

The impact of external team members on internal team processes and project speed – A two country perspective

ABSTRACT

Increasing the effectiveness and speed of new product development projects by opening up the innovation process to external partners is a key topic for today's decision makers. The aim of this study is to shed light on the relationships between external openness, team processes, team psychosocial traits (Organizational citizenship behavior (OCB) and social cohesion) and project speed, by considering not only possible advantages but also disadvantages of external involvement. Basing our analysis on the team effectiveness framework, thereby considering the mediating role of team processes and psychosocial traits, this study extends NPD team level research. We tested our research model with survey data from 225 NPD projects from a cross-industry sample in Thailand and Germany. Using structural equation modeling as well as the bootstrapping and phantom model approach to calculate the indirect mediation effects, our results highlight the strong positive influence of external openness on CFI team processes and OCB. Moreover, CFI has been established as a key mediator within the relationship between openness and project speed. Advancing cross-cultural NPD research, we have studied the contextual influence of culture within our model of external openness and team processes and psychosocial traits. We provide insights on the impact of national culture on the postulated relationships, pointing out that the effect of openness on team processes and OCB is stronger in individualistic countries than in collectivistic countries. Providing theoretical and practical implications as well as avenues for further research, we encourage more research to foster the effectiveness of NPD teams and to increase the odds for NPD success.

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INTRODUCTION

"Useful knowledge has become widespread, and ideas must be used with alacrity. If not, they will be lost." (Chesbrough, 2003a, p. 40)

The importance of and the need for opening up the new product development (NPD) process for external partners have been widely acknowledged, both by practitioners as well as academics especially since the seminal book and articles of Chesbrough in 2003 (Chesbrough, 2003a, 2003b, 2003c). Since then, an increasingly volatile and globalized business environment has further strengthened the role of external partners in NPD processes (e.g., Naqshbandi and Kaur, 2011; Van De Vrande et al., 2009). While past NPD research has largely concentrated on within-firm processes (Page and Schirr, 2008), some studies have highlighted that the inclusion of partners, such as customers, suppliers, and research institutes can be a central factor for innovations and new product success (Faems et al., 2005; Laursen and Salter, 2006; Ritter and Gemünden, 2004). Nonetheless, the number of quantitative studies on opening up the innovation process is rather limited (e.g., Van De Vrande et al., 2009), so that it does not come at a surprise that firms are still confronted with many unresolved questions and challenges with respect to the most effective way of managing NPD processes with external partner involvement (e.g., Lichtenthaler, 2008). The key question of why some firms are able to profit more from external openness than others still remains largely unanswered.

Against this background, this paper seeks to answer the core research question as to which effect firm external team members have on internal team processes, team psychosocial traits and project speed within NPD project teams across different cultures. By testing the above mentioned

relationships with survey data from 225 NPD projects across two countries, we contribute to existing literature in several ways: Empirically evaluating which effect external team members with potentially different cultures, values, and way of working, have on team OCBs and social cohesion - within the overall group effectiveness framework (Cohen and Bailey, 1997) - advances our understanding of NPD team dynamics as they explicitly address the individual's attitude and the team's working atmosphere. This approach also reflects a recent call of Dahlander and Gann (2010) who propose to further analyze the underlying team processes. Moreover, we will extend existing research by specifically focusing on the project and individual level of analysis. In a second step, in the light of continuously decreasing product life cycles and a clear need to further address NPD team outcome variables such as speed to market (Sivasubramaniam et al., 2012), we seek to investigate the effect of external openness on NPD project speed within the overall framework of group effectiveness theory (Cohen and Bailey, 1997). Finally, we will perform a two country comparison between Germany and Thailand for the effect of openness on team processes and team psychosocial traits. According to Gannon's (1994) cross-cultural research, individual behavior can be explained by up to 25-50 percent by national culture characteristics. This finding clearly highlights the need to analyze the effect of external openness on team processes and team psychosocial traits, which are both behavioral driven dimensions, in more than one national setting. Both countries strongly differ in their fundamental cultural values and beliefs concerning e.g., the level of individualism vs. collectivism. Advancing cross-cultural NPD research, we will study the contextual influence of culture within our model of external openness and team processes and psychosocial traits. Taken together, this study seeks to answer the following research questions: (1) What is the direct effect of external openness on project speed? (2) What is the direct effect of external openness on CFI team processes, team level OCB, and team social cohesion? (3) What are the indirect effects of

external openness on project speed when mediated by CFI, OCB, and social cohesion? (4) Does the effect of openness on team processes and psychosocial traits differ in a German or Thai cultural context?

Besides the outlined theoretical contribution, this study also yields significant considerations for new product development practitioners. Having a sound understanding of the effect of company external team members on team internal processes and team member attitudes, can be a key success factor to better leverage the benefits of a close collaboration with external partners. Moreover, the results also shed light on potentially existing negative effects of external team members e.g., on the internal team working atmosphere. Providing practitioners with such insights before or early on in the project will allow them to better balance the pros and cons of engaging extensively with external partners. Besides, the study also supports practitioners who are working within NPD teams on an international or global scale as it provides implications on the possible effects of culture on the relationship between external openness and team processes.

THEORETICAL PREMISES

The team effectiveness model of Cohen and Bailey (1997) serves as the underlying theoretical framework of this study. Based on various influences such as environmental factors, team design factors, team processes, and group psychosocial traits, the model aims to explain project team outcomes. The underlying framework clearly distinguishes between the direct and indirect effects of e.g., team design factors, such as team composition, on team processes and project team outcomes. This distinction between direct and indirect effects within the overall framework is essential for our proposed research model. Based on this theoretical framework, we will analyze whether the degree of external openness, represented by the inclusion of external

team members in the project team, has an influence on team processes, team psychosocial traits and eventually on project speed.

Openness in the NPD process entails several different activities such as inbound, outbound, and coupled activities (Gassmann et al., 2010). While inbound open innovation considers the internal use of externally gathered knowledge, outbound open innovation is centered around the external exploitation and usage of internal knowledge (Huizingh, 2010). While both processes are key components of openness, this study will focus on the inbound innovation processes – both pecuniary and non-pecuniary (Dahlander and Gann, 2010) – which include the sourcing of external ideas from e.g., suppliers, customers or universities as well as the acquisition of knowledge from informal and formal relationships (e.g., Chesbrough and Crowther, 2006; Fey and Birkinshaw, 2005; Laursen and Salter, 2006).

CFI, as a central team process, is considered as a measure that includes (a) the frequency of formal and informal communication, (b) the frequency and the amount of information and resources exchanged, and (c) the existence of common goals.

The concept of OCB, as part of the team psychosocial traits, describes "performance that supports the social and psychological environment in which task performance takes place" (Organ, 1997, p. 95). Within our unit of analysis, we conceptualize OCB as those behaviors which are intended to help other teammates within the NPD team. Finally, the concept of social cohesion signifies the level to which team members experience interpersonal attraction and interpersonal ties (Hogg, 1992; Zaccaro and McCoy, 1988). In this sense, social cohesion can be differentiated from OCBs in that both constructs have a different perspective on team attitudes. Whereas OCBs describe the fact that team members have the attitude and willingness to actively help each other and want to improve the overall work setting both on an individual and organizational level, social cohesion rather refers to the general atmosphere within the team and

the level of interpersonal ties among team members. With respect to national culture as moderator, we compare Germany and Thailand as both countries vary strongly in terms of the cultural dimension of individualism vs. collectivism. With a Hofstede score of 67, Germany can be considered as highly individualistic, while Thailand, with a score of 20, can clearly be regarded as a collectivistic culture (Hofstede, 1983). We concentrate on the individualism dimension as this has been considered as the major cultural dimension to be analyzed (e.g., Sondergaard, 1994). A detailed presentation of the theoretical concepts could not be provided in this paper version due to length restrictions. It can be obtained from the author upon request.

RESEARCH MODEL AND HYPOTHESIS DERIVATION

Research Model

The research model is composed of a multiple mediation model. In a first step, the direct effect of a team's external openness on project speed will be investigated. In a second step, the direct effect on CFI team processes and on group psychosocial traits of OCB and social cohesion will be analyzed. In a third step, the indirect effect of external team openness on project speed through team processes and group psychosocial traits will be examined. Finally, the previously identified direct effects of team external openness on team processes and group psychosocial traits will be analyzed and compared across a German and Thai sample. The conceptual model is presented in Figure 1.

Insert Figure 1 about here

Hypothesis Derivation

The direct effect of external openness on project speed. Referring to the group effectiveness framework as postulated by Cohen and Bailey (1997), team design factors, such as the project

team composition, can have a direct effect on team outcomes. Based on this reasoning, we theorize that the inclusion of external team members within the project team, as a group compositional factor, can have a direct impact on project speed as one key project outcome. In their theoretical paper, Naqushbandi and Kaur (2011), propose that close collaboration with external partners can increase speed to market and decrease internal costs of integration. From a knowledge based perspective, it can be argued that the inclusion of external experts increases the available knowledge within the team (Laursen and Salter, 2006). In this sense, value can be created by including external team members in the NPD team by acquiring knowledge and competencies which complement the internally available knowledge (Love et al., 2002). This higher amount of available knowledge has in turn be found to speed up the research process (Van De Vrande et al., 2009). Moreover, a higher level of external openness provides the team with the possibility to learn from external partners who might already have experiences e.g., with a new technology which will be used for the new product. This reasoning is in line with findings of other researchers such as Moffat and Archer (2004) and Ragatz, Handfield and Petersen (2002) who assert that a close working together with external partners improves efficiency and leads to shorter development time. Despite these positive effects of external openness on project speed, other researchers such as Greenstein (1996) have also pointed out the possible negative effects of extensive inclusion of external partners as a high level of openness increases the coordination costs and coordination time needed among the different team members. Taken together, we propose however, that external openness has a positive effect on project speed.

Hypothesis 1: External openness has a positive effect on project speed.

The effect of external openness on CFI. Besides the direct impact on team outcomes, team design factors also directly influence team processes such as CFI (Cohen and Bailey, 1997). CFI

refers to the level of formal and informal communication as well as to the degree of information exchange within a team. It can be argued that more diversified and specialized knowledge is available to the team if external experts are involved in the project. Having team members with different expertise and functional backgrounds, requires a closer integration and cooperation in order to share and transfer the available and needed knowledge. Since our unit of analysis comprises NPD projects with a majority of high technology products (please refer to table 1), it can be assumed that the knowledge is rather tacit, implicit, and not easily articulated (Nonaka, 1994). This in turn requires even stronger formal and informal coordination mechanisms. Dahlander and Gann (2010) argue in a similar direction by highlighting the need for a 'broker' who coordinates ideas and information flows from inside and outside the firm or team. Based on this reasoning we propose that external openness has a positive effect on CFI team processes.

Hypothesis 2a: External openness has a positive effect on CFI.

The effect of external openness on OCB. Based on the team effectiveness framework, team composition directly influences group psychosocial traits such as OCB (Cohen and Bailey, 1997). By focusing on the content, which external team members will provide to the team, this relationship can be made more explicit. External team members generally provide new ideas or new knowledge which is complementary to the existing knowledge in the NPD team. Based on this, Menon and Pfeffer (2003) point out that there is a higher challenge to evaluate external ideas or knowledge when compared to internal ideas or knowledge. This is due to the fact that the internal team usually has less first-hand information accessible on ideas and knowledge brought forward from firm external team members (Menon and Pfeffer, 2003). Based on this, it can be reasoned that in order to make sense of both, internally and externally available knowledge, team members need to help and assist each other, thereby displaying a higher level of OCB, in trying

to assimilate and transform the new knowledge and ideas. While the need for displaying helping behavior, as a central part of OCB, is apparent, it has to be taken into consideration that the relationships with the external team members usually are rather short term so that trust, as a key antecedent for OCB (Settoon and Mossholder, 2002), will only be developed to a limited extent. As such, team members will only display OCBs as long as they are sure that their contribution to the team will be reciprocated at some point in time (Konovsky and Pugh, 1994). However, despite the weakening effect of possibly not having close and long-term personal relationships with the external partners, we postulate that, based on the theoretical mode of action, external openness positively relates to OCB within the NPD project team.

Hypothesis 2b: External openness has a positive effect on OCB.

The effect of external openness on social cohesion. Besides OCB, team composition also influences team social cohesion as a second major psychosocial trait dimension (Cohen and Bailey, 1997). As outlined above, social cohesion refers to the degree of interpersonal attraction, ties, and the general atmosphere among members of a team (Hogg, 1992; Zaccaro and McCoy, 1988). Having a high level of external openness and external partner involvement, the team will be composed of members not only from a different functional background within the same firm but also of members from different organizational culture settings. In this sense, external openness increases the diversity within the team by at least one additional dimension, such as a different corporate culture. From a theoretical perspective, it can thus be argued that external team members will disturb the existing team atmosphere by bringing in a different cultural perspective which might not be completely compatible with the existing team perception. This reasoning is in line with researchers such as Dahlander and Gann (2010), who assert that "being more involved in open innovation can [...] create tensions with other practices within the

organization" (Dahlander and Gann, 2010, p. 707). Having in mind that NPD projects are usually time-limited and not recurring, it can be assumed that strong ties and a solid foundation of trust with external team members hardly exist at the beginning of a project and will only develop slowly, if at all, throughout the course of the project. However, trust is essential to develop an empathic orientation among the members of a team (McAllister, 1995). Bringing in new members from outside, the development of trust will become even more difficult so that the empathy and strength of relationships among the team members will suffer. Based on this, we propose:

Hypothesis 2c: External openness has a negative effect on social cohesion.

Mediating effect of external openness on project speed through team processes and psychosocial traits. The main question when it comes to hypothesizing mediating effects is whether the proposed mediators act as a more immediate precursor or as a mechanism through which the independent variable – external openness – influences the dependent variable – project speed. Cohen and Bailey's (1997) team effectiveness model suggests that the team composition, such as the inclusion of external team members, also has an indirect effect on project speed by influencing team processes and team psychosocial traits which in turn relate to team outcomes. As mentioned above, external team members can bring along necessary new ideas and knowledge to the team in order to develop the new product. Adopting the knowledge based view, it can be stated that project speed is a result of both, the amount of internal and external knowledge available to the team – as signified by the level of openness – and by the way the knowledge and ideas are exchanged and shared among the different team members with the help of integrative processes (CFI). Illustrating the direct link of CFI to project speed, researchers such as Keller (1994) and Mabert, Muth, and Schmenner (1992), for instance, have demonstrated a

positive link between the level of information sharing and communication and the speed of developing new products.

Besides team processes, team psychosocial traits such as OCB and team social cohesion may also have a mediating role within the overall research model. From a theoretical perspective, it can be argued that while external openness influences both, OCB and social cohesion, both psychosocial traits also directly influence project outcomes such as project speed (Cohen and Bailey, 1997). The mode of action can be highlighted with the following examples: Referring to H2b, we theoretically derived a positive relationship between external openness and OCB. A higher level of OCB has in addition empirically led to a higher project speed, as team members were involved in helping each other, which increased their efficiency (Podsakoff et al., 2009). Building upon H2c, we postulate a negative influence of external team members on team social cohesion. Social cohesion has also been related positively to project speed as a higher level of team social cohesion reduces friction within the team so that less time is wasted for dispute settlement (e.g., Beal et al., 2003; Hoegl and Gemuenden, 2001). Based on this reasoning, we postulate a mediating role of CFI team processes and group psychosocial traits.

Hypothesis 3: CFI team processes and group psychosocial traits mediate the relationship between external openness and project speed.

Moderating effect of national culture on the relationship between external openness and team processes and psychosocial traits. As described in the theoretical premises section, national culture needs to be taken into consideration when analyzing the effect of openness on team processes and psychosocial traits in a holistic way. This holds especially true for contexts which differ strongly across a major cultural dimension such as individualism vs. collectivism. People in collectivistic cultures, such as the Thai culture, are inclined to be strongly integrated into

groups and networks. Individualistic cultures on the contrary promote a high sense of personal responsibility. Moreover, the sense of security, loyalty, belonging and dependency are key cornerstones of a collectivistic culture (Chan et al., 2010). In this sense, particularly a good personal atmosphere and rather strong personal ties among the team members are characteristic for collectivistic cultures. Having in mind these differences across the individualism dimension in Germany and Thailand, we expect the effect of having external team members in the NPD team on team processes and psychosocial traits to vary across the two countries. Concerning the specific relationships of our model, we expect that the positive effects of including external team members on CFI and OCB will be weaker in collectivistic cultures than in individualistic cultures. We base this hypothesis on the argument that internal team members in collectivistic settings are strongly focused on their group and are therefore less likely to let organization external partners "invade" the existing group. This more reserved behavior towards external team members in turn will reduce the generally positive effect that external team members have on integrative team processes and helping behavior. Moreover, individualistic cultures focus more on the potential economic benefit and personal achievement that can result from the cooperation with the external partners than collectivistic cultures (Hofstede, 1983), so that it can be expected that team members in Germany are more inclined to engage in integrative processes and OCB. Contrary, we expect the negative effect of external team members on social cohesion to become even stronger in the Thai sample as external team members could potentially destroy established relationships between team members, which however are at the heart of a collectivistic culture (Triandis, 1994). Moreover, the harmony within the internal organizational team can be endangered by including team members with different organization cultural backgrounds and working styles, which again violates a key collectivistic principle (Everdingen and Waarts, 2003). Based on this reasoning, we hypothesize:

Hypothesis 4a/b: The positive effect of external team members on (a) CFI and (b) OCB is stronger for individualistic cultures (GER) than for collectivistic cultures (THA).

Hypothesis 4c: The negative effect of external team members on team social cohesion is stronger for collectivistic cultures (THA) than for individualistic cultures (GER).

METHODOLOGY

Data and Sample

For the empirical validation of our hypotheses, we generated survey data on NPD project level for project teams operating in Germany and Thailand. Projects from diverse industries, firm sizes, project budgets, as well as from different project durations were included in the survey (Table 1). In total, we were able to generate data on 225 NPD projects (146 for Germany, 79 for Thailand) for which we could ensure data completeness and consistency. While the project leader served as the key informant, we used a dyadic sampling approach for the team process and group psychosocial traits constructs to ensure that no informant bias existed by validating the project leader answers of a sub-sample with team member responses (Bagozzi et al., 1991; Homburg and Klarmann, 2009; Van Bruggen et al., 2002). The test of interrater agreement rwg_j (Homburg and Klarmann, 2009; James et al., 1984), revealed that the CFI, OCB and social cohesion constructs displayed high rwg 's with $rwg > 0.90$ signifying strong agreement between the project leader and team member answers (Homburg and Klarmann, 2009). Employing the methodology proposed by Podsakoff, MacKenzie, Lee, and Podsakoff (2003), we tested for common method bias by performing the Harman's Single-Factor test. The test revealed that more than one factor was extracted and that none of the extracted factors accounted for more than half of the indicator correlations. Moreover, following Conway and Lance (2010), we ex-ante ensured that self-

reports are appropriate as the project leader has the best overview and can best assess the different behavioral, process and organizational dimensions asked for in the questionnaire. In addition, while providing evidence for the construct validity, we could also not identify any significant overlaps in items for the different constructs. Based on these results we claim that common method bias is not a concern in our sample. As there were no structural differences between early- and late-group responses, we could also rule out a non-respondent bias.

 Insert Table 1 about here

Measures

Independent variable. For the external openness construct, we asked the NPD project leaders for each NPD phase (conceptualization, product development, and commercialization) separately to specify to what extent "the team cooperated with customers, suppliers, competitors and universities" based on a 7-point Likert scale. Besides, the respondents had the option to select an additional field signifying that they did not cooperate at all with an external partner for the given project phase. These measures were then aggregated to derive a total score to what extent the project team included external team members across the different NPD stages.

Dependent variable. To account for project speed and speed to market, we employed and pre-tested a three item scale including items such as: "The project was completed faster than usual when compared to other NPD projects in the industry."

Mediators. For the CFI construct, we followed the general conceptualization of Olson et al. (2001). An example item reads: "Team members of different functions frequently communicate in a formal manner (e.g., scheduled meetings, exchange of formalized forms)." We operationalized OCB with the measures and conceptualization of Williams and Anderson (1991) and Podsakoff et al. (1997) focusing on the OCBI dimension. The social cohesion scale is based

on Nakata & Im (2010) and comprises four items to analyze the team atmosphere and the level of coherence. Items are available from the author upon request.

In order to validate the usage of the proposed measures, we conducted a series of commonly used test statistics. The confirmatory factor analysis (CFA) ensured convergent validity among the items as all items loaded on the respective factors. Cronbach's alpha, the average variance extracted (AVE) as well as the composite reliability (CR), have been calculated for all constructs with at least three items. With AVE $>.5$, CR $>.7$, and Cronbach's alpha $>.7$, all our constructs exceed the commonly accepted thresholds (Bagozzi et al., 1991). Meeting the Fornell & Larcker criterion (Fornell and Larcker, 1981), the square root of the AVE of each of the employed constructs exceeds the correlation of the respective measure with all other measures. For an overview please refer to Table 2.

 Insert Table 2 about here

While we collected data in two culturally different settings, measurement invariance had to be guaranteed for all reflective constructs. Performing this test is essential to rule out any biasing influences of variant measures which would render cross-cultural comparability impossible (e.g., Mullen, 1995). Following Steenkamp and Baumgartner (1998), we performed tests for configural invariance (the same pattern of factor loadings), metric invariance (equal factor loadings), and scalar invariance (equal intercepts). Configural invariance was confirmed as the model displayed a good model fit when the indicators loaded freely on the constructs (Vandenberg and Lance, 2000). In addition, at least partial metric and scalar invariance was assured for multi-item constructs as we realized a good fit of the data when partially constraining factor loadings (metric invariance) and in a next step partially constraining the intercepts (scalar

invariance) for all metric invariant items. These results allow us to compare the data of the German and Thai samples (Temme and Hildebrandt, 2009).

FINDINGS

Results of Hypothesis Testing

Overall model fit. We tested our hypotheses with the help of a multiple mediation structural equation model (SEM) (Anderson and Gerbing, 1988). According to several researchers, the SEM approach is particularly suitable to analyze multiple mediated models with latent variables (e.g., Iacobucci et al., 2007; Preacher and Hayes, 2008). In a first step, we examined the overall fit of the proposed research model. In line with academics such as Bagozzi and Yi (1988), Browne and Cudeck (1993), and Homburg and Baumgartner (1995), we evaluated our model against the generally accepted cut-off criteria and achieved a good overall model fit. The relative chi-square index (Wheaton et al., 1977) of 1.94 (CMIN = 215.14; df = 111) is below the recommended threshold of 2.0 (Tabachnick and Fidell, 2007). In addition, the baseline comparison indices (IFI = .948, TLI = .936, CFI = .947) as well as the root mean square error of approximation (RMSEA = .065) meet their respective threshold levels.

Direct effects. We then analyzed our proposed hypotheses as stated in our research model. Firstly, we investigated the direct effects of external openness on project speed and the mediating variables. Secondly, the indirect effects will be examined before thirdly, the moderating effect of national culture will be analyzed. H1 postulates a positive relationship between the degree of external openness and project speed. Our results support the relationship and direction ($\beta_{\text{Ext. openness} \rightarrow \text{project speed}} = .17, p < 0.05$). Next, we assessed the relationship between external openness and cross-functional integrative processes, thereby finding support for H2a ($\beta_{\text{Ext. openness} \rightarrow \text{CFI}} = .38, p < 0.001$). Similar to H2a, H2b was also strongly supported by our data ($\beta_{\text{Ext. openness} \rightarrow \text{OCB}} =$

.42, $p < 0.001$), underlining the hypothesized positive relationship between external team members and OCB and helping behavior. Finally, we did not find supporting evidence for H2c, as our data provides insignificant results for the proposed negative relationship between external openness and team social cohesion. For an overview of the results of the direct effect please refer to table 3.

 Insert Table 3 about here

Mediation analysis. Analyzing the indirect effects within the multiple mediation model, we employed the method of bootstrapping to test whether CFI, as a central team process, as well as OCB and social cohesion as team psychosocial traits, do mediate the relationship between external openness and project speed. Bootstrapping is a nonparametric resampling procedure, based on which confidence intervals, estimates as well as standard errors can be calculated (Preacher and Hayes, 2008). We employed the bootstrapping method since it is particularly suitable when investigating multiple mediation models (Preacher and Hayes, 2008). By using the methodology to test hypothesis H3, our results reveal that external openness has a significant positive indirect effect on project speed through team processes and team psychosocial traits. In line with Zhao et al. (2010), it can be concluded that an indirect-only mediation exists when the indirect effect is significant and the direct effect is not. As the direct effect of external openness on project speed in the multiple mediation model is not significant in our data ($\beta_{\text{Ext. openness} \rightarrow \text{project speed}} = .02$, $p > 0.05$), the results support our proposed mediators and highlight that it is unlikely that we have neglected any major mediators in our model (Zhao et al., 2010). While the overall mediating role of team processes and psychosocial traits has been established, the next step goes one step further by questioning which team dimension actually fosters or causes the overall indirect effect. Following the recently proposed approach of Macho and Ledermann (2011),

named 'the phantom model approach', we tested the specific indirect effects of each mediator within the SEM model. Concerning the team process dimension, we analyzed the mediating role of CFI and found a significant indirect effect with $\beta_{\text{Ext. openness} \rightarrow \text{CFI} \rightarrow \text{Project speed.}} = .16, p < 0.01$. Contrary, OCB and social cohesion, as two team psychosocial trait dimensions, have no mediating role at the 95 percent confidence level as the indirect effects were non-significant ($\beta_{\text{Ext. openness} \rightarrow \text{OCB} \rightarrow \text{Project speed.}} = .04, p > 0.05$; $\beta_{\text{Ext. openness} \rightarrow \text{Social cohesion} \rightarrow \text{Project speed.}} = .03, p > 0.05$;) . Table 4 provides an overview of the results.

 Insert Table 4 about here

Moderation analysis. Finally, we performed a multiple group comparison among the German and Thai samples. The results of the nested model comparison in AMOS (Arbuckle, 2009), highlighted that there are structural differences within the SEM across the two countries ($\Delta\text{Chi}^2 = 22.30, \Delta\text{df} = 12, p = .03$). As highlighted in table 5, the results for H4a and H4b are in line with our hypotheses since the coefficients and significances for the effect of external openness on CFI and OCB are stronger in the German than in the Thai sample. In contrast, H4c was not supported by our data as the effect of external openness on team social cohesion was insignificant in both samples.

 Insert Table 5 about here

DISCUSSION

Interpretation and Implications for Research

The aim of this study is to shed light on the relationship between external openness, CFI team processes, team psychosocial traits (OCB and social cohesion) and NPD project speed.

Basing our analysis on the team effectiveness framework, thereby considering the mediating role of team processes and psychosocial traits, this study complements and extends NPD team level research.

Firstly, in line with hypothesis H1, we found strong support for the positive effect of external openness on project speed. This finding is in line with existing research on the topic of openness within the context of NPD (e.g., Kessler and Chakrabarti, 1996; Lazzarotte and Manzini, 2009). While most evidence considers the effect of openness on a firm or organizational level, we provide additional support for the relationship on team and project level.

Secondly, considering the direct effects of external openness on CFI processes, OCB, and social cohesion, we found partial support for our hypotheses 2a-c for the total sample. While both, CFI and OCB were influenced positively by the level of external openness, our data did not lend support for H2c as external openness has no significant relationship to team social cohesion. With respect to the effect on CFI and OCB, our results clearly point out that it is not sufficient to only look at the performance implications of external openness but also on the effect of openness on team processes and psychosocial traits. Having in mind this finding, we answer a call by Dahlander and Gann (2010), who point out that only few studies have focused on underlying processes compared to a higher number of studies which have concentrated on performance implications. Interestingly, when comparing the sizes of the effect of external openness on CFI and OCB respectively, both factors are strongly and to a similar degree influenced by a team's external openness. This finding highlights the need to not only consider the implications of a high level of external openness on practical team processes but to also thoroughly reflect on the impact of external team members on the psychosocial traits like OCB of the NPD team. Considering the insignificant effect of openness on social cohesion, the hypothesized negative effects which have been observed by other researchers (e.g., Dahlander and Gann, 2010) might have been offset by

the fact that external partners bring in knowledge and a sense of 'fresh air', which in turn can positively influence the working climate within the team. Moreover, it has to be taken into consideration that a majority of the surveyed NPD projects were high technology focused projects, which are generally more tacit knowledge intensive. From our point of view, team members in tacit knowledge intensive projects are more highly dependent upon the knowledge and the sharing of this knowledge than those in projects which have more explicit and formalized knowledge. Knowing this, it can be argued that the possible negative effects of working together with external partners with a different working attitude and culture, rather decreases in importance as the focus is clearly placed on ensuring a most effective acquisition, assimilation, transformation and eventually exploitation of the knowledge within the team. As such, the effect of different corporate cultures and working styles, which might be encountered in internally and externally staffed NPD teams, might be negligible when the task requires a high level of tacit and specialized knowledge which needs to be exchanged within the team.

Thirdly, we investigated the indirect effect of openness on project speed through the mediators CFI, OCB, and social cohesion (H3). The information that in the mediated model, external openness has no significant direct effect on project speed strengthens the relevance of team processes and psychosocial traits as key mediators within the overall team effectiveness framework (e.g., Zhao et al., 2010). Going one step deeper, the analysis of the specific indirect effects revealed that CFI is the central team process which acts as a mediator within the external openness and project speed relationship, while OCB and social cohesion as team psychosocial traits, do not have a mediating role in our model. These results clearly highlight that only by ensuring that team members actively engage in integrative processes such as formal and informal communication and information exchange, external openness influences project speed. Taking the perspective of the knowledge-based view, our results point out that not only the provision of

external knowledge is sufficient, but that it is eventually the communication and exchange of knowledge among the different internal and external partners which positively influences project speed. As such, integrative team processes are a key to leverage and to fully take advantage of the close collaboration with external partners within the NPD team.

Finally, we also analyzed the role national culture plays in the relationships of external openness on CFI, OCB, and social cohesion, by comparing our results across a German and Thai cultural setting. In line with our hypotheses for the effect of openness on CFI and OCB, our results underscore the notion that the positive effects are stronger in a German cultural context with a high level of individualism, than in a Thai context, which is characterized by a strong collectivistic attitude (e.g., Hofstede, 1983). Based on these results, we argue that the effect of having external team members in the team on team processes and team helping behavior is more pronounced in predominantly individualistic cultures, as the individuals are more 'open' to connect with external partners and focus more on achieving the given task than on building close personal relationships. Contrary, the advantage of having new external knowledge in the team, by including external partners, is less strongly leveraged in more collectivistic cultures as the organization internal team members focus more on relationship building than on a more transactional and task focused exchange of knowledge and helping other teammates. This approach, however, usually requires a long time period which is not always available in NPD projects. Having this in mind, our findings underscore the need to consider national culture, when trying to understand NPD team processes and team psychosocial traits (e.g., Garrett et al., 2006; Guo, 2008).

Managerial implications

Besides the stated research implications, this paper also offers interesting insights for practitioners in the area of new product development and team management in general. Our

results stress the benefits associated with including external team members in the development process of new products. This not only holds true for outcome variables such as performance or project speed, but also and foremost for team processes and team psychosocial traits such as OCB. Based on our analysis, the inclusion of external team members fosters integrative team processes as well as OCB and particularly helping behavior among the team members. When answering the question which external partners most strongly impact team integrative processes and psychosocial traits, we found out that customers and universities/research institutes had the strongest positive impact on CFI and OCB, while a close collaboration with suppliers only significantly fostered CFI and the inclusion of competitors had no significant impact on neither CFI nor OCB.

When project speed and speed to market is the primary target, this study proposes to focus on ensuring that integrative processes are in place as CFI is the major mediator in the external openness and project speed relationship. Notwithstanding the fact that OCBs can have positive performance implications on a number of outcome variables (Podsakoff et al., 2009), our results reveal that neither OCB nor social cohesion plays a mediating role in the stated relationship. Based on this, practitioners should clearly concentrate their time and resources on securing integrative processes in order to fully leverage the benefit of close collaboration with external partners on NPD project speed.

Finally, this study also provides insights to practitioners who are working on an international or global scale. Our results clearly point out that national culture impacts the relationship between external openness and team processes and psychosocial traits. While the effect of openness on CFI and OCB is stronger in a national culture such as Germany, which is highly individualistic, the effect is smaller for the case of CFI and even insignificant for OCB in more collectivistic cultures like Thailand. Knowing that external partner collaboration does not

necessarily lead to OCB or helping behavior within the team in more collectivistic cultures, can be an important insight for project leaders who are not used to work in such cultural contexts.

Limitations and Avenues for Further Research

The present paper has certain limitations which offer insightful avenues for further research. Firstly, concerning the regarded team outcome variable, we selected project speed. Certainly, other team level consequences such as innovativeness, overall performance, or product quality could be additional factors to be considered within the described research model. This would further prove the legitimacy of openness and open innovation to be considered as an important field of research (Lichtenthaler, 2011; Van De Vrande et al., 2009).

Secondly, referring to the overall team effectiveness framework, it would be interesting to consider the level of external openness on team processes and psychosocial traits in connection with other team design factors such as organizational structure and/or organizational culture. In addition, other contingency factors like the analysis of a specific industry type or level of environmental uncertainty could further detail the results of this cross-industry study.

Thirdly, while this study provided a two-country comparison on the effect of external openness on team processes and psychosocial traits, additional work is needed to fully understand the implications and influences national culture has on the described relationships. A more nuanced and balanced picture will emerge once more cultural contexts and cultural dimensions are explicitly included in the analysis. Moreover, even though Hofstede's dimensions are widely employed in research, they have also faced some criticism from researchers (e.g., Ailon, 2008; Morgeson et al., 2010). We therefore encourage researchers to use additional cultural concepts such as the GLOBE study.

To conclude, this study analyzed the effect of external openness and the resulting inclusion of external team members in the NPD team on cross-functional integrative team processes, team psychosocial traits and project speed within the overall team effectiveness framework. Our results point out the strong positive influence of external openness on CFI team processes and psychosocial traits such as OCB. Moreover, CFI has been established as a key mediator within the relationship between openness on project speed. Finally, we also provided insights on the impact of national culture on the postulated relationships. We wish to encourage more research in this field of literature to foster the effectiveness of NPD teams and to increase the odds for new product success.

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APPENDIX

TABLES AND FIGURES

Figure 1. Overview of the conceptual model examined

Table 1: Sample composition (total sample n=225 NPD projects)

Industry	GER	THA	Total
Automobile	19.9%	10.1%	16.4%
Biotechnology/ Chemicals/Healthcare	14.4%	10.1%	12.9%
Construction/ Real Estate	5.5%	8.9%	6.7%
Consumer Goods/ Food industry	15.1%	21.5%	17.3%
Electrical Industry	8.9%	2.5%	6.7%
Energy/Natural Resources	2.7%	8.9%	4.9%
Engineering	15.1%	7.6%	12.4%
Media/IT/Tele-communications	7.5%	8.9%	8.0%
Transport/Logistics/Retail	1.4%	12.7%	5.3%
Other	9.6%	8.9%	9.3%
Industry Type			
Producing	86.3%	62.0%	77.8%
Service	13.7%	38.0%	22.2%
Technology intensity			
High Tech	65.8%	70.9%	67.6%
Low Tech	34.2%	29.1%	32.4%

Position of respondent	GER	THA	Total
Managing director	6.8%	8.9%	7.6%
Head of department/ Project Leader	91.7%	75.9%	85.8%
Other staff	1.5%	15.2%	6.6%
Organization size (number of employees)			
<50	10.4%	7.7%	9.5%
50-99	10.4%	19.2%	13.5%
>99	79.2%	73.1%	77.0%
Project budget (in Euro)			
< 50.000	24.8%	19.0%	23.0%
< 250.000	26.3%	12.1%	22.0%
> 250.000	48.9%	69.0%	55.0%
Project duration (in months for three phases of concept dev., product dev. & launch)			
< 12 months	26.7%	63.2%	39.2%
< 36 months	56.2%	25.0%	45.5%
> 36 months	17.1%	11.8%	15.3%

Table 2: Correlation, statistics and square root of AVE in diagonal

	1	2	3	4	5
Constructs					
1. External openness	.84				
2. CFI	.37	.86			
3. OCB	.40	.57	.71		
4. Social cohesion	.10	.42	.59	.84	
5. Project speed	.17	.41	.34	.35	.74
Statistics					
Mean	3.346	4.715	4.664	5.609	3.797
SD	1.151	.948	1.390	1.009	1.760
AVE	.71	.75	.50	.71	.55
Composite reliability	.88	.90	.83	.88	.79
Cronbach's alpha	.87	.89	.83	.88	.78

N = 225

Table 3: Overview of direct effects of team composition on CFI and CFI on team outcomes

		Stand. Coefficient (Beta)	Regression Weight	Stand. Error
Model 1 (only direct effect)				
H1	Ext. openness → Project speed	.17*	.24	.11
Model 2 (multiple mediation model)				
H2a	Ext. openness → CFI	.38***	.33	.07
H2b	Ext. openness → OCB	.42***	.43	.09
H2c	Ext. openness → Social cohesion	.12	.11	.07
	CFI → Project speed	.30**	.47	.15
	OCB → Project speed	.06	.09	.16
	Social cohesion → Project speed	.21*	.31	.16
	Ext. openness → Project speed	.02	.03	.12

Note: N = 225; * p < .05; ** p < .01; *** p < .001. Two tailed significances.

Table 4. Specific indirect pathways using bootstrapping

		Bootstrapping		BC 95% CI		
Indirect Effects		Estimate	SE	Lower	Upper	p
<i>Total indirect effect</i>						
H3	Ext. openness → CFI/OCB/Social → Project speed	.226	.087	.073	.412	.004
<i>Specific indirect effects</i>						
	Ext. openness → CFI → Project speed	.156	.065	.049	.317	.002
	Ext. openness → OCB → Project speed	.037	.079	-.121	.197	.626
	Ext. openness → Social → Project speed	.034	.032	-.005	.136	.091

Note: N = 225, BC = bias corrected; CI = confidence interval. Entries represent unstandardized coefficients. Two tailed significances.

Table 5. Moderation effect of national culture on the relationship between external openness and team processes and psychosocial traits

		Stand. Coefficient (beta)	Regression Weight	Stand. Error
Germany (n = 146)				
H4a	Ext. openness → CFI	.44***	.52	.12
H4b	Ext. openness → OCB	.42***	.68	.16
H4c	Ext. openness → Social cohesion	.18	.22	.12
Thailand (n = 79)				
H4a	Ext. openness → CFI	.33**	.26	.10
H4b	Ext. openness → OCB	.32	.18	.10
H4c	Ext. openness → Social cohesion	-.01	-.01	.12

Note: N = 225; * p < .05; ** p < .01; *** p < .001. Two tailed significances.