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From Planning to Performance: The Adaptation Process as a Determinant of Outcomes

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Abstract

Currently, teams require adaptation to deal with work demands successfully. However, research concerning team adaptation should necessarily involve a greater empirical effort in defining under which conditions teams prove more adaptable. This article seeks to contribute to the literature by linking plan formulation, plan execution, and team learning behaviors with team outcomes (i.e., team-adaptation perception and objective performance). Participants formed 142 teams, which were involved in structured-problem solving task (i.e. a simulated management competition). Conditional process analysis was used to test a double-mediated relationship. Results show that, although not all parts of the model are directly associated, there is an indirect link from plan formulation to team outcomes through plan execution and team learning behaviors. Our results support the idea of adaptation as a process, providing four ways in which organizations can elicit changes in teams: increasing plan execution, promoting team learning, improving team adaptive behaviors themselves, and building teams composed of members who demonstrate individual adaptability.

Keywords

team adaptation, team performance, team learning, plan formulation, plan execution

Currently, the ability to adapt is crucial in the face of rapidly changing conditions of the work environment (Burke, Stagl, Salas, Pierce, & Kendall, 2006; Ramos-Villagrasa,

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Navarro, & García-Izquierdo, 2012). Within this changing context, teams must operate in response to sudden changes in the demands of the workplace, for instance, dealing with workload fluctuations (Porter, Webb, & Gogus, 2010) or facing novel situations (Marks, Zaccaro, & Mathieu, 2000). All these authors place the focus on the study of adaptation.

Adaptation has been present in team literature over the years, but only recently has empirical research been undertaken (Maynard, Kennedy, & Sommer, 2015). One approach that still needs more development is the analysis of adaptation as a process (Baard, Rench, & Kozlowski, 2014). In the present research, we follow the model proposed by Burke et al. (2006). This model, which has been well-received by team researchers, describes adaption as a sequence of stages. These stages look familiar to any observer of organizational behavior (e.g., planning, error analysis), but surprisingly, there is not much empirical evidence about their role as part of the adaptive process. Consequently, the present study aims to (1) provide empirical support for the conceptualization of adaptation as a process and (2) show the impact of the adaptation process in two different outcomes: team perception of adaptation, and objective performance.

Team Adaptation Framework

After years of research, team adaptation remains a fuzzy construct that can be defined as an ability, a process, or an outcome (Maynard et al., 2015). Following the theoretical integration of Baard et al. (2014), the phenomenon of adaptation can be analyzed from two different perspectives: as domain general (i.e., generalized to several situations) or as domain specific (i.e., applied to certain situations). From the domain general perspective, adaptation can be seen as a *performance construct* (a set of behaviors that enable adaptation) or as a construct focused on *individual differences* (a set of characteristics that makes some individuals or teams more adaptable to novel situations), whereas from the domain specific perspective, adaptation can be seen as *performance change* (adaptation occurs as a consequence of changes in the inputs) or as an *adaptation process* (adaptation is an iterative cycle linked to performance outcomes). In the present article, we follow this latter approach.

As a process, team adaptation is a recursive cycle that functionally changes the current cognitive or behavioral goal, directed by a team's action (Burke et al., 2006) to meet organizational objectives (Chen, Thomas, & Wallace, 2005). It can be defined as an emergent phenomenon (Kozlowski, Chao, Chang, & Fernandez, 2016) where team members change their behavior to cope with the demands of the environment, for example, focusing on a specific task whose relevance suddenly increases due to changes in the deadline. Changes in team behavior in accordance with demands are also analyzed by group development theories (e.g., Gersick, 1988). These theories deal with evolution when a team is aware of itself, which, in turn, leads to changes in team behavior (Bushe & Coetzer, 2007). On the other hand, the adaptation framework describes what happens when teams face unexpected behaviors, regardless of their development stage. Thus, both viewpoints are complimentary ways of thinking about groups. Group development theories label team changes across performance, whereas team adaptation describes how teams change their performance in accordance with novel situations or unexpected events.

The adaptation process approach (called also *adaptive performance*, Burke et al., 2006) emphasized the identification of the components of this process, mainly, the role played by each component. In this sense, there are three different trends in the literature in the light of the review by Baard et al. (2014): (1) those that focus on adaptation as a consequence of learning (e.g., Kozlowski & Bell, 2008; Kozlowski, Gully, Nason, & Smith, 1999), (2) those that follow a self-regulation rationale (e.g., Burke et al., 2006; Rosen et al., 2011), and (3) those that stress the leaders and their impact on adaptation (e.g., Day, Gronn, & Salas, 2004). As we want to focus specifically on teams, we are going to review the first two trends.

Lessons From Experience: The Learning Approach

Team learning can be defined as "an ongoing process of reflection and action, characterized by asking questions, seeking feedback, experimenting, reflecting on results, and discussing errors or unexpected outcomes of actions" (Edmonson, 1999, p. 353). According to this definition, successful teams require adaptation, and this only emerges when team members acquire the knowledge, skills, and abilities to perform their job in collaboration and coordination with others and, additionally, learn how to cope with unexpected situations (Kozlowski et al., 1999).

Kozlowski and Bell (2008) propose that learning is an emergent process—that is, developing from an individual to a team level—whose outcomes serve to build adaptive teams. As a process, learning involves different behaviors, but there is no consensus regarding this matter (e.g., Gabelica, Van den Bossche, Fiore, Segers, & Gijselaers, 2016; Savelsberg, van der Heijden, & Poell, 2009). However, error analysis, the collective process of discussing errors to prevent them, is always a main component of learning, at least, of experiential learning (Sanner & Bunderson, 2015).

Regardless of the specific behaviors involved, learning is a necessary condition for successful adaptation (Kozlowski & Bell, 2008). Although it seems that learning and adaptation are overlapping constructs, Burke et al. (2006) described how team performance models conceptualize learning as a set of behaviors that never manifest in functional change activity but which are directed at increasing teams' behavioral repertoire (i.e., knowledge gained for learning), which, in turn, teams can use to face uncertainty (i.e., being adaptable). The idea that learning is a determinant of team adaptation has received empirical support (e.g., Gorman, Cooke, & Amazeen, 2010; Oertel & Antoni, 2014). As a recent example, Santos, Passos, and Uitdewilligen (2016) have found that team learning behaviors have a direct and indirect relationship with team outcomes through team adaptation. However, further empirical support is needed to prove that learning is an essential condition for adaptation. Successful teams require adaptation, but adaptation only emerges when team members develop self-regulatory skills at individual and team levels, which allow them to perform by means of collaboration and coordination with other team members and to cope with unexpected situations (Kozlowski et al., 1999). This is the rationale followed by the self-regulating approach.

From Warning Cues to Team Adaptation: The Self-Regulating Approach

Another trend of adaptation is that it emphasizes self-regulation. Following this approach, the adaptation process consists of a series of steps that begin with the detection that something is happening, continue with successive stages to solve the problem, and end with the outcome of these stages.

The model by Burke et al. (2006) follows this reasoning. It is focused on explaining how teams adapt their functioning in accordance with four sequential stages affected by team emergent states, which, in turn, are influenced by the previous stage, composing a sequence. The first stage, *situation assessment*, is the perception of an environmental cue by one or more team members, which might affect overall team outcomes (e.g., a delay that could substantially affect the planned deadline). The second stage *is plan formulation* (also known as transition processes, Marks, Mathieu, & Zaccaro, 2001), which consists of decision making to face a situation. The third stage of the model is *plan execution* (called also action processes, Marks et al., 2001), the performing phase of team adaptation. Finally, the fourth and last stage is *team learning*, where the team evaluates past performance, develops lessons, and makes decisions in accordance with the events. The final result of the behaviors composed of the four stages is team outcomes.

Although this conceptualization achieved extensive support in the literature, the review performed by Baard et al. (2014) emphasized that research needs to solve the lack of consensus about what mechanisms constitute the process of adaptation. For this purpose, they believe that more empirical studies examining the mechanisms of the process are needed. The present study, which merges learning and self-regulating approaches, is aimed at filling this gap.

Planning, Acting, Learning, and Adapting: The Present Study

Taking into account the aforementioned literature, the adaptation process approach needs more efforts to advance the understanding of how teams adapt to the changing environment. The present research was conducted to contribute to this in two different ways: (1) providing empirical support for the conceptualization of adaptation as a process and (2) analyzing the impact of the constructs included in the model in two different outcomes: the perception of team adaptation and objective performance.

Regarding the conceptualization of the adaptive process, the team adaptation framework is an approach based only on theoretical efforts (Baard et al., 2014). Although these contributions have an undeniable value, we need empirical research that contributes to support the proposed mechanism of adaptation or to re-conceptualize our models. In this sense, we attempt to take a step forward in this direction considering the existing trends of team adaptation framework (i.e. Burke et al., 2006; Kozlowski & Bell, 2008) in order to propose and test a model of team adaptation.

The other way in which we extend the previous models on team adaptation is by explicitly considering the association between the adaptation process and outcomes. Prior studies pay little attention to the outcomes of the model. In this sense, Maynard

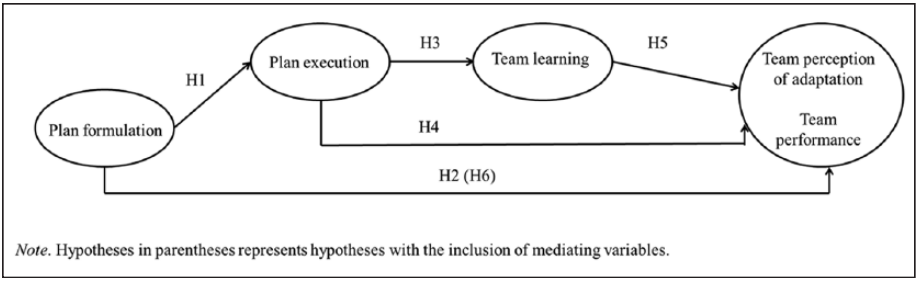


Figure 1. Hypothesized model of team adaptation.

et al. (2015) consider the outcomes of adaptation (in terms of effectiveness, performance, or innovation), but they do not provide empirical support for their proposal. Specifically, we are going to focus on two different outcomes: the perception that the team can adapt, and team performance.

As can be seen in Figure 1, our model has three components in an adaptive performance cycle that acts sequentially and recursively: plan formulation, plan execution, and team learning behaviors. In our proposal, except for team learning, each of the components has direct and indirect links with team outcomes. We shall describe each of the components of the model conjointly in the hypotheses development.

The first component is plan formulation. Planning is the first genuine team-phase of team adaptation, and the following stages cannot be accomplished without it (Rosen et al., 2011). According to the team adaptation framework (see Burke et al., 2006; Rosen et al., 2011), plans need to be translated into actions in order to show their effect. Thus, plan formulation should be followed by plan execution. However, empirical research has shown that plan formulation has a positive relationship with team performance (e.g., Lepine, Piccolo, Jackson, Mathieu, & Saul, 2008; Mathieu & Schulze, 2006; Weingart, 1992), especially when plans are developed in response to changing circumstances (DeChurch & Haas, 2008). Given this evidence, we want to determine whether plan formulation has a direct effect on team performance plus an indirect effect through plan execution. Thus, our first two hypotheses are as follows:

Hypothesis 1: Plan formulation is positively associated with plan execution.
Hypothesis 2: Plan formulation is positively associated with team outcomes.

The next step is plan execution. Plan execution represents performing actions to address the plan outlined during plan formulation. The meta-analytic review by LePine et al. (2008) has shown that plan execution is related to team outcomes. However, we also hypothesize an indirect effect through team learning behaviors. The consequences of plan execution are opportunities to learn that teams may use in order to prevent further mistakes and continue to perform the actions that achieve the desired outcome (e.g., Gabelica et al., 2016; Savelsverg et al., 2009). Therefore, the third and fourth hypotheses are as follows:

Hypothesis 3: Plan execution is positively associated with team learning behaviors.
Hypothesis 4: Plan execution is positively associated with team outcomes.

The third stage of the model is team learning behaviors. At this stage, teams assess their performance and make decisions based on the outcomes of their planning actions to deal with the future. This turns learning into an essential condition for team adaptation. As a consequence of learning, teams can perform in different scenarios, as they know how to achieve a good performance and can make plausible predictions about the outcomes of different strategies (Kozlowski & Bell, 2008). This proposal has been partially supported by empirical research showing that learning and adaptation are associated (Gorman et al., 2010; Oertel & Antoni, 2014) or even involved in a causal relationship (Santos et al., 2016). Moreover, team learning has been the subject of an extensive literature linking it with performance (e.g. Kostopoulos & Bozionelos, 2011; van Woerkom & Croon, 2009; van Woerkom & van Engen, 2009). Therefore, we propose the following hypothesis:

Hypothesis 5: Team learning behaviors are positively associated with team outcomes.

Last, we have already stressed that our model is a process-based model. If we take into account all the previous hypothesized relationships as a part of the process, we can hypothesize a relationship between team performance and the stages of the process: (1) a team formulates an action plan to face the changing situation, (2) the plan is executed, (3) the execution of the plan contributes to the learning process in terms of things that go well and those that go wrong, and finally, (4) the degree to which the team successfully adapts determines its outcomes. Thus, this is our last and most important hypothesis:

Hypothesis 6: Plan execution and team learning behaviors partially and sequentially mediate the relationship between plan formulation and team outcomes.

Method

Study Setting

Our study was conducted during the Global Management Challenge® or GMC®, a worldwide management competition developed by a company specialized in business simulations. The GMC is based on a realistic simulation that has been celebrated for more than 30 years, and many top companies promote their employees' participation. In GMC, each team runs a company that competes in a randomly assigned stock exchange with the objective of concluding with the highest company share price. The teams involved in the competition operate in a self-organized way, and management decisions are made by the whole team. There is a team leader who is responsible for uploading the team decisions. Communication is also directed by the team leader. Every week, the teams must make management decisions (about marketing, production, personnel, purchasing, and finance), and a computer model calculates the share price of each company based on these decisions, providing feedback about their stock value and their ranking in the stock market. This information helps the teams find cues about their adaptation (e.g., whether they are performing poorly, whether they need to make changes). The teams that rank first in each of their simulated stock exchanges win a place to participate in a new round where the winning teams of each simulated stock exchange are rearranged in new stock exchanges in order to compete again. This process is iterated until the international end of the competition, in which the winning teams of each country compete with one another.

This simulation is useful for research purposes because it has similarities with a company's management: (1) participants are members of real teams; (2) teams have to make management decisions mirroring a real-world scenario, within a simulation developed by a specialized company; (3) the degree of success of each team depends on the other teams involved in the competition, as in reality; (4) the competition is real, and the winner has the opportunity to compete with winners from other countries for the final prize; and (5) successful performance has an impact: teams receive rewards in accordance with their final classification in the global competition (e.g., the regional winner receives a free intercontinental flight for each team member).

The management competition was performed with the help of a computer simulation. Computer simulation is aimed at "representing team task environments that contain elements of a reference system and the relations among them" (Marks, 2000, p. 657). Studies in simulated contexts have a long and fruitful tradition in team research (e.g., Hollenbeck, Ilgen, LePine, Colquitt, & Heldhund, 1998; Santos, Uitdewilligen, & Passos, 2015). Following the review developed by Marks (2000), computer simulations are useful, depending on the research purpose, and share some advantages: (1) the scenario can be scripted; (2) access to data and data handling are made possible; (3) they allow the study of contexts that are harder to access than real scenarios; and (4) the tasks performed tend to engage team members in the study. However, computer simulations have limitations, such as the following: (1) easy data collection may lead to information overload, (2) the expense of the simulation, (3) the difficulties in designing highly complex environments, (4) the inherent context loss.

Participants

A total of 144 teams (685 individuals) involved in GMC participated in this study. The majority of the team members are male (67.3%), and the mean age is 28.8 years (SD = 8.3). Regarding the teams, they are composed of workers (43.1%), students (40.3%), or both (16.7%). Team size varies between three (10.4%), four (22.2%), or five members (67.4%).

Procedure

Our study uses only data from the first round of GMC because their representativeness in terms of the heterogeneity of real teams is much higher than in the subsequent rounds, which are composed only of winners. To collect data, each week, team members answered an online questionnaire that included the variables of interest before having access to the weekly financial report. At the end of the competition, all the teams received feedback about their answers and their performance. Given that team adaptation is a process developed over time, cross-sectional design seems inadequate, as the synchronization of measurement timing and the development of phenomena over time are critical to the basis of causal inferences (Mitchell & James, 2001). Thus, we measured data at different times (plan formulation on the second week of competition, plan execution on the third week, team learning behaviors on the fourth week, and outcomes on the fifth week, that is, at the end of this stage of the competition) to reproduce the pace of our model. Using this approach instead of a cross-sectional design strengthens causal inferences (Mathieu & Taylor, 2006), facilitates the identification of when and how the relationships emerge (Roe, Gockel, & Meyer, 2012), and attenuates common method variance (Spector, 2006).

Measures

All scales (plan formulation, plan execution, team learning behaviors, and team adaptation) were measured on a 7-point Likert-type scale with responses ranging from 1 (*totally disagree*) to 7 (*totally agree*).

Plan Formulation. Mathieu and Marks (2006) developed a scale to assess Marks et al.'s (2001) taxonomy of team processes. We used six items similar to the ones used in Mathieu and Schulze's (2006) article adapted for the GMC context. The scale has an observed Cronbach alpha index of .92. An example item is, "My team identified the main aspects related to this decision."

Plan Execution. We followed the same rationale as in the plan formulation scale. This scale is composed of six items with an observed Cronbach alpha index of .96. An example item is, "In my team, members coordinate activities with each other."

Team Learning Behaviors. We used a three-item version of the Team Learning Scale developed by Salversberg et al. (2009), focused on error analysis, which is considered one of the main dimensions of learning. The observed Cronbach alpha index was .94, and an example item is, "My team considers the analysis of our errors to be an important matter."

Team Adaptation Perception. We used the 10-item scale employed by Santos et al. (2015), based on Marques-Quinteiro, Ramos-Villagrasa, Passos, and Curral (2015), which assesses team adaptation as proposed by Pulakos et al. (2002). An example item is, "My team was effective in quickly developing plans of action to deal with unpredictable situations." The observed Cronbach alpha index of the scale was .98.

Team Performance. We measured the share price obtained by the team at the end of the first round (the fifth week of the competition). To facilitate the comparison between teams belonging to different simulation groups, we reranked the share price of the teams according to their rank order in the group (1-8, where 8 is the highest).

Control Variables. Team size was controlled for its potential to affect a team's ability to adapt to novel situations.

All the self-reported measures reach an excellent level of reliability, which is critical for performing mediation analyses (Mathieu & Taylor, 2006).

We analyzed the validity of the measures by confirmatory factor analysis (CFA), testing different models using the Lavaan package in R software: (1) one-dimensional solution, $\chi^2(594) = 3414.07$, $p = .000$, comparitive fit index (CFI) = .70, Tucker–Lewis index (TLI) = .67, root mean square error of approximation (RMSEA) = .20, standardized root mean square residual (SRMR) = .16; (2) two-dimensional solution, with plan learning and plan execution belonging to the first dimension, and team learning and team adaptive perception to the second one, $\chi^2(593) = 2411.59$, $p = .000$, CFI = .81, TLI = .80, RMSEA = .15, SRMR = .10; (3) three-dimensional solution, with team learning and team adaptive perception belonging to the same dimension, $\chi^2(591) = 1724.83$, $p = .000$, CFI = .88, TLI = .86, RMSEA = .12, SRMR = .09; and (4) four-dimensional solution, with each variable as a dimension: $\chi^2(588) = 886.39$, $p = .000$, CFI = .95, TLI = .94, RMSEA = .08, SRMR = .03. Based on the fit indexes, only the four-dimensional approach was supported, allowing us to continue with our analyses.

Analyses

Questionnaires were recorded by the research team, using SPSS v.22 and R software to perform data analyses. Listwise, deletion method was used to eliminate missing cases for any variable. Subsequently, we calculated the James index ($r_{wg(J)}$) and the intraclass correlation coefficient 1 (ICC1) indexes to justify the aggregation of variables at team level, as well as descriptive analyses and correlations. The next step was devoted to analyzing convergent and discriminant validity through CFA. We then calculated correlations. Finally, we used a conditional process analysis (CPA) based on bootstrapping with the PROCESS macro (Hayes, 2013) to check the proposed model. In line with Preacher and Hayes (2008), CPA offers several advantages compared with other approaches: (1) it is suitable for testing multiple mediators simultaneously; (2) it does not require the assumption of a normal sampling distribution; (3) it reduces the number of inferential tests, and, as a consequence, the likelihood of Type 1 errors is reduced; and (4) it performs better than the traditional Sobel test in real situations with finite samples. Furthermore, the existing software, as macros for SPSS and SAS, facilitates its usage, so team researchers are beginning to take advantage of CPA (e.g., Mell, Van Knippenberg, & Van Ginkel, 2013; Santos & Passos, 2013).

Results

In our study, the analysis is at team level. Thus, all individual answers were aggregated to team level. We justify aggregation by considering the $r_{wg(J)}$ index (James, Demaree, & Wolf, 1993) and the ICC1 (Bartko, 1976).

To justify aggregation, we computed $r_{wg(J)}$, an estimate of within-group agreement designed for multiple-item scales. Generally speaking, values of $r_{wg(J)}$ equal to or greater than .70 (Cohen, Doveh, & Eick, 2001) are required for within-group agreement. However, scholars have classified this criterion as arbitrary and recommend analyzing also the degree of agreement in terms of two categories (e.g., Santos, Passos, Uitdewilligen, & Nübold, 2016): (1) lack of agreement or weak agreement (from .00 to .50) and (2) moderate, strong, or very strong agreement (from .51 to 1.00). In our study, the percentage of teams with lack of agreement or weak agreement was as follows: 15.15% in plan formulation, 21.80% in plan execution; 11.00% in team learning; and 7.90% in team-adaptation perception. As some teams showed weak agreement, we conducted sensitivity analyses, testing our hypotheses with and without these teams to determine whether the results had a similar pattern or were inconsistent (Biemann, Cole, & Voelpel, 2012). As expected, the analyses without the teams that showed lack of agreement or weak agreement ($n = 75$ teams) showed the same pattern of results as the analysis including those teams (i.e., the total sample, $n = 142$).

Regarding ICC, values between .05 and .20 of ICC1 (Bliese, 2000) are required. As shown in Table 1, our variables fit these criteria. The reliability of the group mean (ICC2) was not considered because our teams were small (Bliese, 2000).

The descriptive statistics and correlations are also shown in Table 1. All the variables are related to one another, except for plan formulation and team performance. This can be due to the fact that performance is more a result of how the plan is developed than of its formulation, which is quite distant in time. Noteworthy are the high correlations between all predictors and team-adaptation perception, with values between .49 and .67, $p \leq .01$, supporting the idea that the hypothesized predictors are part of the adaptation process. As a consequence of these results, we can state that Hypotheses 1 and 3 are strongly supported (there is a large effect size in the relationship between plan formulation and plan execution, Hypothesis 1, and plan execution and team learning behaviors, Hypothesis 3); Hypothesis 2 is not supported (plan formulation and team perception of adaptation show a small effect size, but there is no relationship with team performance); and Hypotheses 4 and 5 are mildly supported (plan execution and team learning behaviors show a large effect size with team perception of adaptation and a small effect size with team performance).

We continued with the conditional analysis process to describe the direct and indirect effects of our proposed model. CPA analysis produces a confidence interval, based on bootstrapped sampling distribution, and it can be assumed that the indirect effects are significant and that mediation occurs if zero falls outside the 95% confidence interval (Preacher & Hayes, 2008). In this sense, Table 2 reveals an indirect effect in the prediction of team outcomes. The effect (i.e., value used to estimate the population parameter, as in traditional regression) of the fully mediated model was

Table 1. Aggregate Level Indicators, Descriptive Statistics, and Correlations.

Variables	$r_{wg(J)}$	$r_{wg(J)}$ weak agreement	ICC1	*M*	*SD*	Range	1	2	3	4	5
1. Plan formulation	.75	15.15%	.14	5.77	0.53	4.22-7.00	1				
2. Plan execution	.74	21.80%	.10	5.79	0.63	3.58-7.00	.66**	1			
3. Team learning	.76	11.00%	.14	5.60	0.74	3.50-7.00	.59**	.71**	1		
4. Team adaptation perception	.80	7.90%	.10	5.70	0.69	4.00-7.00	.49**	.67**	.59**	1	
5. Team performance				4.49	2.29	1.00-8.00	.09	.17*	.24**	.22**	1

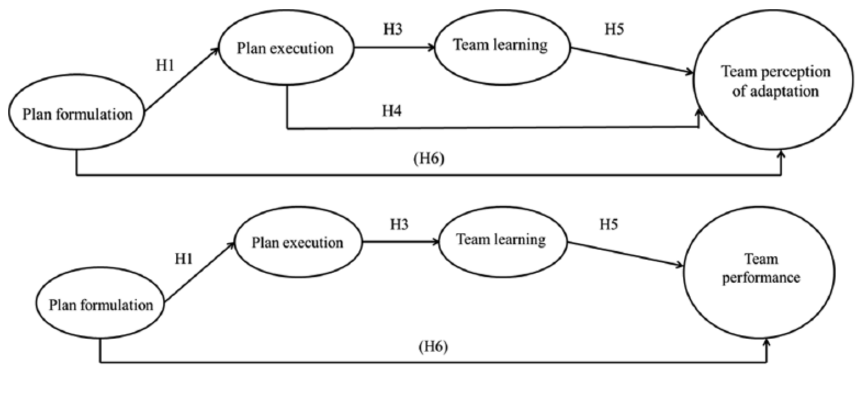
Note. $N = 142$; ICC1 = intraclass correlation coefficient 1. Weak agreement is when $r_{wg(J)}$ is .50 or lower.
*$p < .05$. **$p < .01$.

Table 2. Total, Direct, and Indirect Effects in the Prediction of Team Outcomes.

Predictive model of team adaptation perception	Effect	Bootstrap 95% CI
Direct effect	.08	[−0.15, 0.29]
Indirect effects		
Total indirect effects	.58	[0.44, 0.77]
Plan formulation → plan execution → team adaptation perception	.41	[0.25, 0.58]
Plan formulation → plan execution → team learning → team adaptation perception	.11	[0.02, 0.23]
Plan formulation → team learning → team adaptation perception	.06	[0.01, 0.19]
Predictive model of team performance	**Effect**	**Bootstrap 95% CI**
Direct effect	−.46	[−1.43, 0.51]
Indirect effects		
Total indirect effects	.83	[0.18, 1.48]
Plan formulation → plan execution → team performance	.15	[−0.64, 0.89]
Plan formulation → plan execution → team learning → team performance	.43	[0.08, 0.85]
Plan formulation → team learning → team performance	.25	[0.02, 0.70]

Note. $N = 142$. Number of bootstrap samples = 5,000. CI = confidence interval. Results are controlled by team size.

.58 (team-adaptation perception) and .83 (team performance), and both were statistically significant due to the zero point not being included in the interval. It is also noteworthy that, in the prediction of team performance, the link composed of plan formulation-plan execution has an effect only if team learning behaviors are considered.



Note. Hypotheses in parentheses represents hypotheses with the inclusion of mediating variables.

Figure 2. Empirically supported links in the adaptation process.

Given that the main relationship was nonsignificant, it is more accurate to refer to *indirect effects* instead of *mediation* (Mathieu & Taylor, 2006). In the absence of a direct effect, we must conclude that H6 is mildly supported: There is only an indirect relationship between plan formulation and team outcomes. Figure 2 shows the relationships supported in our model.

Discussion

The aims of this study were twofold: first, to empirically test the conceptualization of adaptation as a process, and second, to investigate the relationship of team adaptation process with outcomes (i.e., perception of adaptation and team performance). Summing up, the present research contributes to demonstrating that adaptation in team evolution takes place across time and does not depend only on the initial conditions (e.g., team size). We also found support to conceptualize team learning as part of the adaptive process and not the other way around. Now, we shall further discuss these results.

According to our results, the predictors included in our study work as part of a process, like what Burke et al. (2006) propose, and all of them contribute to displaying adaptive behaviors and to achieving better outcomes. This evidence provided empirical support to the theoretical models that describe adaptation as a sequence of necessary but insufficient phases. Plans without execution are useless, and even when teams are following a plan, they need to analyze its errors in order to obtain objective outcomes. To our knowledge, we are the first to empirically test this idea. This finding is the most outstanding result of our study because it suggests that all stages should be considered to ensure team adaptation.

Regarding the role of the different stages of the adaptive process, we must acknowledge that team learning has (again) revealed its key role in team adaptation. Although plan formulation and plan execution are important, learning plays the prominent role: In the prediction of team-adaptation perception, team learning behaviors enhance the influence of prior variables; when the criterion is objective performance, learning appears as the only way to achieve the best results. The differences between the two predictive models may be that perception of adaptation, as its name implies, refers to the shared belief that the group is reacting to the changing situation, and not necessarily an actual adaptation. On the other hand, team performance requires real and effective learning to be successful.

Implications for Practice

Most teams perform in routine situations until a disruption happens. Disruptions may be task-based (e.g., changes in the deadline) or team-based (e.g., team turnover), but irrespective of their nature, they always trigger team adaptation (Maynard et al., 2015). Teams that want to face the disruption successfully need to display adaptive behaviors. Our study has shown that something more than always doing the same thing in the same way is necesary (i.e., planning and execution): Teams need to learn from the experience that they are undergoing.

At the light of these results, team adaptation can be improved in at least four ways: (1) increasing plan execution; (2) promoting team learning, as a neccesary condition to adaptation; (3) improving team adaptive behaviors themselves; and (4) building teams composed of members who demonstrate individual adaptability, because this precedes team adaptation (Pulakos et al., 2002). Now, we shall explain each of these alternatives.

The first way implies an intervention on plan execution as an indirect way to increase the impact of plan formulation. According to Burke et al. (2006), successful plan execution is related to communication, whereas performing, coordination, and leadership can be improved by training (e.g., simulations).

The second way is focused on team learning. According to our data, teams must understand the need for change to sucessfully adapt. To achieve this insight, leadership plays a capital role. Team leaders should go further than developing plans and supervising plan execution; they should also promote active debriefing of performance, that is, a collective discussion of errors and possible improvements to prevent their further appearance (Frick, Fletcher, Ramsay, & Bedwell, 2017).

The third way implies the improvement of adaptive team behaviors. Following the taxonomy of Pulakos and colleagues (2002), these behaviors are the following: solving problems creatively; dealing with uncertain or unpredictable working situations; learning new tasks, technologies, and procedures; demonstrating interpersonal adaptability; demonstrating cultural adaptability; demonstrating physical-oriented adaptability; handling work stress; and handling emergencies and crises. All these behaviors can be achieved in two ways (Kozlowski & Bell, 2008): through *learning by doing* training (e.g., by computer simulations such as synthetic learning environments, Cannon-Bowers & Bowers, 2010) and through team leaders who promote psychological safety, guide the development of shared mental models, and perform motivational and consulting functions.

The last way is focused on individual characteristics. The meta-analysis by Christian, Christian, Pearsall, and Long (2017) has pointed out that cognitive ability, personality traits (emotional stability and openness), and team goal orientation are individual characteristics related to adaptive team performance. All of these can be assessed in potential team members, for example, during personnel selection process.

Summarizing all the aforementioned interventions aimed at increasing team adaptation should be based on the following: (1) building teams composed of members who demonstrate individual adaptability, (2) developing training scenarios where adaptation is needed, and, more important, (3) putting leaders in charge who can perform error analysis and psychological safety within the team.

Limitations and Recommendations for Further Research

The present study does have certain limitations. First, it is necessary to acknowledge that our results belong to a simulation, and this may limit their generalizability (i.e., their validity). Raser (1969) established four criteria for validity in simulation studies: (1) psychological validity, the degree to which participants believe that they form a part of the team with interdependent members; (2) structural validity, the similarity between simulation constructs and real constructs; (3) process validity, the relationships and processes involved in the simulation mirror real-world situations; and (4) predictive validity, the ability of the simulation to predict relationships in a real-world context. We believe that our simulation fulfills at least the first three criteria. Regarding predictive validity, the competition was designed by SDG, a company specialized in mimicking reality with its simulations, which has received international recognitions such as the CEL accreditation by the European Foundation for Management Development, which can be considered an indicator of the similarity between simulation and reality. In any event, further research should determine the degree to which the present results can be generalized.

The presumption of rationality is also a limitation for the generalizability of our results. The theoretical model we have followed assumes that individuals and teams are behaving rationally, which is a very specific situation (structured problem-solving context with moderate interdependence), but this is not always the case in real organizations, especially in times of change. As a consequence, our findings should not be considered as rules that can be applied in every setting and every situation but as initial steps that may guide practitioners in similar contexts and as findings that can be improved with further research (e.g., incorporating nonrational variables in the model, e.g., emotional states).Another limitation is that our study does not analyze the situation assessment stage or emergent states, both included in the model of Burke et al. (2006). Situation assessment stage was not included in our study because, in our simulation setting, all the teams received the same information (i.e., the value in the stock exchange of all the companies), and it seems to have no impact on their plans, as they always need to constantly improve their performance to ensure the first ranking position. Regarding emergent states, Burke et al. (2006) and Rosen et al. (2011) pointed out their role as mediators in the model. Nevertheless, we wanted to focus on providing empirical support to the pace of the adaptation process. In any event, we believe that further research should take emergent states into account.

Continuing with limitations, it is necessary to acknowledge that performance data could be affected by the particularities of each stock exchange—for instance, in stock exchanges composed mainly of high performing teams, share price values tend to be higher than for groups with higher heterogeneity. Further research should try to control this variability.

Despite these flaws, we believe that our study is a valuable first step that encourages further research on dynamic approaches. In terms of future research, besides the aforementioned aspects, the present study analyzes performance, but other results of team processes such as team satisfaction and team viability have not been taken into account. Further research should cover all the team outputs with a view to gaining a better insight into the effects of adaptation. Furthermore, in our opinion, group development theories and team-adaptation literature could converge in the research—for example, the study of changes in adaptive behaviors according to each phase of team development and how the outcomes of adaptation facilitate transitions between phases. Finally, although team adaptation is a team-level phenomenon, individual adaptation must also be taken into account. As stated previously, studies relating individual and team-level adaptation do exist, but a multilevel approach such as that proposed by Baard et al. (2014) would lead to a better understanding of adaptation as a process that emerges from individuals finishing on their teams.

Summing up, our article analyzes adaptation as a process by conducting an empirical research in a simulated context. Our findings show that team adaptation can be analyzed as a process in which all its components matter. It also help practitioners interested in organizational change, showing four ways in which we can improve the adaptability of teams. Furthermore, the present research raises new and refreshing questions about the topic: "Do the components of the model have the same relevance in different settings and tasks?" "What happens to team learning behaviors when adaptation is not needed?" "Is plan execution only an extension of plan formulation or does it have value in itself?" "Further research could help achieve the correct answers to these questions."

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