Examining information literacy experience in light of activity theory and task complexity

Fereshteh Kamran Toroghy, Azam Sanatjoo* and Masoumeh Tajafari
Department of Knowledge and Information Science,
Faculty of Education and Psychology,
Ferdowsi University of Mashhad, Mashhad, IRAN
e-mail: fe.kamrantoroghy@mail.um.ac.ir;
*sanatjoo@um.ac.ir (corresponding author); tajafari@um.ac.ir
ORCID: F.K.Toroghy: 0000-0006-6972-0589
A.Sanatjoo: 0000-0002-6288-314X
M.Tajafari: 0000-0001-7716-8280

ABSTRACT

This study aims at examining information literacy in light of activity theory and task complexity. The sample of this survey consists of 86 randomly selected university employees with simple and complex tasks. Three researcher-made questionnaires collected information concerning information literacy, relevant components of activity theory in all stages of information literacy experiences and task complexity. Regarding the components of information needs, namely, identifying information sources, searching, combining new information with prior knowledge and updating information, the analysis indicates that these components enjoyed a satisfactory level in terms of simple tasks. Analysis, evaluation, selection and implementation of information at the workplace, however, were not satisfactory among people with simple tasks. The findings showed that elements of activity theory significantly and positively impacted information needs, sources and seeking behaviour of both groups of employees; information analysis and evaluation behaviour in employees with complex tasks; information selection and summary behaviour in the group assigned to simple tasks; combining new information with prior knowledge in employees with simple tasks. These factors, too, had a significantly positive effect on the ability to update information in both groups. These factors in activity theory also had a significant positive effect on information literacy experiences in both groups; however, the effect was larger for employees assigned to simple tasks, compared to those assigned to complex tasks.

Keywords: Workplace **i**nformation literacy; Information needs; Information behaviour; Activity theory; Task Complexity.

INTRODUCTION

In today's environment of rapid technological change and the explosive proliferation of information resources, information literacy is becoming increasingly important; Because of the increasing complexity of this environment, individuals in different work environments are faced with a variety of information options. In such situations, reliance on information literacy allows the use of inherent opportunities in the information society (Sharkey 2006). When it comes to information literacy, the environmental context of information use should also be considered because there is an interactive relationship between the

individual and the environment in which he operates. According to Engeström's theory of activity, which was developed based on Vygotsky's early theories, the individual acts collectively in the workplace through interaction with clients and colleagues (Vygotsky 1978; Engeström 1987; Forte 2009). Therefore, he must have sufficient information ability, i.e. the skill in acquiring and using information, in order to respond to people and exchange information with other colleagues, which Bruce (1999) calls it "the experience of information literacy" (p.33). Experience of information literacy in the workplace is the ability to search, retrieve and use different types of information resources and information technologies by employees in different job environments to perform work tasks, respond to clients and interact and exchange information with colleagues. The experience of information literacy enables managers and employees to adapt themselves with increasing changes in work environments. It also causes the survival and development of the organisation.

Information literacy can be defined as one's ability to identify information needs, evaluate and use information resources and effectively use information resources. When it comes to workplaces, employees need information to execute their tasks. Bruce (1999), nonetheless, is of the view that there is a common misconception about information literacy, which has been mistakenly linked to abilities and competencies required to work with computers and use information technology, rather than information literacy skills.

A new line of research has concentrated on information literacy at the workplace through qualitative research methods. This promising area of investigation examines the crucial role of information seeking and use at the workplace for employees to succeed in their tasks (Bruce 1999; Hepworth and Smith 2008; Wu 2012; Molopyane and Fourie 2015; Gilbert 2017). Therefore, this area of study explores information literacy experience at the workplace. Despite these scholarly attempts, this research strand has overlooked three important areas of issues. First, information literacy experience at the workplace needs some scholarly attention as research can offer insights into how information literacy skills are achieved at the workplace and what is precisely achieved, and how information literacy is employed. The type of workplace has not been the concern of research. This is also highlighted in Forster's (2017) book on information literacy in the workplace with empirical evidence. Second, the existing literature has not addressed task complexity at the workplace while task complexity can affect information literacy experiences. Broadly speaking, there are two types of tasks: simple and complex. It seems that people tend to prioritize personal and public information over technical information. That is the reason why they face a few challenges in terms of identifying information sources when they handle easy tasks. To be able to handle complex and challenging tasks, the employees should rely on a wide range of information sources, most notably technical and scientific sources. This implies that people may have difficulty accessing and identifying sources of information for their jobs. To conclude, information literacy experiences of people in the workplace can be analysed in terms of simple and complex tasks. Additionally, it is reasonable to examine and analyse individuals' information literacy experiences in varying occupations so as to understand their ability in executing their tasks properly, in meeting the needs of users and customers and in exchanging and sharing information with co-workers (Hjørland 2002).

As a renowned researcher of information literacy in information sciences, Byström (2005) is of the view that in order for people to fulfill the tasks assigned to them in a specific career, they need to resort to a diverse range of information sources and channels. Therefore, they should be able to identify various types of information resources and must

know how to find and access them. According to this scholar, the degree of task complexity varies with fields and occupations. Therefore, an increase in task complexity is assumed to affect employees' information behaviour, including information needs, seeking and use, implying that fact that the more complex the task, the more complex information seeking (Byström 2005; Kumpulainen and Järvelin 2012). This leads us to the belief that there is an association between career and task complexity which in turn affects information literacy in employees.

After all, third issue, we need to use the activity theory lens to look at information literacy experience and task complexity. This is because, according to this theory, humans need to interact with the environment, and human activities result from this interaction and the environmental context can shape these activities. This theory examines the nature of human activities, traces their social origins and analyses the systems of activities wherein humans communicate and interact with each other. This theory works as a basis for gaining further understanding of organisations in order to develop a strategy that best serves the purpose of implementing information literacy in organisations. This area has received little attention in the literature and studies have so far ignored the importance of this theory and its tenets, and consequently, they failed to examine information literacy and develop guidelines in light of activity theory.

Activity theory can also be used to scrutinize the relationship between individuals and the goals they pursue at the workplace. According to this theory, individuals and groups are engaged in activities in the workplace to achieve such goals as broadening their information literacy experience to address customer needs in a timely manner, properly executing professional tasks and interacting and exchanging information with peers. These goals are related to the concept of motivation. Motivation drives individuals and their activities to achieve goals. People also use tools to achieve goals and obtain the desired results, and tools act as intermediaries in activities. Tools include physical tools (artifacts) such as computers, texts, and non-physical tools such as written utterance, speech, and skills (Hall, Cruickshank and Ryan 2018).

Besides people in the workplace—who are called actors in activity theory— and goals that people endeavor to reach and tools that they use to attain the goals, a number of other factors, including rules, community and division of labor are especially fundamental. Known as the backbone of the activity theory, these factors affect people, goals and tools (Hashim and Jones 2007; Dayton 2000; Barnard 2010; Gretschel, Ramugondo and Galvaan 2015).

Following the active strand of research on information literacy at the workplace (Hepworth and Smith 2008; Boustany 2013; Ayoub 2016; Gilbert 2017) on the one hand, and the complexity of tasks at the workplace, on the other hand, the present study tries to gain a better understanding of information literacy experience among individuals executing tasks with varying complexity from the lens of activity theory.

The conceptual model of the study can be seen in Figure 1; it represents the effects of activity theory components on any faces of information literacy experience in terms of task complexity.

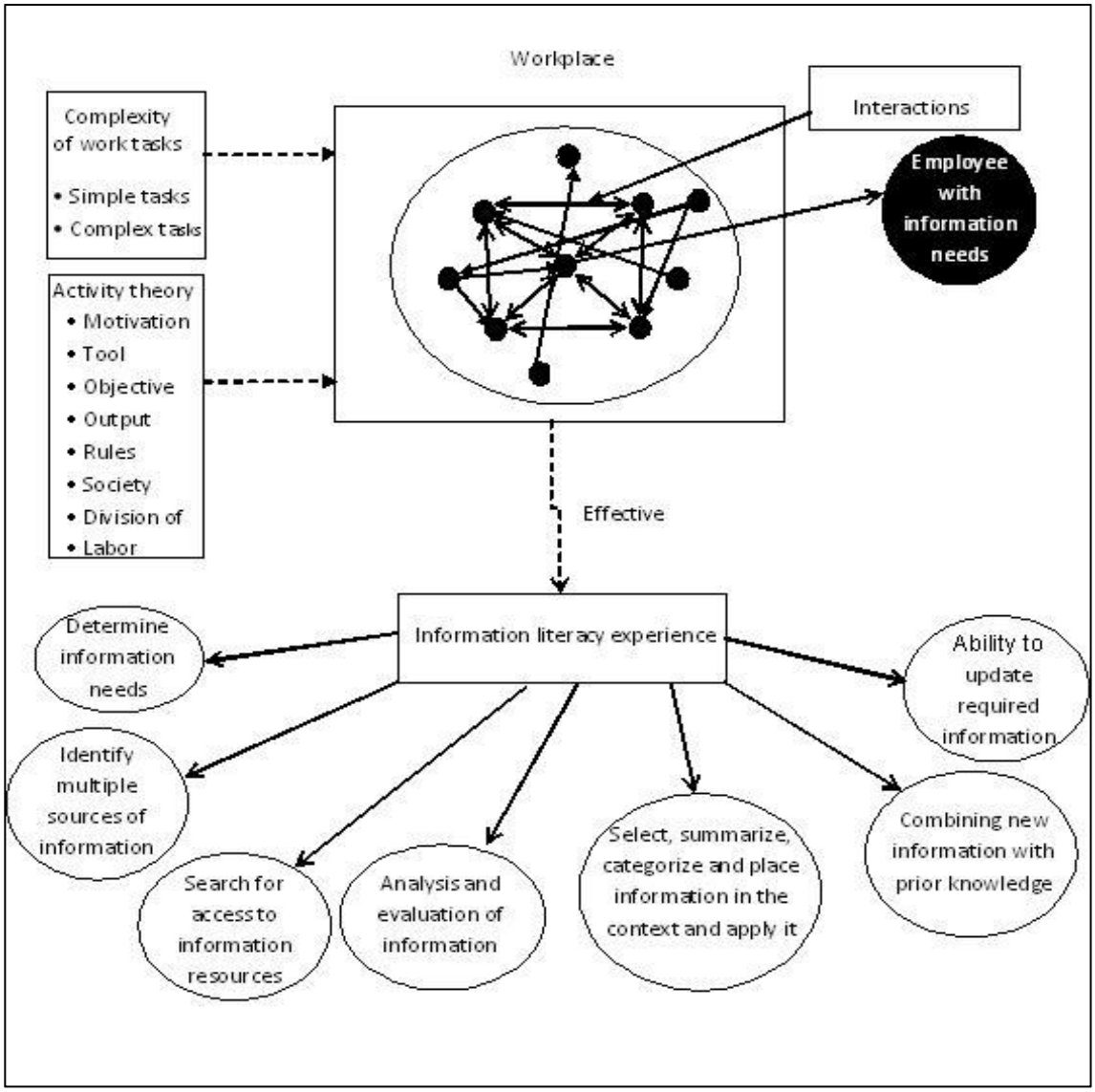

Figure 1: Conceptual Model of Research

THEORETICAL FOUNDATION: INFORMATION LITERACY EXPERIENCE AT WORKPLACE

Information literacy experience is defined as finding and identifying information from diverse reliable sources to resolve work-related challenges, meet customer needs, fulfill responsibilities as an employee and exchange and share information with co-workers. Information literacy experience can also be examined from the perspective of American Library Association Presidential Committee on Information Literacy. According to the definition offered by this association, a workforce equipped with information literacy skills, including how to organise information and how to learn and acquire new information is capable of locating information and put into practice this information (Molopyane and Fourie 2015; Firdaus Salehudin 2016).

Information literacy experience at the workplace embraces 15 steps and stages, ranging from information seeking, obtaining and analysing to researching for information. It has been suggested that each stage should effectively increase employee interaction and spur collaboration (Firdaus Salehudin 2016).

In other words, each job or occupation holds its own complexity. For instance, the lack of a clear understanding of the assigned task, the lack of enough support (e.g., no transparency), the lack of enough knowledge concerning the assigned task are typical challenges that add to the complexity of the task in question. This implies that to execute a task at the workplace properly, an individual needs to acquire information literacy skills. Performing the duties efficiently at the workplace and addressing customer needs and queries can lead to high-performance outcome in the professional work environment and can be an indicator of social growth and attention to employees' responsibilities at the workplace.

Following the activity theory, it can be concluded that employees need different levels of information literacy experience to be able to execute easy or complex tasks successfully and to interact with others at the workplace (Hasan and Kazlauskas 2014). Accordingly, the importance of information literacy training for the workforce is undeniable and can lead to a high-performance outcome in the professional work environment (Molopyane and Fourie 2015). In fact, employees can make optimal use of information in the workplace by improving information literacy skills and this, in turn, can build a high-performing workforce (Kirton and Barham 2005; Bird 2016).

In line with Ben Abdallah's (2013) point of view, based on Engeström's theory of activity, information literacy takes a social dimension in addition to being individual. In the individual dimension, information literacy is only a set of skills and knowledge for the ability of a person to find, evaluate and use the information that he or she needs. Indeed, information literacy is only a means for a person's success. In the social dimension, information literacy is considered as a social practice that the context, situation or environment in which people are placed affects this skill and ability. In other words, the components of activity theory including motivation and goals, various tools (print, electronic and face-to-face), position and rules and division of labor affect people in environments such as work and professional environments as part of the fabric of society. Therefore, the components of the activity theory in the well-known triangle of Engeström (1987) in relation to the information literacy experience of people in the workplace are shown in the form of Figure 2.

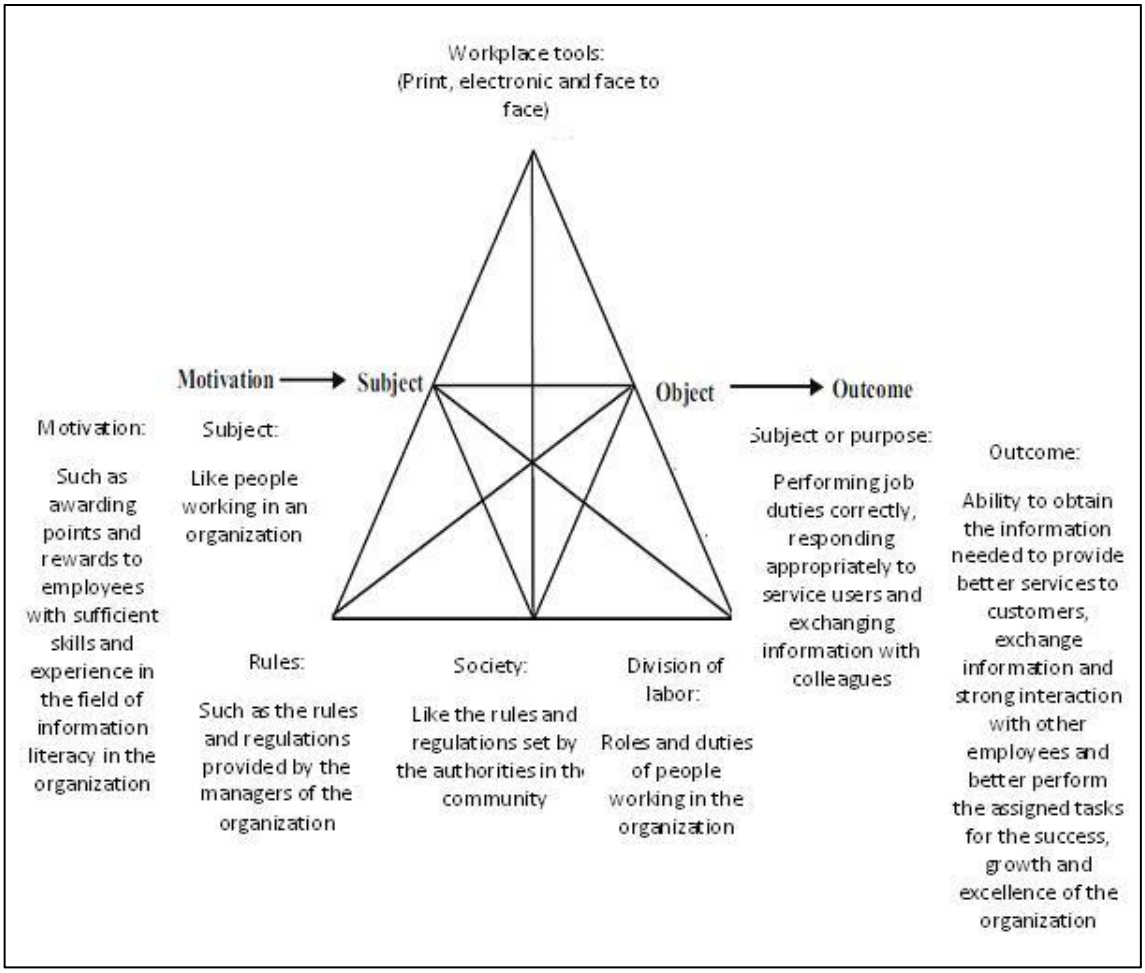

Figure 2: Activity Theory in Information Literacy Experience at the Workplace (based on Engeström 1987)

LITERATURE REVIEW

As a matter of fact, information literacy in the workplace (workplace information literacy) has attracted a great deal of attention. The reason can be ascribed to the competition among organisations and an increased need for productivity and innovation. The other reason is the different nature of Workplace information literacy. While information literacy (in general) has been suggested as a stimulus for "conscious learning", i.e. learning to use information for learning (Somerville and Bruce 2017), workplace Information literacy is also associated with information creation and innovation (Lloyd 2011, p. 292; Lloyd 2012; Middleton and Hall 2021). Workplace Information literacy is a sense of workplace learning to meet organisational goals and in some way by applying internal sources and collaborating with people. Workplace information literacy comprises socially instituted, collaborative, context dependent, embedded, critical work practice that is executed by co-located and co-participating workers using information from organisational and non-organisational internal and external sources. This drives learning, knowledge creation, and significantly innovation (Lloyd 2011, p. 292; Lloyd 2012).

But despite this fact, a review of the literature shows very little research has been done on information literacy at the workplace. In these few related studies, workplace information

literacy has been considered from different views. Workplace information literacy may be viewed as a set of employability skills that supports people in finding and making decisions about information, or a set of abilities for employees to interact with information when the need to address any business issues or problems at work (Cheuk 2017). In fact this definition is commonly deployed in educational settings as it shares a focus on the personal acquisition and application of information skills for handling published information sources. The problem is that it does not focus on the various settings or contexts of educational and workplaces. As indicated by Middleton and Hall (2021) it fails to take into account that employees (unlike students) undertake their work (and in many cases their learning) collectively as a workplace information literacy (p. 1347). This critique can, however, be applied to all information literacy research in the workplace, which is why the present study focuses on the experience of workplace information literacy and the complexity of the task at work.

In another view, Lloyd (2011, 2012, 2017), Ahmad, Widén and Huvila (2020), and Middleton and Hall (2021), applied information literacy workplace in conjunction with innovation. Ahmad, Widén and Huvila (2020) identified a positive link between workplace information literacy and innovation in small and medium-sized enterprises (SMEs).

In Lloyd's studies (2011, 2012, 2017) and Middleton and Hall (2021), workplace information literacy is a "way of knowing" how to use information to develop information work behaviour (IWB). As such, their work made a novel contribution to the body of work on IWB, while also adding to a decade and a half of information literacy research that explores the extent to which information supports workplace learning development (e.g. Lloyd 2010 2012; Lloyd and Somerville 2006).

Lloyd (2012) took the socio-cultural perspective by criticizing more attention to individual skills in the workplace (both when considering the concept in general and in applying it to the workplace). Referring to the practice theory, Annemaree Lloyd argues that information literacy is "a way of knowing the perspective of information" (p. 772). In fact, in Lloyd's (2017) theory, information literacy is "an exercise performed in a social environment" (p. 74). This set includes a set of activities and skills related to knowledge and cognitive methods related to the field. She rejects the notion that the workplace information literacy is merely a set of skills that can be used to manage information, as she put it; and is critical to learning, knowledge creation, and - essentially - innovation (Lloyd 2011, p. 292; Lloyd 2012).

What Annemaree Lloyd puts forward as information literacy in the workplace can be seen as the information literacy experience in the workplace from Wu's (2012) and Molopyane and Fourie's (2015) point of view. Workplace information literacy experience is the ability of employees to search, retrieve and use information and ICT in the context of the work environment in order to perform work tasks, respond to service users and interact and exchange information with colleagues. Their findings stressed the pivotal role of information literacy skills at the workplace. Given the importance of information literacy, a framework was provided for the implementation of official information literacy programmes at the workplace in a way that meets needs of organisations and is in line with the policies of the organisation. Along the same lines, but from the viewpoint of task complexity, previously, Kumpulainen and Järvelin (2012) examined obstacles to task-based information access among six researchers of medicine. The data were collected through shadowing, observation and interviews. The data analysis highlighted such barriers as information retrieval systems (information seeking difficulty, problems with the system,

information access limitation), users (lack of information seeking skills and lack of knowledge and awareness of information), work task context (lack of proper understanding of the task, lack of task support system and lack of proper knowledge on the workplace and scope of the work), which hamper individuals' interactions with the content. The authors concluded that task complexity affects data seeking behaviour of employees.

While Lloyd (2012) used practice theory to focus on social activities that should be considered in the workplace information literacy, Hall, Cruickshank and Ryan (2018) examined information literacy from the perspective of activity theory. In their survey-based research, they found that participation within the community, which is a core element in the activity theory, community councils need to exchange information with citizens as these councils are part of the society. That information literacy is must for them is indisputable; however, these associations were not capable of sharing and exchanging information with people as excepted because of their limited information literacy capabilities.

Overall, this review of the literature suggests that despite some attempts in examining information literacy in the workplace, researchers have not addressed information literacy experience at the workplace in light of task complexity.

OBJECTIVES

The main purpose of the current research is to analyse the experience of information literacy based on activity theory according to the complexity of work tasks. In this regard, the following objectives are pursued:
(a) To investigate the status of information literacy components in individuals dealing with simple and complex tasks, and
(b) To evaluate the effect of activity theory elements (motivation, means, goal, output, laws, society and division of labor) in all stages of information literacy experience.

In order to achieve these goals, the following questions followed by the research hypothesis are proposed and examined in the present study:

Research Question 1: What is the status of information literacy components in individuals dealing with simple and complex tasks?

Research Question 2: What is the effect of activity theory elements in all stages of information literacy experience?

Research Hypothesis: Components of activity theory significantly affect information literacy experience in individuals with simple and complex tasks.

Research Question 2 has seven sub-questions (2a to 2g) that gauge the effect of activity theory in terms of task complexity in seven stages of information literacy experience - (a) determining information needs; (b) identifying the sources of information; (c) seeking information resources; (d) analysing and evaluating information; (e) selecting, summarising, categorising, placing information in the desired context and implementing information; (f) combining new information with prior knowledge; and (g) updating information.

METHOD

Since this research investigates and analyses the experience of information literacy in work-task place, the studied population should be people working in a work environment that has simple and complex tasks. The statistical population consists of university employees in such fields as sciences, agriculture and engineering, working at Ferdowsi University of Mashhad, one of the top universities in Iran. The university is composed of 12 academic faculties, 38 research centres, 820 faculty members, over 20,000 students (including international students) and 1050 staff members. A combination of employees in simple and complex work-tasks, information dependent jobs and information interaction with users, were actually the reasons for choosing such an academic environment in this research.

In this research, a list of 21 educational groups in the fields of basic sciences, agriculture and engineering of Ferdowsi University of Mashhad was prepared. Among the employed employees (including people with simple tasks such as office manager or group expert and people with complex tasks such as laboratory staff) in 21 educational groups in the prepared list, whose number was 110, the sample size was determined by Cochran's formula. In this way, considering the confidence level of 95% and after putting the numerical values in Cochran's (1997)formula the sample size, 86 people, was obtained.

The data were gathered through three researcher-made questionnaires with open- and closed-ended questions. The first questionnaire (Appendix 1) was related to measuring the complexity of work tasks of research population. These questions were designed based on the framework provided by Byström and Järvelin (1995) and Saastamoinen, Kumpulainen and Järvelin (2013). To check the complexity of the work, the total complexity of the tasks was calculated for each person. If the obtained number was higher than the average, it meant that the person's working situation was complicated, if it was lower than the average, it was simple work task.

A simple work task is a task that is well defined and in relation to information, it is clear what information is needed to do it; The answer is usually found in a specific source and little cognitive effort is required to perform the task. On the other hand, the complex work task is an open question and the desired information is less specified and the answer is found in several sources. To respond to such a task, a high level of cognitive activities such as comparing, interpreting and synthesizing information is required (Zhang 2012). The complexity of the task affects the search for information and the use of information resources by users. There is a relationship between task complexity and performance, and users' performance differs in simple and complex tasks. In complex tasks, users perform more searches, and the number of information sources used and the time spent for each source in complex and medium complexity tasks are more than simple tasks. Also, people in complex tasks face less uncertainty and confidence in choosing information sources (Li et al. 2011; Kumpulainen and Järvelin 2012). Therefore, users face fewer problems in accessing information in simple tasks and show better or more transparent performance in accessing and using information. In complex tasks compared to simple ones, people's use of personal information decreases and the use of scientific and specialized information sources increases. Completing complex tasks depends on the expertise and scope of individual knowledge, cognitive ability, and having not only the appropriate level of information literacy, but also the increase in skill and experience in information literacy (what is called information literacy experience in today's work environments). In complex tasks, people find it difficult to find the desired information, go through more steps, have

trouble completing the task, and achieve less success, or this success is less obvious or transparent (Saastamoinen, Kumpulainen and Järvelin 2012).

The participants' information literacy experience was measured by the second questionnaire (Appendix 2). The experience of information literacy was measured in seven dimensions including identifying information needs, identifying information sources, searching, analysing and evaluating of retrieved information, selecting, summarising, categorising and applying information, integrating new information with previous knowledge and learning, and the ability to update information.

The last questionnaire (Appendix 3) was designed to evaluate the effectiveness of the factors involved in the theory of activity in each stages of information literacy experience. It was designed based on Hall, Cruickshank and Ryan (2018). The face and content validity of the questionnaires were assessed and confirmed by experts. Reliability of the questionnaires was also confirmed by calculating the Cronbach's alpha coefficient (more than 0.7).

RESULTS

In this section, the findings are presented in response to the research questions and research hypotheses.

Research Question 1: What is the status of information literacy components in individuals dealing with simple and complex tasks?

To address this research question, an independent sample *t*-test was used. The scale items were measured on a 6-point Likert-Type scale, ranging from 1 (minimum) to 5 (maximum) with a midpoint (see Tables 1 and 2).

Table 1: Results of an Independent Sample *t*-test for Information Literacy Components in Individuals Dealing with Simple Tasks

Information literacy component	Mean	Standard deviation	T Statistics	Degree of freedom	Significance level	Mean differences
Information needs	3.721	0.674	7.011	42	0.000	0.721
Identify information sources	3.721	0.625	7.559	42	0.000	0.721
Search	3.209	0.532	2.579	42	0.013	0.209
Analysis and evaluation	2.549	0.449	-6.592	42	0.000	-0.451
Selection and application of information	3.132	0.573	1.507	42	0.139	0.132
Integrate new information with previous learning	3.349	0.630	3.632	42	0.001	0.349
Ability to update information	3.256	0.595	2.821	42	0.007	0.256

The independent sample *t*-test show people with simple tasks outperformed their counterparts in some information literacy components, including information needs, identifying information sources, seeking information and updating information. Therefore, employees with simple tasks did not hold skills and capabilities concerning the mentioned components, compared to other components of information literacy. Notwithstanding this, all components of information literacy enjoyed a satisfactory level in people with complex tasks (Table 2).

Table 2: Results of an Independent Sample *t*-test for Information Literacy Components in Individuals Dealing with Complex Tasks

Information literacy component	Mean	Standard deviation	T Statistics	Degree of freedom	Significance level	Mean differences
Information needs	4.163	0.344	22.162	42	0.000	1.163
Identify information sources	4.155	0.336	22.536	42	0.000	1.155
Search	4.116	0.396	18.486	42	0.000	1.116
Analysis and evaluation	3.775	0.470	10.810	42	0.000	0.775
Selection and application of information	3.969	0.397	15.998	42	0.000	0.969
Integrate new information with previous learning	4.070	0.368	19.076	42	0.000	1.070
Ability to update information	4.023	0.359	18.677	42	0.000	1.023

Research Question 2: What is the effect of activity theory elements in all stages of information literacy experience?

To examine this research question, it is necessary to examine the first model of research, as shown in Figures 3 to 6. In this section, respondents are divided into two categories with simple and complex tasks. Therefore, the model is considered for both groups.

Table 3 reports coefficients of determination (Q^2) for the first model for individuals with simple and complex tasks.

Goodness of fit for individuals with easy tasks and complex tasks are 0.591 and 0.491, respectively. These values indicate a strong model fit for both models as they are greater than 0.36.

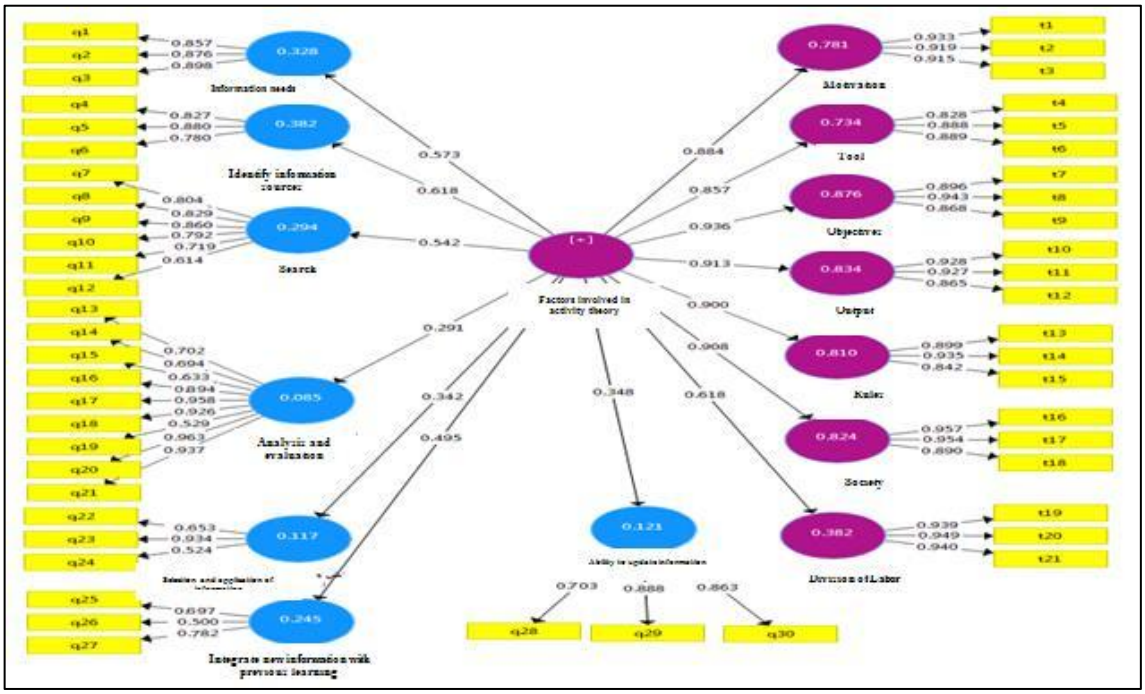

Figure 3: Path Coefficients for the First Model for Individuals with Simple Tasks

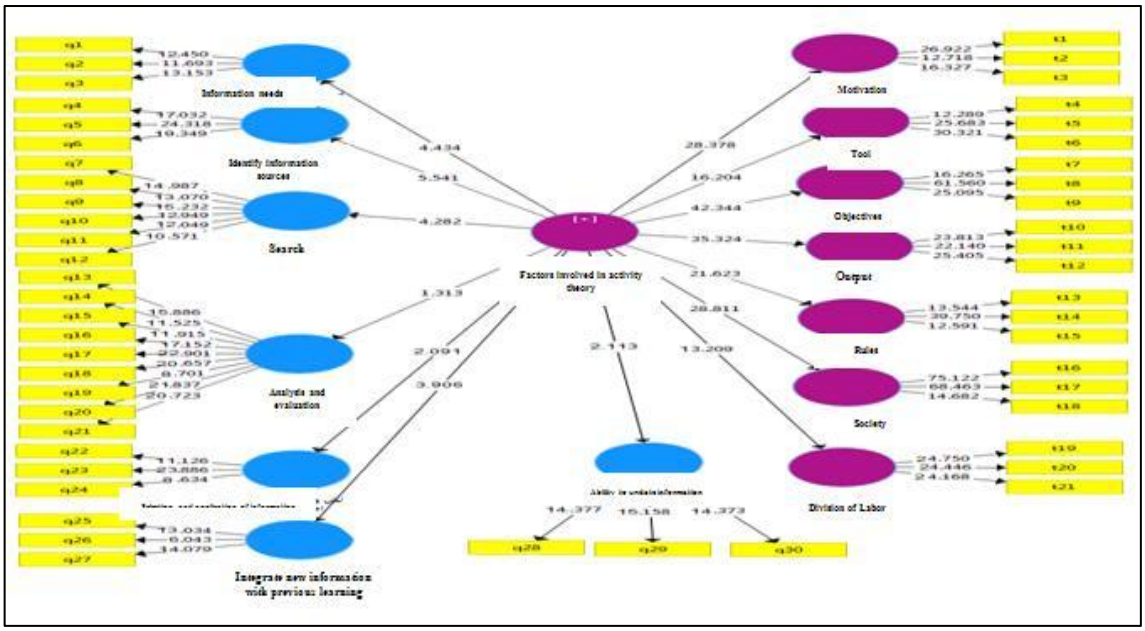

Figure 4: T-values for the First Model for Individuals with Simple Tasks

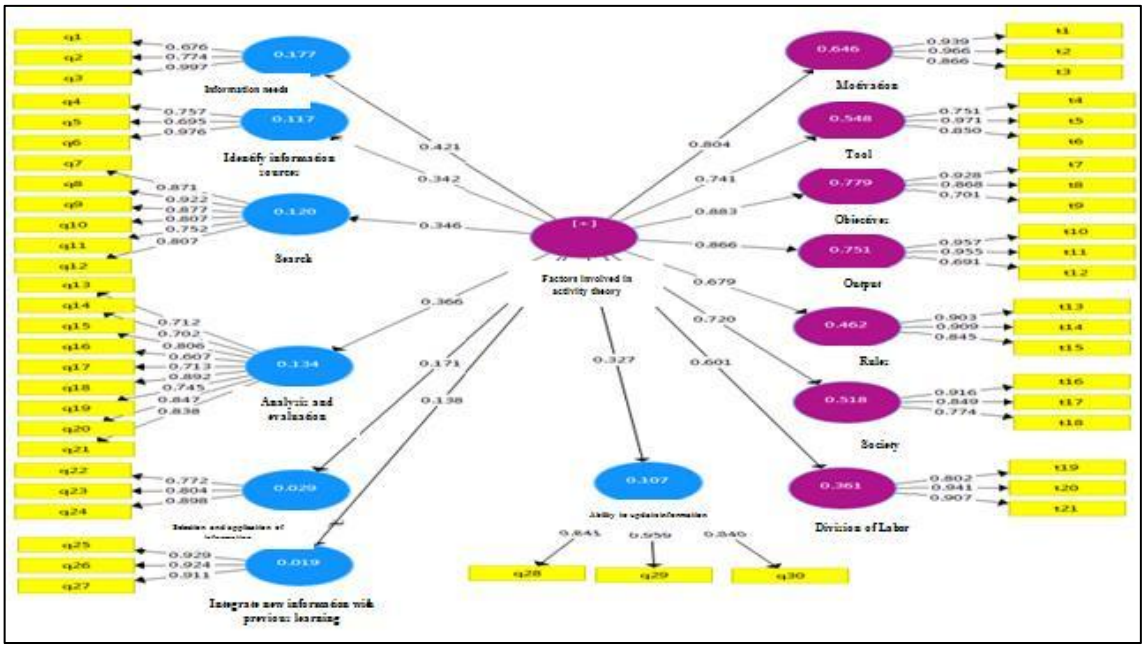

Figure 5: Path Coefficients for the First Model for Individuals with Complex Tasks

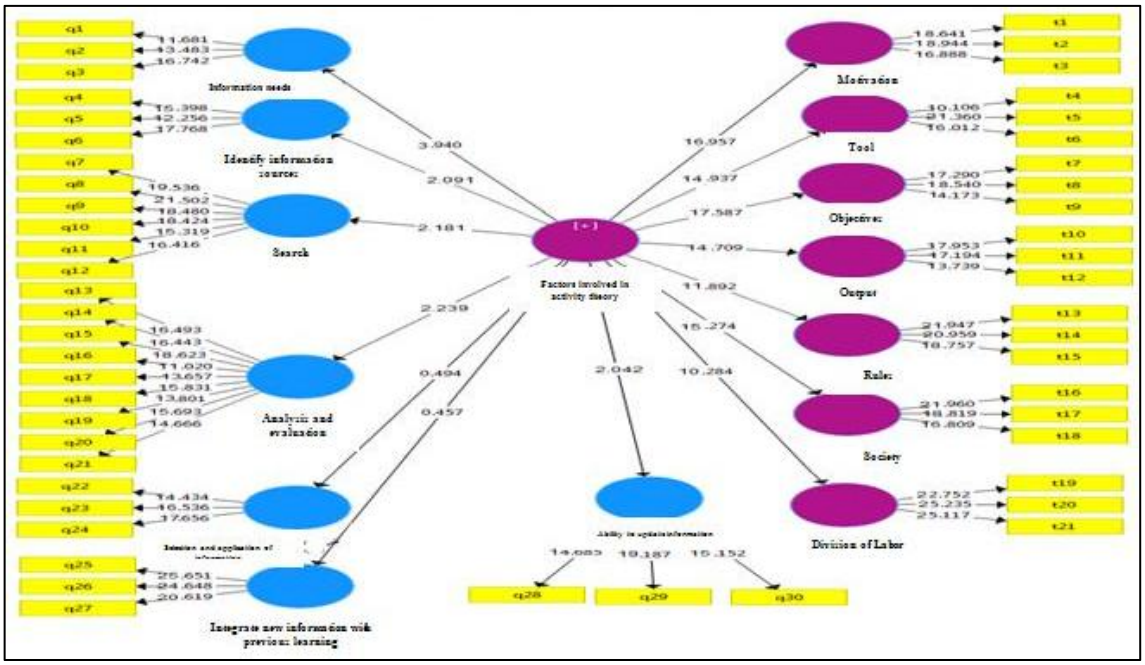

Figure 6: T-values for the First Model for Individuals with Complex Tasks

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Table 3: Coefficients of Determination (Q^2) for the First Model for Individuals with Simple and Complex Tasks

Stages of information literacy experience	Coefficient of determination		Coefficient Q2	
	simple tasks	complex tasks	simple tasks	complex tasks
Information needs	0.328	0.177	0.230	0.094
Identify information sources	0.382	0.117	0.246	0.126
Search	0.294	0.120	0.035	0.045
Analysis and evaluation	0.085	0.134	0.031	0.011
Selection and application of information	0.117	0.029	0.048	0.028
Integrate new information with previous learning	0.245	0.019	0.027	0.021
Ability to update information	0.121	0.107	0.038	0.026
Motivation	0.781	0.646	0.656	0.554
Tool	0.734	0.548	0.544	0.313
Objectives	0.876	0.779	0.695	0.614
Output	0.834	0.751	0.658	0.610
Rules	0.810	0.462	0.606	0.491
Society	0.824	0.518	0.666	0.522
Division of Labor	0.382	0.361	0.298	0.299

Research Question 2a: How effective are the components of activity theory in determining information needs in terms of task complexity?

As presented in Table 4, the values of the path coefficient and the absolute value of the *t*-value indicate that components of activity theory had a significant and positive effect on information needs of individuals with easy and complex tasks. Also, this effect was larger in individuals with easy tasks, compared to individuals with complex tasks.

Table 4. Path Coefficients and t-values for Research Question 2a

Group	Path coefficient	T- value	Standard error	P-value	Significance
Simple tasks	0.573	4.434	0.129	0.000	Yes
Complex tasks	0.421	3.940	0.107	0.000	Yes

Research Question 2b: How effective are the components of activity theory in identifying the sources of information in terms of task complexity?

Table 5 reports path coefficients and the absolute value of *t*-value, and components of activity theory had a significant and positive effect on both groups with easy and complex tasks. Additionally, this effect was larger in individuals with easy tasks, compared to individuals with complex tasks.

Table 5: Path Coefficients and t-values for Research Question 2b

Group	Path coefficient	T- value	Standard error	P-value	Significance
Simple tasks	0.618	5.541	0.111	0.000	Yes
Complex tasks	0.342	2.091	0.164	0.000	Yes

Research Question 2c: How effective are the components of activity theory in seeking information resources in terms of task complexity?

Following path coefficients and the absolute value of *t*-value in Table 6, components of activity theory had a significant and positive effect on seeking information resources for both groups with easy and complex tasks. Additionally, this effect was larger in individuals with easy tasks, compared to individuals with complex tasks.

Table 6: Path Coefficients and t-values for Research Question 2c

Group	Path coefficient	T- value	Standard error	P-value	Significance
Simple tasks	0.542	4.282	0.127	0.000	Yes
Complex tasks	0.346	2.181	0.159	0.000	Yes

Research Question 2d: How effective are the components of activity theory in analysing and evaluating information in terms of task complexity?

Following path coefficients and the absolute values of *t*-value in Table 7, components of activity theory had a significant and positive effect on analysing and evaluating information in individuals with complex tasks. Additionally, this effect was not significant in individuals with simple tasks.

Table 7: Path Coefficients and t-values for Research Question 2d

Group	Path coefficient	T- value	Standard error	P-value	Significance
Simple tasks	0.291	1.313	0.222	0.189	No
Complex tasks	0.366	2.239	0.163	0.000	Yes

Research Question 2e: How effective are the components of activity theory in selecting, summarising, categorising, placing information in the desired context and implementing information in terms of task complexity?

Following path coefficients and the absolute values of *t*-value in Table 8, components of activity theory had a significant and positive effect on selecting and summarising information in individuals with simple tasks. Yet, this effect was insignificant in individuals with complex tasks.

Table 8: Path Coefficients and t-values for Research Question 2e

Group	Path coefficient	T- value	Standard error	P-value	Significance
Simple tasks	0.342	2.091	0.164	0.029	Yes
Complex tasks	0.171	0.494	0.346	0.621	No

Research Question 2f: How effective are the components of activity theory in combining new information with prior knowledge in terms of task complexity?

Table 9 presents the path coefficients and the absolute value of t-value, and components of activity theory had a significant and positive effect in combining new information with prior knowledge in individuals with simple tasks. This effect was, however, insignificant in individuals with complex tasks.

Table 9: Path coefficients and t-values for Research Question 2f

Group	Path coefficient	T- value	Standard error	P-value	Significance
Simple tasks	0.495	3.906	0.127	0.000	Yes
Complex tasks	0.138	0.457	0.302	0.648	No

Research Question 2g: How effective are the components of activity theory in updating information in terms of task complexity?

Table 10 reports path coefficients and the absolute value of *t*-value, and components of activity theory had a significant and positive effect in updating information in both groups of individuals with simple and complex tasks

Table 10: Path Coefficients and t-values for Research Question 2g

Group	Path coefficient	T- value	Standard error	P-value	Significance
Simple tasks	0.348	2.113	0.165	0.000	Yes
Complex tasks	0.327	2.042	0.160	0.000	Yes

Figures 7 to 10 demonstrate the second research model. Here, the respondents are divided into two categories with simple and complex tasks. Therefore, the model is implemented for groups of simple and complex tasks. The coefficients in these diagrams are divided into two categories. The first category is the relationships between latent (elliptical) and observed (rectangular) variables, also called factor loading. Factor loading shows the extent of variable importance and relevance in explaining a construct. The second category is the relationship between latent variables, which are called path coefficients and are used to test hypotheses. All coefficients are tested using a t-test.

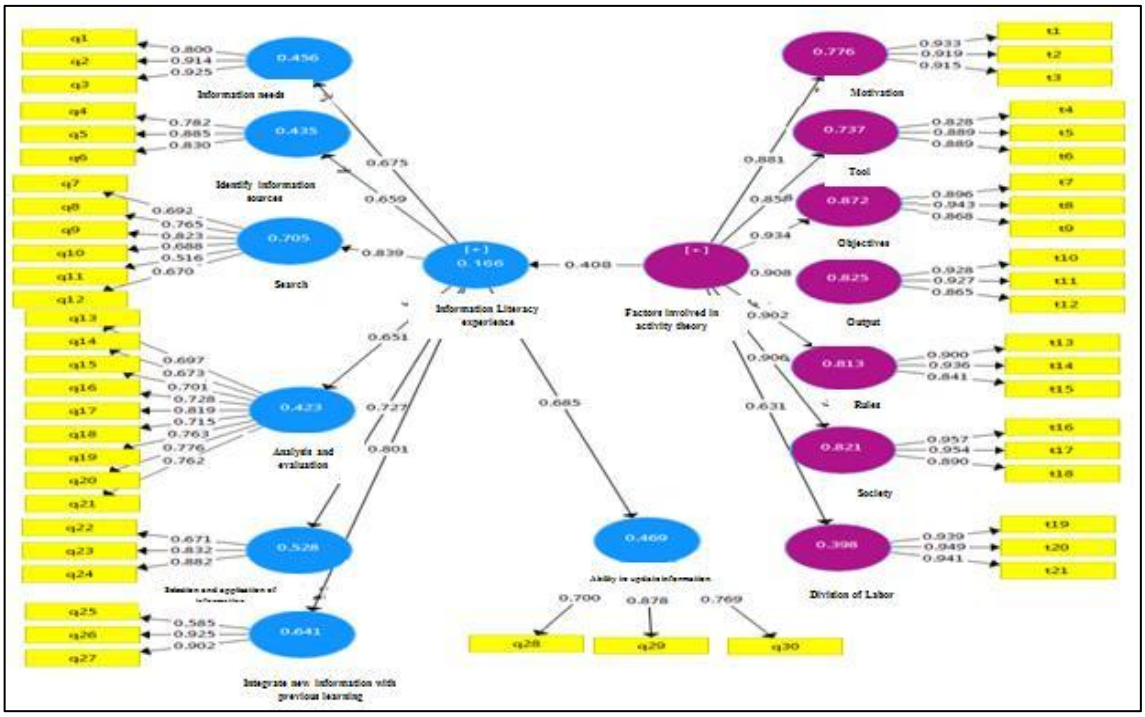

Figure 7: Path Coefficients for the Second Model for Individuals with Simple Tasks

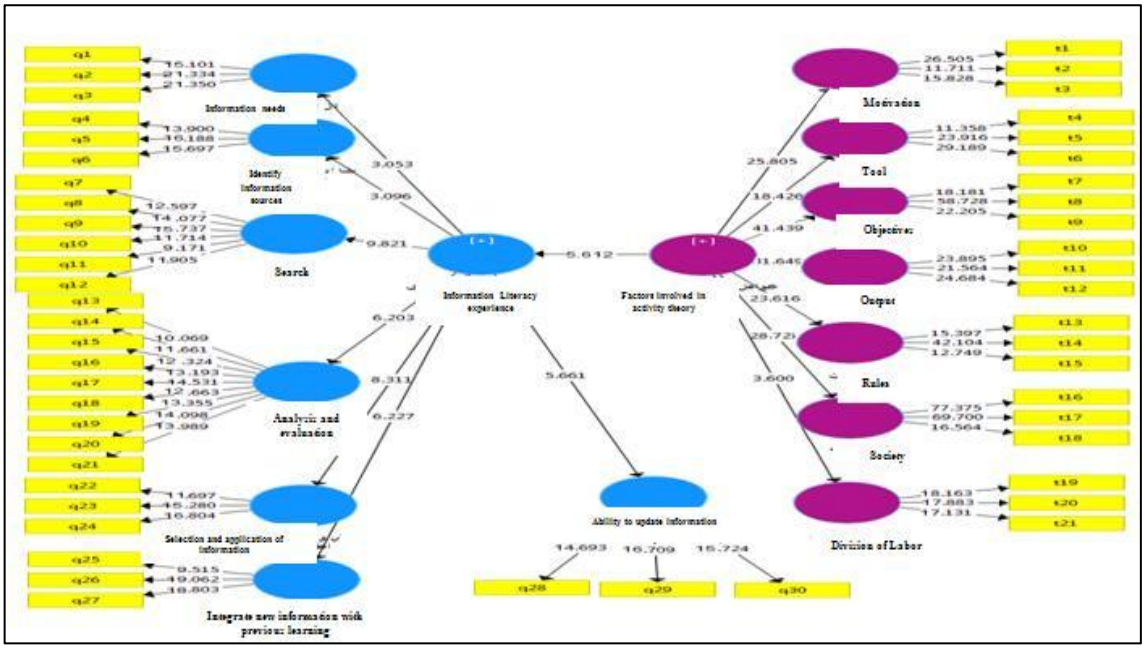

Figure 8 . T-values for the Second Model for Individuals with Simple Tasks

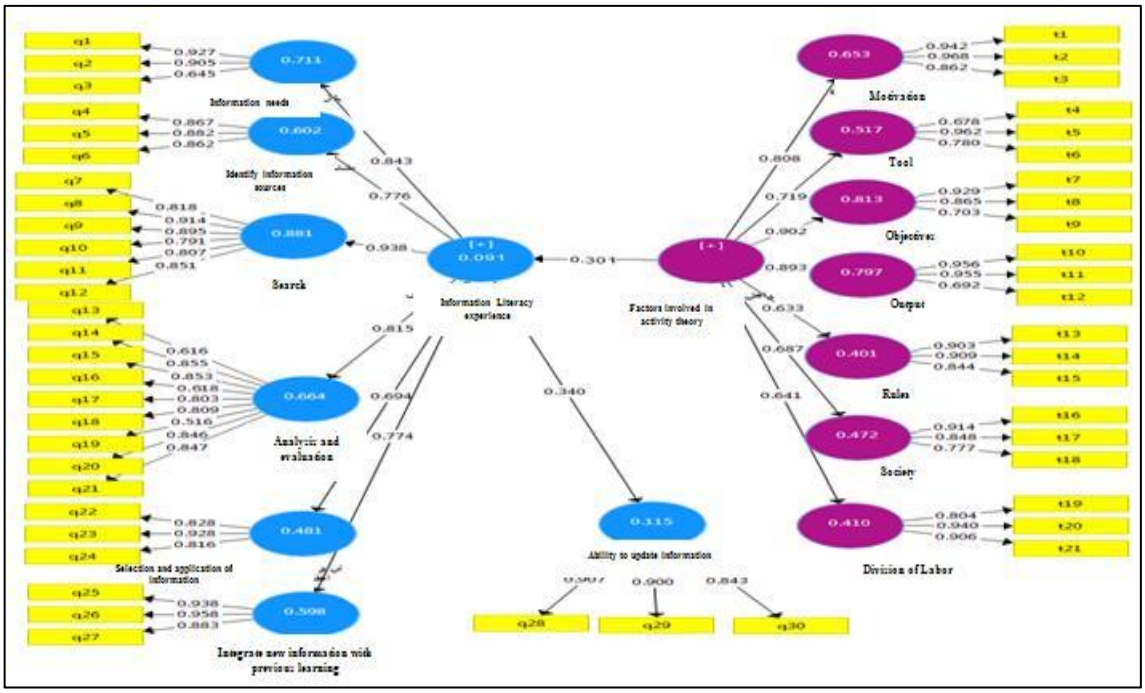

Figure 9. Path Coefficients for the Second model for Individuals with Complex Tasks

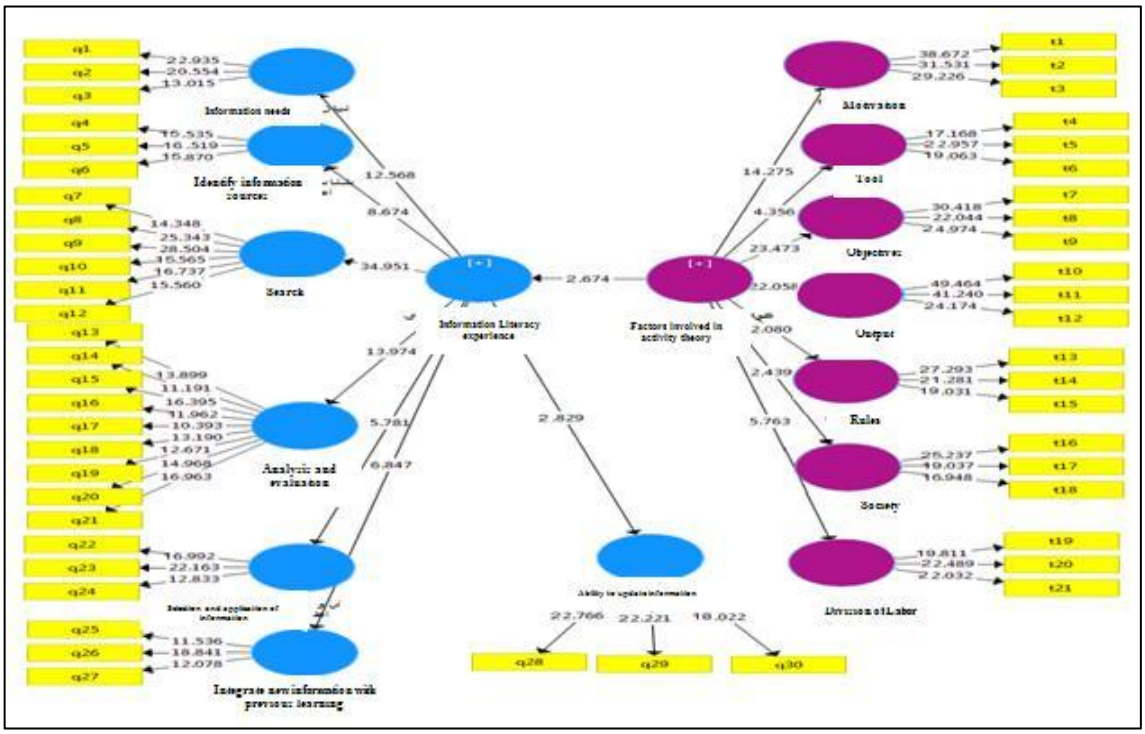

Figure 10: T-values for the Second Model for Individuals with Complex Tasks

The predictive power of the constructed model for the dependent variables is measured by the percent of explained variance (R^2). The coefficient of determination calculates the proportion of the variance in the dependent variable that is predictable from the independent variable.

R-squared values of 0.67, 0.33 and 0.19 are considered strong, moderate and weak. The predictive power of the model is assessed by Q^2 where values of 0.02, 0.15, and 0.35 show that an exogenous construct holds a small, moderate and strong predicting power.

Table 11 reports coefficients of determination Q^2 for the second model for individuals with simple and complex tasks.

Table 11: Coefficients of Determination Q2 for the Second Model for Individuals with Simple and Complex Tasks

Stages of information literacy experience	Coefficient of determination		Coefficient Q^2	
	simple tasks	complex tasks	simple tasks	complex tasks
Information needs	0.456	0.711	0.337	0.347
Identify information sources	0.435	0.602	0.282	0.310
Search	0.705	0.881	0.274	0.525
Analysis and evaluation	0.423	0.664	0.173	0.587
Selection and application of information	0.528	0.481	0.291	0.475
Integrate new information with previous learning	0.641	0.598	0.384	0.520
Ability to update information	0.469	0.115	0.256	0.359
Information Literacy experience	0.166	0.091	0.002	0.010
Motivation	0.776	0.653	0.651	0.555
Tool	0.737	0.517	0.546	0.313
Objectives	0.872	0.813	0.691	0.619
Output	0.825	0.797	0.650	0.614
Rules	0.813	0.401	0.609	0.480
Society	0.821	0.472	0.663	0.515
Division of Labor	0.398	0.410	0.315	0.308

These values indicate both models have a good fit as they are greater than 0.36. The following section concerns testing research hypothesis.

Research Hypothesis: Components of activity theory significantly affect information literacy experience in individuals with simple and complex tasks.

This hypothesis examines how components of activity theory affect information literacy experience in individuals with simple and complex tasks.

Table 12: Path Coefficients and *t*-values for the Research Hypothesis

Group	Path coefficient	T- value	Standard error	P-value	T- value
simple tasks	0.408	5.612	0.073	0.000	Yes
complex tasks	0.301	2.674	0.046	0.000	Yes

Following Figures 7 to 10 and Table 12 and the coefficients and *t*-values, it can be concluded that components of activity theory significantly and positively contributed to information literacy experience of individuals with simple and complex tasks. Additionally, this effect was greater for the individuals with simple tasks, compared to those with complex tasks. In other words, elements of activity theory, including motives, tools,

objectives, output, regulations, society and division of labor play a pivotal role in motivating employees with simple tasks to hone their information literacy skills.

DISCUSSION

As the complexity of work-related tasks increases, accessing information for executing tasks becomes of paramount importance. The overall findings of the present study were consistent with those of Hepworth and Smith (2008) as employees with complex tasks were capable of handling complex tasks at the workplace. They make use of elements of information literacy experience to meet and exceed their job requirements, address customers' needs and help peers in the workplace. Their outstanding ability and considerable experience in determining information needs, identifying information sources, searching, in addition to enormous capabilities and abilities in analysing and evaluating information, selecting and applying information to the job, combining new information with prior knowledge and updating information, allowed individuals with complex tasks to outperform individuals with simple tasks at the workplace. Therefore, measures should be taken to improve employees' skills on information literacy experience at the workplace.

Wu (2012) also showed that many employees attach importance to information literacy experience in their work environment and try to enhance their skills on information literacy experience. Also, they use information to perform tasks assigned to them and respond to clients' needs and offer support to their colleagues at work. But some employees need more training to acquire skills of information literacy and this training helps them increase their ability to access the information they need, especially the case of complex tasks.

The study, too, examined effects of activity theory components, such as motivations, tools, objectives, output, rules, society and division of labor in most stages of information literacy. The analysis showed that these components have significant and positive effects on determining information needs, identifying information sources, seeking information and updating information in both groups of employees with simple and complex tasks. This effect was, however, greater in individuals with simple tasks; in other words, in comparison with other groups, people with simple tasks demand less information due to having tasks that are less specialized and complicated. That is said, to acquire more information, to be able to exchange information with colleagues, and to be able to make use of this information in addressing customers' demands, they are expected to enhance their information literacy skills. This in turn empowers these people in terms of salary and occupational status. Nevertheless, people with complex tasks are more likely to achieve new information literacy experience skills at work because they frequently face very specialized and complicated issues.

Employees with simple tasks, in contrast with individuals with complex tasks, deal with less specialised and completed activities, and consequently, they should be encouraged to develop a set of information literacy skills so that they can put into practice these skills when they need to select, summarise, categorise and implement information in its specific context or apply information to the job and combine new information with prior knowledge. This makes sense when factors associated with activity theory, such as salary increase and detailing job requirements are considered. Because individuals with simple tasks deal with less complicated tasks need to increase their information literacy skills and knowledge. It is quite understandable from the very perspective of activity theory where

there is a focus on norms, regulations, values at the workplace and equal division of work and responsibility between employees according to their competence. In contrast, individuals involved in complex tasks are more expected to promote their current information literacy skills and capabilities because they are assigned to tasks that demand great expertise and competence.

Taken all together, information literacy experience and task complexity go hand in hand. Simply put, as information literacy experience increases, individuals are more encouraged to take full advantage of information literacy. In turn, occupational knowledge is developed and organisational excellence is easily achieved, and, most importantly, task complexity is doubled.

CONCLUSIONS

Information literacy experience refers to employees' ability to search, retrieve and use different types of information resources and IT in various workplaces to execute tasks assigned to them, address customer needs, and exchange information with other employees. To keep pace with the rapid changes in workplace environments and to facilitate organisational progress and development, managers and employees are expected to acquire information literacy knowledge and upgrade information retrieval skills (Abram 2013).

Employees are expected develop their awareness of the principles of information seeking through social media and the Internet in order to succeed in the workplace. To grow their organisation effectively and achieve organisational excellence, they should broaden their information literacy skills, hone their information seeking capabilities and pay particular attention to the importance of social networking services.

Success in the workplace depends on employees having information literacy experience and being committed and efficient so that they can keep pace with the rapid growth of information technology and are able to perform their job tasks properly. Accordingly, having information literacy experience, possessing the ability to retrieve information, addressing customer needs and cooperating with other employees at the workplace are of paramount importance and they can result in achieving a successful performance in simple and complex tasks.

Therefore, in today's competitive world of occupations and economics, employees and managers of organisations must keep their skills and knowledge up to date. To achieve this, in addition to having information literacy, which has been overemphasized in the literature, employees need to master seven important aspects of information literacy experience (not just a few aspects). To inspire their employees to reach the organisation's goals, managers are expected to take advantage of activity theory elements. This leads to organisational growth and development and creates ample opportunities for the activities and plans of the organisation. Achieving the mentioned goal requires serious attention to planning and policy-making for employees in order to encourage them to pursue intellectual development, increase skills and gain experience in information literacy, which are a must for any persons and organisations in the 21st century. Reaching this goal has become even more critical when applying activity theory elements to careers has been quite successful.

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AUTHOR DECLARATION

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APPENDIX 1

Work task complexity questionnaire

PART 1

Demographic information:

Gender: Female ☐ Male ☐

Age: ..... Years

Level of education: Diploma ☐ Associate Degree ☐ Bachelor's degree ☐ Master's degree ☐ PhD degree ☐

Organisational position (the job you are employed in): **.....**

Type of employment: official ☐ contractual ☐ contract ☐ corporate ☐

How long have you been in this job? Less than a year ☐ 1-5 years ☐ 5-10 years ☐ More than 10 years ☐

PART 2

1. Education: Choose the option that best represents the minimum level of education this job requires.

Diploma ☐ Associate Degree ☐ Bachelor's degree ☐ Master's degree ☐ PhD degree ☐

2. Level of experience required: Select the option that best represents the minimum level of experience required by the job (not necessarily the years of experience you have, but what the job requires).

Less than 6 months ☐
More than 6 months to 1 year ☐
More than 1 year to 3 years ☐
More than 3 years to 5 years ☐
More than 5 years to 7 years ☐
More than 7 years ☐

3. Skill Required: Select the option that best represents the minimum level of skill required for this job (eg ICDL skills or other professional qualifications).

Very High ☐ High ☐ Medium ☐ Low ☐ Very Low ☐

4. Information used: How much information do you use to perform daily, weekly and monthly tasks?

Very High ☐ High ☐ Medium ☐ Low ☐ Very Low ☐

5. Information sources used: To what extent do you use each of the following sources in order to access information to perform job duties?

Information Resources	**Very high**	**High**	**Medium**	**Low**	**Very Low**
Use of general reference sources such as dictionaries, encyclopedias, Wikipedia, manuals, etc. (to assist in the search for knowledge in all fields) in print or electronic form					
Using specialized reference sources such as specialized dictionaries, specialized databases, etc. (to search in specific fields of knowledge) in printed or electronic form					
Using official information services (referring to the library) in order to access the required information					
Using informal communication (communication with colleagues) in order to access the required information					

Printed or electronic newspapers					
Printed or electronic articles					
Printed or electronic books					
Scientific databases					
Audio and visual resources					
Thesis					
Standards					
Patent licenses					

5. List other sources of information used to perform assigned job duties.

.....

6. Familiarity with job duties: To what extent is complete familiarity with work duties and responsibilities and the steps involved in achieving the desired goal in this job important?
Very High ☐ High ☐ Medium ☐ Low ☐ Very Low ☐

7. Problems and challenges in performing job duties: To what extent do you face each of the following problems and challenges in performing job duties and responsibilities?

Problems and challenges	**Very high**	**High**	**Medium**	**Low**	**Very low**
Lack of proper understanding of the work task					
Lack of work task support system such as insufficient and inappropriate description of work tasks by the organisation					
Insufficient information and knowledge about the work area or task					

Other things to mention:

.....

8. Supervisory nature: In which of the following categories does your supervision and job responsibility fall? The scope of supervision means the number of units and people who perform duties under your responsibility.

No supervisory responsibility ☐
Directing the work of one or more employees or students ☐
Supervising or managing more than one department ☐
Manager assistant ☐

9. Submitting performance reports by students: How many performance reports are sent directly back to you by students?
No report ☐ 1 report ☐ 2-3report ☐ 4-6 report ☐ More than 7 report ☐

10. Number of employees or students under your supervision: Specify the total number of employees or students who are under your responsibility and supervision, according to the nature of the job.
0 ☐ 1-5 people ☐ 6-10 people ☐ 11-20 people ☐ 21-50 people ☐ 51-100 people ☐
More than 100 people ☐

11. Physical ability to do the work: Show how much physical ability (hard work conditions) is necessary to carry out your job responsibilities.
Rarely ☐ Occasionally (less than 2 hours) ☐ Often (2-5 hours) ☐ Continuous (5-8 hours) ☐

APPENDIX 2

Information Literacy Experience Questionnaire

PART 1
Demographic Information:

Gender: Female ☐ Male ☐ Age: ..... Years
If you work in a special educational group, mention: .....
Level of education: Diploma ☐ Associate Degree ☐ Bachelor's degree ☐ Master's degree ☐
PhD degree ☐
Field of study: ..... Work experience: Less than one year ☐ 1-5 years ☐ 5-10 years ☐
More than 10 years ☐
Work experience in the current work situation: Less than one year ☐ 1-5 years ☐ 5-10 years ☐
More than 10 years ☐

PART 2
Information literacy experience

The dimension of information need	**Fully agree**	**Agree**	**No idea**	**Disagree**	**Fully disagree**
I have the ability to clearly identify the information needs related to my organisational duties.					
I have the ability to identify and understand the information needs of the recipients (students or employees related to my work).					
I have the ability to interact and clarify work-related information needs with colleagues.					
The dimension of identifying information sources					
I am familiar with the information sources needed to meet my business information needs.					
I have the ability to identify information sources needed by recipients (students or employees related to my work).					
I can discuss work-related information sources with colleagues.					
The search dimension					
I can search all kinds of printed sources and databases in order to find the information I want.					
I have the ability to help in searching for all kinds of printed resources and databases for recruiters (students or employees related to my work).					
I can help my colleagues in the field of searching for all kinds of printed sources and work-related databases.					
I am familiar with the search facilities of search engines and databases (such as advanced search limiters and Boolean operators).					
I can provide guidance and assistance to recruiters (students or staff related to my work) on how to use the search facilities of search engines and databases (such as advanced search limiters and Boolean operators).					
I can help colleagues on how to use the search facilities of search engines and databases (such as advanced search limiters and Boolean operators)					

related to work.					
The dimension of analysis and evaluation					
I have the ability to analyse and evaluate databases, search engines, digital libraries and other search resources in order to choose the best one for searching and meeting my work information needs.					
I have the ability to evaluate databases, search engines, digital libraries and other search resources in order to choose the best one and respond to the information needs of the recipients (students or employees related to my work).					
I can assist colleagues in evaluating databases, search engines, digital libraries, and other work-related search resources in order to select the best.					
I have the ability to analyse and evaluate the quality of findings and information obtained from searching sources and databases (in terms of criteria such as validity, accuracy and up-to-dateness).					
I have the ability to analyse and evaluate the quality of findings and information obtained from sources and databases for the recipients (students or employees related to my work).					
I can help colleagues in analysing and evaluating the quality of findings and information obtained from work-related sources and databases.					
I have the ability to analyse and evaluate the usefulness of findings and information obtained from searching sources and databases in meeting my work information needs.					
I have the ability to analyse and evaluate the usefulness of findings and information obtained from sources and databases for the recipients (students or employees related to my work).					
I can help colleagues in analysing and evaluating the usefulness of findings and information obtained from work-related sources and databases.					
The dimension of selecting, summarising, categorising and applying information					
I use the information that I have collected after searching the sources and databases with actions such as selection, summarisation, classification, etc., to achieve the goals of the organisation.					
In the field of actions such as selecting, summarising, categorising and using the information obtained from searching sources in order to achieve the goals of the organisation for the recipients (students or employees related to my work), I have the ability.					
The dimension of integrating new information with previous knowledge					
I combine the new information retrieved as a result of searching in sources and databases with my previous knowledge and understanding to meet my information needs.					

I have the ability to combine new information retrieved from sources and databases with what I have and previously learned in order to meet the information needs of the recipients (students or employees related to my work).					
I have the ability to combine new information retrieved from work-related sources and databases with what I have and previously learned in order to meet the information needs of colleagues.					
The dimension of ability to update information					
Using one or some methods such as asking colleagues, friends, RSS, e-mail, virtual network, participating in meetings and conferences, reading magazines/newspapers, etc. in the course of publishing new works and updated specialized information. published and how to access them in order to meet the information needs of my work.					
I have the ability to update and access new works and specialized information for recipients (students or employees related to my work).					
I can help colleagues in the field of updating and accessing new works and specialized information related to work.					

APPENDIX 3

Activity Theory Questionnaire

To determine the effectiveness of the factors involved in the activity theory

Motivation	**Very high**	**High**	**Medium**	**Low**	**Very low**
To what extent do you know the effectiveness of managers' attention and encouragement as motivation?					
To what extent do you know the effectiveness of job promotion as a motivation?					
To what extent do you know the effectiveness of salary increase as a motivation?					
Tool					
To what extent do you know the effectiveness of accessibility to printed tools such as texts as an information tool?					
To what extent do you know the effectiveness of accessibility to electronic tools such as scientific and specialized databases as an information tool?					
To what extent do you know the effectiveness of face-to-face communication (using informal communication such as communication with colleagues) as an information tool?					
Goals					
To what extent do you know the effectiveness of responding to service users as a work goal?					
To what extent do you know the effectiveness of correctly performing job duties as a work goal?					
To what extent do you know the effectiveness of exchanging information with other employees in the work environment as a work goal?					
Output					
To what extent do you know the effectiveness of providing better services to users for the success, growth and excellence of the organisation as a work output?					
To what extent do you know the effectiveness of better performance of assigned tasks in the work environment for the success, growth and excellence of the organisation as a work output?					
To what extent do you know the effectiveness of information exchange and strong interaction with other employees in the work environment for the growth and excellence of the organisation as a work output?					
Rules					
To what extent do you know the effectiveness of formal and explicit dos and don'ts presented by managers or authorities in the workplace (which can cause restrictions or freedom of action for employees) as (internal) rules and regulations?					
To what extent do you know the effectiveness of norms, contracts and values in the work environment (which may cause restrictions or freedom of action for employees) as (internal) rules and regulations?					

To what extent do you know the effectiveness of written job descriptions as (internal) rules and regulations?					
Society					
To what extent do you know the effectiveness of the laws enacted by the authorities in the society (such as government laws) as foreign laws and regulations (outside the field of work)?					
To what extent do you know the effectiveness of the norms, contracts and values in the society as foreign laws and regulations (outside the workplace)?					
To what extent do you know the effectiveness of the job descriptions specified from outside the organisation as external rules and regulations (outside the workplace)?					
Division of tasks					
To what extent do you know the effectiveness of correctly dividing tasks among people in the form of simple and complex tasks based on the abilities of employees as division of the task?					
To what extent do you know the effectiveness of taking advantage of the participation of all employees in order to achieve the goals of the organisation as a division of the task?					
To what extent do you know the effectiveness of placing employees in their appropriate positions based on expertise and information abilities in the organisation's structure as a division of the task?					