



TECHNOLOGICAL FRAMES: A QUALITATIVE STUDY ON LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Halit KESKIN

Yildiz Technical University, Turkey

Hatice Tuba BASARAN

Yildiz Technical University, Turkey

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Abstract:

This study aims to provide an insight for the concept of “frame” in general and “technological frame” in particular, which have gained considerable interest in management and organization studies. Additionally, it investigates the factors affecting technological frame construct, which is defined as people’s “assumptions, expectations and knowledge about the purpose, context, importance and role of technology” (Orlikowski and Gash, 1994). On the other hand, the importance of technology in the success of logistics and supply chain management has increased dramatically over the recent years in line with the emergence of new technologies. Based on this, we conducted an exploratory qualitative study, including semi-structured interviews with employees working in the logistics and supply chain management area. After content analysis, we found out that past experiences with technology, biases towards or against the new technology, personality, and technology knowledge and competence are the individual factors whereas organizational culture, colleagues’ attitudes, making stakeholders participate in the process of establishment, understanding the differences between employees, managers, and other stakeholders, and aligning them on a common goal, and providing training and on-time feedback to technology-related problems are the organizational factors affecting emotional and cognitive experiences of employees with a new technology they encounter at the workplace for the first time. Perhaps the most important finding of the study is that it has an affective dimension. Future research should provide further validation with research sample covering larger contexts.

Keywords:

Frame, technological frame, social cognition, logistics and supply chain management

1. Introduction

The "frame" construct in management and organization theory guides interpretations and perceptions of organizational phenomena. It provides “a crisp and powerful lens for focusing specifically on how people make sense of particular aspects of the world” (Orlikowski and Gash, 1994, p.178). As individual perceptions are shared commonly throughout the organization, these interpretations become the underlying organizational paradigm. However, organizational frames do not cover information technology design and use, so it is important to distinguish the concept of “technological frames” (herein, after TF) from the general frame structure.

Past research (such as Orlikowski and Gash, 1994; Davidson, 2002; Mc Govern and Hicks, 2004; Allen and Kim 2005; Mishra and Agarwal, 2010; Olesen, 2014) provided empirical evidence on TF domains, but rather than operationalizing TF as latent structures, they have mostly used biographical proxies, theme content analysis, and qualitative analysis. Since the research methodology of these studies were context-specific, more empirical evidence is required for further validation (Spieth, et al.. 2021).

On the other hand, the advancement of supply chain management and logistics can only come from information technology (Dawe, 1994). Furthermore, according to Bradley et al. (1999), 34% of logistics executives believe that technology is the most crucial element in enhancing logistical skills. Therefore, understanding and managing employee perceptions and feelings towards technology is a significant concern in the area of logistics and supply chain management.

Based on this, the aim of this study is to provide both a theoretical and empirical insight for the concept of TF. Additionally, it aims to identify the factors affecting TF of employees working in the logistics and supply chain management, in which the digitalization has become a concern. In this context, first, the concepts of frame and TF in management and organization studies are discussed. Secondly, research methodology, including sample selection and conducting semi-structured interviews, is explained. Thirdly, after content analysis, frame domains constituting and affecting the TF construct of logistics and supply chain management employees are identified. Finally, theoretical and practical implications are discussed and future research suggestions are provided.

2. Literature View

2.1. The Concept of Frame

According to Gioia (1986), frames refer to “definitions of organizational reality that serve as vehicles for understanding and action” (Gioia 1986, p. 50). They consist of presumptions, information, and expectations that are symbolically communicated through language, pictures, metaphors, and narratives. Frames have variable dimensions that change in salience and content over time and are flexible in both structure and content (Gioia, 1986). The implicit rules, defined as frame of reference that organizational members follow serve to organize, shape, and give meaning to their perceptions of events and organizational phenomena (Bartunek and Moch, 1987).

The framing construct has been studied in the management and organization literature referring to an array of “cognitive, linguistic, and cultural processes” (Cornelissen and Werner, 2014), of individuals in distinctive terminology, such as interpretive schemes (Bartunek, 1984; Greenwood and Hinings, 1988), cognitive maps (Weick and Bougon, 1986), organizational schemas (Poole, Gioia & Gray, 1989), belief structures (Walsh, 1988). These concepts are often used interchangeably but there are subtle differences in their meanings in addition to terminological differences. Therefore, it is important identify the distinctive features of those cognitive structures for the clear conceptualization and operationalization of framing.

According to Greenwood and Hinings (1988), interpretive schemes refer to the “sets of ideas, beliefs and values” that provide “meanings” and “coherence” to the structural designs with which organizations operate (Greenwood and Hinings, 1988, p. 313). A schema offers a knowledge foundation that acts as a manual for interpreting data, actions, and expectations. During interactions between two or more people, frames and schemas interact. Frames provide an interpretative “footing” that aligns the schemas that participants bring to the interaction. As a result, frames and schemas are not dissimilar notions for the same phenomena but rather are highly interactive, with frames serving as a more comprehensive, interpretive description or answer to “what is going on” or “should be going on.” (Benford and Snow, 2000, p.614).

The term “cognitive map” refers to the “order” and “interrelationships” of meaning that make up our cognitive schemas (Gioia and Manz, 1985). A cognitive map is as a mental image of the environment that accurately conveys the spatial relationships between objects in the real world. A similar mental image can be used to identify locations, calculate distances and directions, and, more practically, to guide for leaving from one point to another (Arzy and Kaplan, 2022). According to Fiol and Huff (1992), cognitive maps “exhibit the reasoning behind purposeful actions” (Fiol and Huff, 1992, p.267).

According to Fiske and Taylor (1984), a belief structure is a “cognitive structure that represents organized knowledge about a given concept or type of stimulus” (Fiske and Taylor, p. 140). It includes not only the characteristics of the concept, but also the relationships among those characteristics. Individuals have a variety of different belief structures for every single information domain. A belief structure functions as a road map for processing information, making it more manageable through the basis for inference it provides (Walsh, 1988).

The concept of individual cognitive structure was expanded to the levels of group, organization, and industry (Orlikowski and Gash 1994, Walsh 1995, Weick 1995, Davidson and Pai 2004) in organization and management literature. Individuals were believed to share similar cognitive frames in addition to their individual cognitive frames. In the organizational context, it was argued that a group of actors having similar roles share the same frames in an organization (Bartunek and Moch, 1987). Based on this, the concept of TF was first proposed by Orlikowski and Gash (1994), from a socio-cognitive perspective to identify how individuals sense make technology in organizations.

2.2. Technological Frame

The notion of TF has become popular due to its usefulness in explaining how individuals and groups interpret and create shared meanings around new technology. TF is generally defined as the “assumptions, expectations, and knowledge” individuals use to understand technology, including its nature, role, and specific conditions. Interaction with technology is only possible through sense-making process in which individuals develop “particular assumptions, expectations, and knowledge of the technology, which then serve to shape subsequent actions toward it”. Although these interpretations are frequently ignored and considered as “taken for granted”, they continue to have a substantial impact on how players in organizations, which are technologists, users, and managers, perceive and use technology. Distinctive groups hold various TF, affecting the way they understand and assess the groupware intervention (Orlikowski and Gash, 1994, p.175).

According to Davidson (2002), a processual understanding of framing is essential, focusing on both the practice and content aspects. Scholars have taken this approach, explaining evolving frames (Azad and Faraj, 2008) and discussing how individuals within a group could come to share an assumption of heterogeneous behavior (Mazmanian, 2013). Mc Govern and Hicks (2004) discussed frame incongruence and dominant frames. The dominant frame determines the system's structure, including decision-making power, process organization, and employee autonomy. Stakeholders may interpret new technology differently, causing incongruence between their frames. Lin and Silva (2005) highlighted the political aspect of technological framing, explaining how discourse and language plays a role in shaping framing. In review of the TF literature, Davidson (2006) noted that while TF had been studied widely, but it had not been extended or refined. She focused on the structural elements of framing, namely how individuals formulate their arguments, the range of issues they take into consideration, and how rigid or fixed the framing is. On the other hand, Gal and Berente (2008) proposed a social representation approach to explain TF, arguing that current research is primarily focused on technological aspects. The theory suggests that people's interactions with the outside world are mediated by socially constructed, constantly changing symbols, providing a comprehensive understanding of how these representations influence behavior.

Although the socio-cognitive view of Orlikowski and Gash (1994) to technology has attracted to a number of organizational researchers, awakening the interest for framing technology, there are some limitations in the conceptualization and operationalization of the notion of TF. First of all, since frames have been considered as “time and context-dependent” (Orlikowski and Gash, 1994, p.184), TF studies have mainly investigated employee perceptions for a particular technology (Mc Govern and Hicks, 2004; Mishra and Agarwal, 2010; Leonardi, 2011; Mazmanian, 2013), resulting the concern for generalizability of the research findings. Another methodological limitation is that most of the studies conducted qualitative research including interviews and field studies to identify TF domains undermining quantitative analyses (Mishra and Agarwal, 2010). On the other hand, the literature on TF undermined the affective dimension, neglecting the role of emotions in framing. Organizations' management of emotions (Arnold, et al., 2022) and employees' assessment of digital technology adoption (Spieth et al., 2021) were also understudied. Additionally, the notion of TF in the logistics and supply management area where technology is seen as vital for sectorial growth and improvement is undermined in the literature. Organizations see strategic potential to establish competitive advantages in supply chain and logistics management, thanks to the emergence of new technology. The degree of success is contingent upon the appropriate technology being chosen for the application, as well as the presence of appropriate organizational infrastructure, culture, and management practices (Bhandari, 2014). Based on this, understanding and managing TF of logistics and supply chain management employees is crucial for organizations to use technology as a source of competitive advantage. In this context, this study conducts a qualitative research in order to identify the factors affecting TF in logistics and supply chain management area.

3. Research Methodology

In this qualitative study, both deductive and inductive techniques were used following the procedures of Grant and Davis (1997) and Hinkin (1998). To identify the characteristics of the TF construct, the relevant literature was first reviewed. The interview questions were then written using a deductive approach. Then, through an inductive methodology, semi-structured interviews were conducted on individuals employed in logistics and supply chain management.

The research sample was chosen among MBA candidates from a mid-size university based on some criteria. First of all, the interviewees were required to have at least five-year experience both in their organization and logistics and supply chain management area. Additionally, employees from different managerial levels were called for. As a result, 11 employees who fulfilled the required criteria were invited to participate in the study.

Interviews lasted between 35-45 minutes and were voice-recorded. First, participants were briefly explained what TF is. Then, they were asked the following questions: 1) Which emotions and feelings do you have regarding a new technology you encounter for the first time at your workplace? 2) What are the individual and organizational factors that affect your feelings towards a new technology? 3) Which thoughts do come to your mind initially about a new technology at your workplace? 4) What are the individual and organizational factors that affect your thoughts about a new technology? 5) After encountering a new technology in your workplace, what kind of emotional, cognitive, and behavioral experiences do you have when learning, making sense of, adapting to, and using this new technology? Research participants were asked to answer those questions in detail, providing examples and past experiences, imagining that a new technology related to their job tasks was recently established at their workplace. When the data started to duplicate and no new information could be gathered, the interviews were ended (Lincoln and Guba, 1986). Every voice record was carefully transcribed and discrepancies were eliminated collectively by the researchers. Then, we conducted content analysis on interview data. Finally, we discussed and clarified the findings with a researcher who is an expert in the field and asked the field expert to review the interview analysis and terminated the process with a new set of areas and factors that TF of employees are constituted and affected.

4. Results

By analyzing and interpreting the data collected from the semi-structured interviews, we identified a pool of feelings and perceptions towards a new technology and the factors affecting affective and cognitive experiences of employees. First of all, interviewees mainly stated that they have curiosity and excitement when they face a new technology at the workplace:

“...I have curiosity and excitement. It might be interesting to explore what can be done with the new technology.”

One interviewee expressed worry as a negative feeling when he first encounter a new technology related to his job:

“Along with curiosity and excitement, I may also feel worried, especially about security and privacy issues.”

Some employees talked about both positive and negative feelings they have simultaneously:

“On the positive side, I feel excitement about the innovations that a new technology will bring to the organization and my job processes. However, along with this excitement, I also worry about the lack of knowledge and experience in possible malfunctions, downtimes, etc. that the new technology may bring. When I compare those feelings, the excitement I feel will outweigh.”

As a result of our content analysis, we found that past experiences with technology and biases towards or against the new technology, and personality are individual factors affecting employee feelings towards a new technology:

“If I have used similar technology before, it affects my feelings towards this new technology. I feel more confident and become eager to use it.”

“If you have a negative bias against the technology in general, it may cause to you have anxiety and fear for not being successful with a new technology at the workplace.”

“...reactions or feelings to a new technology may not be the same in everyone. It can be difficult for people are resistant to change to adapt to the new technology.”

Colleagues and organizational culture were also found out as significant factors affecting employee feelings:

“My colleagues’ past experiences and attitudes towards a new technology affect my initial emotional reactions to it. If I hear good stories about a similar technology and if my colleagues have positive feelings about a new technology established in the organization, I become more enthusiastic to learn and use it.”

“If an organization has a culture supporting novelty and innovation, organizational members become open to new ideas and tend to have positive attitudes towards a new technology established within the organization.”

Some employees emphasized the importance of involving stakeholders in the process of establishment of a new technology:

“If a technology is introduced by involving stakeholders in the establishment process, it will create positive feelings. However, a technology that comes directly from the top management without asking stakeholder opinion and comments will inevitably be met with resistance.”

"I have been receiving training for "Nettrack", the new planning program for which I attended the meetings for the last 3 days and which will soon be included in our operating system. When this training is completed, I will also provide training on the program to my teammates working in our unit. Being given responsibility made me proud and excited."

Besides the emotions towards a new technology, interviewees argued that the purpose and benefits of the new technology, its user convenience, efficiency, cost and benefits, and data security are the primary concerns about which they think when they first encounter a new technology at the workplace:

"I first think what differences it provides from the old technology, what positive benefits it will provide to our current way of doing business, how easy or difficult to use and apply it."

"It is important whether a new technology facilitates the job processes and to what purpose it serves. A new technology should both reduce the economic cost and have a facilitating effect in terms of labor force. Before applying the technology to the job routines, the necessary evaluations should be made and its suitability for both the nature of the job and the organization should be considered."

"... I first think to which purpose it was developed to serve and what benefits it will provide us. Then, I question whether the necessary precautions are taken in the application and usage process, particularly for data security issues."

Employees argued that their initial cognitive processes on a new technology are affected by individual technology knowledge and competence.

"As my technological capabilities and the level of technology knowledge increases, my concerns on technology differs."

Technology training provided by the organization was also expressed as an organizational motivator for learning, adapting, and using a new technology:

"In order to ensure faster adaptation to technology, training should be carried out beforehand. After completing the training, we can start using technology to test what we learnt."

Also, some managers drew attention to the importance of understanding the differences among perceptions of employees, managers, and other stakeholders towards a new technology and "aligning them on a common goal":

"I listen to everyone's opinions and suggestions in order to understand the discrepancies among the perceptions on a new technological development of different stakeholders, and to align them on a common goal. We exchange views on what benefits this technology provides to the operational processes, and whether it is used for its intended purpose in a proper manner."

"Developing the ability to act together towards the same common goal and making the entire organization participate in the establishment of the new technology are essential."

Finally, employees emphasized the significance of being given feedback related to their problems with using the new technology:

"...as we use it, we gain new experiences. Negative aspects should be identified as much as possible in advance. If previously undetected deficiencies occur while using technology, these should be reported to the technology producing teams immediately and the feedback should be provided by them."

"When we detect deficiencies or problems, the IT team's quick response will have a more positive effect on my adaptation process to technology."

5. Discussion

5.1. Theoretical Implications

This study contributes to the literature in several ways. First of all, it provides an insight for the notion of frame, in general, and TF, in particular, through a literature view. Secondly, through an exploratory qualitative study, including semi-structured interviews, it explains employees' affective and cognitive experiences with a new technology they meet for the first time at the workplace. It also addresses the individual and organizational factors affecting TF. According to the findings of the study, past experience, personality, and biases towards or against technology are the individual factors whereas organizational culture and colleagues' attitudes are the organizational factors affecting employee feelings towards a new technology. If employees have positive experiences with technology in the past and if they have positive biases towards technology, they tend to have positive feelings when they face a new technology at the workplace. On the other hand, if they have a personality that reluctant to change, initial reactions towards a

new technology would probably be negative. Additionally, as an organization has a culture that supports novelty and technology, employees also become more open-minded for new technologies and this facilitates their enthusiasm for learning and using of the new technologies. Colleagues' attitudes towards a new technology also affects an employee's feelings for a new technology. Another notable finding of this study is that as employees are involved in the establishment process of a new technology, by being asked for their suggestions and opinions or being given responsibility by their supervisors, their motivation to learn and use the new technology increases. On the other hand, cognitive processes of employees are affected by their technology knowledge and competence. The level of technology-related knowledge and competence affects initial thoughts and evaluations of employees towards a new technology. On the other hand, technology training and feedback on technology related issues, such as deficiencies and malfunction, provided by the organization, and understanding the differences among perceptions of employees, managers, and other stakeholders towards a new technology and "aligning on a common goal" are found as organizational factors making initial cognitive experiences positive and motivate employees to learn, adapt to, and use the new technology.

5.2. Managerial Implications

When a new technology emerges in an organization, managers should effectively explain to which purpose this technology serves, what benefits and contributions it will provide, and how it will facilitate job tasks and create efficiency to their subordinates. Managers should create a workplace atmosphere in which employees have a common attitude towards a new technology recently established within the organization, by understanding the perceptual differences on the new technology among different stakeholders (users, managers, technology developers, and other stakeholders) and aligning them on a common organizational goal. This stimulates employee motivation to learn and use the new technology. Also, they should ask opinions and suggestions of their subordinates about the new technology and give them responsibility in the establishment process. This causes employees to have positive feelings and attitudes towards the new technology, facilitating the adaptation to the new technology. Providing training and on-time feedback on technology-related issues is also essential.

5.3. Limitations and Future Research Suggestions

This research has some methodological restrictions. Our data sample only covers employees working in logistics and supply chain management area in a particular district of Turkey, İstanbul. This raises concern for the generalizability of the study findings. Another methodological limitation of this study is that semi-structured interviews were conducted with few employees. Future studies should conduct research, including more participants and covering larger contexts and the findings of this study should be extended addressing more factors constituting and affecting TF construct.

Additionally, the literature lacks of a valid and reliable measurement instrument for TF construct. General frame domains should be identified through more exploratory studies and, then specific scale items applicable to all organizations and sectors should be developed for quantitative analysis. The antecedents and consequences of TF concept should also be investigated.

6. Conclusion

This study provided a theoretical insight for both frame and TF concepts in management and organization studies and explored the factors affecting TF construct based on the data obtained from the semi-structured interviews conducted with employees in logistics and supply chain management area. This study brought a new perspective to TF concept based on social cognition, highlighting its emotional dimension.

This study revealed that TF of logistics and supply chain management employees are affected by individual factors including past experience with technology, biases towards or against technology, personality, and technology knowledge and competence. On the other hand, organizational factors affecting their TF consist of organizational culture, colleagues' attitudes towards a new technology, making stakeholders participate in the process of establishment, understanding the differences between employees, managers, and other stakeholders and aligning them on a common goal, and providing training and on-time feedback to technology-related problems.

TF literature is still in need for further empirical evidence on both logistics and supply chain management and other sectors. Researchers should extend the findings of this study in line with the abovementioned future research suggestions.

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