THE IMPACT OF INTRA-ORGANIZATIONAL NETWORKS ON LEARNING AND PERFORMANCE AT INDIVIDUAL AND TEAM LEVEL

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ABSTRACT

Teams of people working together for a common purpose have been a centrepiece of human social organization for a long time. Yet, the modern concept of work in large organizations that developed in the late 19th and early 20th centuries is largely a tale of work as a collection of individual jobs. A challenge for most organisations is to learn across project boundaries or even departmental or sectional by making the necessary level knowledge available to the organisation. More emphasis now needs to be on team learning as a key performance driver in organisations including the project based organisation (PBO). Research needs to be done on how intra-organisational networks can boost learning and performance at both individual and team levels. The case used in this study is a PBO in the South Africa's electricity utility. This study therefore intends to evaluate whether intra-organisational networks can enhance learning and performance at both individual and team levels using a PBO which has multiple project teams. A quantitative research methodology is used with questionnaires. The research findings illustrated that individuals who have higher trust with their team members tend to work in high performing teams. The results also show that teams that perform better have team members who frequently exchange knowledge within and outside the team as well as having high trust amongst them. Furthermore, teams that learn more have team members who have a variety of formal ties within the team and with other teams. Finally the study also identified that individuals with more formal and social ties with other team members can learn more. Managerial recommendations would be to encourage frequent interactions, build stronger trust amongst team members, and support team members to establish formal ties not only within a team but also with other team members within an organisation.

Key words: Intra-organizational networks, individual learning, team learning, individual performance, team performance

INTRODUCTION

Teams of people working together for a common purpose have been a centrepiece of human social organization for a long time. Human history is largely a story of people working together in

groups to explore, achieve and conquer. Yet, the modern concept of work in large organizations that developed in the late 19th and early 20th centuries is largely a tale of work as a collection of individual jobs. A variety of global forces unfolding over the last two decades, however, has pushed organizations worldwide to restructure work around teams, to enable more rapid, flexible, and adaptive responses to the unexpected. This shift in the structure of work has made team effectiveness and performance a salient organizational concern (Martin, 2002).

A challenge for most organisations is to learn across project boundaries or even departmental or sectional by making the necessary level knowledge available to the organisation (Bartsch et al. 2012). Focus for most organisations have always been on the achievement of the organisational goals and the techniques and tools that increase the efficiency and effectiveness of individual department, project or section. However, the emphasis has changed and now the focus is on organizational learning as a key performance driver in organisations including the project based organisation. One of the ways that can boost team learning or team performance is through intra-organisational networks. Intra-organisational networks consist of group of people who come together for a common problem or opportunity for a specific period of time. These networks cross boundaries and often include multiple functions or specialization areas. The degree of formality in the structures that hold these entities together varies. Some are governed by formal agreements and contracts while other are held together by informal verbal agreements. Some are formed with clear-cut objectives and dissolve when these objectives are met and others come together and meander along indefinitely with vague goals that inconsistently shift. Some experience various level of success while others accomplish little if anything at all and fizzle from existence (Flap et al. al 1998).

A key building block to network is a tie, which establishes a linkage between two people (known as a diad). Intra-organisational networks which represents how teams are structured and interact within an organisation, often examine ties based on communication, such as task-related communication ("To whom do you speak regularly about business matters?"), advice-related communication ("To whom do you go for advice when you have a work-related problem or a decision to make?") and social communication ("Whom have you met with privately outside of work?") (Flap et al., 1998). Social capital is very important resource as it offers access to knowledge, which is the expertise or wisdom possessed by other people. It includes knowledge transfer (e.g. "here is how you fix your computer") and/or knowledge access (e.g. knowing whom to call to fix your computer"). An effective knowledge network is built on a combination of individuals knowing (1) how to do things and (2) who knows how to do which things. The knowledge transfer usually flows from individual to individual, from sub-unit to sub-unit within an organisation (Sparrowe et al, 2012).

It is therefore crucial for organisations to have effective intra-organizational networks that facilitate effective flow of information, enhance team learning and also improves team performance in order to achieve set project goals. The set targets inherently include providing a quality service to target clients at the least cost and at the right time and place. This study intends to evaluate whether these intra-organizational networks legitimately enhance team learning and team performance using Eskom's Kusile power project as a case.

The initial intra-organizational network research was done in the time of empirical revolution in social science ahead of the World War II during which it was found that informal groups exist

within the formal structures of an organisation. Now in the recent times the intra-organization network studies have again resurfaced with the strong belief that they can be critical to organizational and individual performance. However there are methodological improvements and the emphasis of theory has moved from viewing networks as a constraint to business operations but as social capital that can drive business development (Flap et al, 1998). Nowadays organisations are using project teams to conduct their business (Murray and Moses, 2005). Project teams are different from normal functional teams as they are temporary in nature. Since these teams "project teams", are temporary and thus team learning may be difficult. It is not clear if the team members have formal and informal intra organisational networks. He/ she can bring the knowledge from the organisational level to the team, thus facilitate team learning and team performance. However, it is not clear whether these formal and informal intra- organisational networks can genuinely and consistently enhance team learning and team performance. The objective of this study therefore intends to evaluate whether intra-organisational networks can enhance team learning and team performance using Eskom's Kusile multi-billion power project which employs about 4000 people with varied specialist teams. This study will provide an insight on whether skills transfer and knowledge sharing can be facilitated through such networks. This study will also assist to develop strategies that can boost team learning and ultimately improve project performance.

For an organisation to perform its tasks and hence achieve its strategic objectives, it needs to leverage on its human resources (employees) base, which is one of the most critical assets supporting business operations. In the modern day, organisations group employees into teams in order to perform particular tasks. The underlying assumption is that such teams can do work much more efficiently. Project based organizations such as Eskom has a lot of diverse teams that often interact at work and outside work environment. During this interaction of teams it is not clear whether there is any worthwhile learning that can benefit the project teams and ultimately improves their performance and hence facilitate effective skills transfer to locals as per the Government expectation.

The main question asks:

To what extent do intra-organizational networks relate to learning and performance at individual and team levels in a project-based organization?

The associated sub questions are:

- Does the strength of the network ties enhance learning and performance at individual and team level?

- Does the degree of centrality of the network ties enhance learning and performance at individual and team level?

- Does the diversity of the network ties enhance team learning and performance at individual and team level?

CONCEPTUAL MODEL

New knowledge can be harnessed through interaction of different teams and individuals either formal or informal. In addressing the objectives of this study, this section attempts to

conceptualize the factors that need to be considered in order to enhance team learning and team performance in an organisation.

Definition of Intra-organisational network

An intra-organisational network is a formal or informal social structure made up of a set of actors (such as individual employees or teams of an organisation) and a multifaceted set of the dyadic ties between these actors. These ties can be important in seeking information and innovation within an organisation. Contacts in a network provide information, opportunities and perspectives that can be beneficial to the team or central player in the network. Most intra organisational network structures tend to be characterized by dense clusters of strong connections. A team or player can mobilize social capital by acting as a "broker" of information between two or more clusters that otherwise would not have been in contact, thus providing access to new ideas, opinions and opportunities. A social capital broker also reaps benefits of being the facilitator of information flow between contacts (Nooteboom and Six, 2003).

There are quite a number of intra-organisational network characteristics that have been published which provide a baseline for evaluating whether such networks enhance team learning, team performance and consequently benefit the entire organisational value chain. The main intra organisational models that are of value to this study are discussed below.

Characteristics of a tie

Ties can be analysed according to certain characteristics and how they contribute to the overall network. Some of the characteristics of a tie that can be analysed include the degree of centrality, strength of a tie (frequency and trust) and the diversity of a tie. From Flap and others (1998), these characteristics are briefly described as follows:

- Degree of centrality means the extent to which interactions are concentrated in a small number of individuals rather than distributed equally among all members

- Strength of ties is a measure of relationship strength, capacity of information, rate of flow of information, frequency of interaction and distance between two nodes.

- Diversity of a tie is a degree to which team members differ in terms of expertise, experiences, and perspective.

Degree of Centrality

Centralization means the extent to which interactions are concentrated in a small number of individuals rather than distributed equally among all members (Gilsing and Nooteboom, 2005). Centrality, meaning the extent to which a given individual is connected to others in a network, is the fundamental property in most cases is associated with instrumental outcomes, including power, influence in decision making and innovation (Sparrowe et al, 2001). In a network, centrality offers an individual actor greater access to a wider array of information and knowledge. This means the teams that are centrally located in the intra-organisational network will outperform teams that are not centrally located (Bartsch et al, 2012). Network centrality is important because it captures the extent of an individual's access to resources, such as task-specific knowledge and confidential information about work-related issues. Central individuals,

because of their numerous connections to others, have more relationships to draw upon in obtaining resources and so are less dependent on any single individual. The individual who is central in the network is, over time, able to accumulate knowledge about task-related problems and workable solutions (Sparrowe et al, 2001). The acquired expertise and knowledge not only enables the central individual to solve problems readily, but also serves as a valued resource for future exchanges with other co-workers.

Strength of ties

According to Granovetter (1973:1361), the strength of personal ties entails a combination of 'amount of time, emotional intensity, intimacy (mutual confiding) and the reciprocal services that characterise the tie. Strong ties also depend on cognitive distance, i.e difficult to absorb knowledge. Greater distance entails more investment in mutual understanding. To the extent that this investment takes time and is specific, ties need to entail sufficient frequency and duration of interaction. While investment and duration facilitate learning, they also facilitate spillover. Long duration of a tie may lead to identification, which enhances mutual understanding and trust, but may reduce learning potential, particularly if the tie is exclusive, i.e. in the areas of collaboration there are no direct ties with others. Trust is conceptualized as the extent to which one partner is genuinely interested in the other partner's welfare and motivated to seek joint gain (Doneyand Cannon, 1997). As far as collaborative relationships are concerned, trust has been demonstrated to have a strong connection to intra-organizations outcomes (Barber, 1983).

Diversity of ties

Diversity is a crucial condition for learning and innovation to produce 'novel combinations' as demonstrated in evolutionary economics (Nelson and Winter 1982) and acknowledged in some of the social network literature. Diversity is associated with the number of agents involved in a process of learning by interaction. The second dimension of diversity is the degree to which their knowledge and skills are different (Nooteboom 1999).

Diversity of a tie is a degree to which team members differ in terms of expertise, experiences, and perspective (Flap et al, 1998). In an organizations knowledge base, diversity increases its ability to exploit internal and external knowledge resources. Hence, difference in information is an important source of deep-level diversity, as it reflects differences in personal knowledge and cognitive decision plans, which are not immediately noticeable to other people. These differences generally do not become apparent when team members first meet each other but emerge over time (Harrison et al., 2002).

The proposed conceptual model to be investigated in this study is shown in Figure 1.
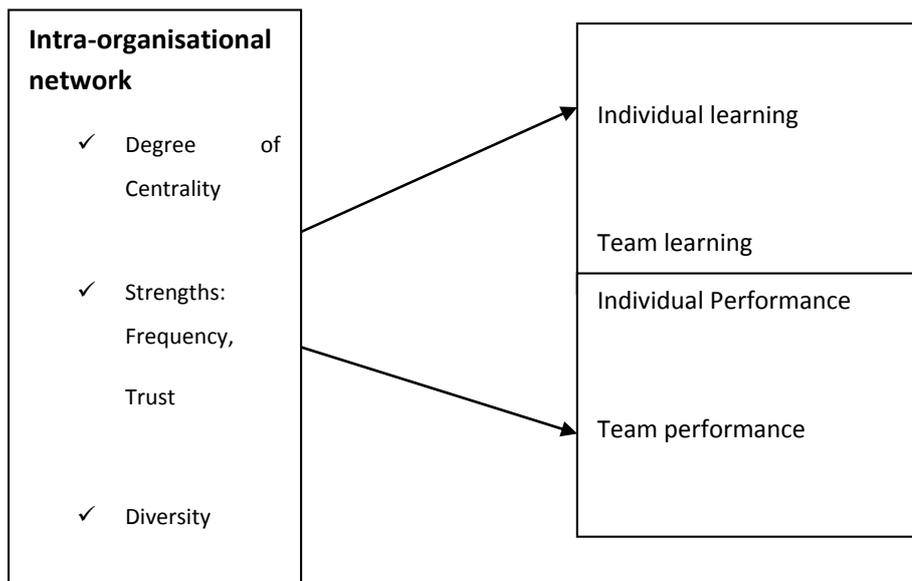
Figure 1: conceptual model

Hypotheses proposed in this conceptual model are as follows:

Degree of centrality

H1 a) Higher degree of centrality will result in higher learning outcome at individual level

H1 b) Higher degree of centrality will result in higher performance at individual level

H1 c) Higher degree of centrality will result in higher learning outcome at team level

H1 d) Higher degree of centrality will result in higher performance at team level

Tie strength

H2 a) Higher tie strength will result in higher learning outcome at individual level

H2 b) Higher tie strength will result in higher performance at individual level

H2 c) Higher tie strength will result in higher learning outcome at team level

H2 d) Higher tie strength will result in higher performance at team level

Diversity

H3 a) Interaction with more diverse ties will result in higher learning outcome at individual level

H3 b) Interaction with more diverse ties will result in higher performance at individual level

H3 c) Interaction with more diverse ties will result in higher learning outcome at team level

H3 d) Interaction with more diverse ties will result in higher performance at team level

RESEARCH METHODOLOGY

Once the conceptual framework guiding the research process is developed, the research continues with the identification of the most adequate research methodology for addressing the research question. This section, therefore, provides an overview of the research strategy and

design to be applied in the study. Population and sampling, data collection methods most importantly, validity and reliability of the method used.

Research approach

The most appropriate approach for the study was a quantitative research. A quantitative research approach was chosen for the reasons that it can be analysed more scientifically and objectively than most of the other forms of research. Large amounts of information can be collected from a large number of people in a short period of time in a relatively cost effective way and the results of a quantitative research approach often are quickly and easily quantified by a researcher through the use of a software package (Popper, 2004).

Research population, sample and data collection method

The unit of analysis refers to what or who is studied (Mouton, 2005). In the context of this study, the unit of analysis was individuals (Eskom employees) as well as teams who are involved in Kusile project. Data collected from these employees was analysed to examine the impact of intra-organizational networks on learning and performance at individual and team level. However, not all Eskom employees were considered for the study. Only senior managers, middle managers, supervisors and consultants assigned to Eskom's Kusile project within Contracts and Construction Management departments were sampled

The population size for this study was estimated at 100, the number was taken from the human resources department employment statistics. The sample taken was representative of the population from which it was drawn and it was a good size to warrant statistical analysis (Welman and Kruger, 2003).

The questionnaire was first piloted to seven (7) preferred but knowledgeable employees within the project, which were not part of the main study but represented the same population as the one in the study. Pre-test questionnaires ensured that shortcomings were identified early and rectified before the tool was used in the main study. In total about 90 questionnaires were distributed to the respondents. Of these only 59 on 14 teams of questionnaires were returned back. The response rate was high at 65%.

Measurements of variables

The description of the control and independent variables are described in Table 1 below.

Table 1. Description of variables used in the conceptual model.

Variables		Description
Control variables		
Individual level	Age	Age of the respondent
	Work experience	Number of months that the respondent worked at Kusile project
	Team tenure	Number of months that the respondent worked in his/her project team.
	Education	The highest education level of the respondent.

Variables		Description
Team level	Team tenure mean	This is the mean value of the team tenure for all the members in the team. This variable indicates on average how long (in months) that team members belong to this team.

Independent variables		
Degree of Centrality		
Individual level	IntraTeam formal	Number of formal ties with members in the team
	InterTeam formal	Number of formal ties with members in other teams
	IntraTeam social	Number of social ties with members in the team
	InterTeam social	Number of social ties with members in other teams
Team level	Formal ties sum	This is the sum of all formal ties that all the team members have within the team as well with other teams.
	Social ties sum	This is the sum of all social ties that all the members have within the team as well with other teams.
Tie strength		
Individual level	Intra Frequency	Frequency of knowledge exchange with members in the team.
	Inter Frequency	Frequency of knowledge exchange with members of other teams.
	Intra Trust	Trust level with members in the team.
	Inter Trust	Trust level with members outside of the team.
Team level	IntraFreq_mean	This is the mean value of Intra Frequency for all the members in the team.
	IntraTrust_mean	This is the mean value of Intra Trust for all the members in the team.
Diversity		
Individual level	KDiversity Intra	Diversity in terms of technical knowledge with members in the team.
	KDiversity Inter	Diversity in terms of technical knowledge with members of other team.
Team level	TM formal social	This variable represents the variety of ties in this team in terms of formal and social ties that all the members of the team have. The variety is considered to be high if there is a well balance of formal and social ties in the team. This type of variety is measured using entropy indices called Teachman's (1980).
	TM intra inter formal	This variable represents the variety of ties in this team in terms of formal ties that all the members of the team have within the team and with other teams. The variety is considered to be high if there is a well balance of formal in the team and with other teams. This type of variety is measured using entropy indices called Teachman's (1980).
	TM intra inter social	This variable represents the variety of ties in this team in terms of social ties that all the members of the team have

Variables		Description
		within the team and with other teams. The variety is considered to be high if there is a well balance of social ties in the team and with other teams. This type of variety is measured using entropy indices called Teachman's (1980).

At individual level, the dependent variables are "individual learning" (IL) and "individual performance" (IP) which consist of nine and five items respectively. They are both measured on a 7-point Likert scale (ranging from strongly disagree to strongly agree). At team level, the dependent variables are "team learning" (TL) which is measured using six items on a 7-point Likert scale. The other dependent variable "team performance" (TP) has ten items with 5-point Likert scale. Again, the Likert scale is based on the respondent's agreement to the items.

A reliability test of Cronbach's alpha was used to measure the reliability of the items used to represent a specific variable. Cronbach's alpha of 0.6 was used a threshold value and this suggests that these items can represent a single, uni-dimensional latent construct. All items used to measure dependent variables show internal consistency (Cronbach's alpha > 0.6).

RESULTS

The outcomes on data analysis i.e. the linkages between intra-organisational networks and higher learning and performance are structured according to the conceptual method that was introduced and hypothesis put forward. The first report is on the descriptive statistics, then the correlation analysis and lastly the independent samples t-tests. In each section, the individual level will be reported first, then the team level.

Descriptive statistics

At individual level, on average, the respondents had an experience of 42 months working in the Kusile project and have worked for his/her team for 29 months. The average age of the respondents is 36 years. In majority (79%) the highest education of the respondents is Bachelor's Degree.

The total formal ties that the respondent has within his/her team (mean value of 9.153) are lower than the ones with other teams (mean value of 11.898). Also on the social ties, the total number that an individual has with his team (mean value of 1.508) is lower than that with other teams (mean value of 5.559). On the frequency the respondents regularly exchange information with people within their team (mean value 4.424). With people outside their team they will exchange information sometimes (3.458). On trust the respondents seem to trust their team members and can always count on them (mean value 5.2). But on the people outside their team they trust some and others not (mean value 4.63). On diversity the respondents show diverse knowledge as they possess different technical background with people in their team and outside the team (mean values 0.54 and 0.55) respectively.

At team level the average number of years of a team is 28 months. This means that most teams have been in existence for more than 2 years. The table also displays the average number of

formal ties at 82 and social ties at 29. The respondents not only have formal relationships with their team members but also socially interact with them after work.

Table 2. Means and standard deviations of variables at team level

	Mean	Std. Deviation
TeamTenure_Mean	28.7623	16.10439
FormalTies_sum	82.8462	69.00102
SocialTies_sum	29.7692	22.96430
IntraFreq_mean	4.3906	0.44039
IntraTrust_mean	5.2348	0.44086
TM_Formal social	0.5391	0.09256
TM_IntraInter formal	0.6232	0.10332
TM_IntraInter_Social	0.3059	0.27844

Correlation Analysis

Correlation coefficient sometimes referred to as Pearson's *r* is a measure of the strength and the direction of the linear relationship between two variables. In this study a correlation coefficient is significant if $p < 0.05$.

Individual level

Table 3. Correlation matrix at individual level

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. IP (Individual Performance)	1.000	-0.013	0.039	0.089	-0.014	0.161	0.025	0.048	0.107	0.109	0.195	0.069	0.036	-0.039	-0.070	
2. Age		1.000	0.276	-0.169	-0.092	0.136	-0.107	-0.029	-0.065	-0.076	-0.063	-0.002	-0.381	-0.018	-0.192	0.176
3. Education			1.000	-0.144	-0.224	-0.111	0.121	-0.132	0.078	0.134	0.182	-0.114	-0.079	0.018	-0.013	-0.036
4.WorkExperience				1.000	0.601*	-0.219	-0.052	-0.120	-0.189	0.055	-0.006	-0.014	0.246	-0.262	0.149	0.184
5.TeamTenure					1.000	0.027	-0.083	-0.067	0.018	-0.079	-0.043	0.009	0.076	-0.212	0.220	0.189
6. Intra Frequency						1.000	0.050	0.009	0.120	-0.147	-0.114	0.111	-0.020	0.038	0.121	0.157
7. Inter Frequency							1.000	0.160	0.273	0.239	0.166	0.021	0.297	-0.063	0.174	-0.076
8. IntaTeam formal								1.000	0.301	-0.025	-0.084	0.004	-0.055	0.142	-0.057	0.130
9. IntraTeam social									1.000	.100	0.330	-0.089	-0.032	0.041	0.051	0.028
10. InterTeam formal										1.000	0.760	0.084	0.051	0.060	0.019	0.114
11. InterTeam social											1.000	0.167	0.078	0.062	0.056	0.258
12. Intra Trust												1.000	0.305	-0.058	0.199	0.348
13. Inter Trust													1.000	-0.044	0.282	-0.020
14. KDiversity Intra														1.000	-0.022	-0.136
15. KDiversity Inter															1.000	-0.025
16. IL (Individual learning)															-.025	1.000

There is a moderate correlation and positive relationship between work experience and team tenure (r =0.601). This shows that an individual has worked more with the same team since they joined the Kusile Project.

Team level

Table 4. Correlation matrix at team level

	1	2	3	4	5	6	7	8	9	10
1.TL	1.000	0.766*	-.008	0.226	-0.051	0.540*	0.261	0.399	0.638*	0.378
2.Team Tenure mean		1.000	-.288	-.034	-0.021	0.504*	-0.094	0.370	0.536*	0.513*
3.Formal ties sum			1.000	0.766*	-0.008	0.161	0.388	-0.017	-0.014	0.030
4.Social ties_sum				1.000	.472	0.159	0.532*	0.242	-0.049	0.204
5.TM Formal Social					1.000	-0.094	0.342	0.136	-0.131	0.379
6.TM IntraInter Formal						1.000	0.241	0.264	0.166	0.734*
7.TM IntraInter Social							1.000	0.109	-0.106	0.291
8. IntraFreq_mean								1.000	0.113	0.342
9. IntraTrust_mean									1.000	0.240
10. TP										1.000

On the team learning and team tenure mean there is a high correlation and substantial relationship (r=0.766). This means that there is more team learning with the increased number of years of a team. Again there is a moderate correlation and relationship between team learning and TM_IntraInter_Formal (r=0.54). With the variety of ties that the team has in terms of formal we find that there is more learning. This supports the hypothesis that the interaction with more diverse actors will result in higher learning outcomes. Team tenure mean also has a moderate correlation and relationship with TM IntraInter Formal (r=0.504). The more the number of years of the team the higher the number of variety of ties there will be of that team and other teams in terms of formal. There is also a strong correlation between IntraTrust_mean and TL (0.638). The more there is trust within the team the more people will learn from each other. There is also a strong correlation between TeamTenure_mean and IntraTrust_mean (0.536). The more number of years the team has been in existence, the more there will be trust within the team. The results also show a strong correlation between TeamTenure_mean and TP (0.513). As the team grows in number of years its performance improves. FormalTies_sum has a high correlation and substantial relationship with social ties sum (r=0.766). The sum of all formal ties that all the team members has within the team as well as with other teams increases with the sum of all social ties that the team has within the team as well as other teams. SocialTies_sum and TM_IntraInter_social have a moderate correlation and relationship at (r=0.532). The sum of all social ties that all team members have within and outside team increases with the variety of ties in this team in terms of social ties that all members of the team have within the team and with other teams. TM_IntraInter_Formal and TP have a strong

correlation and relationship (0.734). The more variety of ties within and outside the team in terms of formal the more the team will perform.

Independent Samples T-test

The independent-samples t-test was conducted to compare the means between two unrelated groups on the same continuous, dependent variable. It is used to evaluate whether the means for two independent groups are significantly different from each other. The Leven's test of equality was also used to test the assumption of homogeneity of variance.

At individual level, two criteria for grouping the respondents are used. These are Individual Performance and Individual Learning. Two groups were identified for the criteria "Individual Performance" at Individual level, one group of individuals with high performance (N=28) and the other group with low performance (N= 31). On the criteria of "Individual Learning" we have two groups; one with high learning outcomes (N=32) and the other one with low learning outcomes (N=26). The new variable "degree centrality" is calculated as the total number of formal and social ties with members in the team as well as members of other teams that the respondent has.

Individual Performance

Table 5. Independent Samples T-test

Variable	Group 0 High P (N = 28)		Group 1 Low P (N = 31)		t - test[a] p -value[b]
	Mean	SD	Mean	SD	
DegreeCentrality	31	32.44939	25.5161	18.17667	5.48387
I1- IntraFreq	4.536	0.5762	4.323	0.5993	0.2131
I2- InterFreq	3.536	0.6929	3.387	0.8437	0.1486
IntraTrust	5.4429	0.95895	4.9871	0.80488	0.45576*
InterTrust	4.7	1.13594	4.5806	0.95966	0.11935
KnowledgeDiversity intra team	0.5629	0.40319	0.5203	0.36212	0.4266
KnowledgeDiversity inter team	0.5206	0.41749	0.5773	0.36521	-0.5679

*Mean difference between two groups * Mean difference is significant different at p<0.05*

Individuals with high performance (Group 0) have higher trust with their team members (IntraTrust) whereas the individuals with lower performance (Group 1) have lower trust with their team members. The mean difference of 0.45576 in IntraTrust between these two groups is significant (p< 0.05). This means that there is high and significant association between IP and Intra team trust. These results suggest that the more trust there is within the team the greater the individual performance.

Individual learning

Table 6. Independent Samples T-test

Variable	Group 0 High L (N = 32)		Group 1 Low L (N = 26)		t - test[a] p -value[b]
	Mean	SD	Mean	SD	
DegreeCentrality	30.0625	31.34299	26.2308	17.82651	3.83173
IntraFreq	4.469	0.6214	4.385	0.5711	0.0841
InterFreq	3.438	0.8776	3.5	0.6481	-0.0625
IntraTrust	5.475	0.93636	4.8769	0.77372	0.59808*
InterTrust	4.6875	1.25255	4.5923	0.74077	0.09519
KnowledgeDiversity intra	0.4692	0.39883	0.6170	0.34747	-0.14777
KnowledgeDiversity inter	0.5347	0.39458	0.5870	0.37999	-0.5232

*Mean difference between two groups * Mean difference is significant different at p<0.05*

Individuals in Group 0, i.e. with high learning outcome, have a higher trust with their team members (IntraTrust) whereas individuals with lower learning outcomes (Group1) have lower trust with their team members. The mean difference of 0.59808 in IntraTrust between these groups is significant (p<0.05). There is high and significant association between IL and IntraTrust. These results suggest that when there is trust within the team individuals learn more.

At team level, two criteria for grouping teams were used. These are Team Performance and Team Learning. Two groups were identified for the criteria "team performance" at team level, one group of teams with high performance (N=7) and the other group with low performance (N=6).On the criteria of "team learning" we have two groups, one with high learning outcomes (N=7) and the other one with low learning outcomes (N=6).

Team performance

Table 7. Independent Samples T-test

Variable	Group 0 High P (N = 7)		Group 1 Low P (N = 6)		t - test[a] p -value[b]
	Mean	SD	Mean	SD	
FormalTies_sum	88.5714	91.98887	67	39.56851	21.57143
SocialTies_sum	33.5714	22.5304	21.7143	24.54054	11.85714
IntraFreq_mean	4.592	0.45348	4.1334	0.28843	0.45857*
IntraTrust_mean	5.4365	0.49336	4.9138	0.30624	0.5227*
TM_FormalSocial	0.5631	0.08282	0.4381	0.21483	0.12493
TM_IntraInter_Formal	0.6513	0.03962	0.597	0.13449	0.05432

Variable	Group 0 High P (N = 7)		Group 1 Low P (N = 6)		t - test[a] p -value[b]
	Mean	SD	Mean	SD	
TM_IntraInter_Social	0.3204	0.26354	0.2891	0.31952	0.03133

*Mean difference between two groups * Mean difference is significant different at p<0.05*

On the Team Performance, we can conclude that there is a statistically significant difference between the two groups in terms of IntraFreq_mean and IntraTrust_mean respectively. Teams that perform better have team members who frequently exchange knowledge with other members in the team as well as have high trust within the team. This could be attributed to the fact that the more frequently the team members interact amongst themselves, the more they share critical information that can help the team to do their work better and hence improve the team's performance. Again there is a significant association between Intra trust and Team Performance. This means that the more trust team members have amongst themselves, the more they can share vital information that can help improve Team performance.

Team learning

Table 8. Independent Samples T-test

Variable	Group 0 High L (N = 7)		Group 1 Low L (N = 6)		t - test[a] p -value[b]
	Mean	SD	Mean	SD	
FormalTies_sum	70.7143	53.77023	84.8571	85.38819	38.13956
SocialTies_sum	25.1429	16.2114	30.1429	30.24031	12.96856
IntraFreq	4.4453	0.4458	4.2801	0.44369	0.23773
IntraTrust	5.331	0.62631	5.0194	0.21832	0.25069
TM_FormalSocial	0.4451	0.22612	0.5561	0.06171	0.08859
TM_IntraInter_Formal	0.6749	0.02211	0.5734	0.122	0.04686*
TM_IntraInter_Social	0.4071	0.24837	0.2192	0.29093	0.15155

*Mean difference between two groups * Mean difference is significant different at p<0.05*

On Team learning, there is a statistically significant difference with TM_IntraInter_Social. Teams with the variety of ties in terms formal within and outside their teams learn more. This could be attributed to the fact that there is more exchange of information and this results in team learning.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

This study provided a structured analysis, which shows that the propositions put forward are supported by correlation and independent t-test:

- Higher trust within a team is associated with higher individual learning outcomes (H2a),

- Higher trust within a team also associated with individual performance (H2b)

- Higher trust within a team associated with higher team performance (H2d)

- Frequent interaction with members in the team is associated with higher team performance (H2d).

- More diverse (within a team and with other teams) formal ties is associated with team learning (H3c)

- More diverse (within a team and with other teams) formal ties is associated with team performance (H3d).

Recommendation

The investigation has shown that indeed intra organisational networks enhance team learning and team performance. Managerial recommendations would be to encourage frequent interactions, build stronger trust amongst team members, and support team members to establish formal ties not only within a team but also with other team members within an organisation.

This study was limited in the fact that it was done in a Construction Project environment. Further studies could be done on other industry such as service industry to see the impact they have on learning and performance in an organisation.

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