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Dezhi Wu

Southern Utah University, wu@suu.edu

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Relationship between the Quality of Individual Time Management and Temporal Structure Usage: Design Implications for Electronic Calendar Systems

Dezhi Wu

Computer Science & Information Systems Department

Southern Utah University
Cedar City, UT 84720, USA

wu@suu.edu

ABSTRACT

This research examines the time management strategies of individuals and gathers information on the complex temporal structures they experience and manage. Its focus is on understanding the relationship between the quality of individual time management and an individual's understanding and use of temporal structures involving electronic calendar systems. This work consists of a survey study which examines the hypotheses developed from a review of literature on the impact and role of time in people's work lives. A theoretical research model is proposed and tested using partial least squares (PLS) technique to examine the relationships between the key survey constructs. This study demonstrates that the use and understanding of temporal structures is an important component for good individual time management. Significant relationships between the quality of individual time management and various temporal structures were discovered and also indicate that temporal structures could be a new design component for the electronic calendar systems.

Keywords

Temporal structure, calendar, time management systems, electronic calendar design.

INTRODUCTION

Researchers in management and organizational behavior have shown that temporal rhythms and norms exist, and that they collectively impact multiple aspects of an organization. They have also shown that individual productivity is hampered if temporal cycles clash. This suggests that individual time management is related to the temporal structures that govern and constrain an individual's life. Current electronic calendars (such as Google online calendar) mainly support explicit temporal structures (e.g., deadlines, meeting schedule), which professionals often record to view the relationships between the temporal structures affecting their lives.

Knowing these relationships can, thus, help an individual build a personal schedule that optimizes his or her use of time while still abiding by the engrained temporal structure that cannot be controlled. However, except for explicit temporal structures, many other types of temporal structures are not being supported by the current electronic calendar tools. The focus of this research is, therefore, on understanding the relationship between the quality of individual time management and temporal structure usage and the implications of incorporating more extensive temporal structure components into the current emerging electronic calendar systems.

The first section of this paper briefly examines the theoretical background of how the temporal structures are used in personal time management. A theoretical research model is then introduced and a set of hypotheses is proposed to investigate the relationship between the quality of individual time management and personal usage and the creation of temporal structures. To test these hypotheses, a large survey was conducted in a US academic institution. Partial Least Squares (PLS) technique was utilized in the data analysis. Finally, the conclusion is drawn, and the electronic calendar design implications are discussed.

BRIEF THEORETICAL BACKGROUND

Temporal structures are patterned organizations of time, used by humans to help them manage, comprehend or coordinate their use of time (Wu, 2009, p. 12). The temporal structures provide a foundation that human beings use to create temporal regularity for their uncertain lives. Two major temporal structure categorizations found in the previous literature build the theoretical foundation for this study. One categorization is proposed by Orlikowski and Yates (2002), who categorize temporal structures into clock-based (e.g., meeting schedule), event-based (e.g., wedding) and practice-based time (e.g., family vacation time). Another temporal structure categorization is somewhat different from Orlikowski and Yates' classification scheme. Blount and Janicik (2001) organize temporal structures into explicit, implicit and

sociotemporal structures. Explicit temporal structures are those that are posted and made readily available, e.g., deadlines for turning in timesheets or reporting quarterly earnings. Implicit temporal structures are those that are known by the group or subgroup but never stated explicitly, e.g., the creation of advertising, shipment and delivery schedules in preparation for the Christmas shopping season. Sociotemporal norms are the usually unstated time lags that are expected by a culture, e.g., the amount of time to wait before requesting overdue information from a colleague again. Thus, Blount and Janicik suggest that time management is the active task of manipulating the temporal structures that govern a person's work and leisure time. The above two categorizations of temporal structures form separate dimensions for viewing time norms and both can be used to categorize any temporal event. These studies identified organizational temporal structures, which impact employees' work satisfaction and efficiency. A recent temporal structure study (Wu, 2009) extended temporal structure theories and found that professionals use a variety of temporal structures in their personal time management practices.

This study suggests that the quality of individual time management is likely to be associated with temporal structure manipulation. Empirical research is needed to further demonstrate this possibility, which is the main focus of this paper. Because no existing temporal structure constructs can be directly adopted for this research based on our best knowledge, partial temporal structure categorizations proposed by Blount and Janicik (2001) were utilized to develop temporal structure constructs.

This research applies the belief that better time managers are also better temporal structure manipulators. It is argued that the quality of individual time management is likely to have some relationship with the level of expertise an individual shows in using electronic calendar systems.

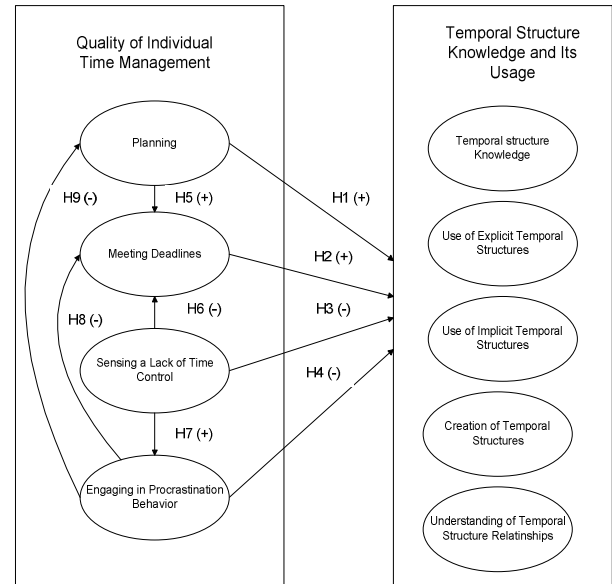
In the following section, detailed research hypotheses are developed based upon the proposed research model in Figure 1.

THEORETICAL RESEARCH MODEL

Our fundamental research question for this research is whether the quality of individual time management is associated with individual capability to manipulate temporal structures through electronic calendar tools. Most professionals recorded explicit temporal structures in their electronic calendar tools to support their work (Wu, 2009). This work is now extended to further explore what constructs can be used to measure individual capabilities in manipulating temporal structures, and what constructs affect the quality of individual time management. Moreover, the relationship between the quality of individual time management and temporal structure knowledge is investigated along with their

different levels of usage. It is also expected that some correlations exist among individual time management quality constructs. Therefore, this study is the first step in providing evidence as to whether incorporating temporal structures in the current electronic calendar tools is useful and worthwhile.

Figure 1 below depicts the research model of the relationship between the quality of individual time management and the different levels of temporal structure manipulation in personal calendar tools. It also shows additional relationships among individual time management constructs.



Note: "H" means hypothesis, "+" means there is a positive relationship between two variables, "-" represents a negative relationship between two variables.

Figure 1. Theoretical Research Model

RESEARCH HYPOTHESES

In order to test our hypotheses, both the quality of individual time management and temporal structure instruments were created. Little empirical time management research has been conducted because many variables affect time management activities from an individual perception of time usage to a person's need to manage time. Also, time itself is very complicated, so there are many impediments to conducting research in this area (Ancona et al., 2001). Therefore, it is challenging to find appropriate constructs to measure the quality of individual time management. This research develops four constructs in order to measure the quality of individual time management, which includes *planning*, *meeting deadlines*, *sensing a lack of time control* and *engaging in procrastination behavior*.

Regarding temporal structure construct development, no existing constructs can be directly adopted from the previous research because temporal structure research is

still in a theory building stage in management science and organization behavior fields, and few empirical measures exist. Therefore, a whole set of new temporal structure constructs including *temporal structure knowledge*, *use of explicit temporal structures*, *use of implicit temporal structures*, *creation of temporal structures* and *understanding of temporal structure relationships* were developed and validated in this study.

The following hypotheses will test the relationships between the quality of individual time management and the use, understanding and creation of temporal structures. It is also expected that there will be some relationships among time management constructs. In general, these hypotheses state that better time managers are more aware of the temporal structures that impact their time usage, create more of their own temporal structures to help manage their time, and also use more temporal structures in their electronic calendar entries.

H1: Planning is positively associated with temporal structure utilization involving electronic calendar systems.

Because of different levels of capturing and utilizing the temporal structures described, this hypothesis is further decomposed to the following sub-hypotheses:

H1.1 Planning is positively associated with personal temporal structure knowledge.

H1.2 Planning is positively associated with personal use of explicit temporal structures.

H1.3 Planning is positively associated with personal use of implicit temporal structures.

H1.4 Planning is positively associated with personal creation of temporal structures.

H1.5 Planning is positively associated with personal understanding of temporal structure relationships.

H2: Meeting deadlines is positively associated with temporal structure utilization involving electronic calendar systems.

H2.1 Meeting deadlines is positively associated with personal temporal structure knowledge.

H2.2 Meeting deadlines is positively associated with personal use of explicit temporal structures.

H2.3 Meeting deadlines is positively associated with personal use of implicit temporal structures.

H2.4 Meeting deadlines is positively associated with personal creation of temporal structures.

H2.5 Meeting deadlines is positively associated with personal understanding of temporal structure relationships.

H3: Sensing a lack of time control is negatively associated with temporal structure utilization involving electronic calendar systems.

H3.1 Sensing a lack of time control is negatively associated with personal temporal structure knowledge.

H3.2 Sensing a lack of time control is negatively associated with personal use of explicit temporal structures.

H3.3 Sensing a lack of time control is negatively associated with personal use of implicit temporal structures.

H3.4 Sensing a lack of time control is negatively associated with personal creation of temporal structures.

H3.5 Sensing a lack of time control is negatively associated with personal understanding of temporal structure relationships.

H4: Engaging in procrastination behavior is negatively associated with temporal structure utilization involving electronic calendar systems.

H4.1 Engaging in procrastination behavior is negatively associated with personal temporal structure knowledge.

H4.2 Engaging in procrastination behavior is negatively associated with personal use of explicit temporal structures.

H4.3 Engaging in procrastination behavior is negatively associated with personal use of implicit temporal structures.

H4.4 Engaging in procrastination behavior is negatively associated with personal creation of temporal structures.

H4.5 Engaging in procrastination behavior is negatively associated with personal understanding of temporal structure relationships.

H5: Planning is positively associated with meeting deadlines.

H6: Sensing a lack of control is negatively associated with meeting deadlines.

H7: Sensing a lack of control is positively associated with engaging in procrastination behavior.

H8: Engaging in procrastination behavior is negatively associated with meeting deadlines.

H9: Engaging in procrastination behavior is negatively associated with time planning.

STUDY DESIGN AND DATA COLLECTION

A large survey was conducted in a US public research university to test our research model. Five new temporal structure constructs were created based upon a review of literature, and four constructs from the prior time management research were modified and developed for measuring the quality of individual time management. Therefore, a total of nine constructs were developed to measure our research model (Figure 1). Because temporal structures are specifically related to an individual's work

environment, the questionnaire was customized for the students at the university where the research was conducted. Then, a pre-set temporal structure survey was distributed to all participants to determine how the participants use various time management tools, to examine how much knowledge of temporal structures they currently have, to assess how effective they are as time managers, to determine how temporal structures are currently used by them, and whether they perceive that their personal time management quality is associated with the use of temporal structures.

In this study, the total number of valid responses was 560, and subjects who did not use any calendar tools were eliminated. The majority of the respondents were full-time students at the university mixed with some part-time students. The incentive for answering this survey was the chance to earn three extra credits in class for student participants. The whole data collection process took about four months.

SUMMARY OF DATA ANALYSIS RESULTS

A structural equation modeling technique called partial least squares (PLS) was selected to examine our theoretical model. This technique has been widely used in recent information systems research (Aubert et al., 1994; Karimi et al., 2004; Fornell, 1982; Chin, 1988). PLS is a powerful technique for exploratory studies. Given that our study is an initial attempt to build a temporal structure theory in relation to the quality of individual time management involving calendar systems, and our data is not normally distributed, it is appropriate to choose PLS technique to test our theoretical model.

In summary, based on the PLS analyses, H1.1, H1.5, H2.1, H2.2, H3.1, H3.2, H3.4, H4.2, H4.3, and H4.5 were not supported, and the majority of the hypotheses were significantly supported (see Figure 2).

CONCLUSION AND DISCUSSIONS

Prior research (Wu et al., 2006; Wu and Ngugi, 2008) found that users had significant complaints about the capabilities of their electronic calendar tools, in particular, their inability to capture and represent the multiple time constraints that affected their time management. It is hypothesized that we could build better electronic calendar systems that supported a wider variety of temporal structures and also allowed the seamless transfer of organizational temporal structures. However, with any such proposal for a new type of information system, it is important to determine the potential efficacy of this tool. Thus, this research embarked on an assessment of whether such a calendar tool would be useful. Literature from the field of organizational behavior suggested that temporal structures could impact productivity, and no research had been conducted to examine the relationship between individual time management quality and

temporal structure use and understanding. If research supports these hypotheses, then building a tool that makes it easier to capture multiple temporal structures should help good time managers. Thus, this work is the first effort to assess the viability of building new electronic calendar systems with new temporal structure components. Because of the significant relationships found, this research does build a strong case that it is viable and worthwhile to build this new type of temporal structure systems which can not only be useful for personal time management, but also could be valuable for organizations and businesses to capture useful temporal structures to better train their employees to achieve better productivity. Furthermore, capturing and utilizing various types of temporal structures could be considered as part of organizational knowledge management systems. Thus adding explicit temporal dimension to the organizational memory and knowledge base could be useful practices for maintaining and enhancing organizational productivities.

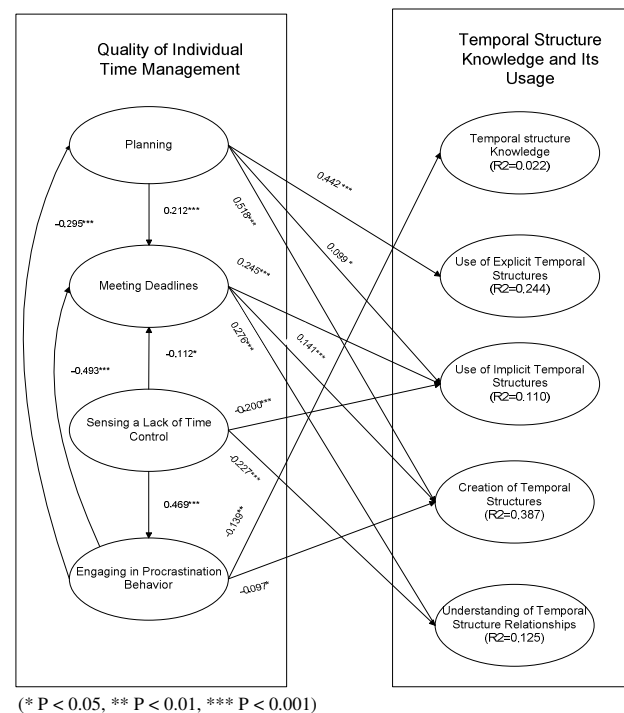


Figure 2. Research Model Testing Results

Because temporal structures are a salient form of organizational knowledge, an electronic tool which captures this knowledge is performing knowledge management. New constructs created in this research are an initial attempt to represent a variety of temporal structures that have been identified by organizational behaviorists. With refinement, they could serve as a template for capturing temporal structure knowledge.

As a result, this research implies that designing and implementing temporal structure features into electronic time management systems would be a useful tool for many employees. The relationship found between temporal structures and good time management implies

that a tool that supports the use of these temporal structures would be desirable for those users who already practice good time management habits. This is borne out by the significant positive correlation found between the amount of electronic calendar usage and good time management; That is, people who strive to be good managers want efficient electronic support for this time management task.

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