitive transformations which are: socialization, externalization, combination and internalization.
2. The processing of ascendant cognitive dynamisms is the result of SECI.
3. Knowledge develop along with ontological dimension from the early stage till the late stage without any other medium transformations.
4. Considering the two currents at the same time, the main ascendant current represents forward feed and reverse feed for the whole process. These synchronized currents lead to a cycle of self-reinforcement and represents a better description than knowledge spiral.

This model can be represented graphically through double-edged chart. Vertical edge represents epistemological dimension and horizontal edge represents ontological dimension. Figure (5) illustrates mechanism of the model.

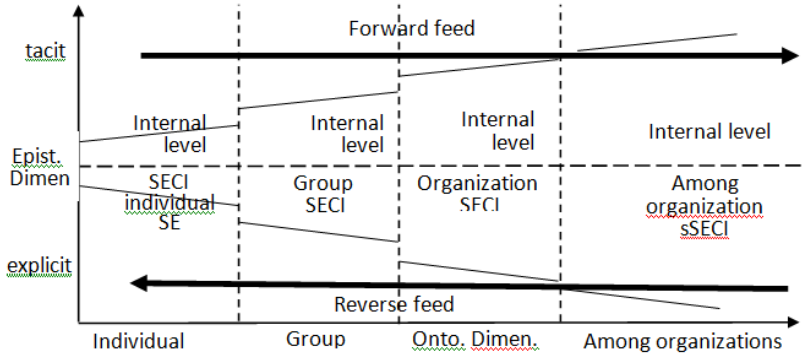

Figure5. Graphic representation of the model EO – SECI
Source: [18] Organizational Knowledge Creation, Management & Marketing Challenges for Knowledge Society, Vol.5, No.3., P.58.

From here, adopting Nonaka view is the most acceptable to represent cognitive transformation which can be a starting point for our research in explaining cognitive transformation processes to

generate organizational knowledge. It is regarded as the most applicable and common model among other models.

3. Chapter Two

3.1. Critical elements for Five Steps

Ongoing enhancement process requires utilization of a set of tools. Tools developed by quality scientists such as Five Steps. It is a Japanese concept presents by (Taiichi Ohno), designer of Toyota Production System, and (Shigeo Shingo), practitioner presents Poka concept. Five Steps Concept is a Japanese philosophy that most administrative methodologies were built on it in the field of production and quality management such as Total Quality Management (TQM), Kaizen, Just in Time Manufacturing and Total Productive Maintenance (TPM). The methodology aims at enhancing production quality by optimum use of available materials. Then, the Japanese developed it so it is the way leads to many administrative methodologies in production and quality management such as TQM, KAIZEN, JIT, TPM and others [20] as illustrated in figure (6).

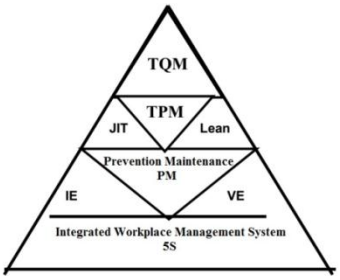

Figure6. illustrates Five Steps Technique as a base for many quality techniques
Source: I.P.S. [21] "Total productive maintenance: literature review and directions", International Journal of Quality & Reliability Emerald Group Publishing Limited,

On the other hand, [22] sees that this technique is regarded as "Sweep Criterion". It is a method to organize and manage workplace and flow of work in order to enhance efficiency by removing rubbish and reduce unqualified processes. [23] identifies utilization of Five Steps in North America and Europe as a main tool for fine manufacturing. Many researches prove that it is an essential tool for fine manufacturing. Organizations often choose Five Steps as a starting method in their fine manufacturing program as it is an applicable and understandable process for workers [22]. [24] see that it is one of many common administrative tools aims at enhancing work efficiency through arranging organization environment. [6] defines it as an essential technique that enhances production efficiency and ensures a suitable organizational atmosphere. [25] sees it as a series of designed activities to enhance organization workplace and to unify standardizations and all these activities starts with S letter. [26] see it as a Japanese methodology to organize and enhance joint work efficiency through incorporate important processes such as sweep, sorting and rearrange surrounded areas and work method inside workplace. Accordingly, the two researchers see Five Steps Conception as a concept presents in japan as a tool used for ongoing enhancement for workplace and to ensure its flow inside organization. Many literatures point out the necessity to adopt a set of bases in applying the theory of Five Steps (Person Maharjan), [27], [28] and as follows:

1. Training: application of Five Steps Bases should start to train workers on its contents and benefits of its application. All participants will understand the need to adopt this technique to control workplaces, their approval on changes through apprehend the methodology of this technique and its importance in all sites of organization.
2. Participation: application of this technique requires participation of workers and administration. Participation does not limit to a group of workers with special skills but to all workers in the organization whatever their ranks and qualifications. It is also should be applied by all departments and it is necessary to be applied gradually to get best results.
3. Forming teams: formation of typical teams of number of individuals with different posts in the organization. The number of these teams depends on size of the organization and brainstorming is a tool to enhance and develop. Ongoing enhancement well-known as Five Steps because it consists of five elements start with letter S in Japanese language.

Table (2) summarizes relevant idioms and as follows:

Arabic	English	English starts with letter S	Japanese
التنظيم	Organization	Sort	Seirri
الترتيب	Tidiness	Systematize	Seiton
التنظيف	Cleanliness	Sweep	Seiso
الصيانة	Maintenance	Standardization	Seiketsu
الانضباط	Discipline	Self-discipline	Shitsuke

Figure7. Illustrates reciprocal and integrative processes among these Five Steps do not work apart from each another
Source: [29]

1. Categorization:

sees that it removes all excessive and unwanted elements from work center. In this stages, it decides what is really required and what is not existed. In this stage, any item or tool exists out of work or unnecessary must be documented. [30] defines it as eliminating unwanted elements from workplace to get desired result. sees that it is sorting and organizing elements (critical, important, periodic, useless and unwanted now). Unwanted elements can be picked up, critical elements preserve nearby and unused elements in the future preserve somewhere else. In this step, elements' value calculates in terms of benefits but not cost. As a result, reduce search time. This step can be divided into sub-steps and as follows:

- Specify and eliminate findings.
- Get rid of unused tools and stagnant.

Table3. Illustrates elimination process depending on rate of use

Priorities	Rate of use	Way of use
Low	Less than once a year	Get rid of it, keep it away from workplace
Medium	At least once every two or six months, once a month, once a week	keep it together somewhere in workplace
High	Once a day	keep it in workplace

Source: An Introduction to Total Productive Maintenance (TPM), The Plant Maintenance Resource Center, p8

This step has many advantages and as follows [31], [32]:

- Increases production by making areas of individual work clear and makes flow of work highly efficient.
- Workers feel comfortable inside their environment and this makes their morale high. In addition, specify and remove unwanted items and dangerous items on human health.
- Enhance final product.
- Workers do not have to focus on occasional tasks like specifying tools.

2. Organizing or arranging:

[30] defines that it is the establishment of organized and comfortable for sight workplace. sees that each element has only one position and elements be returned to their positions after use. Identifying elements easily, names' tags, colored tags and vertical shelves are used for this reason. Heavy materials occupied the lower part of the shelf. Organizing process aims at cancelling lost time searching for categorize and return them back to their locations by some conditions:

- Work should be done smoothly.
- Safety condition should be achieved.
- Make work more comfortable.

The advantages accomplished by these steps are as follows [31] and [32]:

- Enhance processes (increase effectiveness and efficiency).
- Reduce searching time for necessary objects.

3. Sweep:

[30] defines Five Steps that it is the removing garbage and wreckage and checking equipment and to eliminate pollution sources to get assigned result. The result is to evaluate workplace, add features of smart workplace, the workplace must be visible and source for minimum human errors and wastes. sees that cleaning workplace and makes it clean from grease, wastes, junks, decrease the length of hanging wires and oil leaks from machines.

[31] see that the benefit of clean workplace will be clear after a while. This leads to raise workers' morale and allocate more time to increase production besides the following:

- Keeping devices clean.
- Servicing clean workplace.

[32] see that the benefits of this step are:

- Clean workplace.
- Increase machines' efficiency.

4. Standardization:

[33] define as setting standards for optimum practices in workplace, ensure collecting standards and ensure that workplace is clean and organized all the time. sees that workers mush discuss together and make decision concerning standards to keep the place (work, machines, directions) neat and clean. These standards are applicable to organization as whole and can be tested and examined randomly. [30] adds, it is the establishment of standards to preserve the improvements of Five Steps to obtain assigned results. Assign result is: establishes procedures, mechanisms and checklists to keep work environment (visually useful, clean, arranged and organized), reduces humans' wastes and errors to the minimum. [32] and [31] see that the advantages of this step are:

- Increase safety and reduce industrial pollution.
- Establish procedures to specify processes' directions.

5. Self-discipline

[30] defines it as monitoring, expansion and revision of Five Steps results to get assigned results which are system's rearrange automatically in workplace, organize activity and improve continuously. sees that Five Steps is a mean for life and self-discipline among organization workers. It includes wearing badges, following work procedures, punctuality and dedication to work. He adds that these steps are the most important and difficult to achieve as they are link with man power training to achieve previous steps and to make them part of its behavior. The advantage is to keep work efficiency, promote skills and keep quality. [31] see that the advantages of these steps are:

- Increase awareness and morale.
- Decrease the number of mistakes result from careless.

4. Chapter Three

Test correlation and impact relationships between study variables and analysis

The hypothesis states that there is "a correlation and impact relationships with significance level between cognitive transformation dimensions and Five Steps in the factory under consideration.

Table4. Results of correlation relationship between cognitive transformation dimensions and Five Steps in the factory under consideration

Five Steps	Dependent variable Independent variable
0.778*	Cognitive transformation dimensions

N = 40 *P ≤ 0.05

Table (4) illustrates correlation relationship with significance level between cognitive transformation dimensions and Five Steps in the factory under consideration. the total value of the index reached (0.778*) at a significance level (0.05). This proves the strong relationship between the two variables. The result indicates when factory administration increased its attention of cognitive transformation dimensions leads to Five Steps reinforcement. According to the aforementioned, the hypothesis on the factory under study can be accepted. To identify impact relationship, the two researchers prepare table (5) which illustrates the impact of cognitive transformation dimensions on Five Steps in the factory under consideration.

Table5. results of cognitive transformation dimensions' impact in achieving Five Steps in the factory under consideration

Dependent variable	Cognitive transformation dimensions		R^2	F	
Independent variable	0β	β1		Calculated	Tabulated
Five Steps	0.501	0.73 * (13.032)	0.640	19.794*	3.97

*p≤0.05 N=45 D.F(1, 43) indicates the calculated T value

Table (5) illustrates the results of regression analysis and significance impact for cognitive transformation dimensions as an independent variable and Five Steps as dependent variable. The value of F calculated is 19.794 bigger than tabulated value 3.97 with degree of freedom 43.1 and significance level 0.05. R-squared reaches 0.640 and it means that 64% of explained variations in Five Steps result from the impact of cognitive transformation dimensions and the rest results from uncontrolled random variables or out of regression model. Following value of β1 (0.73) and T test it shows that calculated T value is (13.032*) and it is significance value and bigger than its tabulated value (1.661) at significance level (0.05)

and degree of freedom (68.1). the result indicates that improving in cognitive transformation dimensions will contribute in reinforcing Five Steps [34, 35].

5. Conclusion

The research presents result of correlation relationships between variables as follows:

- There is significant correlation relationship between cognitive transformation and Five Steps. It confirms the important role leads by cognitive transformation towards Five Steps.
- There is significant impact for each dimension of cognitive transformation dimensions in the Five Steps in the factory. It allows us to say that Five Steps influence by cognitive transformation in the factory.
- The results lead to a significant conclusion which is the approval of essential hypothesis emerged in the organization under consideration.

6. Recommendations

Supplementing the requirements of the methodology and based on the findings of the two researchers, it has to present some recommendations and as follows:

- Reinforce Five Steps all over the factory.
- Deepen awareness for decision makers in Zaki Facroty – Iraq on cognitive transformation concept and its dimensions beside Five Steps and their elements to ensure continuous support and reinforcement of Five Steps. To achieve this, the two researchers suggest to expand the horizons of the administrative leaders and workers in the factory on cognitive transformation and Five Steps. This can be achieved by providing the latest updates in these fields to cope with the recent development and to increase their knowledge on these variables. In addition, identify correlation and impact relationships between those two variables periodically.
- Reinforce strength sides in the factory concerning cognitive transformation and Five Steps.
- Overcome difficulties in applying cognitive transformation and Five Steps in the factory. To achieve this, the two researchers suggest human, information and financial requirements must be available to overcome difficulties.

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