An Overview on the Team Interaction Process

Yan Wang
School of Management, Shanghai University, Shanghai, China
Email: hebetien@shu.edu.cn

Abstract
Team interaction process contains three stages: input, process and output. The effectiveness of team interaction is the decisive factor of team competition. Nowadays, many scholars study on team interaction process based on a particular view, but few scholars put up with an overview on the whole team interaction process research results. Based on the predecessors’ researches and centered on the team interaction process, this paper outlines the three stages and its elements, the influence to team performance and measurements of team interaction. This paper also puts forward some prospects finally.

Keywords
Team, Team Interaction Process, Input, Output

1. Introduction
McGrath proposed the concept of team interaction process in 1964. He believed that the team interaction process is a process of interacting between different personal traits, which includes communication and conflict (McGrath, 1964) [1]. Cohen and Bailey (1997) [2] also suggested that the team interaction process is an interaction between team members and external environment, including communication and conflict. In general, scholars think that effective team interaction can improve the efficiency of team operations and reduce the negative effects of competition and conflict on team effectiveness. McGrath (1964) [1] constructed the I-P-O (Input-Process-Output) model of team interaction process integration, which laid a good foundation for the subsequent researches.

McGrath (1964) [1] used the theoretical framework of the I-P-O model to explore the influencing factors of the team’s interaction process. McGrath pointed out that different factors in the input process (e.g. individual factors, environmental factors) affect the team interaction process directly, and then influence the team performance through the team interaction process. He also pointed out
that although the team interaction in the I-P-O process affects the team performance, team performance also has a feedback impact on team interaction.

Many scholars rely on McGrath’s research to construct a theoretical model that has a great influence on the team interaction process. With the gradual deepening of research, the theory of team interaction process becomes richer, but scholars still have differences on the process of team interaction. For example, different scholars have different ideas about the role of the board of directors in management, and they divide into positive and negative schools. In addition, currently most scholars’ research on team interaction process is based on a specific interactive process. Few have comprehensively overviewed on the research results related to team interaction process all over the world. Therefore, based on the relevant research results around the world, this paper will focus on the team interaction process and comb the theory of team interaction process, impact on performance and measurements, in order to clarify the current status, problems and research trends of team interaction process.

2. The Theory of Team Interaction Process

Team interaction process mainly includes three stages: input, process and output. The process stage mainly includes four elements: communication, conflict, trust and learning. These four elements interact with each other and finally form the process stage.

2.1. The Origin of Team Interaction Process Theory

As social competition intensifies, the team becomes a fundamental unit of the enterprises. It has also become a hot topic in academic research. A team is a formal group of individuals who work together to achieve a goal. It makes rational use of the knowledge and skills of each member to work together to solve problems and achieve common goals. Robbins (1994) [3] believed that all teams are groups, but only formal groups can become work teams.

Marschak first founded the team theory in 1955. He believed that the team is a group of people who make different decisions, but accept the joint results produced by the joint decision. The theory initially points out that the team’s success depends not only on the joint decision between team members, but also on the uncontrollable factors outside. If each member knows the external information, then their decision will be better. However, the cost (information fee) is too large. In fact, each member does not need to know all the information about the team. Therefore, the question raised by team theory is: how to find the best information system and decision rules in order to maximize the team’s expectations? His theory does not indicate how team members interact to produce joint decision-making.

Later, based on it, scholars developed a theory of team interaction process, focusing on the impact of team interaction on team performance. It holds that the effectiveness of interaction among team members is the key to team perfor-
mance. The more effective team interactions happen, the higher team’s performance will be. Team interaction is different from general interpersonal interaction, and it involves more behaviors among team members in order to achieve common goals. Therefore, paying attention to the team interaction process, we can’t simply analyze from the team division of labor, but should pay more attention to the communication, friction, conflict, trust and learning in the interaction process. We not only should focus on the generation and results of team interaction, but also should concern about how the team interaction produces these results.

2.2. The Basic Stage of the Team Interaction Process

2.2.1. Input Stage and Its Influencing Factors
As the first stage of the team interaction process, the input factors of the input stage have the following four aspects generally: individual factors, team factors, environmental factors, and target factors. Individual factors included team members’ skills, attitudes, and personality traits (McGrath, 1964) [1]. Then scholars added team members’ knowledge to it, while Rosen et al. (2011) [4] refined knowledge into task knowledge, team knowledge, and mental model. McGrath (1964) [1] and Gladstein (1984) [5] all put team cohesion and the number of team members into the team factors. Especially, Jewell took team roles, team behavioral norms, and team maturity into consideration, and regards them as input factors. Environmental factors include not only internal factors (e.g. the nature of tasks, reward mechanisms), but also external factors (e.g. external environmental pressures, external resources). The target factor depends largely on leadership. Good leaders will set appropriate goals according to the actual situation. Research shows that the team’s goals are highly correlated with team performance. The clarity and challenge of the target can lead to high team performance within a certain range.

2.2.2. Process Stage and Its Components
As the main stage of team interaction, the process stage has always been the focus of scholars’ attention and discussion. Some scholars divide it into task dimension and interpersonal dimension. Some scholars divide it into trust, conflict, communication, support, learning and cohesion. Some also divide it into arguments, conflicts, trust and humor. In general, the components of the team interaction process can be summarized as the following four aspects: team communication, team conflict, team trust, and team learning.

Team communication is the basis of team operation. Team communication is the basic way to achieve “docking” and “interconnection” on the psychological level among team members. The quality of communication is positively related to the efficiency of team interaction. Liu et al. (2008) [6] also pointed out that when the quality of team communication is improved, the interaction among team members will be enhanced, which will improve team effectiveness. High-efficiency and high-quality information exchange requires team members
communicate around the topic closely, engage in exploratory dialogue, and have more teamwork than personal plots.

Team conflict refers to the disagreement or tension that occurs because of the existence or perception of the difference. Lehmann-Willenbrock and Chiu (2018) [7] pointed out that conflicts and disagreements are indispensable components of teamwork. According to the nature of conflicts, Jehn (1995) [8] divided conflicts into relationship conflicts and task conflicts. Liu and Zhao (2012) [9] found that the relationship conflict will greatly reduce team harmony and productivity, on the contrary, the task conflict has a positive impact on the team’s operation. However, when they occur together, the wrong attribution of conflicts may turn the task conflicts into relationship conflicts, thus also adversely affect team interaction. Fortunately studies have shown that team trust can effectively reduce this transformation (Wu et al., 2017) [10].

Team trust refers to the mutual trust among team members, and it is the subjective feelings of team members whom work towards the common goals. Wang and Yang (2012) [11] pointed out that the stronger mutual trust among team members, the higher the frequency and quality of communication. Thus the strategic goals of the team are easier to achieve. Team trust has a constructive impact on team interaction and team management. In order to form a good team trust atmosphere, team leadership, member quality, communication and cooperation must be developed and coordinated.

Team learning is actually a kind of knowledge sharing behavior, and knowledge sharing is a self-interested behavior. It is the responsibility of the team to share knowledge. The existence of team learning has its own undeniable advantages. Xing and Yao (2004) [12] showed that team learning is faster, broader and deeper than individual learning. Positivity in team interaction is good for team learning and performance (Patrícia et al., 2017; Lehmann-Willenbrock et al., 2017) [13] [14]. However, there is no denying that there is a certain “knowledge protection barrier” in team learning. In order to maintain their own advantages, there will be reservations when people learning from each other. Team trust and team goal consistency can effectively solve this problem (Zhao and Chen, 2010) [15].

2.2.3. Output Stage and Its Outcomes
The outcomes of the output stage are mainly reflected in the team level and individual level. The team level mainly includes the improvement of team quality, the enhancement of cohesiveness, the rapid resolution of problems, the reduction of errors, and the improvement of satisfaction. The individual level includes the growth of members, the satisfaction of needs and the improvement of their abilities. These outcomes are summarized as performance outcomes, and these performance outcomes are mainly reflected in the team innovation performance.

Zhang and Zhang (2012) [16] showed that team trust, teamwork, team cohesion, and task interaction were significantly related to team innovation performance, among which team cohesion was the most relevant one. Wang and Zhou
also believed that the process of innovation cannot be separated from the communication and communication among members. The process of team interaction is beneficial to the generation, discussion and implementation of new ideas. The paper also believes that the establishment of behavioral norms is conducive to team innovation. Members participate in team interaction and they are unconsciously influenced by the norms. These all ultimately enable them to show more team innovation behaviors.

The feedback of the team interaction process has gradually attracted the attention of scholars. Scholars construct the team interaction process into a closed loop, emphasizing the high-quality team performance have a great effect on the team initial resource subsequently. Rosen et al. (2011) [4] also focused on the feedback of good performance outcomes on input factors, which made team interaction more flexible and adaptable.

2.3. Phased Summary of Section 2

This paper analyzes the three major stages and four factors of the team interaction process. The input stage includes four factors: individual, team, environment and goal. The process stage consists of team communication, team conflict, team trust and team learning. The output stage is mainly reflected in the performance outcomes, especially the innovation performance. However, it is not difficult to find out that most of the influencing factors in the input stage neglect the transformation of the external environment. There are fewer discussions about the impact on team performance in team competition and collaboration. It can be seen that research in these areas should be strengthened for further improvement.

3. The Impact of the Team Interaction Process on Performance

Based on the basic theory of team interaction process, combined with the recent theoretical research on team interaction process, we can find out that scholars put much attention to the impact of team interaction on performance. This paper divides performance outcomes into two aspects: team and individual level.

3.1. Performance Outcomes at the Team Level

3.1.1. Management Team Interaction and Team Performance

The effect of management on team performance is mainly reflected in the mutual complementation and mutual promotion of knowledge, experience and cognition among different manager. Hambrick and Mason (1984) [18] proposed the Top Echelon Theory. It said that it is impossible for managers to fully understand all things, so it is necessary for directors and senior executives to interact. The good communication among the senior executives is conducive to improving the quality of the company’s decision-making. Thus it is good for the improvement of team performance. Xiong et al. (2016) [19] also proved the
smooth exchange of information among the senior executives can help people to solve problems, and thus improve the team performance. Lehmann-Willenbrock et al. (2015) [20] thought that transformational leadership is generally considered helpful for team functioning and performance.

### 3.1.2. Team Trust and Team Performance

Team trust has a significant impact on team interaction. The stronger the trust among team members, the higher the frequency and quality of members’ communication will be. Thus, the strategic goals of team are easier to achieve. Song (2014) [21] found that team trust has a significant positive impact on teamwork behavior, innovation behavior and conflict behavior. Han and Fu (2008) [22] believed that team trust would reduce the management cost of team affairs and enhance the spontaneous social behaviors of team members, thus indirectly affecting team performance. Staples and Webster (2008) [23] pointed out that team trust plays a positive role in team knowledge sharing, which makes it easier to achieve team innovation and team performance.

### 3.1.3. Team Interaction Atmosphere and Team Performance

The team interaction atmosphere is gradually formed in the constant communication and interaction among team members. The good team interaction atmosphere is created by the team members together, which will have an important impact on the team cohesion and performance improvement. This paper will discuss it from the point of team emotion atmosphere and team innovation atmosphere.

Team emotion atmosphere refers to the common perception among team members’ emotions. This common perception creates a team atmosphere that represents the overall characteristics of the team and has a significant impact on the team members. Qu (2007) [24] showed that team emotional atmosphere can indirectly affect team performance by affecting the feelings of individual members. Liu and Liu (2012) [25] agreed with this view that the interactions among team members would stimulate emotional reactions, which would affect their job satisfaction and job performance. Finally it can make a difference in team performance.

The team innovation atmosphere refers to the environmental factors related to innovation inside and outside the team, including related policies and events. Gilson and Shalley (2004) [26] found that the supporting atmosphere team members percept was significantly positive to team members’ innovative behavior. Studies also show that the team innovation atmosphere has a positive impact on team innovation performance (Sui et al., 2012) [27].

### 3.1.4. Team Cohesion and Team Performance

The impact of team cohesion on team performance is primarily achieved through team trust and team goal consistency. Studies pointed out the trust between team members, which can greatly reduce the uncertainty among team members, increase the sense of psychological commitment, improve the team
effectiveness, and then enhance the team performance. Zhao and Chen (2010) [15] pointed out that team goal consistency will be like an invisible specification, guiding team members to fight for common goals, and also enhance team cohesion in the interaction process. Thus, performance will also be improved. And study shows that team resilience, as a dynamic and multilevel phenomenon, is good to help the team recover from setbacks, enhances the team’s adaptability. Team members experience hardships and ultimately promote team cohesion (Gucciardi et al., 2018) [28].

3.2. Performance Outcomes at the Individual Level

By literature reviewing, the paper concludes that the performance outcomes at the individual level include the improvement of members’ ability and the satisfaction of member needs. The improvement of members’ ability is reflected in the improvement of members’ business ability and innovation ability. The satisfaction of member needs is reflected in both mental and physical level.

With regard to business ability, we can easily draw a conclusion that when teams encounter tasks and dilemmas, team members can always learn from the team interactions, and the relevant business capabilities will be improved to some extent. These experiences will have a good reference when they encounter the same or similar situations. As for the innovation ability, Wang and Zhou (2012) [17] pointed out that the team interaction process has a significant positive impact on the individual members’ innovation behavior and innovation ability. The better the team interact, the more the thoughts collide. It is very likely that innovation behaviors will happen.

The satisfaction of team members’ needs is mainly manifested in mental and physical level. As analyzed above, good team interaction will produce good team performance, and good team performance will give team members a strong sense of honor and pride in the team. This is the mental level of satisfaction. Similarly, good team performance will bring team higher income. Therefore, team members will be greatly satisfied in both salary improvement and post promotion.

3.3. Phased Summary of Section 3

The impact of team interaction process on performance is mainly reflected in the two levels: team and individual. The team level mainly includes the improvement of team innovation performance and team cohesion. On the individual level, it mainly includes the improvement of team members’ ability and the satisfaction of team members’ needs. However, through combing, we found that attention to the satisfaction of the needs of members on the individual level is not that rich. This requires further efforts.

4. Measurement of Team Interaction Process

After the end of the team interaction process, the measurement of the overall
team interaction is particularly important. It not only clarifies the effectiveness of the task team in achieving the team goal, but also summarizes the experience and lessons of team interaction in the previous stage. These experience and lessons can provide a good reference for the next stage of new team interaction.

Most western scholars pay great attention to the measurement of team interaction process. Famous scholar developed a scale for measuring the key behavioral factors of team interaction process. They found that team communication, team coordination and team adaptability are the key factors determining the efficiency of the team. Helmreich (1984) [29] developed a scale to measure crew attitudes. Later, he and his colleagues established 40 “behavioral markers”. These behaviors can be divided into three aspects: team formation and management, communication process and decision making, and situational awareness and workload management. Brannick et al. (1993) [30] developed a team process scale using contextual simulations. The scale consisted of five dimensions, including acceptance of advice, advice, collaboration, coordination, and teamwork. This scale measures the mutual trust, coordination and other factors involved in team interaction.

Chinese scholars are not far behind. Based on the previous research, Liu and Zhang (2005) [31] initially constructed a scale of team interaction with high efficiency and reliability. The main purpose of it is to understand and clarify the interaction process among team members and their relationship to team performance in completing a specific task. They two came up with several factors that affect the effectiveness of the team members. On this basis, they summarized and compiled 16 related questions about the team interaction process. Finally, they concluded that the team with better team performance is a team with clear team goals, mutual trust and mutual respect among team members. In other words, a team with better performance is better than a bad one in both the interpersonal dimension and the structural dimension. Scholars have divided the team interaction process into task completion and interpersonal maintenance. Chen and Zhao (2011) [32] believed that there are two other dimensions in the study of team interaction process: fact and emotion orientation. Then they divided the team interaction style into four types based on two dimensions.

5. Summary

With the gradual deepening of research on the team interaction process, scholars pay more attention to the impact of team interaction process on team performance. The three major stages of team interaction and the four major factors of process stage are also increasingly enriched. The theory of team interaction process is gradually improved. However, it is undeniable that there are still some details about team interaction that need our attention. Firstly, the influencing factors of the input stage are not sufficiently deep. The change of the external environment of the team is enough concerned. Secondly, in the process stage, most scholars have paid attention to team communication, conflict, learning,
trust, etc., but there is less discussion and research on the impact of team competition and cooperation on team performance. Finally, in the performance outcomes of the output stage, many scholars pay much attention to innovation performance at the group and individual levels, but few focus on the “non-innovative” performance outcomes.

These aspects are obviously not conducive to the improvement and development of the team interaction process theory. It can be seen that there is still a long way to go in the future development. Multi-perspective and in-depth research methods will be the main way to study the team interaction process in the future. In addition, researches need to be rooted in the real team culture context. It also should take specific team characteristic, the real development environment and the life cycle stage of the team into account. Xu and Zhao (2013) [33] also said that attention of external environment and border management activities will be a major direction for future research in this field. Only in this way, can the research results be of more theoretical significance and practical significance.

Returning to our daily life, although there are more and more studies on team interaction, the process of real team interaction is not as effective as the theoretical model studied by scholars. How to establish a theoretical model and measurement tool with universal applicability is the real meaning of the team interaction process study. This is a problem that scholars cannot avoid. It needs our further attention and effort in the future.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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