

The impact of time pressure on knowledge transfer effectiveness in teams: trust as a critical but fragile mediator

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Abstract

Purpose – With faster innovation and shorter product cycles, time pressure is a highly relevant factor affecting contemporary business processes. This study aims to extend prior research on the effects of velocity at the firm level by considering the effect of time pressure on knowledge transfer effectiveness (KTE) on the team level and the role of trust as a mediator of this effect.

Design/methodology/approach – We empirically assess the impact of time pressure on knowledge transfer effectiveness in teams. Further, we test the mediating effect of trust on this relationship. We study a sample of 285 project teams applying partial least squares structural equation modeling (PLS-SEM).

Findings – The authors find that time pressure is negatively associated with KTE. Moreover, trust among team members has a complementary mediating effect on this relationship. Thus, while trust is urgently needed for enhancing KTE under time pressure, time pressure reduces trust-building too.

Research limitations/implications – This study establishes empirically the importance of time pressure and trust as drivers of KTE in teams. The contribution connects the field of knowledge management to important streams in the wider business literature: organization studies, management, strategic management, project management, innovation etc. Whereas the model is parsimonious, it has high explanatory power and high generalizability to other contexts.

Practical implications – Team managers should take care to allow enough time for knowledge transfer within the team. This is particularly important when knowledge sharing is central, e.g. in innovation, development and change processes. If this is not possible, measures should be taken to maintain trust among team members.

Social implications – Effective knowledge management enhances the performance of business entities and public-sector organizations alike. Today, both the private and public sectors are under considerable pressure to increase both efficiency and effectiveness. Effective knowledge transfer within teams is a core capability to achieve this goal. More effective organizations result in more competitive private firms, more employment opportunities and improved public services to citizens.

Originality/value – Time pressure is an increasingly relevant factor in contemporary business but so far little explored in research. This study extends current knowledge by considering the effect of time pressure on KTE.

Keywords Teams, Knowledge transfer, Trust, Time pressure, Knowledge transfer effectiveness, Knowledge

Paper type Research paper

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Introduction

Time pressure has long been recognized as a feature of modern-day business (Eisenhardt, 1989; McCarthy *et al.*, 2010; Takeuchi and Nonaka, 2004). Across industries, firms are facing faster innovation and shorter product cycles, forcing businesses to adjust continuously. So far, the impact of time pressure has been explored primarily in the strategy literature, notably in the research stream on high-velocity

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environments (Bourgeois and Eisenhardt, 1988; Halebian and Finkelstein, 1993). This research has highlighted the added requirements for effective internal communication and information-processing in the face of “rapid and discontinuous change across multiple dimensions” (Li *et al.*, 2019, p. 212). Whereas the velocity literature assesses the impact of volatile, fast-paced settings at the firm or executive-management levels, the literature has so far devoted scant attention to the consequences of time pressure at the *meso*-level of the firm. We only possess a vague understanding of the influence of time pressure on team-level outcomes. Specifically, little research is published on the effect of time pressure on intra-team knowledge transfer effectiveness (KTE) (Shekhar, 2016) which can be essential for firms’ performance and competitiveness (Argote and Ingram, 2000; Grant, 1996; Kogut and Zander, 1992; Nonaka and Takeuchi, 1995). This paper seeks to address this knowledge void by assessing empirically the impact of time pressure on KTE within teams. In line with Maruping *et al.* (2015), we are here concerned with “perceived time pressure” measured at the group level. Further, “knowledge-transfer effectiveness” is understood as the successful exchange of knowledge among team members (Argote and Ingram, 2000; Shen *et al.*, 2015; Tasselli, 2015).

Team collaboration is based on the repeated interaction of team members which can result in team cohesion and the development of trust (Stahl *et al.*, 2010). Trust is a prevalent concept for explaining organizational outcomes (Kramer, 1999; McAllister, 1995), including KTE (Wu *et al.*, 2007; Zapata Cantu and Mondragon, 2016). Trust has been defined as “the willingness of a party to be vulnerable to the actions of another party” (Mayer *et al.*, 1995, p. 712). Trust can represent a team-level capacity (Fischer *et al.*, 2020; Mayer *et al.*, 1995; Rousseau *et al.*, 1998). While trust is likely to reinforce team-level KTE in high-velocity contexts, trust itself may become subject to attrition as time pressure builds. Accordingly, we present and assess a model where trust mediates the association between time pressure and KTE at the group level. Our research questions are:

RQ1. How does time pressure affect KTE?

RQ2. How does trust mediate the relationship between time pressure and KTE?

By answering these questions, our study seeks to contribute to the literature in knowledge management by studying the increasingly prevalent issue of time-pressure and its effects on KTE.

Our work proceeds as follows. The next section sketches the conceptual foundations of KTE, trust and time pressure, and combines these concepts to derive a set of hypotheses. Thereafter, the research design, data collection and methods will be described. Then follow the presentation and discussion of the empirical results. We conclude with a summary of the main findings and their implications for practice.

Hypotheses development

Knowledge transfer effectiveness

Knowledge transfer can be defined as “the exchange of ‘facts, experiences, and insights’ from one person to another” (Tasselli, 2015, p. 843). In the literature, there are occasional discussions over definitions of knowledge transfer and related concepts (Tangaraja *et al.*, 2016). Nonetheless, in line with previous research, we understand knowledge transfer to be largely identical with knowledge sharing, knowledge exchange and similar constructs (Foss *et al.*, 2010; ZadJabbari *et al.*, 2010). Our notion of knowledge accommodates both tacit and explicit knowledge (Nonaka, 1994; Polanyi, 1966). Further, the literature distinguishes between structured (i.e. planned) and unstructured (i.e. spontaneous) knowledge transfer (Chen *et al.*, 2010). Both these forms are used in project teams, and both contribute to KTE (Shen *et al.*, 2015). Hence, in this article, we understand knowledge transfer in the aggregate sense. KTE is different from knowledge-transfer efficiency, insofar as the former

denotes the degree to which knowledge transfer is attained, whereas the latter focusses on the economy of the transfer in terms of time and costs (Pérez-Nordtvedt *et al.*, 2008). In this study, we are solely concerned with KTE, i.e. the success of knowledge-transfer activities as perceived by participants.

Existing research has mainly studied KTE between firms (Pérez-Nordtvedt *et al.*, 2008) and at the firm level (Jensen and Szulanski, 2007; Ambos and Ambos, 2009; Iyengar *et al.*, 2015). Research on KTE on the team-level and within teams is scarce. In their study on knowledge transfer between project teams, Ren (2018) found that the degree of similarity of projects positively affects inter-project communication and transfer intention, and that both variables enhance KTE. The urgency (a synonym for time pressure) and temporality of projects negatively influence inter-project communication.

Recently, research started looking at intra-team knowledge transfer. Ali *et al.* (2018) considered knowledge sharing within project teams. They identified knowledge sharing as an antecedent of project absorptive capacity which in turn increases project performance. These effects are moderated by social processes such as trust and proximity. Chen *et al.* (2020) analysed how the degree of a team's virtuality affects KTE. They established and empirically tested a model with a sequence of virtuality, a transactive memory system (mediator), an open communication climate (mediator) and KTE. Bjorvatn and Wald (2020) studied the antecedents of KTE in international teams. They found that geographical distance and cultural diversity of team members impede KTE. We build on this stream of research and aim to extend knowledge on the antecedents of KTE by studying the role of time pressure and trust.

Trust

Here, we adhere to Mayer *et al.*'s (1995: p. 712) definition of trust as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party". The notion of trust has been explored from a range of perspectives. Mayer *et al.* (1995) discuss ability, benevolence and integrity as antecedents of trust. In a separate taxonomy, Rousseau *et al.* (1998) specify deterrence-based, calculus-based, relational and institution-based forms of trust. Moreover, trust can be asymmetric, context-sensitive and evolve over time (Schoorman *et al.*, 2007). Further, in a more recent stream of research, scholars distinguish between cognitive and affective trust (Fischer *et al.*, 2020; McAllister, 1995; Schoorman *et al.*, 2007). Both types of trust are found to positively influence knowledge sharing between departments. Whereas these aspects of trust are distinct and occasionally drive unique outcomes (Fischer *et al.*, 2020), they are interrelated and often seen as shades of one and the same construct (Mayer *et al.*, 1995; McAllister, 1995). Accordingly, for the present purpose, and in line with a number of influential contributions (Dirks and Ferrin, 2001), we treat trust as a unidimensional construct signifying a willingness to be vulnerable to the actions of another party (Mayer *et al.*, 1995). Notably, Rousseau *et al.* (1998) find this conceptualization to be widely acknowledged by trust researchers across disciplines.

Trust is a critical component for intra-team coordination and cooperation. Indeed, trust matters most in circumstances associated with complexity, absence of hierarchies and strong interdependencies (Ping Li, 2012), the very circumstances that are identified as characteristic of project teams (Lundin and Söderholm, 1995; Packendorff, 1995).

Politis (2003) finds broad evidence that trust is an antecedent of knowledge acquisition in teams, a construct closely related to our notion of KTE in teams (Mykytyn *et al.*, 1994). In an empirical study on interdepartmental knowledge sharing, Yuan *et al.* (2020) consider institution-based trust and interpersonal trust as antecedents of knowledge sharing success and satisfaction. In a recent study of knowledge workers in virtual organizations, Shekhar (2016) determines trust as the single most important factor for effective knowledge transfer.

This positive relationship is validated by earlier research. For example, trust enhances information sharing (Butler, 1999; Renzl, 2008), facilitates the receipt of useful knowledge (Levin and Cross, 2004) and enhances knowledge sharing (Chen and Hung, 2010; Sankowska, 2013) and KTE (Zapata Cantu and Mondragon, 2016). However, the effect of trust on knowledge transfer can also be contingent on context factors, such as causal ambiguity, as shown by Szulanski *et al.* (2004). Of specific relevance to our study, as evidenced by Ko (2014), trust fosters KTE in project teams. Thus, formally:

H1. Trust is positively associated with KTE in teams.

Time pressure

In the following, we shall consider the effects of time pressure on, first, intra-team KTE and, second, on team-level trust. A distinction is made between time constraints and time pressure. Whereas time constraint is present whenever there is a deadline, “time pressure indicates that the time constraint induced some feeling of stress and created a need to cope with the limited time” (Ordonez and Benson, 1997, p. 122). Consistent with Maruping *et al.* (2015, p. 1315), we define “time pressure” as “the perception that there is a scarcity of time available to complete a task, or set of tasks, relative to the demands of the task(s) at hand”. “Time pressure” has been assessed at the individual level (Putrevu and Ratchford, 1997). Here, however, we align ourselves with prior research at the group level. Notably, Maruping *et al.* (2015, p. 1316) conceptualize time pressure as “a shared property of the team that originates from the common experiences and perceptions of team members”.

Team performance and behaviour is affected by the time pressure experienced by its members (Hwang, 1994; Khedhaouria *et al.*, 2017). A negative effect of time pressure on group task performance has been attributed to fewer opportunities for joint goal-setting, problem-solving and bargaining among team members (Kelly and McGrath, 1985). Specifically, knowledge transfer is difficult and time-consuming (Kogut and Zander, 1992; Szulanski, 2000). Indeed, research has long established that time pressure inhibits communication and the exploration of others’ needs (Yukl *et al.*, 1976). Time pressure results in reduced information search and superficial information processing (De Dreu, 2003; Van Bruggen *et al.*, 1998). Nonetheless, despite these insights, and despite the topic’s relevance to management, the temporal aspect of knowledge transfer has been relatively little considered in the business literature. For example, in a Delphi study, Duan *et al.* (2010) record no time-related variables among 24 factors identified to affect transnational knowledge transfer. Nevertheless, in a qualitative study on online environments, Hew and Hara (2007) established a lack of time as the most common barrier to sharing knowledge. Similarly, in his study of virtual organizations, Shekhar (2016) determines a strong negative association between time constraint and KTE.

More recently, knowledge management scholars have turned their attention to the construct of time pressure. In a study of buyer–supplier relationships, Thomas *et al.* (2011) establish that time-pressure coping mechanisms inhibit KTE by reducing information exchange, operational knowledge transfer activities and shared interpretation. In an experimental setting, Connelly *et al.* (2014) found perceived time pressure to be negatively associated with knowledge sharing. A content-analysis study performed on 103 knowledge management articles concludes that the perceived time available is the foremost barrier to knowledge-seeking behaviour (Cleveland and Timothy, 2015). Similarly, time pressure is associated with knowledge hiding (Škerlavaj *et al.*, 2018). Thus, the emerging business-related research on time pressure is aligned with the broader academic literature in predicting that:

H2. Time pressure is negatively associated with KTE in teams.

Conspicuously, very little prior research has considered the effect of time pressure on trust, reflecting the general paucity of research on the temporal dimensions of management and

organization (Ancona *et al.*, 2001; Karau and Kelly, 1992). In his review of trust-related research, Kramer (1999) does not refer to any temporal aspects as antecedents of trust. Nonetheless, applying a distinct but related variable, research has associated time scarcity with a reduction in social and non-task activities (Karau and Kelly, 1992). Consequently, as *relational trust* arises from repeated interactions between people over time (Rousseau *et al.*, 1998), a drop in interpersonal attention and involvement is likely to impede team-level trust-building. Equally, dependability and reliability tend to be confirmed over time (Ridings *et al.*, 2002), thus reinforcing mutual trust (Mayer *et al.*, 1995). At the individual level, Acar-Burkay *et al.* (2014) find that trust in strangers decreases with time pressure. Studying group-level outcomes, Maruping *et al.* (2015) identify time pressure as an obstacle to a team's interpersonal processes, among which trust is one aspect. Although less explored than time pressure's effect on KTE, prior studies do suggest that time pressure has a similar, negative effect on trust. Formally:

H3. Time pressure is negatively associated with trust in teams.

Mediation effect of trust

Mediational designs are central to determining causal relationships and theory development (Memon *et al.*, 2018). Following recent guidelines (Rungtusanatham *et al.*, 2014), we explicitly hypothesize the mediation effect. In its simplest form, mediation can be understood as the presence of a third variable that accounts for the relation between the independent and the dependent variables (Baron and Kenny, 1986). In this study, trust represents the mediating variable. We predict that the direct effect of time pressure on KTE is negative (see H2). Further, we hypothesize that time pressure has a similar negative effect on trust (see H3), but that trust influences KTE positively (see H1). Accordingly, the predicted relationships of H1–H3 above amount to so-called complementary mediation (Zhao *et al.*, 2010) insofar as the direct effect and the mediated effect in the research model point in the same direction (in our case both are negative). Hence (Figure 1):

H4. Trust exercises a complementary mediation on the relationship between time pressure and KTE.

Method

Measures

All measures and their items are presented in Table 1. KTE is represented by Shen *et al.*'s (2015) five-item measure. All items refer to the extent to which knowledge was transferred successfully within the project, as assessed by project participants. Nuances in the scale relate to the quality of the transferred knowledge, the process itself and the results of knowledge-transfer activities. Accordingly, the concept of effective knowledge transfer is intended to be taken at face value and assumed to be immediately understood by

Figure 1 Research model

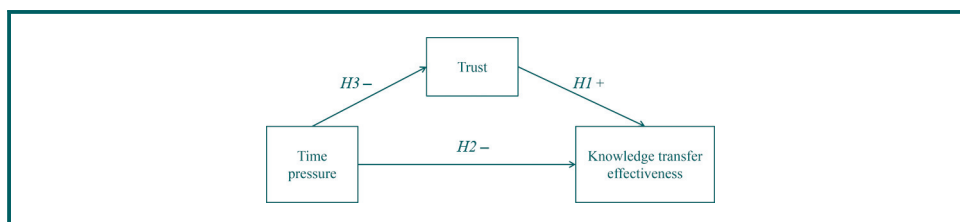


Table 1 Internal consistency reliability and convergent validity

Variables (Cronbach's alpha; composite reliability; AVE)	Questionnaire items ("1" = strongly disagree, "7" = strongly agree)	Outer loadings	p-value
Time pressure (0.928; 0.882; 0.656)	Project participants were often under a lot of pressure to complete their tasks on time	0.802	<0.001
	Project participants were not afforded much time to complete their tasks	0.874	<0.001
	The amount of time provided to complete tasks was short	0.891	<0.001
	Task durations were often short	0.649	<0.001
Trust (0.831; 0.887; 0.663)	...I assumed that project participants would always look out for each other's interests	0.827	<0.001
	...I assumed that everyone would go out of their way to make sure other project participants were not damaged or harmed	0.838	<0.001
	...I believed that all other project participants approached their job with professionalism and dedication	0.847	<0.001
	...given their track record, I saw no reason to doubt the competence and preparation of the other project participants	0.741	<0.001
KTE (0.828; 0.946; 0.777)	The quality of the knowledge transferred within the project was satisfactory	0.849	<0.001
	The process of knowledge transfer between project participants was satisfactory	0.910	<0.001
	Project participants thought that the knowledge transfer between themselves was successful	0.863	<0.001
	The results of the knowledge transfer activities within the project were very good	0.870	<0.001
	The results of the knowledge transfer activities in the project satisfied project participants	0.913	<0.001

respondents. Used as a dependent variable, the scale consistently yields adequate values for reliability and convergent validity, it is simple and readily understood by respondents while, at the same time, retaining the construct's conceptual content (Argote and Ingram, 2000; Tasselli, 2015). Although less well defined, *trust* remains a key concept in management and organization research (Mayer *et al.*, 1995). Building on Levin and Cross' (2004) discussion of trust as an antecedent of KTE, we also draw on their measure for our four-item scale for intra-team trust. Consistent with prior research (Ko, 2014), the measure encompasses both benevolence- and competence-based trust. All four items of the measure reflect the notion that trust involves relying on other people's actions and words (Dirks and Ferrin, 2001; Rousseau *et al.*, 1998; Tsai and Ghoshal, 1998). Thus, Mayer *et al.*'s (1995) definition of trust that we apply in this study, is in line with central texts on the subject. Maruping *et al.*'s (2015) four-item measure for *time pressure* was applied. Accordingly, time pressure is seen as "a shared property of the team that originates from the common experiences and perceptions of team members" (Maruping *et al.*, 2015, p. 1316). All items refer to a perceived scarcity of time available to complete a task. This measure corresponds closely with other scales in the literature (Putrevu and Ratchford, 1997). To assess the constructs, respondents used a seven-point Likert scale where 1 indicated "strongly disagree" and 7 indicated "strongly agree".

Data collection

Prior to the survey, a pilot study involving 20 respondents with similar demographic profiles as in the main study was undertaken. The pilot study prompted the researchers to make minor adjustments to their survey instrument. Subsequently, a survey was conducted, drawing on Scandinavian databases involving three industrial associations and three public-sector agencies. A similar sampling procedure was chosen by Hanisch and Wald (2014) and Tyssen *et al.* (2014). Aiming for a diverse sample, we targeted teams of all sizes in private business, the public sector and among non-governmental organizations. All six databases included information regarding projects, including names of project focal points and their contact details. As projects include clearly identifiable teams, this feature allowed

us to access practitioners with personal work experience in teams and, thus, to obtain expert assessments of our questionnaire items. During the period January–May 2017, a total of 3,544 dual-language (Norwegian and English) questionnaires were distributed by e-mail. Only one invitation to participate was sent to each contact person. Moreover, two industrial associations posted an announcement with a link to the survey on their websites. Respondents were guaranteed anonymity. Whereas this provision addresses an ethical concern in survey studies and may have enhanced the response rate, it precluded an assessment of non-response bias. The survey yielded complete responses from 285 individuals, representing a response rate of 8%. This response rate is similar to other survey studies applying analogous data-collection methods (Lindner and Wald, 2011).

Most respondents work on international project teams. Accordingly, the sample includes respondents in 32 countries on all continents. In total, 196 teams had members in more than 2 countries, while 89 teams were purely domestic. A total of 16 teams relate to the non-governmental sector, 114 to the public sector and 66 teams to the private sector. Similarly, the distribution of team roles among respondents was diverse: 182 respondents (64%) were project managers, 69 respondents (24%) were team members and 34 respondents (12%) had other functions on the team. Team sizes varied from 3 persons to over 100. The mean team size was 36.3 and the median was 20 persons. Similarly, the teams were diverse in their composition. Representation varied from team membership from one single organization to more than one hundred different organizations. The mean team configuration was 11.2 organizations and the median was 6 organizations. With respect to budget size, the projects ranged from US\$1,500 to US\$2bn. The duration of the projects varied between one month and more than eight years. The mean duration was 31.5 months and the median was 32 months.

Respondents were asked to relate their evaluation to any project team of their choice. Consistent with the study's level of analysis, respondents were requested to consider the entire team. Perceptual measures are suitable when objective data are not available and generally satisfy the requirements of reliability and validity (Ketokivi and Schroeder, 2004). No global register of projects or teams exists. Therefore, it is not possible to generalize the results of the survey statistically to a population. Nonetheless, *external validity* can be assumed with regard to similar contexts, i.e. with regard to comparable measures, persons, settings and times (Calder *et al.*, 1982; Lynch, 1999). The sample's diversity with respect to country, sector and team characteristics reduces the likelihood of systematic error because of respondent features or team context. In the method section below, we report test results for endogeneity and unobserved heterogeneity.

The possibility of common method bias was addressed in an auxiliary survey akin to Tatikonda and Rosenthal (2000). Applying a snowball design, a second team member was requested to assess all endogenous constructs. This allowed comparisons with the scores provided by the primary respondent. The procedure yielded 58 secondary responses, which corresponds to 20% of the main sample. Using the full set of indicators in the auxiliary survey ($N = 40$), paired-samples correlation tests demonstrated that 43 of the 58 respondent pairs were strongly correlated ($r > 0.50$, $p < 0.05$). Nine pairs displayed medium-level correlation ($r > 0.30$, $p < 0.05$) (Cohen, 1988). Only six pairs were not statistically correlated at the $p < 0.05$ significance level, allowing us to rule out the possibility of common method bias. Equally, Harman's single-factor test indicated that 29.3% of the variance is explained by one factor. As this value is lower than 50, common-method bias is unlikely to be present in the sample.

Results

The data were analysed using partial least squares structural equation modelling (PLS-SEM), applying the SmartPLS 3 software (Ringle *et al.*, 2015). The technique is superior to

covariance-based SEM when the study has a predictive aim (Bagozzi and Yi, 2012; Hair et al., 2019). Similarly, when mediation is present in the research model, PLS-SEM performs better than regression analysis (Hair et al., 2019). Relevant to our study, PLS-SEM has recently been exploited in project management studies (Bjorvatn and Wald, 2018; Hair and Sarstedt, 2019) as well as in knowledge management research (Cepeda-Carrion, 2019).

We start by assessing the measurement model. The relevant indicators and values are displayed in Table 1. First, all item loadings are above 0.708 but for one (0.649), suggesting adequate item reliability. Next, internal consistency reliability is established for the three latent constructs, which all display Cronbach's alpha and composite reliability scores between 0.70 and 0.95. Further, we establish convergent validity with average variance extracted (AVE) well above the lower threshold of 0.50 for each of the latent variables. Finally, discriminant validity is determined for the latent variables. Applying the heterotrait–monotrait ratio of the correlations, values are comfortably below the conservative upper bound of 0.85.

As for the structural model, we first discard any concerns about collinearity (i.e. any variance inflation factor [VIF] values above 5). In our structural model, all indicators display VIF values below 4. With R^2 values of 0.246 for KTE and 0.017 for trust, the model possesses relatively strong predictive power insofar as two exogenous variables are able to explain one-fourth of a complex organizational process (i.e. KTE) (Hair et al., 2019). Indeed, trust has an f^2 effect size of 0.238 ($p = 0.001$), indicating that the R^2 value of KTE will be substantially reduced if trust is removed from the model. Moreover, applying blindfolding (Chin, 1998), a Stone–Geisser's Q^2 value of 0.184 for KTE suggests medium predictive accuracy of the model (Hair et al., 2019). Further, following Shmueli et al.'s (2019) guidelines for *PLSpredict*, we establish that the model has high out-of-sample predictive power. Path coefficients with their corresponding p -values are displayed in Table 2. All path coefficients are statistically significant at the 0.05 level. The strongest effect is 0.427 between trust and KTE. Time pressure yields negative effects on both KTE (-0.202 , $p < 0.001$) and trust (-0.131 , $p = 0.033$). The indirect effect is understood as the difference between the total and direct effects (Nitzl et al., 2016). It is computed as the product ($a \times b$) of the path coefficients between time pressure and trust ($a = -0.131$) and between trust and KTE ($b = 0.427$). Consistent with contemporary practice, bootstrapping was preferred over the older Sobel test to assess the statistical significance of the mediation (Memon et al., 2018; Preacher and Hayes, 2008). Accordingly, a statistically significant, negative mediating effect is established (-0.056 , $p = 0.036$).

In contrast to covariance-based SEM, tests of goodness-of-fit are not commonly undertaken in PLS-SEM (Hair et al., 2019). Moreover, endogeneity issues are less relevant in studies with a primarily predictive objective such as ours, which is aimed at “deriving managerial recommendations” (Hult et al., 2018, p. 5; Shmueli and Koppius, 2011). Nonetheless, as national-culture diversity has been shown to affect KTE (Bjorvatn and Wald, 2020), we explicitly controlled for this variable. No such effect was established. Similarly, controlling for team size, project-budget size and economic sector, no association with the dependent variable was determined. Thus, endogeneity seems not to be a concern. Further, in support of the validity of the above results, applying the finite mixture PLS technique (Hahn et al.,

Table 2 Path coefficients

Exogenous	Variables		Path coefficients (p -value)		
	Endogenous	Direct	Indirect	Total	
Trust	KTE	0.427 (<0.001)		0.427 (<0.001)	
Time pressure	KTE	-0.202 (<0.001)	-0.056 (<0.036)	-0.258 (<0.001)	
Time pressure	Trust	-0.131 (0.033)		-0.131 (0.033)	

2002; Sarstedt *et al.*, 2011) gave no indication of unobserved heterogeneity in the structural model relationships.

Discussion

Theoretical implications

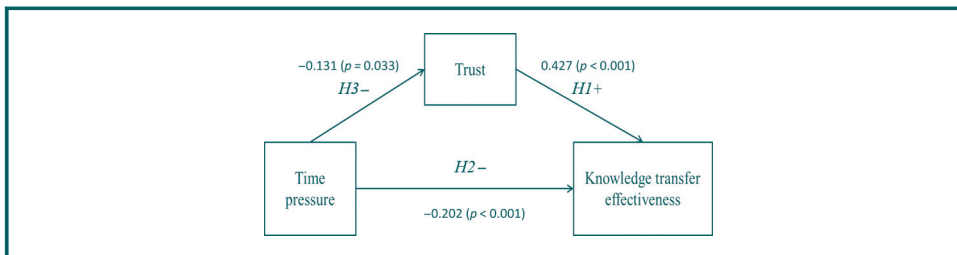
In this paper, we have extended our understanding of time pressure and its effects on KTE in teams. Time pressure is an increasingly relevant factor in contemporary business but so far little explored in the academic literature. We found all four hypotheses supported by the data. Trust is positively and very strongly associated (0.427, $p < 0.001$) with KTE ($H1$ supported). This is in line with findings in contexts such as virtual organizations (Shekhar, 2016), dyadic knowledge exchange (Levin and Cross, 2004), knowledge transfer within not-for-profit organizations (Zapata Cantu and Mondragon, 2016), professional virtual communities (Chen and Hung, 2010) and knowledge sharing in teams (Staples and Webster, 2008; Renzl, 2008). Thus, we corroborate earlier research in this regard (Figure 2).

Knowledge transfer can be time-consuming and entail difficult information search and processing. Under time pressure, these processes may be abbreviated resulting in a suboptimal quality of knowledge (De Dreu, 2003). Therefore, $H2$ postulated a negative association of time pressure and KTE. This is empirically supported by our data, which revealed a significant negative association (-0.202 , $p < 0.001$) between time pressure and KTE within teams. The literature so far mostly considered time pressure on the individual level where it was found to reduce individual knowledge contributing behaviour (Wasko and Faraj, 2000; Connelly *et al.*, 2014) and limit knowledge sharing (Keegan and Turner, 2001). Our results reveal that these individual effects seem to aggregate to the team level.

Similarly, time pressure is negatively associated with trust (-0.131 , $p = 0.033$; $H3$ supported). This finding is important insofar as the negative effect of time pressure on intra-group trust is not extensively documented in previous research. Based on the above, we determine that trust represents a complementary mediation of the relationship between time pressure and KTE (-0.056 , $p = 0.036$; $H4$ supported). The total effect of time pressure on KTE is -0.202 (direct effect) plus -0.056 (indirect effect) = -0.258 ($p < 0.001$). Thus, around 20% (i.e. -0.056 of -0.258) of the impact of time pressure on intra-team KTE relates to a reduction in interpersonal trust. This mediating association has not been previously reported, it is non-trivial and it has direct practical implications and points to a paradox. In the fast pace of contemporary business, trust-building among team members is hindered by time pressure, but at the same time trust is urgently needed to enhance intra-team KTE. This can be explained by the time-consuming trust-building process which requires repeated interaction of team members (Mayer *et al.*, 1995; Weber *et al.*, 2005).

In summary, our results document the relevance of time pressure in contemporary business operations, where team-based work is ubiquitous. Specifically, the effect of time pressure on KTE is relevant given the predominance of service- and knowledge-based industries in contemporary economies. From a theoretical point of view, our study offers empirical

Figure 2 Empirical model



documentation of these relationships. The present research addresses a persistent knowledge void insofar as the effect of time pressure on group-level outcomes remains an under-researched area. Equally, our study contributes to theory by establishing the central, albeit fragile, role of trust in generating effective knowledge transfer within teams.

Practical implications

Time pressure constitutes a major threat to KTE in teams. Notably, time pressure can jeopardize team outcomes that rely on effective knowledge sharing, such as innovation, product development, market-entry and organizational change – central processes in today's dynamic work environment. At the same time, intra-team trust can mitigate the negative effect of time pressure. Accordingly, if time pressure cannot be reduced, teams that rely on knowledge sharing should take care to maintain, and – if possible – strengthen, trust among its members. The fact that team-level trust can itself decline under time pressure presents a specific challenge to managers. Accordingly, our study adds to the practitioner-oriented research on trust and knowledge sharing (Abrams *et al.*, 2003).

The research also has implications for policy at the macro-economic level. As demonstrated by Schoper *et al.* (2018), in Western economies, project teams account for approximately one-third of work in terms of person-hours, thus representing a major share of a nation's gross national product. In consequence, even minute improvements in KTE in project teams can have vast economic implications at the corporative and national levels. Governments can facilitate the realization of such benefits by supporting research and education in the fields of knowledge management, project management and team management.

Limitations and future research

Our study is cross-sectional and does not account for the trust-building processes which develop over time. This limitation presents opportunities for future research. Specifically, benevolence-based and competence-based trusts are outcomes of repeated interaction and take time to develop. On the other hand, institutional trust (Luhmann, 1979) and swift trust (Meyerson *et al.*, 2004) may be more effective for teams working under time pressure. Institutional trust refers to individuals or groups who trust specific institutions without the existence of a personal experience and history in dealing with the institution and is a form of impersonal trust (Bachmann and Inkpen, 2011). The concept of swift trust was introduced by Meyerson *et al.* (2004) in the context of temporary teams. Swift trust can develop out of necessity when no relational trust can be built because of time constraints and no institutional trust can compensate for this lack. In this case, a team assumes trust instantly that will be verified only later by experience (Swärd, 2016). Hence, we call for future research on the mediating effect of trust to differentiate the different types of trust.

New insights may also be attained by contrasting temporary and permanent teams. For example, adopting a longitudinal research design, Webber (2008) finds that trust dimensions develop throughout the team's lifespan. Relatedly, Mortensen and Haas (2018) suggested that the traditional view of teams as a clearly bounded set of individuals may be outdated. They explain that contemporary teams often have overlapping memberships and are fluid in the sense of changing team compositions. Hence, estimating the effect of time pressure on trust in the early and late stages of team formation, or in *ad hoc* and permanent teams, can yield more nuanced knowledge with important implications for both theory and practice.

Our parsimonious model may be considered a limitation insofar as we consider only three main variables. Nonetheless, a high coefficient of determination (R^2) and high out-of-sample predictive power testify to the model's explanatory power. Further, model parsimony allowed us to concentrate on the analysis of our hypothesized effects and, importantly, to enhance the generalisability of our results (Myung, 2000; Shmueli *et al.*,

2019). Still, as evident from our statistical analysis, factors other than trust may also mediate the effect of time pressure on KTE. Moreover, demographics such as national culture (McAllister, 1995; Schoorman *et al.*, 2007) or economic sector may moderate the relationships, notably in their effect on trust, thus representing possible boundary conditions to our model. Hence, the identification of these additional mediating and moderating variables and their effect sizes constitute a future research agenda. Finally, time pressure may influence team processes and team outcomes in other ways. As the effect of time pressure is under-researched in team contexts, and team-level outcomes are potentially important to organizational performance, we encourage further investigations in this direction.

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Further reading

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