The Effect of Tacit Knowledge Characteristics on Tacit Knowledge Transfer: An Empirical Study within Egyptian Industry

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Abstract: The purpose of this research paper is to examine the effect of tacit knowledge characteristics TKC on success factors to tacit knowledge transfer SFTKT from external sources such as suppliers, buyers, universities, and competitors to the recipient of knowledge. This research paper was based on questionnaire survey of Egyptian Industry Sector (75 companies) to investigate the range of attitude and their ability to transfer both organisational and technological knowledge. The questionnaire was carried out by two ways; online, and the great majority via interviews questionnaire. In addition to, the empirical evidence collected from the survey confirms that the urgent need to continuous tacit knowledge transfer process in order to achieve a competitive advantage and sustainability. Additional, results suggest a strong positive effect of tacit knowledge characteristics on success factors to tacit knowledge transfer. As well as**,** empirical study involved the study of the tacit knowledge and classifying it into organisational and technological knowledge depends largely upon functional perspective. This was due to the user diversity**.**

1. Introduction:

"It is believed that knowledge is qualified to become the main source of wealth in the world. This applies not only to corporations and individuals but also to nations and societies. As individuals and organisations struggle to compete in the global economy, they need more than sound technology; they also must have the support of integrated national and social structures to help them manage their constant demand for new knowledge. Such knowledge – intensive assets include value – creating networks, communities of practice, advisory committees, training and teaching resources". (Parent, Rory, & St-Jacoues, 2007, p.81). Few organisations internally generate all the knowledge required for continuous technological development. And the others must, therefore, often turn to external sources such as suppliers, buyers, universities, and competitors. However, given the tacit and complex nature of most valuable knowledge, its acquisition can be difficult (Kogut & Zander, 1992), Copiedfrom:http://www.accessmylibrary.com/coms2/summary_0286-23920931_ITM. Malik (2004, p.64) clarifies that "there has been a growing realization that successful technology flows in relation to supporting technology transfer and sustaining a firm's competitive advantage depends on the way in which knowledge is generated, articulated, and shared within the organisation" According to Goh (2002,p.25)" the existence of a strong co-operative

and collaborative culture is an important prerequisite for knowledge transfer between individuals and groups. Without appropriate mechanisms to encourage co-operation, structured or technological interventions to facilitate knowledge transfer may not work ".

I apply this paper to the Egyptian Industry, particularly companies that benefit from The Industrial Modernisation Centre (IMC), and the Egyptian Industries Union, which are both funded by European Union. This study, I aim to examine the effect of tacit knowledge characteristics on success factors to tacit knowledge transfer, particularly, the availability range or existence of success factors to tacit knowledge transfer in the Egyptian Industry.

Literature Review
Tacit Knowledge Concept

Tacit knowledge concept is simple to depict in digest terminologies but much more evasive when I try to put a concrete and applicable definition. By more clarity, there are many studies focused upon the concept from Polanyi to nowadays. Examples of these studies that are defined tacit knowledge include Polanyi (1966) who adopts philosophical perspective in the definition ; Schön (1983) concentrates upon the importance of transfer of tacit knowledge to 'reflection in action' ; whereas, Vincenti (1990) depicts the contents of tacit knowledge ; while Nonaka (1991) argues tacit knowledge as technical

perspective "know-how" and as elements of organisational culture ; Arora (1996) adds the commercial dimension to the tacit knowledge ; although Smith (2001) repeats some of the perspectives mentioned previously , nevertheless he focuses on tacit knowledge as a personal experience and practice of 'know-how' ; Collis & Winnips (2002) add the technical operational dimension to tacit knowledge ; and finally, Mc Adam, Mason, & Mc Crory,(2007) summarise my viewpoint about tacit knowledge where they combine both technical and organisational knowledge and I have adopted this approach for the objective of the study particularly, they separate and define the two types carefully. Whereas, according to Mc Adam et al., (2007, p.46)" it is necessary to have a workable definition of tacit knowledge. Tacit knowledge is an important element in work and workplace learning and needs to be examined closely in terms of how it is incorporated into organizational practices". Besides," tacit knowledge – knowledge-in-practice developed from direct experience and action; highly pragmatic and situation specific; subconsciously understood and applied; difficult to articulate; usually shared through interactive conversation and shared experience". Depending upon this definition I can conclude that:

Tacit knowledge-knowledge-in-practice developed from direct experience about technological, organisational knowledge; highly pragmatic and situation specific; understood and applied; difficult to articulate; and usually shared through interactive conversation and shared experiences.

Types of Tacit Knowledge

The purpose of this section is to demonstrate which studies concentrate on organisational knowledge or technological knowledge or on both, especially; I adopt the difference between them in order to facilitate the tacit knowledge transfer where the source of these types is variable. As a result of this some of these studies have focused on organisational knowledge like, (Nelson & Winter, 1982; and Inkpen, 1998) where clarify that the acquisition of new organisational knowledge that characterises as tacit and vague. According to Williams (2007, p.869) " there are two key characteristics of organisational knowledge: causal ambiguity and context dependence. Casual ambiguity arises because knowledge is embodied in the repeated activities of the organisation, known as routines. On the other hand, context dependence arises because knowledge integrates components of knowledge – such as people, personal networks, or information – which vary between different settings". Doubtless, this type of knowledge has played a central role at the top of managerial priority in order to gain and sustain

competitive advantages for the corporations regard, it serves this level of management to facilitate decision making and solve the managerial problems.

In relation to studies which discuss the technical knowledge 'know-how' like, Bohn (1994, p. 62) that defines technological knowledge as "understanding the effects of the input variables [of a manufacturing process] on the output. Additional, Orlikowski, (1993); and Lapré, Mukherjee, & Van Wassenhove, (2000) concentrate on the effect of technological knowledge on technology performance so as to improve the performance between individuals and groups in manufacturing organisations. This knowledge should be shared and rooted in actions.Moreover, Edmondson, Bohmer, & Pisano,(2001)assure the factor of trust for developing and applying new technology among individuals While, Doz & Hamel (1997) add the environmental dimension whereas technological knowledge is embedded within a specific context. Kachra & White (2008, p.426), gather between the characteristics and trade perspective that "the tacit knowledge is non-proprietary, not protected by patent, does not constitute a firm – specific trade secret, and there is no formal embargo on its transfer. We refer to this type of knowledge – tacit, non-proprietary, and technological – as 'know – how'".In my opinion, this type is useful to apply on technical problems particularly, manufacturing processes.

The rest investigates both technological knowledge and organisational knowledge. For example, Agarwal, Echambadi, Franco, & Sarkar, (2004, p.502) collect the types that, "we consider two specific types of know-how, namely, technological and market pioneering. A firm's technological know-how reflects its ability to generate new scientific discoveries and technological innovations before competitors do". Furthermore, Guzman and Wilson (2005, p.60) clarify that "organisational knowledge is a concept with a wide scope. On the one hand, it refers to socially constructed templates (concepts, methods, routines, techniques and tools) usually used to improve performance. On the other hand, organisational knowledge is also attached to "artifacts "(i.e. equipment, machines) or to "technical processes". In both cases, organisational knowledge is needed in order to adapt either artifacts or technical processes to the specific – social and technical – local conditions of operation, and / or vice versa". I think that the gap in these studies is to mix between organisational knowledge and know-how or technological knowledge; it remedies both of them under one type namely organisational knowledge. By contrast, in this study I separate between them, this is without doubt, represents stepping stone accordingly the source and the user of knowledge that we can get

it from learning by doing, rather than from learning by theory. When regarding with tacit knowledge used to enhance group innovation, Leonard & Sensiper, (1998) clarify that it plays a predominant role in two applications problems discovering and solving, and strategic planning through future events anticipation.

I suggest that the types of tacit knowledge which depend largely upon functional perspective are:

• Organisational knowledge points out socially structured templates (concepts, methods, routines, and tools) and shared company's culture. It often applies to the top level of management and takes managerial priority, in brief management systems.

• Technological knowledge means, know – how, techniques, artifacts, and technical processes as a whole, in brief it relates to equipment, machines, and so on. It often applies to operational management level. Therefore, Figure 1.classify the types of tacit knowledge onto organisational and technological knowledge.
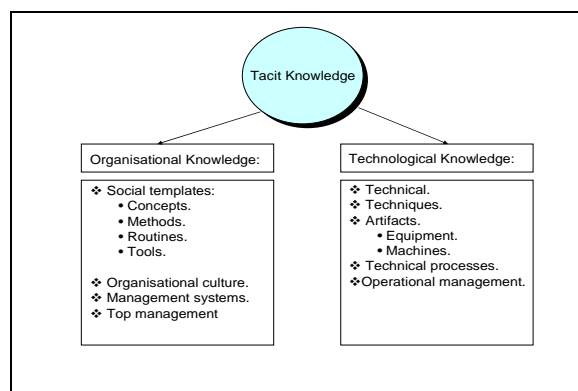

Figure1: Types of Tacit Knowledge

Tacit Knowledge Characteristics

In surveying of tacit knowledge characteristics I focus mainly upon two studies Wong & Radcliffe, (2000) and (Johnson, 2007) because they recite these characteristics with some details and do not mix between tacit characteristics and factors prerequisite for tacit knowledge transfer especially the differences between them resemble a fibre thin. Continuously, tacit knowledge is the term used to illustrate any shape of difficulty in quantifying knowledge, respect the knowledge about social interactions and practices, and more obviously, how an individuals and groups get things done. According to, Linde (2001, p160), "this type of knowledge is considered particularly problematic for knowledge management, because it is difficult to represent as proposition".

Wong & Radcliffe, (2000, p.506) argue in details" through observation, interview, discussion

and direct participation processes, the effects imposed on the tasks by knowledge that could hardly be articulated were identified. These effects are regarded as the characteristics of the tacit knowledge, or tacit characteristics, since they help to indicate what tacit knowledge can do and what role it plays in the management and execution of design activities". In order to phrase the appropriate and compatible tacit characteristics from not only simplicity of theoretical frame but also the empirical study, I classify these characteristics into four categories: personal phase which contains personal knowledge and efficiency enhancing; context phase where involves context dependency and trusting in human relationships; available skills where consist of image formation and recognition, judgment facilitating, and physical manoeuvrings and skills; and the final category is available experiences which combine estimation and envisioning and personal experiences that I search for objectivity as shown below and in Figure 2.

Personal phase

• *Personal knowledge.* "The tacit knowledge is a part of an individual's understanding is at once tied to a person's other tacit understandings and may also be shared with others. This shared tacit knowledge is often conceptualised as group or organisational knowledge". (Johnson, 2007 p.126).

• *Efficiency enhancing.* "This resembles the general learning curve model which suggests that efficiency improves in subsequent trials. Some knowledge is involved that contribute to such efficiency enhancement ". (Wong & Radcliffe, 2000, p.506).

Context phase

• *Context dependency.* According to, Augier, Shariz, Vendelo, (2001, p.129) "context is an individual construct and emerges as an individual encounters a situation, including others and artifacts, as it is the individual's interpretation of situation that results in context".

• *Trusting in human relationships.* "These concerns the knowledge used in dealing with people and the realisation of human factors in various circumstances". (Wong & Radcliffe, 2000, p.507). According to Alavi, Kayworth & Leidner (2005,p.197) "a "good" cultural values such as sharing, openness, and trust will lead to positive knowledge management behaviors (e.g., knowledge contribution and sharing), which will lead to innovation and efficiencies".

Available skills

• *Image formation and recognition.* "When working with a design task, the design engineer must

formulate, at the back of his mind, an image of the artifact he is designing. On the other hand, image recognition is also a state of mind that utilizes in articulable knowledge.Have to illustrate the tacit characteristics of the knowledge concerned. As a result, tacit knowledge is an action when we need to formulate organise images". (Wong & Radcliffe, 2000, p.506-507).

• *Judgement facilitating.* "This refers to the knowledge of an opinion about something. In a design project, judgement is required in many yes/no, true/false, positive/negative, go/no go situations. However, how the design engineer makes a certain judgement was beyond articulation. This is the work of tacit knowledge". (Wong & Radcliffe, 2000, p. 506).

• *Physical manoeuvrings.* "These are often referred to as skills. These involve physical body movement and co-ordination, preparing sketches, controlling hand or machine tools and so on are tasks that require tacit knowledge to control body to move at the right time, with the appropriate amount and along the proper orientation in order to achieve the task". (Wong &

Radcliffe, 2000, 506).Furthermore, this element forms a part of personal knowledge also, but with some details.

Available experiences
• *Estimation and envisioning capability.* "This requires the envisioning ability of foreseeing the potential problems and realising possible outcomes if certain measures were to be instituted. This involves an understanding of the situation and actively evaluates what the possible outcomes of an event may be". (Wong & Radcliffe, 2000, p.506).

• *Path dependency.* "Development of tacit knowledge inevitably depends on personal experience. This is evident in all of the research examining or purporting to describe tacit knowledge". (Johnson, 2007, p.126). In addition to, Baumard, (2002) discusses the influence of experience on tacit knowledge while it accumulates and is applied as people within the professional firm workers collaboratively with their clients.

Therefore, my perspective of tacit knowledge characteristics is shown in Figure 2.
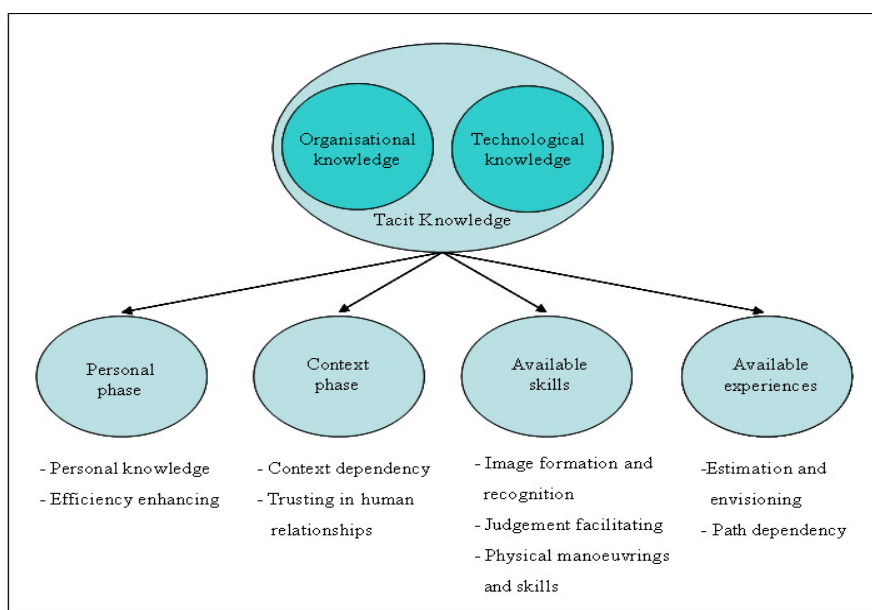

Figure (2): Characteristics of Tacit Knowledge

But without doubt, due to the fact that characteristics of tacit knowledge are stickiness, it may be divided it into two major elements, personal and contextual while the first one involves both experiences and skills.

Tacit Knowledge Transfer
Štrach & Everett (2006, p.62) put in details "the knowledge transfer model where they suggest two dimensions – facilitating factors and knowledge flows" related to Multinational Companies for

facilitating knowledge transfer between parent company and subsidiaries . On the one hand, "facilitating factors are contextual conditions that weaken or strengthen knowledge flows; in this model, these are access to knowledge transfer channels, motivation to transfer knowledge, and ability to transfer knowledge". On the other hand, "knowledge flows are spatial and time measurements of knowledge transfer – it is expected that some knowledge enters a subsidiary from its parent

company (inflows), some knowledge is transferred and maintained at the level of the subsidiary (intraflows), and finally some knowledge is exported from the subsidiary to the headquarters (outflows)". While, Nonaka (1994) emphasises that the elements of transfer process are achieved by moving manpower and combining them with tools and management systems. Furthermore, Nonaka & Takeuchi (1995) determine that at least half of all knowledge is tacit and for gaining and transferring it, the work force have working together and trusting each other over a period of time. No doubt, this view point assures the importance of social capital and time dimension in the organisation. Additional, Lei, Slocum, & Pitts, (1997) adopt the same view through emphasising the time have spent and interaction among skilled personnel, particularly, transferring technological knowledge by "day – to – day "activities. Interestingly, Hutzschenreuter & Listner (2007,p.138)epitomise and numerate the three elements of knowledge transfer need to have that include" knowledge transfer context, knowledge transfer fits, and knowledge transfer configuration that are the process which achieves from a sender over a channel to receiver so that it is learned and used". Importantly, Gooderham (2007, p.36) summarises the benefits that "The key element in knowledge transfer is not the underlying (original) knowledge, but rather the extent to which the receiver acquires potentially useful knowledge and utilizes this knowledge in its own operations."

At the end of this argument, I am interested in conditions that facilitate knowledge transfer between firms (intrafirms), and new knowledge, especially knowledge from outside the firms, can be an important stimulus for change and achieve effectiveness and efficiency for the organisation. I think that the studies of Nonaka (1994), Štrach & Everett (2006), and Hutzschenreuter & Listner (2007) represent my view point and may contain the great majority of elements have been required for knowledge transfer.

Factors of Knowledge Transfer

In surveying the knowledge transfer barriers literature, I have focused on thirteen studies dealing with knowledge transfer barriers and /or critical success factors to tacit knowledge transfer. I adopt the historical perspective to present these studies.

On the one hand the barriers include: Nelson & Winter (1982) give three reasons that make transfer of tacit knowledge likely to be more complex; teaching tacit experiences and skills need more time; causal ambiguity; and the knowledge structure needs to have in the organisation. While, Szulanski (1996) introduces new terminologies for

transferring knowledge like the source and recipient, he identifies five major barriers to intra – firm transfers of knowledge highlights the two phases, the first, lack of the factors that must avoid in the process particularly, at the recipient and the source like motivation and the degree of relationship between them. The second relevant to the nature of tacit knowledge itself, like difficulty of knowledge. Furthermore, Szulanski (2000) adds some details about knowledge transfer barriers; as stickiness at every stage prerequisite for transferring knowledge, the source reliability, and organisational context. On the contrary, Martin and Salomon (2003, p.363) clarify that Arrow (1969) is the first author mention source and recipient in the process of transfer,"all knowledge transfer events involve both a source, or transferor, and a recipient, or transferee(Arrow, 1969; Szulanski, 1996; Gupta and Govindarajan, 2000)." Although, Ordonez de Pablos (2004, p.111) refers to that "tacit knowledge transfer is complex and difficult for several reasons" like, complex nature, but I think this element is characteristic rather than factor or barricade. Besides, she emphasises the means in which knowledge can be transferred, like learning, teaching, observation, imitation, and organisational learning as a whole. But she does not forget the time dimension to obtaining the knowledge. In addition to, Lesser & Fontaine (2004) identify four barriers to knowledge transfer related to the stages of knowledge management as general which are, awareness , access, application , and perception. Respectively, Sun & Schott (2005, p.81) discuss sources of barriers close individual, organisational, inter – organisational, and team of not only imperative but also climate and relationships. Doubtless, they offer organisational view point in particular, from the side of suitable climate and culture. Whilst, Bou-Llusar & Segarra-Cipre's (2006, p.102) classify the elements of internal knowledge transfer into three categories source unit, recipient unit, and organisational context. But, they introduce five author's models epitomise the relationship between characteristics of knowledge and ease of knowledge transfer process. Dyer & Hatch (2006,p.715) focus on five primary barriers to knowledge transfer involve; "attributes of the knowledge (causal ambiguity / complexity); attributes of the source (lack of motivation and credibility) ; attributes of the recipient (lack of motivation and absorptive capacity) ; attributes of the recipient's existing process (internal process rigidities) ;and attributes of the recipient's network / external environment (network constraints) .Finally, (Schwartz, 2007) groups the main barriers into three categories ; source , recipient ,and organisation as can be seen in table 1.

On the other hand concerning success factors, I can identify three studies, the first one, Goh (2002, p28-29) points out five influencing factors for effective knowledge transfer include;" leadership; problem-solving/seeking behaviours; support structures; absorptive and retentive capacity; and types of knowledge".   The second, Reagans & Mc Evily (2003) identify a series of factors critical to successful knowledge transfer focuses upon two types of factors, organisational which remedies the issues of ease and acknowledgement of transfer, and positive relationship between the source and the recipient. As well as, technical or supported like absorptive capacity. The third and finally, (Abou – Zeid, 2005,p.152),suggests model of inter-organizational knowledge transfer intimate culture to facilitate this process" The culturally aware multi-stage model of inter-organizational knowledge

transfer identifies eight cultural contexts that play different roles in each stage of inter-organizational knowledge transfer process, namely: the cultural traits of source and recipient firms at four different levels (societal, national, corporate, and operating/occupational)".

I would conclude the theoretical frame by focusing primarily on two dimensions: the first one is the tacit knowledge characteristics which clarifying in figure (2) where divided into both organisational and technological. The second dimension is the success factors or -barriers which must overcome- to knowledge transfer, namely I adopt the study of (Schwartz, 2007, p.253) which concentrates upon three groups of variables combine the process of knowledge transfer and epitomize the main barriers and success factors in table 1.

Table 1 Barriers and/or success factors by category

Source	Recipient
1. Ease of transfer	9. Awareness of availability
a. Stickiness at initiation	10. Reliability of the source
b. Stickiness at implementation	11. Motivation
c. Stickiness at ramp-up	12. Available time/Access
2. Ability to transfer	13. Ambiguity of knowledge
3. Willingness to initiate transfer, propensity to share	14. Degree of conjecture
a. Acknowledgement and attribution	15. Absorptive capacity
b. Disseminative capacity	16. Retentive capacity
c. Interpersonal connection	**Organization**
d. Motivation of the source	1 7. Organizational context
4. Awareness of need	18. Organizational design
5. Ambiguity of knowledge	19. Motivation/reward system
6. Available time/Access	20. Available time.
7. Stickiness at integration	21. Nature of relationship between source and recipient.
8.Motivation	

The source: Schwartz,(2007,P.253)

For my empirical study and because I am interested in knowledge transfer at the level of inrafirms (between firms) I choose the Schwartz's (2007) category. Regards to the source of knowledge I pick three elements only; motivation, ability to transfer, and willingness to initiate transfer. I neglect the elements of ease of transfer, ambiguity of knowledge, and stickiness at integration in order to avoid overlapping with tacit knowledge characteristics and in my perspective these elements may similar to some characteristics like personal knowledge and path dependency that I search for objectivity in the study. Moreover, the element of awareness of need already exist in the context of the study. Relevant to the element of available time/access this is depends largely upon the agreement between Europe and Egyptian Government.

The second major factor of knowledge transfer is the recipient; I choose three elements only, reliability of the source, absorptive capacity, and motivation as well as exclude the elements of; ambiguity of knowledge and degree of conjecture as the same reasons mentioned above pertinent characteristics. In addition to, awareness of availability and available time/access are by nature in Egyptian context. And the same view point relevant to absorptive capacity and retentive capacity.

Finally, denote the organisation factor; I define two elements only as expressions on this factor are organisation design (structure) and motivation (reward systems). As the previous discussion I seclude the element of available time like the same reason that mentioned above. Additional, organisational context and nature of relationship between source and recipient that I neglect to avoid

the duplication between success factors to tacit knowledge transfer and characteristics of tacit knowledge.

Doubtless with adoption the barricades this means that I seek overcome these barriers and in accordance with applying the success factors to tacit knowledge transfer. To simplify, I choose the terminology of *success factors* as expression on both. Therefore, my perception of success factors to tacit knowledge transfer as shown in Figure 3.
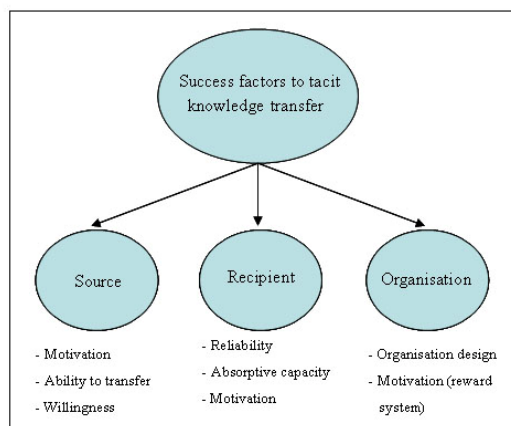

Figure (3) Success factors to tacit knowledge transfer

Then, I can suggest the main research question is as follow:
● Is tacit knowledge characteristics affecting success factors to tacit knowledge transfer? This question may divide into three sub questions like:
1-Is tacit knowledge characteristics (TKC) affecting success factors to tacit knowledge transfer (SFTKT) as source? 2-Is tacit knowledge characteristics (TKC) affecting success factors to tacit knowledge transfer (SFTKT) as recipient 3- Is tacit knowledge characteristics (TKC) affecting success factors to tacit knowledge transfer (SFTKT) as organisation? I think I can find a probably answer for these questions in the empirical study.

Empirical Study
The population

Egypt's economic development critically hinges upon the competitiveness and growth of the industrial sector. Consensus is that industry the engine of growth for Egypt to prosper in the future. The Egyptian Industries Union roughly includes 816 great companies divided into ten sectors which classify under private sector these are: Engineering; Manufacture of Building Materials and Construction Sector; Manufacture of Chemicals; Manufacture of food and Beverage; Manufacture of Leather and Shoes; Manufacture of paper, Printing, and

Packaging; Manufacture of wood and Furniture; Pharmaceuticals; and Service related to Industry. Population size consists of seventy five companies that which belong to the private sector, represents the previous sectors and benefits from the Industrial Modernization Centre (IMC) at the first stage of modernising. On the occasion of, these companies are considered not only the greatest companies in its field but also a pioneer in the field of export to foreign countries. In addition the Egyptian Industries Union (EIU) is also supervising these companies. The EIU has funded many centres in Egypt including Information Centre (IC) and (IMC).

The Industrial Modernization Centre (IMC) is intended to perform as the prime agent for substantiating the government's vision of a vibrant and globally competitive industrial sector. The aim is to create an enabling environment in which the private sector can lead growth and make Egyptian industries leapfrog into global competitiveness. IMC was established by a presidential decree number 477/2000 as an independent body to implement and coordinate the modernization of the Egyptian Industry. Jointly funded by the European Union (250 million), the Government of Egypt is (103 million) and the Egyptian Private Sector (73 million) with a total budget of 426 million. Today IMC is part of the everlasting process of continuously bringing the Egyptian industry to international competitiveness. At the first stage of modernizing these companies the (IMC) have been adopted the developing and improving managerial and organizational abilities of human resources to seventy five greatest companies represent all sectors, this process occurs both in Egypt and Europe. Additional, having improved the technological abilities for technical supervisors in these companies, this is through training them and sharing knowledge at thirty industrial training centers in Egypt. In brief, I can determine that the population under study is the human resources at 75 companies.

The sample

The population size contains 75 companies; these companies roughly have a total labour size of 37,500. This is a sampling frame and because of this frame is a huge to study, I calculated the sample size according to sample for proportions formula, Cochran, (1963:75) with 95% confidence level and 0.05 variation, then sample size is, 385. I gathered sample data from line, top and staff managers, furthermore, technical workers at the plants where these labour have a contact with foreign expertise from European Union. I focused our investigation on people who have benefited from training courses as much as I can. These courses as previously mentioned, I consider it as a tacit knowledge transfer

(organisational and technical) in order to recognise the range of advancements in these companies particularly, with respect to their tacit knowledge. Moreover, it will help to better understand the attitude towards the success factors to tacit knowledge transfer

Questionnaire Development
        I develop the questionnaire of tacit knowledge characteristics based on these studies (Nonaka & Takeuchi, 1995; Wong & Radcliffe, 2000; Augier, Shariz, Vendelo, 2001; Baumard, 2002;Alavi, Kayworth & Leidner 2005;and Johnson,2007). Concerning the questionnaire of success factors to tacit knowledge transfer, I quote these factors or barriers from four studies, (Szulanski, 2000; Goh, 2002; and Reagans & Mc Evily, 2003.Besides, I adopt the study of (Schwartz, 2007) which concentrates upon three groups affect the process of knowledge transfer and he epitomizes the main barriers and success factors as shown in table 1. Furthermore, multi- item scale based on established measures were used for almost all the constructs within the questionnaire and were measured on the same five-point Likert-type scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). As can be seen in Appendix 1 using Cronbach's alpha (α) as a measure of reliability.

Research Methodology
The Objectives
        Tacit knowledge transfer takes a central role in the study. Therefore, adequately having measure the transfer that occur within an organisation, as well as from outside the firm is of vital importance to this work. Thus, I need to measure the degree of an attitude the research units toward success factors to tacit knowledge transfer among firms. Hence, the objectives of the empirical analysis were (1) to describe characteristics of tacit knowledge, (2) to measure the attitude towards the success factors to tacit knowledge transfer, (3) to test the proposed hypotheses and thus the effect of tacit knowledge characteristics on success factors to knowledge transfer. Descriptive statistics are used to meet the first and the second objectives, and Step-wise Regression analysis is performed to meet the third objective.

Data Collection
        Data for this study were collected through a questionnaire survey directed at line, top, and staff managers besides technical workers in every company were defined in sample size. The data for this study were collected during the second quarter of 2009 using two ways, online and interviews

questionnaire particularly the great majority of companies under study locate in new industrial cities like Tenth's of Ramaddan City, Sixth's of October City, Aloboar City, New Aamireia City, and Al Sadaat City .This concentration of these companies facilitate and accelerate gathering data process. The questionnaire were written and answered for the purpose of this paper, and I translated it into Arabic language.

Sample Data
        The target group consisted of 385 employees from line, top and staff managers, in addition to technical workers who have benefited from training courses. A total of 327 surveys were returned, I secluded 9 surveys uncompleted, which means that the accepted returns equal 316 representing a response rate 82 %.

Dependent Variable
        For practical reasons and statistical results accuracy, including the ease of measurement, I put success factors to tacit knowledge transfer on 8 statements divided onto 3 major elements, source, recipient, and organisation.

Independent Variables
        The independent variable of the present study are predominantly based on pre-existing constructs, I form characteristics of tacit knowledge in 9 statements divided onto 4 major variables, personal phase, context phase, available skills, and available experiences.

Hypotheses of the Study
        From the previous dependent and independent variables, the main research questions, and the proposed affect is captured in the final set of hypotheses as follow:
Hypothesis 1: There is no effect of tacit knowledge characteristics on success factors to tacit knowledge transfer (source).
Hypothesis 2: There is no effect of tacit knowledge characteristics on success factors to tacit knowledge transfer (recipient).
Hypothesis 3: There is no effect of tacit knowledge characteristics on success factors to tacit knowledge transfer (organisation).

Validity and reliability
        In the design of the questionnaire, the following steps were taken to ensure measurement validity and reliability. First, the initial constructs of the questionnaire were based on a thorough literature review. Second, the questionnaire was pre-tested by

experienced academics in the field of Human Resource Management. Third, a personalised cover letter accompanying each questionnaire explained the purpose of the study, provided assurances regarding the confidentiality of the collected data, and results of validity and reliability as can be seen in Appendix 2. Finally, I measure reliability by using Interconsistencey and Cronbach's alpha (α) for both tacit knowledge characteristics and success factors to tacit knowledge transfer. But I found that I have a problem of multicolleaniarity between tacit knowledge characteristics as independent variables at the pilot study stage as shown in Table 2. I have not only assured on it through Correlation Matrix for the final data but also neutralised multicolleaniarity by using Step-wise Regression model for analysing data. Importantly, having confirmed that estimated models are not suffering from this problem through proven that all signals of estimated models parameters are positive accordingly the theoretical frame particularly between the two variables (independent and dependent).

Table 2 Correlation matrix between variables of tacit knowledge characteristics

Variables of the study	Personal phase	Context phase	Available skills	Available experiences
Personal phase	1	0.671[**]	0.967[**]	0.480[**]
Context phase		1	0.716[**]	0.626[**]
Available skills			1	0.494[**]
Available experiences				1

(**) refer to Person's correlation (two-tailed) (r) is significant at (0.01).

According to correlation matrix as can be seen in Table 2 I get that there are interrelationship between the four explanatorily variables and all of them are positive, highly correlated, and highly significant.

Results

Descriptive statistics for all of the variables analysed in this study are provided in Table 3 that denote high degree of responses and variability between values is small**.** Hypothesis of the study were tested using Step-wise Regression Model. Data were carefully examined with respect to linearity, equality of variance and normality by plotting standard residuals against predicted values. No serious deviations were detected. Data were also carefully examined for multicollinearity among the independent variables notwithstanding at the pilot study stage but I dealt with its effects by using

appropriate statistical model to analyse the data for examined the hypotheses is as follow:

Table 3. Descriptive statistics

Variables of the study	Descriptive statistics	
	Mean	Coefficient of variation
Independent variables		
Personal phase	4.02	21.69
Context phase	4.35	14.29
Available skills	4.11	19.23
Available experiences	4.04	17.04
Dependent variables		
SFTKT(source)	4.08	15.19
SFTKT(recipient)	4.25	10.59
SFTKT(organisation)	4.19	14.57

The first hypothesis

I can put two stages to judge this hypothesis as the following:

(1) Studying the relationship between SFTKT (source) and TKC. The results shown in Table 4 where indicative to, SFTKT (source) were represented by motivation, ability to transfer, and willingness is highly positive correlated with the different variables of TKC namely, personal phase, context phase, available skills, and available experiences. Besides, this relationship is highly significant at level 0.01.

(2) Estimation the degree effect of TKC on SFTKT by using Step-wise Regression technique because I found interrelationship between the four variables of TKC. With using Step-wise regression the multicollinearity problem may be solved and getting the best combination from TKC that affects SFTKT (source) as shown in model 1.

Table 4. Correlation coefficient between success factors to tacit knowledge transfer (source) and tacit knowledge characteristics

Dependent variables / Independent variables	SFTKT(source) Y1T
Personal phase (X1T)	0.923[**]
Context phase (X2T)	0.774[**]
Available skills (X3T)	0.952[**]
Available experiences (X4T)	0.633[**]

(**) refer to Person's correlation (two-tailed) (r) is significant at (0.01).

This model denote that SFTKT (source) were represented by motivation, ability to transfer, and willingness is affected by available skills, available experiences, and context phase respectively ($R^2 = 0.944$) are highly significant and strong

supported at the 99% level and F – value at 1785.93.Also, the standard error was at the lower level. This clarify that all of the independent variables which mentioned in the present model interpret 94.4 % of variations in SFTKT (source).

Model 1 for the first hypothesis

$Y1T = 0.461 + 0.627\ X3T + 0.165\ X4T + 0.086\ X2T$
$\quad\quad\quad (7.656)^{**} \quad (41.884)^{**} \quad (10.749)^{**}$
$(4.050)^{**}$
F – Value = 1785.93^{**} , with *d. f.* (3 ' 316)
$R^2 = 94.4\%$, S.E = 0.147

(**) refer to significant level at (0.01) for the test statistic (F & T) values.

From the above discussion I can reject the first hypothesis and then:
There is effect of tacit knowledge characteristics on success factors to tacit knowledge transfer (source).

The second hypothesis
According to statistical analysis for this hypothesis I can define two stages also:
The first related to examine the relationship between SFTKT (recipient) and TKC whereas the results shown in Table 5 have been proved that the dependent variables SFTKT from recipient side were represented through reliability of the source, absorptive capacity, and motivation is moderate positive correlated with the different variables of TKC namely, personal phase, context phase, available skills, and available experiences. Additional, this relationship is highly significant at level 0.01.

Table 5. Correlation coefficient between success factors to tacit knowledge transfer (recipient) and tacit knowledge characteristics

Dependent variables / Independent variables	SFTKT(recipient) Y2T
Personal phase (X1T)	0.403^{**}
Context phase (X2T)	0.446^{**}
Available skills (X3T)	0.418^{**}
Available experiences (X4T)	0.404^{**}

(**) refer to Person's correlation (tow-tailed) (r) is significant at (0.01).

The second stage highlight estimation the degree effect of TKC on SFTKT by using Step-wise Regression Model, I am getting the best combination from TKC that affect SFTKT (recipient) as shown in model 2.

Model 2. for the second hypothesis

$Y2T = 2.699 + 0.141X2T + 0.125X4T + 0.105X3T$
$\quad\quad\quad (16.728)^{**} \quad (2.480)^{*} \quad (3.034)^{**}$
$(2.605)^{**}$
F- value = 33.431^{**} , with *d.f.* (3 ' 316)
$R^2 = 24.1\%$, S.E. = 0.393

(**) refer to significant level at (0.01) for the test statistic (F & T) values.
(*) refer to significant level at (0.05) for the test statistic (T test) only.

This model demonstrate that SFTKT (recipient) were represented via reliability of the source, absorptive capacity, and motivation is affected by context phase, available experiences, and available skills successively (R^2= 0.241) are significant at the 95 % level relevant to the first variable but I found that are highly significant and strong supported at 99 % level with the other two variables and F value equal 33.431. Similarly, I found that the S.E. at lower level. Despite, the weak effects of TKC except if the relationship is significant. From the previous analysis I can reject the second hypothesis and then:
There is effect of tacit knowledge characteristics on success factors to tacit knowledge transfer (recipient).

The third hypothesis
The results related to this hypothesis indicate that:
There is relationship between SFTKT (organization) and TKC, where findings refer to highly positive correlated between dependent variables SFTKT (organization) were represented by organization design(structure) and motivation (reward system) and independent variables TKC where include personal phase, context phase, available skills, and available experiences as can be seen in table 6.

Table 6 Correlation coefficient between success factors to tacit knowledge transfer (organization) and tacit knowledge characteristics

Dependent variables / Independent variables	SFTKT(organization) Y3T
Personal phase (X1T)	0.865^{**}
Context phase (X2T)	0.642^{**}
Available skills (X3T)	0.865^{**}
Available experiences (X4T)	0.502^{**}

(**) refer to Person's correlation (two-tailed) (r) is significant at (0.01).

Accordingly, Step-wise Regression Model I get the best combination from TKC that affect SFTKT (organisation) as shown in model 3. This model clarifies that SFTKT (organisation) were represented through organization design (structure) and motivation (reward system) is affected by personal phase, available skills, and available experiences consecutively (R^2 = 0.769) are highly significant and strong supported at the 99% level and F – value at 349.837. As a result, the standard error was at the lower level.

At the end of this analysis I can reject the third hypothesis and then:

There is effect of tacit knowledge characteristics on success factors to tacit knowledge transfer (organisation).

Model 3 for the third hypothesis

$Y3T = 1.361 + 0.309X1T + 0.302X3T + 0.087X4T$
$(12.247)^{**}$ $(4.163)^{**}$ $(3.657)^{**}$
$(3.140)^{**}$
F – value = 349.837^{**} , with *d.f.* (3 ' 316)
$R^{2=}$ 76.9 %, S.E. = 0.295

(**) refer to significant level at (0.01) for the test statistic (F & T) values.

At the end of this argument I can conclude that these hypotheses were supported by the empirical analysis.

Discussion

The main contribution of this study is to apply and assess the theoretical frame on the Egyptian Industry specifically, private sector. I seek the effect of tacit knowledge characteristics on success factors to tacit knowledge transfer. In fact, the empirical evidence supported the attitude toward tacit knowledge transfer from many sources were mentioned previously, that have a greater impact on performance effectiveness and gain sustain competitive advantages to the companies.

Interestingly, this study contributes to the tacit knowledge literature through suggesting the two types of tacit knowledge which differentiate between organisational knowledge related to top management decisions and technological knowledge that pertains line management from perspective of usage to both. The sample data contains the three different levels; line, top, and staff managers besides technical workers because of the dependence of tacit knowledge transfer in their work. In addition, responses to SFTKT (source) were represented by

motivation, ability to transfer, and willingness is affected by available skills which contain - image formation and recognition, judgement facilitating, and physical manoeuvrings and skills - this means that this is the first independent variables impacts on SFTKT (source). Moreover, the available experiences include not only estimation and envisioning but also path dependency that comes at the second degree of influence which encourages the transfer process. But, Song, Almeida, and Wu (2003) treat and test path dependency as the factor of knowledge transfer with patent, therefore, the relationship is negative and significant, this doubtless, stresses my view point that this is no more than explanatorily variable.   In relation to, context phase as the third degree of influence which consists of context dependency and trusting in human relationships, this no suspect assure research standpoint and agree with theoretical frame. Pertinent, context dependency, Persson (2006) and Williams (2007) remedy and test this element as independent variable to facilitate the process of tacit knowledge transfer; their results are found strongly supported and highly significant at the 99% level. Furthermore, relative trust in human relationships, all of Li (2005); Dhanaraj, Lyles, Steensmaz, and Tihanyi (2004); Szulanski, Cappetta, and Jensen (2004); and Foos, Schum, and Rothenberg (2006) treat and examine trust as the element of knowledge transfer, in turn, their findings are found highly significant and strongly supported.

Originally, the results reported here indicate that SFTKT (recipient) were represented via reliability of the source, absorptive capacity, and motivation is affected by three independent variables. The first one is context phase that involves context dependency and trusting in human relationships, this clarify that SFTKT (recipient) entails context of tacit knowledge transfer as prerequisite characteristic in spite of the level of significant is not high. Worthwhile, on the one hand, it may reflect the poor of reliability of the source alike from suppliers, buyers, universities, and competitors. Martin and salomon (2003) introduce mathematical model cover source and recipient transfer capacity (absorptive capacity). Respectively, it also probable epitomizes the weak absorptive capacity and motivation at the recipient namely, Egyptian Companies, as a result of this, it should be enhancing these factors. Moreover, Szulanski, Cappetta, and Jensen (2004); and Ambos, Ambos, and Schlegelmilch (2006) remedy and examine absorptive capacity as the factor of tacit knowledge transfer and then as dependent variables where the findings are strongly supported. Likewise, Riusala and Smale(2007) treat the absorptive capacity as a characteristic of tacit knowledge (dependent variable) regression coefficient has negative

relationship with difficulty of knowledge transfer (independent variable) this is no doubt, assure the work view point that absorptive capacity must be treated as a dependent variables particularly, when we talk about knowledge transfer. But, Tsai (2001) have remedied and tested absorptive capacity as explanatorily variable with innovation and performance where the results are strongly supported. On the other hand, regarding with, context phase should be also quite. The second is available experiences that contain estimation and envisioning and path dependency, not surprisingly, this variables occupies the same degree of influence like SFTKT (source) I interpret this result as probable weak recipient specifically its sub ingredients. The third is available skills which comprise image formation and recognition, judgement facilitating, and physical manoeuvrings and skills this embody the physical side of knowledge which accelerate the transfer process.

Importantly, I found that SFTKT (organisation) were represented through organization design (structure) and motivation (reward system) is affected by personal phase, available skills, and available experiences. Inconsistency, with this result Cheng (2005) finds that motivation as endogenous variable is not significant vice versa skills is highly significant, whereas, reward as exogenous variable is highly significant. Whilst, Szulanski, Cappetta, and Jensen (2004) focus upon some factors like source's motivation, organisational context, trustworthiness, recipient absorptive capacity, and recipient's motivation; and they conclude that the first four factors are significant ranging between moderate and highly significant. Relevant, personal phase I notice that despite the argument focuses here upon the organisational factors except if both personal knowledge and efficiency enhancing, come at the first degree of impact, in my opinion this reflects the necessary need to relate these factors with organisation structure I mean by promotion and create position for knowledge management on formal organisation structure. By the way, The Egyptian Cabinet- Information Decision Support Centre adopts the latest recommendation to apply on companies in Egypt. Furthermore, available skills and available experience cover the couple side of knowledge material (skills) and immaterial one (experience). Obviously, the triangle influence upon these dependent are highly significant, in turn, this finding elicit the important of organisation factors to tacit knowledge transfer. Finally, I can conclude this argument by answering for the main research question that tacit knowledge characteristics (TKC) are affecting success factors to tacit knowledge

transfer (SFTKT) as source, recipient, and organisation.

Conclusion

The aim of this study was to examine the relationship between tacit knowledge characteristics and success factors to tacit knowledge transfer specifically, the effect of TKC on SFTKT. I found that The Industrial Modernization Centre (IMC) has an effective role in the field of tacit knowledge transfer from many sources; suppliers, buyers, universities, and competitors. Obviously, in relevant to the level of adoption initiative and the level of implementation, were at each site in all companies. These companies get (transfer) their tacit knowledge from many sources. This depends on the classification which I have covered about types of tacit knowledge from a functional perspective:

● Organisational knowledge transfer to these companies from Universities (staves in all industrial and managerial areas) where work with Private Expert Houses that are funded by (EIU-CMI) European Union.

● Technological knowledge transfer to these companies is from two sources, on the one hand, from equipment suppliers (UK, Germany, France, and Italy) and expertise (employees) for long time from European Union. On the other hand the tacit knowledge comes from expertise and technical professional from competitive companies but by informal way.

The results depend largely upon the responses about the success factors to tacit knowledge transfer that were found significant with tacit knowledge characteristics. This means that both managers and technical workers have a recognition to the necessary of tacit knowledge transfer despite the tacit knowledge characteristics may a barrier. Results largely support the proposed model. These results, I suggested, have important implications for practitioners and further scholarly research alike. Also, as to the practical implications, the study can be used as a source of recommendations for companies to enable them to overcome some of the potential difficulties and problems in knowledge transfer.

For the theoretical frame and how managers can use the tacit knowledge both organisational and technological. I separate between these knowledge specially many of studies blend between them as (Nonaka,1991; Gupta & Govindarajan, 2000; and Guzman & Wilson, 2005) where they mentioned that every tacit knowledge for example technological(technical or know-how) is organisational knowledge but I propose that clarify the differences between them accordingly the level to create the knowledge where organisational

knowledge quoted from top level in the organisational structure and probable useful for planning and managerial decision making. While technological knowledge that I obtain from middle or first line management and may use this knowledge in both higher and lower levels but mainly in the lower level. I can complete that I am interested in tacit knowledge transfer process among individuals at the level of intrafirms through training, moving people (expertises from European Union), and sharing knowledge despite the tacit nature of knowledge. And my aim from the study may be achieved completely.

Actually, this study contributes in several aspects for tacit knowledge characteristics and transfer, it also has important limitations. Specifically, there are two limitations affecting the scope of these findings. The first limitation is that our survey respondents were representatives only from the private sector (vertical comparison), but I needed to compare between public sector and private ones to complete the judgment process transfer particularly the effectiveness measures (horizontal comparison). The second limitation was the limited number of factors related to tacit knowledge transfer which I have examined. Future research would benefit from public sector as well as private sector and examine more factors to tacit knowledge transfer.

 Future Directions

It has recently been suggested that it is preferred to study the success factors to knowledge transfer in detail where one can include the main three elements to transfer process; the source; the recipient; and the organisation (Schwartz, 2007). I finish by suggesting directions and topics for future research. Therefore I propose three titles of studies that would be useful in this field; the first is: Evaluating the Relationship between Tacit Knowledge Characteristics and the Source of Knowledge; the second is: Evaluating the Relationship between Tacit Knowledge Characteristics and The Recipient of Knowledge; and the third is: Evaluating the Relationship between Tacit Knowledge Characteristics and The Organisational Factors. As well as, go deepen to organisational factors namely trust in knowledge sharing and then the title may be: Does Trust Enhance Knowledge Sharing among Individuals within the Organization? Each of the studies will be expected to follow a similar methodology as outlined in my approach in this paper.
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Appendix 1
The questionnaire

Dependent variables

Success factors to tacit knowledge transfer
  •Source
    -   Motivation.
    -   Ability to transfer.
    -   Willingness.
  •Recipient
    -   Reliability of the source.
    -   Absorptive capacity.
    -   Motivation.
  •Organisation
    -   Organisation design (structure).
    -   Motivation (reward system).

Independent variables

Tacit knowledge characteristics
  •Personal phase
    -   Personal knowledge.
    -   Efficiency enhancing.
  •Context phase
    -   Context dependency.
    -   Trusting in human relationships.
  •Available skills
    -   I mage formation and recognition.
    -   Judgement facilitating.
    -   Physical manoeuvrings and skills.
  •Available experiences
    -   Estimation and envisioning.
    -   Path dependency.
Not: All variables were measured on five-point Likert- type scale ranging from 1 ("Strongly disagree") to 5 ("Strongly agree").

Appendix 2
Table 1 Validity and reliability of tacit knowledge characteristics

Statements	Personal phase	Context phase	Available skills	Available experiences
- Personal knowledge x_1	0.919**			
- Context dependency x_2		0.913**		
- Efficiency enhancing x_3	0.894**			
- Image formation and recognition x_4			0.864**	
- Trusting in human relations x_5		0.911**		
- Judgment facilitating x_6			0.892**	
- Estimation and envisioning x_7				0.849**
- Path dependency x_8				0.829**
- Physical maneuverings and skills x_9				
			0.675**	
Chronbach's Alpha coefficient (α)	0.785	0.797	0.742	0.578

(**) the value is significant at (.01)

Table 2 Validity and reliability of success factors to tacit knowledge transfer

Statements	Personal phase	Context phase	Available skills
- Motivation Y_1	0.827**		
- Ability to transfer Y_2	0.863**		
- Willingness Y_3	0.741**		
- Reliability of the source Y_4		0.647**	
- Absorptive capacity Y_5		0.722**	
- Motivation Y_6		0.455**	
- Organisation design (structure) Y_7			0.897**
- Motivation (reward system) Y_8			0.938**
Chronbach's Alpha coefficient (α)	0.731	0.152	0.802

(**) the value is significant at (.01)

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