Maximizing the Effect of Shared Top Management Team Experience on Team Performance

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ABSTRACT

This paper examines the effects of shared top management team experience on team performance. Previous literature predicts that there could be positive or negative effects caused by team stability. For top management teams, a curvilinear relationship between shared team experience and performance is being proposed, resulting in a performance peak point. An empirical study of US-based top management teams confirmed both the positive effects and the diminishing returns, implying a maximum point after 10 years. As most firms apply changes to top management teams earlier, this study advocates practitioners to enhance team stability to exploit the team dynamic effects.

Keywords
Team Dynamics, Top Management Teams, Group Tacit Knowledge, Collective Mind, Knowledge Ossification

INTRODUCTION

Teams can be observed everywhere from sports teams to music bands to research teams to business units. One can observe some teams performing significantly better than others over time. Also, a team's performance can fluctuate over time (Hackman, 2002). Team performance cannot be easily projected by assessing the accumulated individual contributions of team members because team dynamics can increase or decrease the performance of the team. To better understand these dynamics, research about teams increased strongly in the recent decades (Levi, 2011). Engeström (2008) even talks about a whole *"wave of research to resolve the puzzle of teams"* (p. 2). Both, applied social scientists and managers in practice try to explore team dynamics in order to maximize performance.
By now, it is widely accepted that team dynamics matter. A vast amount of terminologies have been introduced in the literature, such as *group mind, collective mind, group tacit knowledge, collective consciousness, transactive memory, group think* or *Icarus Paradox* (Amason and Mooney, 2008; Katz, 1982; Levi, 2011; Wegner, 1987; Weick and Roberts, 1993). The different expressions all describe either the positive or negative effects on team performance resulting from a stable group constellation. Just following the diverse terminologies, two separate research streams become apparent:

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Positive learning effects against *negative ossification*[1] *effects.*
There is, however, a lack of clear consensus, as well as empirical research regarding the interplay of shared experience and team performance. This paper aims to contribute to existing literature as it postulates that the negative effects develop over a longer period, while the positive effects emerge earlier, resulting in an inverted parabolic shape for team performance. Special emphasis will be placed on the determination of a performance peak point, resulting in the following research question:

If and at which point in time does a stable group constellation exhibit a maximum point of performance?

The aim is to empirically investigate the proposed research question, utilising data on top management teams in the US. In this way, the paper distinguishes itself from the majority of publications in the field. Top management data are less niche than, for example, R&D or sports teams, which are often being used but of which the generalisability can be questioned and data availability is problematic. This dataset is therefore more applicable to different kinds of business settings, increasing the practical implications of the paper.

LITERATURE REVIEW

Teams are generally defined as a group of people working on common goals collectively with their performance being measured for the entire team. The clearly defined, shared objectives are what distinguish teams from groups (Meredith Belbin, 2011). Levi (2011) adds that team members have applied functions related to their role within the team, which needs not to be the case in groups. Well-functioning teams are very valuable for organisations, which is why scholars study team dynamics ever more strongly.
Even though the topic of positive team effects has been discussed since the 18th century, the modern theory has been developed by Wegner (1987). The basic idea is that teams develop a shared pool of knowledge which smooths internal processes, making the team more efficient than others. While Wegner (1987) referred to this concept as *transactive memory*, Weick and Roberts (1993) specified it as *collective mind phenomenon.* Positive effects of shared experience are closely related and often referred to as *learning effects*. Bunderson and Sutcljffe (2003) identified team learning as the backbone for team success and development. This is also related to the term *teaming*, which is a verb introduced by Edmondson (2012). It describes a dynamic process of building a similar mind-set and practices. Aircraft crews, R&D teams and sports teams are generally popular subjects for empirical studies of team

[1] The term *ossification* originates from medicine describing the dying out of fetal cartilage cells, after which bones begin to form. Berman et al. (2002) transferred the expression to the area of knowledge management. It depicts the over-routinization of internal processes, hindering creativity and openness for new.

stability, for example Berman et al. (2012), Katz and Allen (1982) or Weick and Roberts (1993). Finally, Hackman (2002) comprehensively uses Wegner's theories in his book *Leading Teams*, promoting to keep teams stable to maximize performance from a leadership perspective. Hackman (2002) also acknowledges that, in practice, the advantages of stable teams are often not being exploited.

The counterpart of the literature described in the previous subsection are the theories stating that stable teams will eventually decrease performance after a certain amount of time. Katz (1982) most famously introduced this relationship by empirically investigating the impact of team stability on team performance. He finds results supporting his hypothesis that performance will decrease after approximately three years. My paper aims to determine this point more extensively by using a different type of sample. While Katz (1982) focussed on R&D projects teams, I use top management data. In the same year, Katz and Allen (1982) introduced the *Not-Invented-Here Phenomenon* which depicts that teams view themselves as the monopoly source of knowledge in their field which ultimately leads to a stagnation of innovation that causes a performance decrease. This theory is especially applicable to top management teams and therefore of exceptionally high relevance for this paper. Top managers are highly respected employees at the very top of the career ladder. Therefore, they could be prone to become closed-minded towards new ideas and new people. Such a mind-set can often result in a performance decrease because the organisation struggles keeping up with market competitors.
Berman et al. (2002) comprehensively test both strings of theory laid out before. In their paper, they test group tacit knowledge by examining basketball teams in the NBA. They successfully test both the positive and negative effects on team performance, yet concluding that the negative effects do not matter for sports teams, as there will be natural change due to the decay of physical abilities. Additionally, they introduced the terminology *knowledge ossification*, which has been picked up by other authors, like Capasso et al. (2005), who advise to constantly apply changes to teams in order to prevent the decline of new ideas and creativity.
Merging the two different directions of research (positive and negative effects) and testing them empirically constitutes the main added value of my research. As the negative effects develop rather slowly, compared to the positive effects, the conceptual framework results in the following research hypothesis:
Shared top management team experience has a curvilinear relationship with top management performance.

METHODOLOGY

In the following paragraphs the specifics of the dataset, as well as the variables used for the empirical analysis will be discussed. Afterwards, the final regression model used in the analysis will be presented.

Data

The sample for this study includes 42,542 observations from 5,772 distinct large and medium-sized organisations. Data were comprised from 2000 to 2014, including all industries (two-digit SIC-codes). The data contain a variety of top management measures on the 4,500 largest North American companies, which have been extracted from *BoardEx*. From this database, all test variables have been determined. I intentionally focus on the biggest US-based organisations due to the feature of low promotion possibilities. Top managers in the largest organisations reached the very top of career possibilities, which decreases the amount of team constellation changes on behalf of the team member. Personal preferences to leave the team are impossible to control for but distort the results of empirical studies. Sports teams or R&D project teams suffer from this process, since athletes like to join a different team, for example, because of higher chances to win a championship or R&D team members get promoted into hierarchically higher teams.

Compustat has been used to obtain the financial data for the dependent variables and a variety of control variables. The data has been winsorized on the one-percentile level to exclude any possible outliers. Also, in order to prevent violations of assumed standard error independence and heteroscedasticity effects, standard errors have been clustered at the firm level.

Variables

Dependent Variables

ROA_{t+1}

The major objective of this study is to investigate the interplay of shared team experience and team performance. Therefore, the dependent variable needs to be an adequate performance measure. Due to the population being top management teams, standard financial performance measures can be considered. As stock price developments include difficult to control for, short term variations, return-on-assets (ROA) is more suitable in this setting. Also, ROA is a frequently used variable for measuring organisational performance as it best reflects top management activity and is less volatile (Carpenter, 2002). Because team dynamics develop slowly and over time, the ultimate variable used is ROA in the following year (ROA_{t+1}).

Independent Variables

Joint-Tenure

Following the last paragraph, the independent variable of the model needs to capture shared team experience. Therefore, the variable *Joint-Tenure* has been created, which captures the minimum amount of time a top management team has served together. To put it more simply, each top management team is defined as a time series within the sample. By not making any changes to the team's constellation, joint tenure increases each year. If there are changes applied in one year, it starts off again with one year of shared experience in the upcoming year. For example, a team could have worked together for three years, applied changes and then worked together for seven years. After year three, *Joint-Tenure* is three and after year ten, *Joint-Tenure* is seven.

Curvilinearity Joint-Tenure

The projected squared relationship is captured by the variable $Joint\text{-}Tenure^2$. As can be recalled from the research hypothesis, I predict a curvilinear relationship between Joint-Tenure and top management performance, resulting in a performance peak point. Therefore, the squared variable has been created, which I predict will be estimated with a negative coefficient, yielding an inverted parabolic shape.

Control Variables

Because the dependent variable captures the financial performance of the entire organisation, a variety of control variables need to be included to take away concerns on omitted variable bias. The first control variable *Changes* takes into account the magnitude of changes applied to a team in a year by adding up managers joining and leaving the firm. In addition, the model controls for organizational-specific effects, which are *Size* (total assets), *Loss* (binary for loss in previous year) and *Leverage*. Furthermore, a more cohesive team is more likely to experience team dynamic effects. Therefore, a variety of cohesion proxies have been put together: *PCTedu* displays managers educated in the US, *PCTfemale* shows the proportion of females, *PCTboardexp* captures experienced managers, and *PCTelite* is the proportion of elite university graduates. In addition, year- and industry dummies are being used.

Model

Putting together the variables laid out in the previous section, the following multiple regression model will lay the foundation for the analysis.

$$Y\ (ROA)_{i,t+1} = \beta_1 Joint-Tenure_{i,t} + \beta_2 Joint-Tenure_{i,t}^2 + \beta_3 Changes_{i,t} + \beta_4 \text{Ln}(size)_{i,t} + \beta_5 Loss_{i,t} + \beta_6 Leverage_{i,t} + \beta_7 PCTelite_{i,t} + \beta_8 PCTedu_{i,t} + \beta_9 PCTfemale_{i,t} + \beta_{10} PCTboardexp_{i,t} + \Sigma\, \beta_t YearEffects_{2000-2014,i,t} + \Sigma\, \beta_x IndustryEffects_{SIC10-SIC87,i,x} + \varepsilon$$

Subscript *i* indexes the top management team and *t* stands for the year (2000 – 2014).

RESULTS

The main objective of my research was to test the interplay between shared team experience and team performance. More specifically, I projected a curvilinear relationship with a performance maximum point. Table 1 summarises the obtained regression results.

The independent variables are both estimated with the expected sign. *Joint-Tenure* positively impacts ROA_{t+1} with a coefficient of 0.0096. This implies that keeping the top management team stable for one more year, on average, increases ROA in the following year by 0.0096.

To prove curvilinearity, *Joint-Tenure*^{2} is the main variable of interest. It is estimated with the expected negative sign, which is necessary for the inverted parabolic shape. Its coefficient is -0.0005, which needs to be interpreted with more caution. Since we are talking about a squared variable, this coefficient determines the degree to which the parabola is stretched or compressed. The low coefficient therefore suggests a strongly compressed graph, matching my intuition that team dynamic effects develop slowly and over time.

With both independent variables being significant on the 1% level, I can proceed to the derivation of the implied performance maximum point.

From the regression model shown in section 3.3, the partial derivative with respect to *Joint-Tenure* needs to be taken and equated to 0 (variables not dependent on *Joint-Tenure* are dropped) (Berman et al., 2002).

$$Y\ (ROA)_{i,t+1} = 0.0096297 * Joint-Tenure_{i,t} - 0.0004733 * Joint-Tenure_{i,t}^2 + \cdots + \varepsilon$$

$$\frac{dY}{dJoint-Tenure} = 0.00963 - 0.00095 * Joint-\ Tenure$$

$$0 = 0.0096297 - 0.0009466 * Joint-Tenure$$

$$Joint-Tenure = 10.17$$

Therefore, the implied performance peak point will, on average, be exhibited after approximately 10 years. This maximum point after 10 years gives rise to a ROA of nearly 0.05 in the upcoming year.

Table 1
Regression Results

Dependent Variable: ROA_{t+1}		
	Coefficient	**T-Statistic**
Joint-Tenure	0.0096	9.02***
Joint-Tenure^2	-0.0005	-5.11***
Changes	-0.0009	-2.05**
Ln(size)	0.0195	21.22***
Loss	-0.0899	-31.67***
Leverage	-0.0159	-2.2**
PCT Elite	-0.0295	-5.19***
PCT Edu	0.0132	1.63
PCT Female	-0.015	-1.76*
PCT BoardExp	0.0118	2.33**
N	36,168	* p<0.1
Adjusted R^2	0.2735	** p<0.05
P-value model	<0.0001	*** p<0.01

The first and most relevant control variable *Changes* exhibits the expected negative sign, inferring that more changes applied to the top management team lead to a performance decrease in the following year. It reinforces the main research hypothesis of my study that team stability is advantageous for team performance. Control variables pertaining to organisational-specific effects also have the correct signs and are significant. The cohesion proxies exhibit mixed results. *PCTfemale* is the only control variable expected to be negative. Along with *PCTboardexp* it is significantly predicted with the expected sign, while *PCTedu* is insignificant and *PCTelite* is significantly negative. This result is understandable when considering that within the sample only around ¼ of managers are elite university graduates. As they represent a minority, adding an elite university graduate actually decreases cohesion.

Considering the test variables' correct signs, strong statistical significance and the determined maximum point, my initial research hypothesis can be confirmed confidently. The entire model is highly significant with a p-value of <0.0001, accompanied by an adjusted R^2 of 27.35%. Bearing in mind that the dependent variable is time shifted, the adjusted R^2 does not distort the relevance of the model. In one year of time, unforeseen factors, such as organisational developments, economic cycles, public scandals, or financial distress will influence the ROA. Taking the ROA of the same year as dependent variable surely increases statistical fit, but does not fit the story that team dynamic effects develop slowly over time and gives rise to reverse causality issues. In the context of this paper, reverse causality implies that performance impacts joint tenure rather than the other way around. Explicitly, if company performance is high, there is no intent to change top management and accordingly if performance is down, top managers are fired more often. The applied time lag weakens reverse causality issues significantly, because now it would imply that, in fact, next year's performance determines this year's joint tenure.

IMPLICATIONS AND LIMITATIONS

Even though 267 firms within the sample reached ten years of shared experience, it can be inferred that most teams apply changes earlier than after 10 years. The median value is two years of shared experience and one change per year. Consequently, there is support for Hackman's (2002) statement that most teams do not fully exploit the advantages triggered by team dynamics, assuming good control over the composition of the top management team and neglecting individual managers leaving the firm due to personal circumstances, such as retirement. Of course, it needs to be kept in mind that the implied maximum point results from averages of the population. Depending on the current setting and company-specific situation, it can be optimal to apply changes earlier or later. The derived maximum point should, therefore, rather be seen as an average benchmark until when team dynamic effects will rather be positive. Also, it needs to be noted that the population is comprised of top management teams only, implying that any conclusions drawn or implications inferred are mainly limited to those teams. Any other type of teams will experience different dynamics (for example, teams in which high promotion possibilities exist). Further research could expand my analysis to other types of teams and comparing the implied performance maximum point. If team surroundings and circumstances change continuously, the maximum point will occur at earlier stages (for example three years for R&D project teams (Katz, 1982)).

What also needs to be considered when analysing shared team experience is the extent to which team members can be hired or fired. Throughout the paper I assume that the firm has full control over the composition of the team because any deviations from that assumption are impossible to control for. However, different types of teams surely experience varying settings here. Firing and hiring top managers at the largest companies of the US is an expensive endeavour, making it more precarious to apply changes. Also, different cultures or legal setting influence the easiness to apply changes. In this study, only the US has been examined, which is known for lax employee protection laws and where fixed tenures are rare. Further research could therefore expand my analysis to other geographical regions to test the differences in results.

CONCLUSION

This paper examined the effects of top management team stability on team performance. Previous literature studying team dynamics is usually split into positive effects, which depict the development of a *collective mind*, and negative effects, describing the consequences of overfamiliarity or knowledge ossification. I projected a curvilinear relationship between shared experience and performance, resulting from the negative effects emerging later. By conducting an empirical analysis, I found significant results for the linear, as well as inverted quadratic relationship. These results are in line and fit into previous literature, as they prove existing theories and shed light into the specific dynamics of top management teams. The inverted quadratic shape experiences a performance maximum point after approximately ten years. Bearing in mind that most top management teams, on average, apply changes to their constellation after two to three years, my research includes important practical implications, mainly advising to keep top management teams stable for a longer period.

ROLE OF THE STUDENT

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