

# How Intellectual Capital Reduces Stress on Organizational Decision-Making Performance: the Mediating Roles of Task Complexity and Time Pressure

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## ABSTRACT

Previous research claimed that organizational stress, due to task complexity and time pressure, leads to considerably negative effects on the decision-making performance of individuals and organizations. At the same time, intellectual capital (IC), in providing intangible internal and external organizational assets has a positive effect on organizational decision-making performance. This paper develops a structural equation model to analyze the relationships among IC, task complexity, time pressure and decision-making performance. Empirical data are collected from 374 participants, who are from universities, institutes, enterprises, government, with different occupations and expertise. We present two conclusions. First, IC consisting of internal capital, human capital and external capital leads to a reduced complexity of tasks and reduced time pressure and hence reduced organizational stress. Second, reduced organizational stress results in higher levels of performance for organizational decision-making.

## Keywords

Intellectual capital, decision-making performance, time pressure, task complexity, organizational stress.

## INTRODUCTION

Organizational stress is defined as a stimulus, a response or a result of the imbalanced interaction between individuals and job satisfaction (Sullivan and Bhagat, 1992). Different factors may result in organizational stress, which include task complexity and time pressure, unclear individual behavior and imperfect management systems (Kelly et al, 1997). If an organization does not pay enough attention to stress, this can possibly, but not necessarily, act as an antecedent to risk. Therefore, reducing the complexity of tasks and the pressures from time constraints should be considered to mitigate the effects of stress and decrease risks in decision-making.

Organizations have several solutions for reducing stress. Enterprises, for instance, reduce the reliance on traditional production factors and promote knowledge accumulation and intangible asset utilization. In doing so, enterprises focus on the effective utilization of intellectual capital (IC), which helps reduce individuals' stress by cutting redundant work processes and, increasing the quality of work and introducing a better time management. Bontis (2001) considers IC as an organizational intangible asset which refers to knowledge, people and their experience, business process, technology, organizational relationships, etc. In some companies or institutions such as knowledge companies, research institutions or public service institutions where most employees are highly qualified and educated professionals, intangible assets are much more valuable than tangible assets. The accumulation and utilization of IC is in these organizations considered as the principle means of creating value.

IC plays a significant role in the decision-making process. Most research emphasizes the relationship between IC and decision-making at the business strategy level, focusing on improving organizational management and performance, and enhancing organizational capacity through IC. As such, IC has been found to positively affect organizational decision-making. Meanwhile, in organizations, employees and managers can be exposed to stress that result from the complexity of tasks and pressure of time, which may negatively impact organizational decision-making performance. In this research, we assume that an organization's IC can be used to address task

complexity and time pressure in such a way that it reduces organizational stress, and therefore improves the performance of organizational decision-making. We therefore assume that organizational stress plays a mediating role between IC and decision-making performance. In agreement to most current research, we view IC as a human resource and also an intangible organizational asset that exists inside and outside of organizations.

## LITERATURE REVIEW AND HYPOTHESES

### *Intellectual Capital*

IC first appeared as a term of intellectual activity to explain the difference between organizations' book value and market value. To be more specific, some firms do not have big book values but create huge market values, and explains that the traditional balance sheet or the tangible assets could not fully measure the corporate strength. In previous research, IC is considered as an intangible organizational asset (Bontis, 2001), which refers to the internal and external of organizations (Petty and Guthrie, 2000). Although, researchers define IC from different perspectives, it is generally agreed that IC can be put to use as intellectual material to create wealth or provide companies with competitive edges in the market. Petty and Guthrie (2000) propose a tripartite model for IC consisting of internal capital, external capital and human capital. Internal capital refers to all types of IC from the inside of organizations' natural resources, which contains management philosophy and processes, organizational structure, information systems, intellectual property, research and development. Human capital refers to individuals' knowledge, innovation, diversity, education and training, learning and development, demographics, work related competencies. External capital consists of alliances and partnerships, distribution channels, community relations, customer relations, supplier relations and financial relations (Boedker, 2005). We see intellectual capital as an organizational intangible asset that can be used in organizations to address stress. In doing so, we adhere to Petty and Guthrie's (2000) tripartite framework for the categorization of IC. During the decision-making process, human capital, internal capital and external capital have different functions in contributing resources to meet the organization's requirements. Human capital, referring to the human resources within and outside of the organization (Petty and Guthrie, 2000), provides support in every aspect related to knowledge and individual behavior, and it acts from the beginning of decision-making till the end of decision implementation. Internal capital provides organizations with the basic organizational structure, culture, information system, technology ability, etc. External capital not only offers extra-organizational resources and opportunities, but can also be used to achieve organizations' competitive edge and products value via the relationship network. These three IC categories work effectively when they reinforce each other.

**Hypothesis 1.** Internal capital, human capital and external capital positively affect each other.

### *Organizational Stress*

Stress is pervasive in organizations, which might easily turn into risk in the decision-making process. Kelly et al, (1997) claim that time pressure and task complexity are the main forms of stress that affect individuals. Following most research, we consider that severe time constraints and high complexity tasks are the leading factors to stress in decision-making.

Task complexity can be considered as the average complexity of the most common tasks. Most research agrees that task complexity is related to individuals' responses to tasks (Bystrom & Jkrvelin, 1995). In task implementation and decision-making process, the complexity refers to task uncertainty, unpredictable, variety and indistinct attribute lead to an unstable task environment which easily turn into threat by significantly affecting decision-makers' judgment and individual performance. With an aim of reducing the complexity, IC has been considered as organizational intangible assets, consisting of internal capital, external and human capital, which acts different functions. Internal capital refers to knowledge-related facilities, organization structure, information system, innovation capability etc. (Bontis, 2001), and it provides organizations a stable task environment and a high performance of task implementation, which results in reduced complexity effects on individuals. During task implementation, human capital is helpful to reducing the complexity of tasks, based on two aspects -- knowledge and capabilities of individuals. High quality individuals, with more work experience and knowledge, own high level of operational capability, and may provide high performance in complex tasks (Hsu and Fang, 2009). Considering the function of using external capital, two main causes may result in reduced task complexity: accumulating organizational assets by acquiring extra-organizational resources, and transferring complexity tasks via the organization's relationship network. Therefore, we assume that IC provides organizations a stable task environment and additional resources, which leads to reduced complexity of tasks.

**Hypothesis 2.** A high level of intellectual capital leads to a reduced task complexity.

Research on time pressure and organizational stress largely focuses on the salient task-relevant decision-making and the effects of individuals' performance (Kelly et al, 1997). Some researchers argue that high levels of time pressure lead to stress and undermine task and lead to low quality performance (Kelly et al, 1997). To be more

specific, time pressure, refers to time urgency, uncertainty, unpredictability and variability, as individuals' judgment under time constraints which results in endogenous stress in decision-making. In order to reduce the risks result from time pressure, IC is considered as one of the main elements of organizational intangible asset (Bontis, 2001) which plays different functions in promoting work efficiency and quality, under time constraints. High quality of internal capital provides organizations with more intellectual-related facilities, and with high level of knowledge storage. Such process may reduce individuals' pressure from time constraints by increasing task efficiency and cutting redundant works. In organizations, time pressure seriously affects individuals' judgment and decisions, but high quality individuals, with great knowledge capabilities and work experience, have high performance when working under time pressure (Hsu and Fang, 2009). External capital not only supports the ex-organizational resources, but can also be used to reduce the organizational stress via relationship networks, which leads to a reduced time pressure to individuals in task implementation and decision-making process. We thus suppose that rationally utilizing the IC may increase individuals' time controlling capability, which leads to a reduced time pressure during task implementation and the decision-making process.

**Hypothesis 3.** A high level of intellectual capital leads to a reduced time pressure.

#### *Decision-making performance*

Most research in decision-making performance focuses on two characteristics: characteristics related to the individual and group satisfaction, and characteristics related to the factors that affect decisions. In Nemiroff and King (1975), decision-making performance consists of group decision quality, resource utilization and creativity. Huang (2003) approaches decision performance from two aspects: group decision satisfaction and process satisfaction. Brodbeck (2007) argues that decision outcome plays a key role in evaluating decision-making performance. Decision consistency stability, decision accuracy and information processing act as the main aspects for measuring decision-making performance in studies on process performance (Kerr and Tindale, 2004). Following researches, this paper views decision-making performance from two perspectives: (i) how difficult the decision-making can be achieved in the process, and (ii) whether it satisfies most employees or groups.

When facing organizational stress, task complexity and time pressure may easily lead to risks in decision-making process which should be seriously considered in organizations. Previous Research on task complexity and time pressure has been understood in multiple ways to affect organizational decision-making, which mainly focus on two aspects: the effects on different aspects of decisions, and the influences on people. Most of the research claims that high levels of task complexity affect organizational decisions by influencing the performance on decision accuracy and quality, decision choices, process satisfaction, information requirement, outcomes, as well as individual performance (Kerr and Tindale, 2004; Brodbeck et al, 2007). And the complexity of tasks influences individuals' performance as there often is less clear information to understand the issues, the risks involved, and the key factors to consider. Research on the relationships between time pressure and decision-making performance claims that that high levels of time pressure lead to an increased risk of organizational crises which result in a negative effect on decision strategies. Moreover, high time pressure causes inhibitory effects on individual performance which is a significant factor that leads to a reduced decision-making accuracy (Kelly et al, 1997). In view of the considerations, we suppose that a high level of task complexity and time pressure negatively affect the performance of organizational decision-making. Conversely, a reduced complexity of tasks and pressure of time may lead to a better performance of decision-making.

**Hypothesis 4.** A reduced complexity of task may leads to a better decision-making performance.

**Hypothesis 5.** A reduced pressure of time leads to a high performance of decision-making.

## **DATA COLLECTION AND RESULTS**

The empirical data of this research is based on the online questionnaire survey. The participants were asked by questions in two parts. The first part gathered the personal information of the participants: which in terms of the age, occupation, education and position. The second part was about the main survey for this research, which contains 6 constructs, 35 questions in total. All the measurements in this research are based on the pervious studies, which are mentioned in the literature review of this research. 415 questionnaires were distributed and collected online. 312 of the participants have more than five years work experience, and the participants cover more than 12 occupations and 28 expertise. 41 of the collected surveys were incomplete and therefore rejected. This yielded a total of 374 samples in this research that are usable for analyzing.

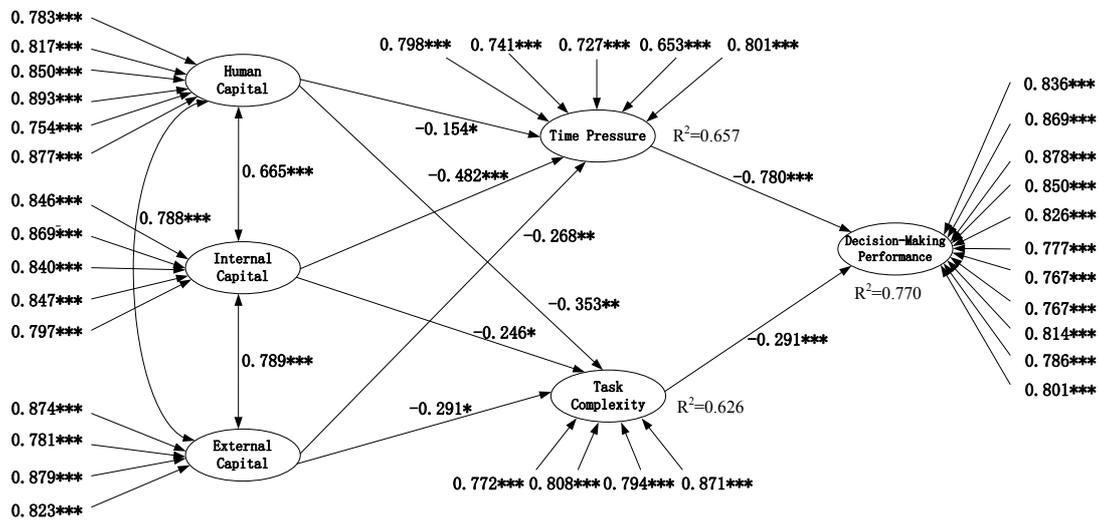
We test the survey for internal consistency, convergent validity, and discriminant validity. Before proceeding to the result of factor analysis, the Bartlett test of sphericity and the Kaiser-Meyer-Olkin test of sampling adequacy need to be reported. The data in this research is shown to be significant by the test of Bartlett test of sphericity and the KMO value is 0.977 which means the integrated data is considered as excellent. Table 1 shows the analysis results of the reliability and discriminant validity of the measurements, including means, standard

deviation, Cronbach’s alpha, loadings and correlation. The results indicate that the Cronbach’s Alpha scores of each construct is higher than 0.86, exceeding the typical threshold of 0.7. This means each measurement has a very good reliability, indicating the internal consistency. The variances extracted scores are exceed 0.62 from each factor, higher than the significance level (0.5), and the factor loading scores are exceed (0.5) which means all of the items loaded quite well on their respective factors. For the correlation test, IC and Decision-Making Performance constructs have a positive correlation to the other ones. The constructs Task Complexity and Time Pressure show negative correlations to the constructs of IC and decision Decision-Making Performance. The correlation of paired constructs is significantly less than 1.0, which implies the discriminate validity.

**Table 1. Reliability & Discriminant Validity**

	Alpha	Loadings	Mean	SD	HC	INC	EC	TC	TP	DMP
HC	0.932	0.59-0.76	1.99-2.36	1.04-1.13	1.000					
INC	0.924	0.60-0.80	2.02-2.14	1.04-1.18	.836***	1.000				
EC	0.900	0.60-0.76	2.09-2.16	0.98-1.01	.841***	.846***	1.000			
TC	0.882	0.51-0.82	5.70-5.87	0.99-1.06	-.771***	-.743***	-.802***	1.000		
TP	0.867	0.65-0.76	5.49-5.58	1.09-1.13	-.765***	-.742***	-.787***	.755***	1.000	
DMP	0.952	0.56-0.75	2.01-2.32	1.03-1.09	.840***	.875***	.882***	-.825***	-.819***	1.000

Note: \*\*\*Significant at p-value<0.001 level of significance. Human Capital-HC; Internal Capital-INC; External Capital-EC; Task Complexity-TC; Time Pressure-TP; Decision-making Performance-DMP.



**Figure 1. Framework Test of Structural Equation Model (\*p<0.1; \*\*p<0.05; \*\*\*p<0.01)**

The test results of SEM in Figure 1 fit well from the goodness-of-fit measurement: the Root Square Error of Approximation (RMSEA) is 0.062, which exceeds the threshold value of 0.08 as recommended by Newcomb (1994). The Comparative Fit Index (CFI) is 0.941, the Tucker-Lewis Index (TLI) is 0.933, the Incremental Fit Index is 0.941 and the Normed Fit Index (NFI) is 0.904 all of them are exceed the threshold value of 0.9.

**DISCUSSION AND CONCLUSION**

Past research has recognized that high levels of task complexity and time pressure provide an imbalanced interaction between people and their environment which leads to less job satisfaction and lower decision-making performance. Meanwhile, IC can be used for providing assets from both inside and outside the organization, in order to provide a stable task environment to individuals. This research explores how IC impacts two types of organizational stress, namely task complexity and time pressure, with the aim of increasing organizations’ decision-making performance. After the empirical survey and data analysis, the result of SEM verifies the acceptance of our hypotheses in this research, and it also lays out three main conclusions. At first, considering the test of structural equation model in Figure 1, three dimensions of IC significantly and positively affect each other (respectively  $\gamma_a = 0.665***$ ,  $\gamma_b = 0.789***$ ,  $\gamma_c = 0.788***$ ). It implies that human capital, internal capital and external capital strongly impact each other. Having this found, managers should focus more on the interactive effectiveness among the three capitals in decision-making process. Secondly, when facing organizational stress, IC plays different functions in reducing task complexity ( $\beta_{2a} = -0.353**$ ,  $\beta_{2b} = -0.246***$ ,  $\beta_{2c} = -0.291*$ ) and time pressure ( $\beta_{3a} = -0.154*$ ,  $\beta_{3b} = -0.482***$ ,  $\beta_{3c} = -0.268**$ ) respectively. Considering the interactions between the components of IC, human capital has a stronger impact on decreasing task complexity as compared to time pressure. Internal capital works better on reducing time pressure as compared to task complexity. External

capital acts both the same significant on time pressure and task complexity. From this aspect, we can clearly see that, individuals have more capabilities in doing works than controlling time. However, effectively utilizing internal capital may significantly enhance task performance and save more time for individuals. It offsets the deficiency of individuals' capabilities in controlling time pressure. Thirdly, the mechanism of organizational stress, task complexity and time pressure play significant effect on decision-making performance in different ways. Based on the result, the reduced time pressure ( $\beta_5 = -0.78^{***}$ ) shows a much higher effect on increased decision-making performance when compared to the reduction of task complexity ( $\beta_4 = -0.291^{***}$ ). The main reason is that, it is more difficult for both employees and decision-makers to control time than tasks (this can be verified by the second conclusion). Therefore, decision-makers should focus more on addressing the issues generated by time pressure and it may easily lead to a higher performance than reducing task complexity. To summarize, the mechanism of organizational stress, task complexity and time pressure in this research play mediating roles that negatively affect the relationships between IC and decision-making performance. From another point of view, effectively utilizing different functions of IC may reduce the negative effects or risks out of task complexity and time pressure. It shall lead to an increased performance during decision-making process. Thus it needs to be seriously considered as part of organizational strategy.

There are some limitations in this research that should be considered for future work. Firstly, the measurements in structure equation model cannot fully explain the components. And the participants are based on different organizations and occupations which cannot be considered in certain special organizations. Secondly, the effect between IC and decision-making performance, as well as between task complexity and time pressure, need to be further developed in future work. Thirdly, online survey is only used as a primitive tool for data, for future works we will conduct field surveys instead. Last but not least, this paper concerns little environment condition change. Therefore, future research needs to examine the effect of environment condition as another mediator for the research topic stressed by this paper.

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