

Modelling Research into Cross- functional Team Effectiveness

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Abstract: In this paper we review cross-functional team effectiveness in the management literature and build an initial research model to be tested on the next phase of our project. We examined management research and theory relevant to cross-functional teams' effectiveness and discovered that the existing frameworks to study this phenomenon are too general. Consequently our understandings of cross-functional team processes are incomplete and the research outcomes are inconsistent. To develop a better understanding of cross-functional teams, we updated the framework by introducing the concept of the functional wall. The functional wall surrounds team members and hinders cross-functional teamwork. Through communication and reciprocal understanding team members can overcome the functional wall and improve a teams' outcome.

Key words: *Cross- functional teams, teamwork, research methods, effectiveness framework*

1. Introduction

Designers, business managers and technologists are working together in cross-functional teams to develop new products and services, and to achieve operational effectiveness [10]. Organizations such as Boeing, Coca-Cola, DuPont, Ford, Hewlett-Packard, Federal-Mogul, Siemens and Xerox are only a small sample of companies employing cross- functional teams [1]. That being said, it is argued that research into cross-functional team effectiveness still lacks tools and methods which would be able to effectively describe, examine and explore the issues at hand. Functional team diversity is a complex theme to study, and research to date has provided only weak and/or inconsistent evidence, with mixed conclusions [24]. While e.g. Bunderson and Sutcliffe [5] brought a better understanding to the subject by conceptualization functional diversity, there appears to exist no clear model that incorporates the potential limitations and benefits of designers and managers working together. This paper addresses this gap in knowledge. It has two main parts and objectives. First, it examines cross-functional team effectiveness in the management literature. Secondly, we develop an initial research model to be tested on the next phase of our project. Recent management research articles on cross-functional teams were reviewed to determine the methods used to study these teams, with the aim of developing an understanding that can serve as the base for research of cross-functional team effectiveness.

This research includes all cross-functional teams (e.g. management teams, project teams), in which team members are from more than one discipline. In this paper we do not differ in terms of cross-functional, inter- and multidisciplinary teams, as we argue that the proposed framework is indifferent to this distinction.

2. Literature overview on cross-functional teams

A review of recent management literature demonstrates a broad and diverse spectrum of writings in cross-functional team effectiveness, with no common focus. Researchers are using different frameworks (e.g. input-process-outcome framework, input-mediator-outcome framework), different methodologies (e.g. experiments, surveys) and focusing on various factors, such as inputs (e.g. contextual- level influence studies), processes (e.g. empowerment) and outcomes (e.g. quality of service provided). As a result the existing knowledge of cross-functional teams is incommensurable and splintered, failing to achieve the consistence needed from a cohesive body of knowledge. In the functional diverse team literature, we can find, on the one hand, that diverse teams can be more innovative [3], can develop more precise strategies [2], and have advantages over functional homogenous teams in introducing some organizational changes [37]. The positive effect of diverse teams is based upon the theoretical perspective of information processing [22]. Information processing states that diversity in teams will increase the range of perspectives and enhance opportunities for knowledge sharing, and thus improve the outcome in terms of quality and creativity [22]. On the other hand research shows that functional diversity also broaden opinion and perspective within the team, which can lead to increased conflict [27], slower competitive response [16] and lower performance [28]. These research studies are often based upon the similarity-attraction paradigm and/or self- and social categorization. Similarity-attraction paradigm and self- and social categorization argue that individuals are more attracted towards other individuals with similar traits, and hence experience less cohesion and social integration in functional diverse teams [22]. All in all, we can assert that performance outcomes in diverse teams are inconsistent.

2.1 From input-process-outcome to input-mediator-outcome framework

McGrath [25] presented the Input-Process-Outcome (IPO) framework. Inputs explain individual, team and organisational factors that allow and restrict members’ interactions. These factors, which steer team processes, consist of individual team members’ characteristics (e.g. competencies, traits), team-level factors (e.g. task structure, team size), organizational and contextual factors (e.g. environmental complexity). Team processes describe how team members’ interact and work together to achieve the assigned task. Outcomes include performance (e.g. quality) and team member’s affective reactions (e.g. satisfaction) [24].

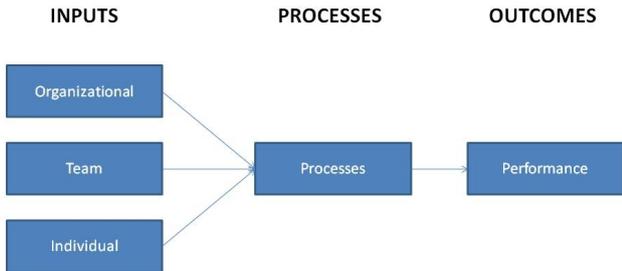


Figure.1 Input-Process-Outcome (IPO) framework [McGrath presented by 24]

Although this model has been shown to be of value, it has received criticism for not including time as a factor or to distinguish among multiple types of processes and outcomes [e.g. 7,18,23,24]. This critiques led to the development of input-mediator-outcome (IMO) framework (figure.2) advanced by Ilgen at al. [18].

The IMO framework addresses the multilevel nature of teams. Individual members are imbedded in teams, which are imbedded in the organization [21]. All three input factors are presumed to be influencing each other, while the outer layers affect the inner layers more than the opposite [24]. The team level inputs effect mediators and outcomes. One variable within the team level input, which received considerable attention in research [24], is interdependence (or interaction) and explains how “team members cooperate and work interactively to complete tasks” [31: 137]. According to Wageman [33] the team members’ skills and abilities, as well as the need to share resources within the team, thrive the team member’s level of interdependence. High interdependence takes place when team members work cooperatively and depend on each other’s resources [31].

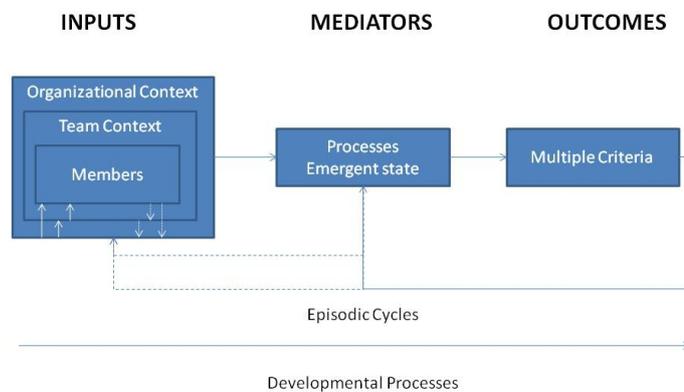


Figure.2 Input-Mediator-Outcome (IMO) framework [24]

Marks et al. [23] introduce mediators to the IMO framework. Mediators are divided into the emergent state (e.g. collective efficacy, potency) and process (team members’ action), to demonstrate the importance of other factors than just processes. Emergent states influence team processes, which then again can alter the emergent state [23]. Traditionally team processes have been separated into taskwork and teamwork [26]. Taskwork explained the function a team member must perform and teamwork explained the interaction within the team [26]. Marks et al. [23] taxonomy of team processes is a more modern approach, dividing processes into (a) transition phase process, (b) action phase process, and (c) interpersonal processes. In the transition phase, teams focus mainly on evaluation and planning of activities to accomplish their task (e.g. goal specification). The action phase process describes the actual activities leading to the task accomplishment (e.g. coordination). Interpersonal processes explain the teams’ management of such things as conflict and motivation. Those three processes occur within episodes, rather than over the entire life cycle. One of the key construct of team outcomes is build by Cohen and Bailey [7], who divide team effectiveness into three categories: (a) performance, (b) attitudes, and (c) behavior. Mathieu [24] on the other hand split team performances in (1) organizational-level performance, (2) team performance behaviors and outcomes, and (3) role-based performance. The focus of organizational-level performance is on top management teams (TMTs), because of the close relation between performance of TMTs and organizational performance. Team performance behaviors are actions to accomplish the goals [24]. Role-based performance analyzes the degree to which team members have the necessary skills and competences to

perform their tasks [35]. The IMO framework incorporates time as a crucial factor. According to Mathieu et al. [24] the two most common ways to include time are (a) the development method and (b) the episodic method. The development models exemplify how teams change over time and that they are different influenced by different factors over time [24]. On the other hand, the episodic model illustrate that teams have to work on different processes during the teams life span. This depends on the task demand, which can recur [cf. 23, 25].

2.2 The concept of the functional wall

The IMO team effectiveness model, while established, is yet insufficient to study cross-functional teams, as its general expression is problematic and it does not take explicitly into account factors such as the functional background of the team member. The issue emerges from the observation that team members from such disciplines like engineering, design or business think, act and behave differently. Those differences effectively create a functional wall¹ that surrounds individuals and hinders interaction among team members. The thought of the functional wall builds on the dominant function conception [5]. According to Bunderson and Sutcliffe [5] the dominant function of team members is the function in which they have worked most of their career. The conception is based on the assumption that every team member has a certain functional perspective that is acquired through work experience [5] and/or education. The extent to which the dominant functions of team members are balanced or broaden within a team is one of the factors determining the effects of the functional wall in cross-functional teams.

2.3 The principle of jointness

To overcome the functional wall, team members must integrate and synchronize strategies and activities to achieve the objections of the team [12]. Douglas and Strutton [12] developed a “jointness” principle, transferring it from the military context to general organization; this paper applies it to cross-functional teams. The principle of jointness introduces: (a) functional competences, (b) reciprocal understanding, (c) cross-functional communication, and (d) trust, together with behavioral norms and organizational capabilities, as factors to overcome the functional wall. Effective cross-functional teams must consist of functionally competent team members, able to successful achieve their taskwork. If functional competence is missing, reciprocal understanding, cross-functional communication, and trust are unlikely to emerge [12]. Reciprocal understanding occurs when team member know each other’s skills (strength and weaknesses), goals and concerns, as well as team members’ dominant functional knowledge and their usefulness for the team [12]. Cross-functional communication denotes the “interoperability” [12:256]. To operate successfully in a cross-functional environment team members must know how to communicate timely and effective with each other [6] and operate together. Cross-functional communication and reciprocal understanding can be acquired through education, training, or cross-functional team experience [12]. Trust builds upon reciprocal knowledge. While its presence does not guarantee success, its absence increases the probability of failure [6]. When functional competence exists, reciprocal understanding occurs and communication is enabled, trust can be build and the team will be effective. With the absence of any of the four factors team will fail [12].

¹ Functional wall is a working term developed for this paper.

3. Modelling for cross-functional team effectiveness research

Figure.3 builds upon the jointness principle and illustrates the effects of cross-functional communication and reciprocal understanding on the functional wall surrounding team members. The matrix does not include functional competence or trust as variables. Functional competence is a constant and integrated in the abilities and skills of a team member. We assume that cross-functional teams are, important and therefore cross-functional teams are staffed with skilled and competent employees. Trust on the other hand builds upon cross-functional communication, reciprocal understanding and functional competence. Consequently, higher cross-functional communication and reciprocal understanding within the teams will generate higher trust.

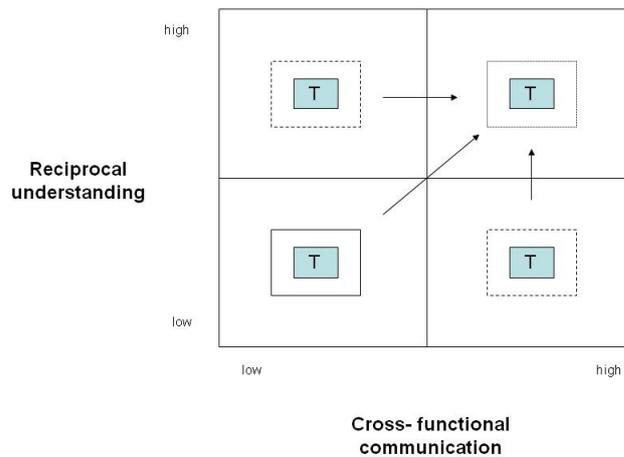


Figure.3 Cross-functional communication, reciprocal understanding and the functional wall

The T describes team member's skills, abilities, and functional competence, and is surrounded by the functional wall (shown by a square). When cross-functional communication and reciprocal understanding are low, team members' functional wall is solid and makes it for those team members impossible neither to accept other ideas nor to communicate effectively with other team members. Team members with high/low or low/high cross-functional communication and reciprocal understanding have a more open functional wall (shown by a dashed square), desirable in cross-functional teams. Although cross-functional communication (or reciprocal understanding) can pass through the functional wall, it is not a sufficient condition for cross-functional teams to be successful. If, for example, cross-functional communication is low and reciprocal understanding is high, the team member is able to understand the other team members, but unable to incorporate this knowledge within the cross-functional communication. Consequently, the cross-functional team cannot reach its full performance. Cross-functional teamwork requires high interdependence and therefore team members with high reciprocal understanding and cross-functional communication will perform best in this environment. Their functional wall (shown by a dotted square) is open for other team members' functional perspective and allows timely and effective communication.

Figure.4 illustrates the integration of the functional wall in to an updated IMO model, named cross-functional team effectiveness framework with a focus on the potential change of the functional wall through the different phases.

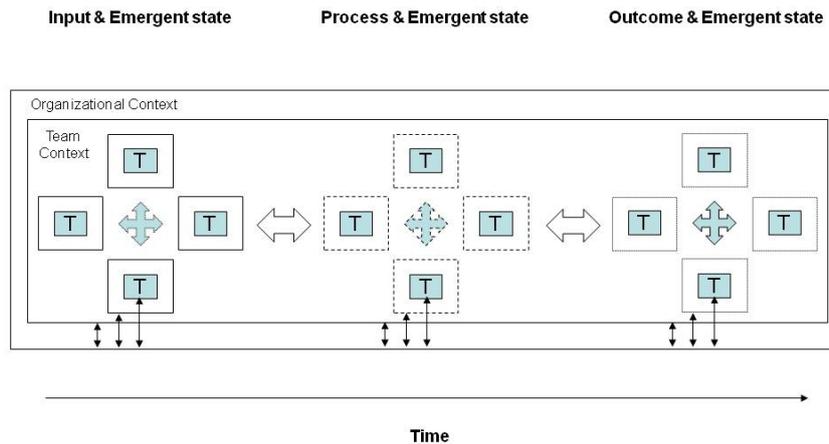


Figure.4 Cross-functional team effectiveness framework

It incorporates the emergent state construct in each phase of the framework, because the emergent state is dynamic in nature. The outer layer illustrates the organization, in which the team and team members with their functional wall are imbedded. Similar to the IMO model [24], all layers influence each other, whereby the outer layers affect the inner layers more than opposite. Organizational context describes such factors as environmental complexity, and team context explains factors such as task structure [24]. The functional competences, personalities, skills and abilities are imbedded in the team member, who is surrounded by the functional wall, defined by cross-functional communication and reciprocal understanding. By showing the different levels of the functional wall, the framework does not try to predict the changes in the functional wall; it merely tries to show that the functional wall exists and is able to change over time. The quad arrow illustrates interpersonal processes (conflict management, motivating/confidence building and affect management) established by Marks et al. [23] and describes “processes teams use to manage interpersonal relationships” [23:368]. The effective management of interpersonal processes depends on the functional wall: Only if cross-functional communication and reciprocal understanding are high, can interpersonal processes be managed effectively. The framework indicates strong interpersonal processes by a solid quad arrow and very weak interpersonal processes are shown by a dotted quad arrow. Time is included as a development factor, illustrating that the team can change over time. The two left-right arrows between the two processes and the outcome show that a team can not only advance in their task, but also come back to a previous stage. A Forming phase is incorporated into the Input stage, which is crucial to the outcome and describes the team shaping. It incorporates the transition phase processes (mission analysis, goal specification, strategy formulation and planning) [23] and the team creation (e.g. introduction). Cross-functional communication and reciprocal understanding will affect the interpretation and evaluation of the team’s mission and hence, complicate the prioritization of goals and the development of the strategy. The process describes tasks, which teams perform to the achievements of goals [23]. The processes of monitoring progress toward goals, system monitoring, team monitoring and backup behavior and coordination occur during this phase [23]. Similar to the forming phase the functional wall has major effects on the team’s outcome. For example, De Dreu and West [11] showed in their study the significance of team member’s participation. Participation depends very much on the level of cross-functional communication and reciprocal understanding. The outcome of the teamwork will have effect on the team member’s future teamwork. The team members learn from their experience, and positive as well as negative experience will influence their functional wall.

4. How to implement the framework in future research

Having demonstrated a conceptualization, we now examine the possible implementation methods of the proposed research. We argue that the cross-functional team effectiveness framework helps us to study multidisciplinary teams. It provides us with a tool to analyze the complex processes and environment by incorporating the functional wall into the team effectiveness framework. Through the idea of the functional wall, we can analyze the nature and effects of cross-functional communication and reciprocal understanding. Furthermore, by utilizing the cross-functional team effectiveness framework we will understand the development stages of the functional wall.

Although the research questions normally drive the research method [32], we propose that a mixed methods approach is pertinent to analyze cross-functional team effectiveness. Tashakkori and Teddlie [32:286] defined mixed method as “research in which the investigator collects and analyzes data, integrates the findings, and draws inferences using both qualitative and quantitative approaches and methods in a single study or a program of inquiry.” In the literature we can find other terms, such as: integrative, combined, blended, multimethod and multistrategy [32]. It is argued that no single research method can cover the complexity involved in this research; thus a mix of experiments, questionnaires and interviews are proposed, which will provide us with a much better understanding of the phenomena. By using an experimental design, a researcher is able to manipulate the input factors (e.g. sex, age of team members), and observe the performance outcomes, as well as examine the changes in communication. The method allows us to compare homogenous teams with functionally diverse teams. Possible hypothesis include the notion that functionally diverse teams attain a superior level of output solely if team members have high level of cross-functional communication and high reciprocal understanding. We argue that research into cross-functional teams should include quantitative methods in addition to qualitative approaches. Probability sampling will allow a greater breath of information, while purposive sampling will allow for greater depth of knowledge [32]. The mixed method allows us to combine both forms of sampling and hence can provide us with a breath and deep understanding of cross-functional team effectiveness. There are two data collection strategies within the mixed methodology [32]: (1) within-strategy mixed data collection (one data collection strategy – e.g. interviews) and (2) between-strategy mixed data collection (more than one data collection strategy – e.g. interviews and questionnaires). The rich narrative data set collected can be analyzed using qualitative thematic data analysis techniques, the numerical data can be analyzed using statistically approaches; in addition the mixed method allows us to covert the data from narrative to numerical (or numerical to narrative) to reanalyze the data [32].

5. Conclusion

This paper has examined the question of how to study cross-functional team effectiveness. Through the literature review it was observed that the input-mediator-outcome framework [25] is a good base, but lacks the central notion of a functional wall. The paper proceeded to propose an updated cross-functional team effectiveness model, which takes into account the functional wall. A mixed methodology approach to analyze cross-functional teams was proposed, as no single research method is able to cover the complexity involved in this research area; these include the use of experiments, questionnaires and interviews.

In terms of the relevance of the research, we note that organizations are increasingly using functionally diverse teams in an international setting, and an enhanced understanding of how to utilize them more effectively is important for future success. This also means that academia has to understand how functional diverse teams work, in order to teach these skills and knowledge to students. This paper contributes to the design research by re-contextualizing knowledge from the management field. More importantly, the developed model will help to structure and direct future research in cross-functional team effectiveness in the field of design.

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