



## To Develop the Auditors' Critical Thinking Model in Evaluating the Client Financial Performances According to Total Interpretative Structural Analysis (TISM)

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### ABSTRACT

The purpose of the present research is to develop the auditors' critical thinking model in evaluating the employers' financial performances according to Total Interpretative Structural Analysis (TISM). In fact, while presenting a hierarchical model, this research tries to combine the relationships between the indicators as a paired comparison and with participation of the target population. In this research which qualitatively is a combined research based on Delphi analysis and meta-synthesis analysis and quantitatively is based on total interpretative structural analysis, two target populations were involved. In qualitative research, a total of 10 experts from the fields of accounting and financial management were selected using the homogeneous sampling method and in quantitative research, a total of 30 persons of audit partners with having PhD and master's degrees and more than 10 years of work experience were selected. According to the results from the qualitative research on critical thinking in auditing, over 42 articles were studied and using the critical evaluation analysis method, a checklist with three main components: Critical Thinking Analytical Power, Critical Thinking Intuitive Power and Critical Thinking Interpretive /Inferential Power were identified in the form of 17 primary indexes. Then five indexes were omitted and two indexes were combined in two steps using the Delphi analysis method and finally a total of 11 critical thinking indexes entered the quantitative analysis phase. In the phase of quantitative analysis, the prioritization of indexes were performed in four levels from the least effective as the first level indexes to the most effective as the fourth-level indexes. Accordingly, the systematic review of evidence; pursuing accounts according to the documents and information contents and reviewing the details related to the description of each registration in the corporate financial statements were recognized as the most effective indicators of critical thinking in auditing.

### Keywords:

Critical Thinking Analytical Power, Critical Thinking Intuitive Power, Critical Thinking Interpretive Power.



## 1. Introduction

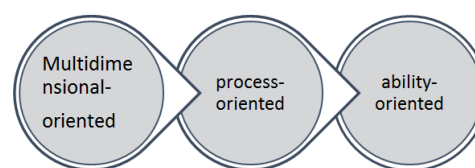
One of the main characteristics of humans in every profession is self-awareness and having the ability of thinking. In other words, the human is able to be aware of his behavior and use his power of thinking in dealing with different problems ( Maleki & Habibi, 2007:13). Critical thinking is an essential skill for an informed participation in different jobs and communities in the modern world. This skill is further understood as the ability of individuals to challenge their thinking and requires that the individuals develop their own criteria to evaluate their thoughts and naturally use them to increase the quality of their thoughts (Zare & Nahravanian, 2017:86). The existence of critical thinking in every profession will result in dynamism and growth of the profession in order to create more responsibility because the person in charge looks at his job from different aspects to discover its hidden criteria with a deeper worldview (Bucaro, 2018:1). The audit as one of the professions that needs thinking has also no exception from this rule. It requires critical thinking to meet the needs and to change the level of the stakeholders' awareness and expectations in the capital market; a kind of thinking which can better infer the deviational approaches and the distortion and fraud in financial performances and show more effective recognition and intuition in such situations. In fact the critical thinking paradigm is one of the important approaches in the audit domain because the auditors can perform more remarkable mental and conceptual computational activities and as Zeki (2015) suggested, the critical thinking leads to the reinforced intuitive power in the decision-making. Butler & Halpern (2012) refer the critical thinking as using the skills with cognitive strategies leading to content recognition from the individuals performances. Given these approaches to the critical thinking issue, an auditor with a critical thinking has a deeper and more accurate view that increases the qualitative level of the reviews and the auditors' statements. In other words, based on the critical thinking, an auditor can obtain more power in thinking and reasoning for the problem- solving, more tolerance against the stress and pressure, information integration through the process of questioning and.... It also causes that the auditors consider the professional performances such as doubt and skepticism in his reviews. Flores et al., (2010) suggest that the approach that the critical thinking is a general skill which can be used in every situations is a

false approach because using the critical thinking in any field like the audit requires the sufficient knowledge of the individual in the decision-making. Thus, the auditor may can assess the opinions in the specific fields of auditing but it can not be generalized to evaluating opinions in all disciplines. Given the descriptions, the research tries to recognize the dimensions of the critical thinking in the audit profession and then prioritize them in reviewing the financial statements based on the total interpretative structural analysis model ( TISM), because this gap has been always seen in the audit research and the auditors have tried to comment on the performances of the employers only by relying on their own mental attitudes and their previous tentative assumptions. This increasingly poses a threat to the quality of the financial reporting. The excessive reliance of the auditors on the previous experimental process is a part of the structural characteristics of the audit framework with limited rationality emphasized by Simon (1972). In fact, it is an approach that chooses the shortest path and the most satisfactory approach in the decision making and only the evidence are used to provide the statements but in this regard, less intuitive power is used. If in the audit reviews, the critical approaches are combined with the expertise of the auditor, all the evidence are evaluated based on the auditor's intuitive power and in addition to the decision making and judgement on the employers' financial performances, the professional philosophies are also used in order to increase the transparency ( Griffith et al., 2015:2). According to the analysis, because of the specific errors made by auditors, they need to increase their thinkings and obtain the corporates' information from different sources in order to improve the quality of the audit for the important accounts. The use of critical thinking can increase the ability of the auditors in identifying the irrational evidence through improving them in identifying and combining the inconsistent information resulting from different audit areas and helping them to improve their ability for critical thinking on the evidence. In the other words, using the critical thinking causes to improve the auditor performance by making them to think differently rather than simply doing things harder. Critical thinking is able to identify the irrational evidence while doing works and find new ways to deal with the issues related to the audit quality.

## 2. Literature Review

### 2.1. Critical thinking

Critical thinking is a kind of directed thinking. It tries to evaluate, modify, exchange and re-formulate the problem. It also related to higher levels of learning, that is analysis and combination. This intellectual process is not a new issue and its roots can be traced back to the time of Plato (Ahangari, 2016:56). The nature of the critical thinking is based on the suspended judgement and healthy skepticism. It is related to a group of affairs that lead to rational and reasonable thinking. The word "criticism" was derived from the Greek language meaning "question, selection, discussion, assessment and judgement" (Swanburg & Swanburg, 2002:211). Critical thinking means a logical and thoughtful thinking which focuses on deciding what to believe or do (Ennis, 2010). This is a process by which a person can evaluate the opinions, information and sources, then organize them in a coherent and logical order and match them with other ideas and information; it also considers other sources and evaluates the implications (Andolina, 2001). Critical thinking has different definitions that show different perspectives about it. Stoner (1998) defines critical thinking as the art of thinking and suggests that the critical thinking helps to further understand what we thought about it. Johnson (2002) defines critical thinking as the process of thinking about the exploratory method that means not only the meaningful contemplation but also a kind of rational experience in dealing with different issues. Yoder-Wise (1995) while providing a set of selected definitions from different researchers, writes "a review of the definitions shows that most of them have acknowledged the dynamic, systematic, purposeful, reasonable and problem solving natures of the critical thinking and most have focused on logic principles or general skills of problem solving in this area. The results obtained from the defintions show that the critical thinking is a regular and intelligent process in which the collected information are understood well. In a category, characteristics of the critical thinking include.



**Figure (1) The Characteristics of Critical Thinking**  
(source: Ahangari, 2016)

**A) Multi-dimensional critical thinking:** Critical thinking is a cognitive and multi-dimensional process that needs the skillful use of knowledge and experience to judge and evaluate in complex situations.

**B) Process-oriented critical thinking:** Critical thinking is associated with asking questions and collecting data for problem solving. In fact, it is a framework for challenges with assumptions, changes, making hypothesis and modification.

**C) Ability-oriented critical thinking:** Critical thinking includes awareness of abilities as a basis for communicating with the environment to better recognize the emotions, beliefs, values and attitudes.

Thus, the critical thinking teaches us how to think as a tool for developing and changing the information and it requires high intellectual processes and judgement based on evidence and sometimes perceptual power (Ahangari, 2016: 56).

### 2.2. The framework of critical thinking in auditing

Critical thinking in all disciplines combined the main components of the logical reasoning with the essential elements to reach the correct judgement. Thus the critical thinking often takes the form of problem solving or analysis in every field. However, both logical reasoning and problem solving take different forms within the different academic disciplines. In the audit, critical thinking is formed based on the individual intuition of auditor toward the contents of his profession according to the evidence. Critical thinking in the audit profession requires a curious and creative mind. That's why the Internal Audit Standards such as the Iranian Audit Standard, No.200 emphasizes on the necessity to use the professional skepticism in the audit planning. Also in paragraph 15 of the Standard, the role of the professional skepticism in the distortion of financial

statements has been mentioned. According to paragraph 15 of the Standard No.200, the professional skepticism requires the auditor's knowledge about the issues such as the contradictory audit evidence, the possibility of fraud, etc. According to paragraphs 17, 18 and 19 of the above Standard, the professional skepticism is necessary for critical evaluation of the audit evidence. The professional skepticism approach means that the auditor provides a critical evaluation of the audit evidence using his questioning mind (Tahriri & Piri Sagharloo, 2016:118). From the conceptual perspective, critical thinking is aligned with the professional skepticism. It creates a positive and normative approach in the audit which tries to improve the quality of the financial performances in the capital market by challenging the traditional and experimental approaches in the audit. The basic assumption of the critical thinking is that the society can be different from what it is and the auditors' informed and conscious behaviors and actions are able to improve and increase the social trust in the capital market if they follow the critical theories (Shabahang, 2012). Therefore the existence of critical thinking in the audit process has conceptually a wide range, but it contains an explicit concept and that is thinking on the decision and better understanding of the topic when making a decision (Abednazari et al., 2018:69). The concept of the critical thinking in the audit process can be examined in more detail. In fact critical thinking in the audit acts as a process that includes the insight, capability, expertise and perception of the auditor in order to better understand the content and the subject matter in the decision making. The coordination between the mind and the skillfulness is a criterion that helps the auditor to increase his inferential power and to have a different understanding of the problem. It seems that based on the worldview in critical thinking, it is expected that by using the critical thinking in auditing, the social relations become more desirable in various dimensions such as social trust, economic and cultural relations and increase the level of knowledge and perception in interactive processes between the auditors, employers and the capital market (Glover et al, 2018).

### 2.3. Researches Background

Bucaro (2018) Examined Enhancing auditors' critical thinking in audits of complex estimates. Audit practitioners, standards, and regulators continually

emphasize the importance of professional judgment in the audit of complex processes and financial estimates. Despite this increasing call for more thoughtful analysis, research and inspection reports seem to suggest that auditors tend to make mechanistic audit decisions in such situations. This experiment evaluates auditor participants' improved application of professional judgment in the audit of complex estimates when taught a specific critical thinking methodology from system dynamics. Results indicate that emphasizing the use of professional judgment is not sufficient to decrease auditors' mechanistic mentality. As expected, however, auditors primed to take a systems-thinking perspective are better able to evaluate the complexity of the situation and to more effectively apply professional judgment. These results suggest that the goal of improving professional judgment can be achieved with an underlying change to the way auditors think. Mubako and Donnell (2018) study examines whether auditors who learn that fraud risks differ between accounts could become less skeptical toward evidence that could signal financial misstatement in low-fraud-risk accounts. they conducted a laboratory experiment where experienced auditors analyzed year over year changes in accounts to assess misstatement risk for revenue and costs. They manipulated fraud risk for revenue and the presence of an inconsistent fluctuation in costs. Participants who learned that fraud risks had been assessed as high for revenue but low for costs rated misstatement risk at lower levels for cost accounts, compared with auditors who learned that fraud risk was assessed as low for both accounts. Nodler & Kadous (2018) Research conducted under the title Grounding the professional skepticism construct in mindset and attitude theory: A way forward. The purpose of this paper is to develop a conceptualization of professional skepticism that will facilitate the conduct of research with meaningful implications for practice, providing a way forward for skepticism researchers. To that end, this research proposes a dual conceptualization of professional skepticism as both a mindset and an attitude, and we rely on mindset and attitude theory to develop measures of each component. Mindsets drive cognitive processing, and the mindset component captures the critical thinking that is an important element of professional skepticism and is required by standards. Including the mindset component reflects the idea that skepticism involves critical analysis of evidence, and

not just doubt. Attitudes include affective and cognitive components to predict intentions and behavior, and attitudes recognize the influence of social factors on evaluative judgments. Including an attitude component thus expands the notion of evaluation to include auditors' feelings, as well as their beliefs, about risk, and it improves the predictive power of "skepticism" for auditors' evidence collection. This research expects that our skeptical mindset and skeptical attitude theoretical approach will move the literature forward, especially in terms of framing standards, developing interventions to improve audit quality, and performing root cause analyses. Agarwalla et al (2017) Examined of self-deception and professional skepticism on perceptions of ethicality. This paper examines the impact of two contradictory psychological traits, self-deception (SD) and professional skepticism (PS), on individuals' assessment of ethicality of various earnings management choices. Whereas, SD allows individuals to reduce cognitive dissonance arising from self-serving unethical behavior, PS would force individuals to question such self-serving behavior and, as a result, could make them less likely to act unethically. Our results indicate that SD, PS, and participant type significantly affected the participants' ethicality ratings. Managers exhibiting high (low) SD and low (high) PS view the earnings management techniques that were generally considered to be unethical, as relatively more (less) ethical. However, the SD and PS scores of accountants are not significantly related to their ethicality ratings. This result could be driven by the fact that accountants tend to have greater exposure to information that emphasizes ethics (professional standards and education) and hence psychological traits have a lesser effect on their ethicality ratings. Wedemeyer (2010) Examined A discussion of auditor judgment as the critical component in audit quality –A practitioner's perspective. Changes in the regulation of the activities of auditors of public companies' in the United States have placed an increasing emphasis on the role of professional standards and of inspections in monitoring and influencing auditor judgment. There is a fundamentally important difference in judgments made by auditors in forming and expressing audit opinions and those made by third parties in evaluating the effectiveness of these judgments after release of the auditor's report. This difference should be recognized by users of financial statements and

regulators. Audit judgments are unique to each individual audit and comparing audit judgment across audits presents significant challenges that should be addressed carefully to avoid unintended consequences. In recent history, changes in accounting principles have increased the inherent variability of financial statement amounts and, correspondingly, have increased the importance of disclosures. Although the primary focus of good auditor judgments and audit quality is at the engagement level, the current regulatory environment and the structure and business model of audit firms are of increased importance in influencing those judgments. These factors also influence the independence and professional skepticism of auditors. Khajavi & Mohammadian (2018) performed a research under the title of "Accounting for citizenship conceptual paradigm based on critical thinking". To do this, they used the most important layer of the Hermeneutic methodology, namely, critical thinking and also the most important method of the library studies, namely, historical recognition. The concepts of Accounting for citizenship and Corporate citizenship are main concepts used in this research. The present research investigates the current position of accounting by relying on these concepts and using the critical school and finally answers the question that "Can accounting at present be considered as Accounting for citizenship?" By studying the citizenship theories and particularly the subset of critical paradigm, political theory, it was found that the role of accountability to society and citizens has moved from the macro level (government) to the micro level (corporates as corporate citizenship) and eventually to accountants (accounting for citizenship) and in order to consider the rights of the citizens, the accountants by observing ethics (fair and justic) and providing useful information must be responsible for the society and citizens.

### **3. Methodology**

Meta-Study is a deep analysis of the research works in a particular field and consists of four main parts: Meta-analysis (quantitative analysis of the early studies' content); Meta-method (methodology analysis of the early studies); Meta-theory (the analysis of the early studies' theories); and Meta-synthesis (qualitative analysis of the early studies' content) (Bench and Day, 2010:488). Among these, meta-synthesis is a kind of

qualitative research studying the data and results obtained from other qualitative studies with the same topic. The meta-analysis tries to find the new subjects and metaphors by providing a systematic attitude for the researchers using the synthesis of different qualitative research method. This method will increase the current knowledge and provide a comprehensive attitude toward the issues (Zimmer, 2006:312). The aim of the meta-synthesis is to provide an integrated and creative interpretation of the qualitative findings (Beck, 2002:95). The research methodology is practical in terms of its purpose, it's descriptive in terms of data collection method and finally it's a combination of meta-synthesis analysis and the total interpretative structural analysis (TISM) in terms of methodology. In this research, in order to realize the goal of the research in qualitative section, first, the seven-step method of Barros & Sandelowski (2007) was used. This included 7 steps: developing research questions; searching and selecting appropriate papers and articles; providing systematic literature; extracting information from articles; control of quality; analysis; presenting a checklist for analysis in quantitative phase. The statistical population in qualitative section included all the research related to the research subject and 10 panel members having the technical and professional knowledge in relation to the field of audit. They were selected using the homogeneous sampling method. Because one of the goal in this research was to select persons who had a theoretical perspective on the subject of the research. In addition, in this section, the articles and the books from many sites such as Jihad Daneshgahi University of Iran (SID); MAGIRAN database; Islamic Computer Science Research Center (NOORSOFR), International Reference for Latest Articles (Scencedirect); Emeraldinsight Reference and Onlinelibrary Reference were used. The statistical population in quantitative section included 30 persons of the audit partners who were selected based on criteria such as having work experience over 10 years and having PhD or master's degrees. In this section, participants contribute in the research through the matrix checklists determined in the meta-synthesis phase.

## 4. Results

### 4.1. Result of Meta-Synthesis

According to Barros & Sandelowski (2007), in qualitative meta-synthesis research, the descriptive validity means identify all reports related to the research subject and interpreting the information of each report . The theoretical validity in meta-synthesis firstly refers to the validity of the methods used in creating integrity in results and secondly refers to integration of results or in other words, the interpretation of the researcher from the findings of the previous researchers (Abbaszadeh et al., 2017:93). For theoretical validity, the researchers have tried to increase the quality of the components' identification related to the research variable by taking notes of reliable research in terms of the articles' references. In the first step, the components and the indicators related to the critical thinking in the audit profession were evaluated, so that based on the systematic analysis, the research does not miss its main goal. Accordingly, the researchers tried to study the books and also collections of papers from the different databases, conferences and the search engines related to the critical thinking in the audit profession. According to the primary results, because of the limited research in the evaluation section, 42 papers and research related to the research nature were identified. Then in order to find the relevant contents according to the Critical Appraisal Skills Program, the researchers tried to determine the priorities for each paper by taking note from the similar papers based on their abstracts and contents. The filtration steps of the sources used are as follows:

**Table (1) The filtration steps of the sources used according to critical Appraisal Skills Program**

Steps	Search source	Number
	Number of found sources	42
Stpe (1)	Number of rejected sources because of the title	(14)
	Screened sources according to title	28
Stpe (2)	Number of rejected sources in terms of abstract	(4)
	Screened sources according to abstract	24
Stpe (3)	Number of rejected sources in terms of content	(10)
Stpe (4)	Number of final sources	14

As shown, 14 papers were selected in order to identify the indicators related to critical thinking in the audit profession and according to the critical appraisal

skills program, the research enters into the step of the extraction of the text information. In this method using 10 criteria: the goals of the research, the logic of research method, research plan, sampling, data collection, reflectivity, the analysis accuracy, theoretical and transparent interpretation of the findings and the research value and also with the help of 10 members of the Panel in the qualitative section, all the indicators related to the critical thinking were determined in the audit profession. Critical evaluation

is a 50-point scale by which a researcher, based on the scoring system, will omit a research with a point below 30. This program is an indicator which helps researcher to determine the accuracy, validity and the importance of the qualitative research studies. Therefore first the relevant researches need to be identified according to Table (2) using the scoring method and based on Table (3), then the indicators related to the critical thinking in the audit profession should be determined.

Table (2) Critical thinking-based appraisal skills program

Critical Appraisal Criteria	Research purposes	Logic of research method	Research plan	Sampling	Data collection	Reflectivity	Ethical consideration	Accuracy of analysis	Transparent	Research value	Sum
Papers											
Glover et al. (2018)	3	5	4	3	3	3	4	5	4	4	38
Bucaro (2018)	4	4	4	4	4	4	4	3	4	4	39
Mubako and Donnell (2018)	3	2	3	3	2	4	3	2	4	3	28
Kirmizia et al. (2015)	3	3	3	3	3	4	3	3	3	5	33
Knechel et al. (2013)	4	4	3	4	2	3	4	4	4	4	36
Grossman and Welker (2011)	4	3	3	4	3	3	3	4	4	4	31
Gul et al. (2010)	2	2	3	4	3	3	3	3	3	4	21
Helsdinen et al (2010)	5	3	3	3	3	4	5	3	3	4	37
Phillips & Burrell (2009)	4	5	5	3	4	3	3	3	4	4	38
Frank (2006)	3	4	5	4	3	3	2	3	3	4	30
Nelson (2003)	3	2	3	2	4	5	5	5	4	5	38
Khajavi & Mohammadian (2018)	2	3	3	3	4	3	3	3	4	4	32
Abednazari et al. (2018)	4	5	4	4	3	4	4	3	5	4	39
Ebrahimi Romanjan & Nazifi (2017)	3	3	3	3	2	3	3	4	4	5	32

As can be seen, two researches, Mubako & Donnell (2018) and Gul et al. (2010), were discarded from the process of finding the components related to the critical thinking because their scores were below 30. Then in step 4, according to the confirmed research, the information are derived as the research indicators. In this step, in order to analyze and combine the qualitative results, the total frequency determination method is used. Based on the method, all the sub-

criteria derived from the texts of the approved papers are written in the columns of the table. Then the names of the researchers are given in the rows of the table. The use of sub-criteria written in the table column by each researcher are shown by the sign "\*", then the scores of each star in the sub-criteria column are added together and the scores above the mean are selected as the research components.

**Table (3) Determination of components related to critical thinking**

Researchers	Critical thinking analytical analysis	Conservatism – based analysis	Professional characteristic- based analysis	Interpretive/Inferential Analysis	Intuitive Analysis	Appraisal Analysis	Thinking expression – based Analysis	Dependence – based Analysis
Glover et al. (2018)	*	-	-	-	*	-	-	-
Bacaro (2018)	*	-	-	*	*	-	-	*
Kirmizia et al. (2015)	-	-	-	-	*	*	*	-
Knechel et al. (2013)	*	*	-	-	-	*	-	-
Grossman & Welker (2011)	*	-	*	*	-	-	-	*
Helsdingen et al. (2010)	*	-	-	-	-	*	-	-
Phillips & Burrell (2009)	-	*	-	-	*	-	*	-
Frank (2006)	-	-	*	*	*	-	-	*
Nelson (2003)	-	-	-	*	*	-	*	-
Khajari & Mohammadian (2018)	*	-	*	*	-	-	-	-
Abednazari et al. (2018)	*	*	-	*	-	-	-	-
Ebrahimi Romanjan & Nazifi (2017)	*	-	*	*	*	-	*	-
<b>Total</b>	<b>8</b>	<b>3</b>	<b>4</b>	<b>7</b>	<b>7</b>	<b>4</b>	<b>4</b>	<b>3</b>

Considering that 12 researches in this section were evaluated according to all components of critical thinking in the audit profession and in terms of the obtained scores' frequencies, the researches which obtained the scores of more than half of the approved

researches were selected as components related to the research sub-component and in total, three sub-components were selected. In step 5, based on Table (4), the sub-components were shown in a scoring checklist.

**Table (4) A checklist for critical thinking indicators**

Main component	Sub – components	Indicators
<b>Office health</b>	Critical thinking analytical power	Evidence – based decision – making Step – by – step and rational action based on standards Distinguishing facts from assumptions Pursing accounts according to documents and information content Reviewing the details of accounts in the corporate financial documents Maching accounts with each other to find the differences Analysis of the internal control weaknesses
	Critical thinking intuitive power	Paying attention to intuitions Subjective evidance – based analysis Experience – based analysis Professional knowledge – based analysis Analysis based on the corporate's financial communications Analysis of the climate affecting the corporate
	Critical thinking Interpretive / inferential power	Analysis of the employers' views The interpretation of the corporate's financial Establishing a rational relationship between the documentation and the previous experience Using the technical and abstract skills in the analysis of financial statements



In step 6, in order to control the quality, validity and reliability of the Delphi method ( in the analysis section) are used. Also, in order to verify the questionnaires ' validity, the content validity method (CVR) was used that accordingly, every 10 persons of the panel members were asked to announce their scores for each of the sub-components. The results showed that considering that the value of CVR was larger than .62 ( minimum ratio of the content validity for 10 members of the Panel), the content validity of

the research components was validated. In terms of reliability, as shown in the section of Delphi analysis, two scales, mean and coefficient of agreement, were used according to the Panel members' opinions in qualitative section and any indicator that did not get the required score based on the Likert 7-item scale ( Instrument for assessing Delphi analysis), was deleted and accordingly the reliability was used. In steps 6 and 7, the final checklist is presented for quantitative analysis and is shown in Table (5):

**Table (5) Approved components**

Sub – Component	Indicators	Likert's scale						
		1	2	3	4	5	6	7
Critical thinking Analytical power	Evidence – based decision – making							
	Step – by – step and rational action based on standards							
	Distinguishing facts from assumptions							
	Pursing accounts according to documents and information content							
	Reviewing the details of accounts in the corporate financial documents							
	Maching accounts with each other to find the differences							
Critical thinking intuitive power	Analysis of the internal control weaknesses							
	Paying attention to intuitions							
	Subjective evidence – based analysis							
	Experience – based analysis							
	Professional knowledge – based analysis							
Critical thinking interpretive / inferential power	Analysis based on the corporate's financial communications							
	Analysis of the climate affecting the corporate							
	Analysis of the employers' views							
	The interpretation of the corporate's financial							
Critical thinking interpretive / inferential power	Establishing a rational relationship between the documentation and the previous experience							
	Using the technical and abstract skills in the analysis of financial statements							

**4.2. Result of Delphi**

In second part, in order to approve or delete the components of the research, using the experts' participation ( members of panel) according to scales,

mean and coefficient of agreement, the components from the meta-synthesis analysis method shown in Table (5) are evaluated. Table (6) shows the results of Delphi method.

**Table (6) Delphi analysis**

Main components	Sub-components	Mean	Coefficient agreement	Approve/delete
Critical thinking Analytical power	Evidence – based decision – making	5.20	0.81	Merge
	Step – by – step and rational action based on standards	5	0.50	Delete
	Distinguishing facts from assumptions	4.75	0.47	Delete
	Pursing accounts according to documents and information content	5	0.50	approve
	Reviewing the details of accounts in the corporate financial documents	5.12	0.79	approve
	Maching accounts with each other to find the differences	5.29	0.83	approve
	Analysis of the internal control weaknesses	4	0.42	Delete
Critical thinking intuitive power	Paying attention to intuitions	5.00	0.55	approve
	Subjective evidence – based analysis	5.15	0.79	approve
	Experience – based analysis	5.12	0.79	approve

Main components	Sub-components	Mean	Coefficient agreement	Approve/delete
	Professional knowledge – based analysis	5.02	0.57	approve
	Analysis based on the corporate's financial communications	4.37	0.43	Delete
	Analysis of the climate affecting the corporate	3.10	0.25	Delete
Critical thinking interpretive / inferential power	Analysis of the employers' views	5.5	0.86	approve
	The interpretation of the corporate's financial	5	0.51	approve
	Establishing a rational relationship between the documentation and the previous experience	3.99	0.41	Delete
	Using the technical and abstract skills in the analysis of financial statements	5.20	0.82	approve

According to two scales of mean (given the 7-item scale) and coefficient of agreement (it must be higher than .5), it can be noted that, 5 indicators were omitted. The omitted indicators are:

- 1) distinguishing facts from assumptions (critical thinking analytical power)
- 2) the analysis of internal controls weaknesses (critical thinking analytical power)
- 3) the analysis based on the corporate financial communications (critical power intuitive power)
- 4) the analysis of the corporate climate (critical thinking intuitive power)

- 5) establishing a logical relationship between documentation and previous experiences (critical thinking interpretive/inferential power)

Since both indicators, step-by-step evidence-based decision-making and rationalization based on standards (critical thinking analytical power) were combined conceptually, a change into an indicator under the title of "study evidence systematically" has been made. After determining the combined and omitted indicators, in order to reach saturation point, the Delphi analysis was performed again in the second round. The results are shown in Table (7):

**Table (7) Delphi analysis in the second round**

Main components	Sub-components	Mean	Coefficient agreement	Approve/delete
Critical thinking Analytical power	Systematic study of the evidence	5.5	0.86	approve
	Pursing accounts according to documents and information content	5.10	0.75	approve
	Reviewing the details of accounts in the corporate financial documents	5.15	0.79	approve
	Matching accounts with each other to find the differences	5.5	0.86	approve
Critical thinking intuitive power	Paying attention to intuitions	5.10	0.75	approve
	Subjective evidence – based analysis	5.5	0.86	approve
	Experience – based analysis	5.20	0.82	approve
Critical thinking interpretive / inferential power	Professional knowledge – based analysis	5	0.52	approve
	Analysis of the employers' views	5.5	0.85	approve
	The interpretation of the corporate's financial structure	5.10	0.75	approve
	Using the technical and abstract skills in the analysis of financial statements	5.20	0.81	approve

As can be seen, all indicators were approved in the second round of Delphi analysis and it shows theoretical saturation regarding the nature of research and its variables.

In the figure below, we can briefly see the components of the critical thinking in the audit profession.

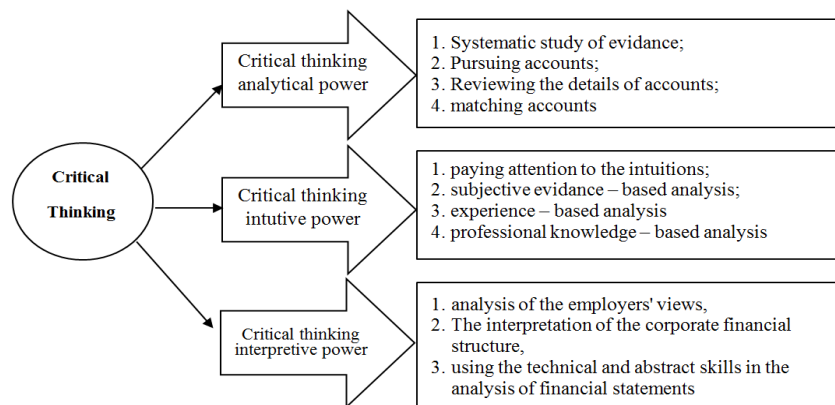


Figure (2) The derived conceptual model

According to the derived model of meta-synthesis, the definitions of main variables are as follows:

**\*Critical Thinking Analytical Power**

This level of critical thinking power refers to the ability of analyzing the evidence and performance facts of the corporates proportional to the level of capital market, such a way that an auditor having this attitude tries to process the environmental information and participate in the capital market for the shareholders, investors and government so that by relying on the Levy's theory, they can achieve a proper understanding and decision for solving problem based on the reasonable evidence (Abednazari et al, 2018: 69).

**\*Critical Thinking intuitive power:**

As Butler & Halpern (2012) suggested that this level of critical intuitive power in auditors refers to intellectual, conceptual and cognitive skills of the auditors in analyzing the corporates' financial performances. In some cases, this kind of critical thinking analysis is based on the individual intuitions. It means that the auditors sometimes use his own intuition in the decision-making to control the corporate performance and accounts. Although this kind of critical thinking analysis may not have any scientific basis, the auditors are able to use it in their judgment on reporting because it is based on the auditor's experience and proficiency (Ahangari, 2016:55).

**\*Critical Thinking Interpretive/Inferential Power:**

This kind of critical thinking in the auditors refers to the degree of their interpretive and inferential abilities to create an argumentative structure between

the facts and the corporates' misleading performances so that the corporates' behavioral and functional reasons can be better proved. In this level of critical thinking, the auditors with this attitude try to have a more inferential understanding from the corporates' facts using the abstract skills (Duron et al., 2006).

After approving Delphi, for total interpretative structural analysis (TISM), the research enters the third step. In this level, 30 audit partners participate and give their scores, defined in the description section, to the matrix questionnaires.

### 4.3. Result of Total Interpretative Structural Analysis (TISM)

First, in order to begin this analysis, it is necessary that the validated indicators from the Delphi analysis step, are coded.

As shown in Table (6), the indicators approved by the experts are given in abbreviated form to develop the structural self-interactive matrix. In order to enhance the structural-interpretative analysis to the total interpretative-structural analysis, each paired comparison should be interpreted completely by answering the interpretative question raised in the previous step. For the paired comparisons,  $i$ th index is compared pairly to all elements from  $(i+1)$ th to  $n$ th. For each correlation, the answer "Yes" is shown with "Y" and the answer "No" is shown with "N", if the answer is positive, its reason is given. But if the answer is No "N", commenting on pair of variables of the participants will be necessary.

**Table (8) The abbreviated coding of validated indicators**

Index	Abbreviation
Employers' view expression analysis	X1
Interpretation of the corporate financial structure	X2
Using the technical and abstract skills in the financial statement analysis	X3
Systematic study of the evidence	X4
Pursuing accounts according to documents and information content	X5
Reviewing the details of account in the corporate financial statements	X6
Matching accounts with each other to find the differences	X7
Paying attention to the intuitions	X8
Subjective evidence – based analysis	X9
Experience – based analysis	X10
Professional knowledge – based analysis	X11

**Table (9) The paired comparison between variables according to the matrix form**

Number	Paired comparison	Yes/NO	Explain how to influence
<b>X1 <input type="checkbox"/> Analysis of the employers' view expression</b>			
1	X1-X2	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	Effectiveness of the employer's approach analysis on the corporate financial structure
2	X2-X1	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
3	X1-X3	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
4	X3-X1	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
5	X1-X4	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
6	X4-X1	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	Systematic study of the evidence based on the employer's view analysis
7	X1-X5	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
8	X5-X1	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
9	X1-X6	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	The analysis of the employer's approaches by reviewing accounts
10	X6-X1	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	Reviewing the details of the employer's approaches by reviewing accounts
11	X1-X7	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
12	X7-X1	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
13	X1-X8	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
14	X8-X1	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
15	X1-X9	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
16	X9-X1	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
17	X1-X10	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	The employer's approaches analysis based on experience
18	X10-X1	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
19	X1-X11	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
20	X11-X1	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
<b>Interpretation of the corporate's financial structure</b>			
21	X2-X3	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	

Number	Paired comparison	Yes/NO	Explain how to influence
22	X3-X2	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	Abstract analysis of the financial statement according to the corporate financial structure
23	X2-X4	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
24	X4-X2	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	The systematic study of the evidence according to the corporate financial structure
25	X2-X5	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
26	X5-X2	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
27	X2-X6	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
28	X6-X2	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	Analysis of accounts according to the corporate financial structure
29	X2-X7	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
30	X7-X2	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
31	X2-X8	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	The interpretation of the corporate financial structure considering the intuitions
32	X8-X2	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	Intuition –based analysis in the corporate financial structure interpretation
33	X2-X9	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	
34	X9-X2	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
35	X2-X10	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
36	X10-X2	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
37	X2-X11	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
38	X11-X2	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	

\*Note: because of the limitation in the number of article pages, only a selection of the paired comparison form is presented in this section.

In order to form the structural self-interactive matrix "SSIM", the paired comparisons of the critical thinking are given in Table (10). For the paired comparisons,  $i$ th index is compared pairly to all elements from  $(i+1)$ th to  $n$ th. For each correlation, the answer "Yes" is shown with "Y" and the answer "No" is shown with "N", if the answer is positive, its reason is given. In this case, the interpretive logic of the paired correlations is presented as an interpretive, reasonable and scientific basis.

In this step, the equations as reachability matrix are written as "-1" or "0" which are given in Table (10). According to Table (11), in homes with "Y", we put "1" and in homes with "N", we put "0". In fact, the matrix is derived from changing the structural self-interactive matrix into a (0,1)- matrix.

In the following, we will give the scores based on interaction of the compared indicators to develop the interactive reachability matrix.

As shown in the table above, the conceptual symbols allocated to the values according to the previous table, have changed into the scores 0, 1 and 1\* based on the mode index and the definition of the conceptual correlations. In the table below, the influence factor<sup>18</sup> (score 1 obtained from the row) and the dependance factor<sup>19</sup> (score 1 obtained from the row) are determined:

**Table (10) To form the structural self-interactive matrix (SSIM)**

Indicators	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
X1		Y	N	N	N	Y	N	N	N	Y	N
X2	N		N	N	N	N	N	Y	Y	N	N
X3	N	N		N	N	N	Y	N	N	N	Y
X4	N	N	N		Y	Y	Y	N	Y	N	N
X5	N	N	N	N		Y	Y	N	N	N	N
X6	N	N	N	N	N		N	N	N	N	N
X7	N	N	N	N	N	N		N	N	N	Y
X8	N	N	N	N	N	N	N		N	N	N
X9	N	N	N	N	N	N	N	N		N	N
X10	N	N	N	N	N	N	N	N	N		N
X11	N	N	N	N	N	N	N	N	N	N	

**Table (11) Initial Reachability Matrix**

Indicators	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
X1		1	0	0	0	1	0	0	0	1	0
X2	0		0	0	0	0	0	1	1	0	0
X3	0	1		0	0	0	1	0	0	0	1
X4	1	1	1		1	1	1	0	1	0	0
X5	0	0	0	0		1	1	0	0	0	0
X6	1	1	0	1	0		0	0	0	1	0
X7	0	0	0	0	0	0		0	0	0	1
X8	0	0	0	0	0	0	0		0	0	0
X9	0	0	0	0	0	0	0	0		0	0
X10	0	0	0	0	0	0	0	0	0		0
X11	0	0	0	0	0	0	0	0	0	0	

**Table (12) Reachability matrix in terms of transferability of correlations between the indicators**

Indicators	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	influence
X1		1	0	1*	0	1	0	1*	1*	1	0	7
X2	0		0	0	0	0	0	1	1	0	0	3
X3	0	1		0	0	0	1	1*	1*	0	1	6
X4	1	1	1		1	1	1	1*	1	1*	1*	11
X5	1*	1*	0	1*		1	1	0	0	1*	1*	8
X6	1	1	1*	1	1*		1	1*	1*	1	0	10
X7	0	0	0	0	0	0		1	0	0	1	2
X8	0	0	0	0	0	0	0		1	0	0	1
X9	0	0	0	0	0	0	0	0		1	0	1
X10	0	0	0	0	0	0	0	0	0		1	1
X11	0	0	0	0	0	0	0	0	0	0		1
dependency	4	6	3	4	3	4	5	6	6	5	5	--

\*Transferable connection between indicators

**Table (13) Separation of influence and dependence factors**

Indicator	Abbreviation	Influence power	Dependency
Analysis of the employers' view expression	X1	7	4
The Corporate financial structure interpretation	X2	3	6
Using technical and abstract skills in financial statement analysis	X3	6	3
Systematic study of the evidence	X4	11	4
Pursuing accounts based on documents and information content	X5	8	3
Reviewing the details of accounts in the corporate financial statement	X6	10	4
Matching accounts with each other to find the differences	X7	2	5
Paying attention to intuitions	X8	1	6
Subjective evidence – based analysis	X9	1	6
Experience – based analysis	X10	1	5
Professional knowledge – based analysis	X11	1	5

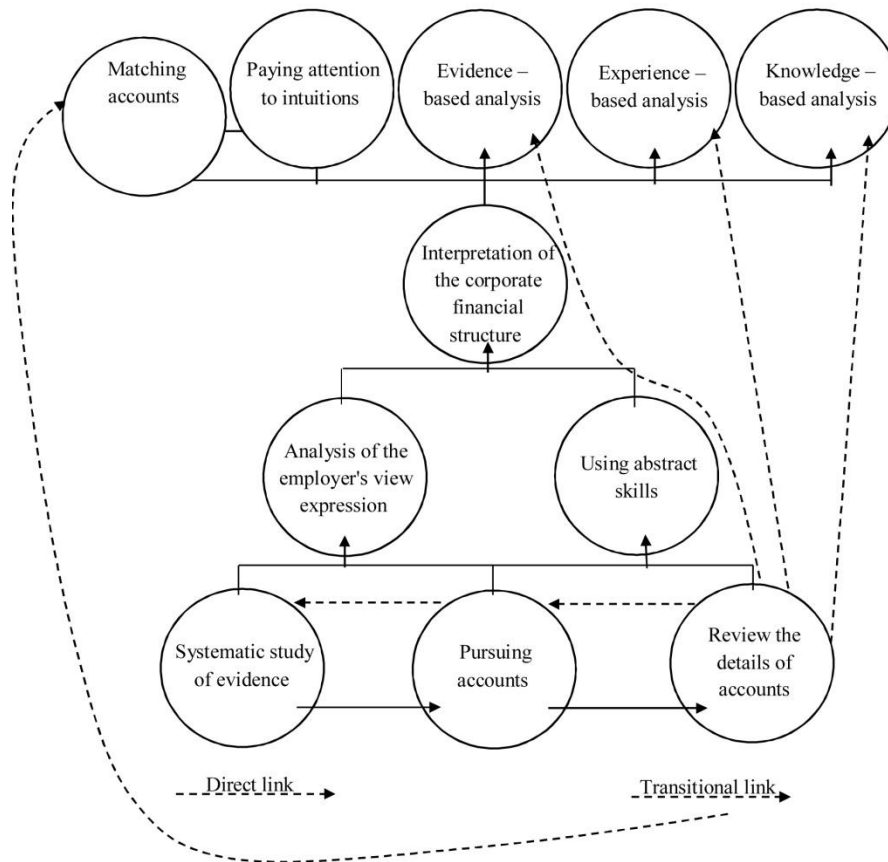
In this section, the inputs and the outputs for each variable are obtained using the final reachability matrix. The inputs and the outputs of a variable are defined as follows: the **output** for a dimension/particular component is the variable itself along with other variables affected by it, in other words, the variables that can be obtained through this variable. The **inputs** for each variable include this variable itself along with other variables that affect it. Finally **the common elements** refer to the common dimensions between the inputs and the outputs of the variable in total interpretive –structural model (TISM) as a high-level variable. In other words, these variables don't have any effect on creating other variable. After determining the inputs, outputs and common elements, the indicator that have the same outputs and common elements, is determined as the first level and effective factor in critical thinking in the audit profession . After determining this level, that is the most effective level of critical thinking, we delete that indicator and we

will examine the same input and common indices and select it as next level. This procedure is repeated until the components of all levels of system are determined (Rezaei Pandari & Zare, 2016:72).

As shown in Table (14), the first levels including X7 code, meaning comparing accounts to each other to find the differences; X8 means paying attention to intuition; X9 means analysis based on the subjective evidence; X10 means analysis based on the experience and X11 means analysis based on the professional knowledge are determined as the first level and least effective factors in critical thinking in the audit profession. The last levels include three indicators: X4 means the systematic evaluation of the evidence; X5 means pursuing accounts based on the documents and information content and X6 means reviewing the details related to each account in the financial documents. Accordingly other levels are also determined.

**Table (14) Outputs of indicators**

Indicator	Abbreviation	Outputs	Inputs	Common elements	Level
Analysis of the employers' view expression	X1	6,4,1	1,4,5,6	1,4,6	Level (3)
The Corporate financial structure interpretation	X2	2	1,2,3,4,5,6	2	Level (2)
Using technical and abstract skills in financial statement analysis	X3	3	3,4,6	3	Level (3)
Systematic study of the evidence	X4	4,5,6	4,5,6	4,5,6	Level (4)
Pursuing accounts based on documents and information content	X5	4,5,6	4,5,6	4,5,6	Level (4)
Reviewing the details of accounts in the corporate financial statement	X6	4,5,6	4,5,6	4,5,6	Level (4)
Matching accounts with each other to find the differences	X7	7,11	3,4,5,6,7,11	7,11	Level (1)
Paying attention to intuitions	X8	8	1,2,3,4,6,8	8	Level (1)
Subjective evidence – based analysis	X9	9	1,2,3,4,6,9	9	Level (1)
Experience – based analysis	X10	10	1,4,5,6,10	10	Level (1)
Professional knowledge – based analysis	X11	7,11	3,4,5,7,11	7,11	Level (1)



Figure(4) The Total Interpretative Structural Model of the critical thinking characteristics in the audit profession

Now, in order to analyze the link nodes related to indicators in hierarchy diagram, the following analytical table is used. The interpretation of the link nodes of the TISM determine the critical thinking indicators in the audit with direct relation and transition link.

As it shown, there is a direct correlation between the X1 and the X2, that is, between the analysis of the employers' views and the interpretation of the corporate's financial structure. It means that the analysis of the employers' view can be considered as a cause for more desirable interpretation of the corporate's financial structure. On the other hand, since the X4 (systematic study of the evidence) affects the X1 (analysis of the employers' views), then an analysis can be conducted according to systematic study of the evidence about the employers' views that is shown in

the table. Other correlations are reviewed in graphical interpretation.

## 5. Discussion and Conclusions

One of the approaches in the social research which focuses on coping with the distortions, multiple levels of reality and the value-based activism in order to empower people working in any profession is **critical paradigm** (YektaKooshali, et al., 2017:2). The advocators of this paradigm believe that now we have found that these modified historical structures are considered incorrectly as absolute realities, the recognition of the individuals' conceptual-structural change in respect to the issue is of great importance and in order to provoke the essential actions to make a change, it is necessary to get a common sense about the issue of critical thinking in the professions. The



main characteristics of critical thinking are: argument, assessing the causes, discovering and intuition in order to reach the self-awareness in decision-making and playing a desirable role in each profession ( Khajavi & Mohammadian, 2018:100). In the audit profession, critical thinking is considered in manifesting the qualitative properties of accounting information such as, neutrality, objectivity, doubt and honest statement that are expressed in the conceptual framework of the audit assessments. Based the description, the purpose of the present research is to develop the auditors' Critical Thinking model in evaluating the employers' financial performances according to Total Interpretative Structural Analysis (TISM). Accordingly, in the first section of the research, we tried to determine the dimensions of critical thinking in the audit using the meta-synthesis analysis, so that we are able to develop a model based on the TISM. According to meta-synthesis analysis, 17 indicators were determined related to three components: critical thinking analytical power, critical thinking intuitive power and critical thinking interpretive/ inferential power. In order to approve or delete the identified indicators during two steps of the Delphi analysis and based on criteria such as the mean and the coefficient of agreement, it was found that among 17 identified indicators, 5 indicators were deleted and 2 indicators were combined pairly. In total, three sub-components and 11 indicators entered the phase of the TISM. According to analysis, in this section, first some forms under the title of " Paired comparison of individual indicators" in a checklist format with "Yes" or "No" were distributed among the Panel's members, then the reachability matrix was developed based on the questions. The results of the hierarchy model show that three indicators including the systematic study of the evidence, pursuing accounts based on the documents and information contents and reviweing the details of the accounts which are related to critical thinking analytical power are considered as the most effective indicators of critical thinking in the audit profession. On the other hand, the existence of the reasonable approaches in this profession is considered as critical thinking priorities which are associated with the auditors' cognitive and perceptual approaches in the decision-making and judgement. In fact, the systematic study of the evidence refers to a kind of central process and an approach with a framework in reviewing the evidence and the documents presented

by the employers in the companies listed in the Stock Exchange that defines the auditor's decision makings only based on taking rational steps in the decision making. On the other hand, relying on presented evidence and documents can obtain a better recognition of the employers' performance realities. As a result, the auditors try to consider more valid and more documentary reasons in their judgement and decisions based on critical thinking. In addition, reviewing the details of each account in the financial documents is another important factor in the auditor's critical thinking analytical power which based on a framework-oriented approach, the auditor seeks to assess the most detailed evidence to present his rational thinking regardless of his emotions and inspirations. In the second level of influencing, it was found that the analysis of the employers' opinions and the use of abstract skills are considered as critical thinking interpretive/inferential power. It shows that the auditors should use the information foraging procedures such as interviewing with the financial and executive managers in their reviews to have better inferential power along with the evidence to judge about the financial performances. In fact, the analysis of the employers' views in order to better recognize the corporates' financial behaviors according to the representative costs is very important for making the decision. In fact the auditor can have more analytical inferential power in his decision making by periodic coexistence with the corporate performance and interviewing with the corporates' managers. Moreover, the use of abstract skills is a critical process based on information abstraction, compaction and purification through identification, derivation, then separation and hiding the details from generality. In other words, the auditor can separate the issues and challenges related to reviewing the corporates' financial performances to obtain more desirable understanding of the corporate financial performances. Finally it was found that every four indicators in critical thinking intuitive power are determined as the least effective criteria of critical thinking in the audit profession. In fact, although the intuitive approach is based on the auditor's individual intuition, it doesn't have any inferential and proving capability in decision making despite its importance and the auditor can not provide a basis for his judgement. He can simply speed up his reviews by relying on his knowledge and experience. In fact the critical thinking intuitive power is an important issue

but for the audit profession that requires the judgement based on evidence and documentation, this is somewhat far from an argument accepted by the court. The results obtained from the research are in consistent with the research carried out by Nelson (2003); Phillips & Burrell (2009) and Helsdingen et al. (2010). According to the results, it is suggested that the organizations and related institutions such as the court of audit in Iran should pay attention to this educational necessity and focus on the necessary strategies in using the critical paradigm in the audit judgments. Moreover it is suggested that the speed of doing jobs and the mental decision-making ability along with the priority of reviewing the employers' evidence as part of the auditors' decision making arguments at critical times are trained to the auditors to help them increase the quality of audit and the ability of decision making in the capital market.

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