

TEAM COMPOSITION AND TEAM PERFORMANCE: ACHIEVING HIGHER QUALITY RESULTS IN AN INTERNATIONAL HIGHER EDUCATION ENVIRONMENT

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Abstract:

This study was piloted over a period of three years (2008-2011) while teaching Project Management courses to international students at Mikkeli University of Applied Sciences, Finland - aiming to explore the possibility to apply the Belbin's theory on building successful managerial teams in a multicultural higher education environment – in order to achieve better quality results. The objective of the study was multifold: (i) to explore the possibility to apply the theory in an international higher education environment; (ii) to assess the students' satisfaction of working in teams built according to different criteria; (iii) to assess the quality of the students' performance while working in teams; (iv) to check if there is any relationship between the quality of the performance and the way of building the team. The results are positive overall: the theory is applicable in the above conditions; students' satisfaction depends on the way the team is built; building the teams according to the theory of team members' roles leads to better quality performance. The results of the study are equally important for higher education professors and managers, aiming at improving the quality of the higher education process. The international dimension is a measure of innovative, entrepreneurial university.

Keywords: project teams, team roles, team performance, higher education, entrepreneurial university.

1. INTRODUCTION: LITERATURE REVIEW

In recent years, firms increasingly rely on designing teams in different ways in order to use their resources effectively and consequently increase their competitiveness. When reviewing the literature on team design and relating it to team performance recent literature review articles identify three broad categories of design factors: team composition, task design, and organizational context (Cohen and Bailey, 1997; Kozlowski and Bell, 2003).

1.1. The effect of Team Composition on Team Performance and on Member Satisfaction

Besides many other factors, team composition has been identified as a key factor that influences team performance (Senior, 1997; Belbin, 2002). Team composition not only questions what individual members bring to the group in terms of skill, ability, experience, role etc. but also whether these individual capabilities combine to result in higher performance for the team as a whole forming a synergy. Literature that has focused on design factors points at aggregated member characteristics, member heterogeneity and team size as categories associated with team composition (Stewart, 2006).

From the perspective of aggregated member characteristics, different abilities of individuals provide the team with a different resource and each resource adds linearly to team performance. Therefore the value of the team success is based on the value of the team members (Templar, 2011; Chapman, 2011).

Member heterogeneity perspective supports that different abilities do not add up linearly, their interactions should also be studied. Studies focus on the affects of heterogeneity or homogeneity of team member characteristics on team performance. Team heterogeneity is believed to create a significant synergy for the team (Dyaram and Kamalanabhan, 2011; Templar, 2011; Hsu, Wu and Yeh, 2011; Van der Haar, Jehn and Segers, 2008) as well as more conflict and miscommunication (Aritzeta, Ayestaran and Swailes, 2005; He and Thatchenkery, 2011; Lech et al., 2010; Staehle, 1999).

In Kurtzberg's study (2000) where he investigated the relationship of diversity, creativity, and conflict, results showed that a mix of creative and non-creative people leads to higher levels of creative performance, but at the expense of team member satisfaction. However, many empirical studies have also revealed that higher levels of diversity lead to higher satisfaction and motivation and thereby to higher quality team output (Katzenbach and Smith, 1993; Kurtzberg, 2000; Staehle, 1999).

The final perspective of review for group composition research was thus to assess whether team size is related to team performance and member satisfaction. Although large teams can generate more outputs because additional members add resources and skills to teams, additional members also complicate the amount of interactions, thereby decreasing satisfaction and trust among members and leading to lower performance for the team as a whole. Empirical evidence suggests that an optimal team size of around five to nine persons is observed in most of the sciences (Qurashi, 1993), an optimal size of seven for project teams (Stewart, 2006) and six persons in managerial teams (Belbin, 1981). There seems to be a strong theoretical argument in the literature that small teams lead to increased team cohesiveness, improved communication and coordination (Horwitz, 2005). It is also commonly accepted that "a team is a small number of people with complementary skills who are committed to a common purpose, performance goals and approach for which they hold themselves mutually accountable" (Katzenbach and Smith, 1994, p. 45). Amid its relative limits ("small" is a relative notion) this definition will be accepted across this article, due to its obvious advantages and large acceptance.

The main purpose of this study is to investigate the influence of team composition on team performance and member satisfaction, particularly the influence of team member diversity in terms of roles played in a team.

1.2. Belbin's theory on successful teams

A consistent theory on building successful teams was constructed by R. Meredith Belbin and his collaborators from the *Industrial Training Research Unit (ITRU)* from Cambridge, UK, over years of solid multi-industry and multi-country research (Belbin, 1996a, 1996b, 1999, 2002). Issues like ideal size of the team, why teams succeed or fail, team leadership, designing a winning team, key team roles were addressed, studied and eventually offered solutions. Referring to management teams, the ideal size seems to be six, accepted between four and eight.

The theory is centred on the team roles and how they better match in order to avoid conflicts, and build sound management teams. There are eight roles that have been identified and declared as "useful people to have in teams", so-called: *company worker, chairman, shaper, plant, resource investigator, monitor-evaluator, team worker, completer-finisher* (Belbin, 2002, p. 74).

In the empirical literature, among studies testing whether teams with a diverse combination of team roles as defined in Belbin's theory have higher team performance, some have reached supporting results (Belbin, Aston and Mottram, 1976; Belbin, 2002; Prichard and Stanton, 1999; Park and Bang, 2002) whereas some have reached opposing results (Partington and Harris, 1999; Senior, 1997). While it has been accepted that the evidence is mixed, Aritzeta, Swailes and Senior (2007) conclude that the model and its accompanying Inventory have adequate convergent validity.

In a recent empirical study based on Belbin's theory, Higgs, Plewnia and Ploch (2005) have investigated the influence of team composition on team performance by considering the complexity of task as an additional factor. The data consisted of 29 teams formed from 270 employees returning the self-assessment Belbin questionnaires. Findings reveal that team performance is positively influenced by high diversity for teams with high complexity tasks.

In another recent study by van de Water, Ahaus and Rozier (2008) where the model is designed according to the team composition construct of Ten Haaf, Bikker and Adriaanse (2002) using Belbin's nine-role SPI, no significant relation has been found between balanced teams and performance. Research included a population of 39 teams of 234 comparable MBA students.

Although the Belbin model has been designed for management teams, Fisher, Hunter and Macrosson (2002) found no differences between management and non-management teams in terms of team performance, reinforcing the idea that the model can also be applied to non-managerial roles.

In order to contribute to the empirical literature on Belbin's theory, the present study is focused on building teams in line with the team roles defined in the theory where the teams are composed of international students working on their academic projects with the aim of achieving higher quality results and work satisfaction.

1.3. The entrepreneurial university and its international dimension

Teams from different sectors such as industry, agriculture, services, education, health, administration, military, culture, sports and arts (music mostly) have attracted research interest throughout time due to their own specificities. Recent research areas of increasing interest have been Research and Development (R&D) sector (Dyaram and Kamalanabhan, 2011; Itaya and Niwa, 2011; Chatterjee, 2012), high-tech industries (Wu et al., 2005; Itaya and Niwa, 2011; Crosby, 2012) and Information Technology and Communication sectors (Yang and Lee, 2006; Dyaram and Kamalanabhan, 2011). Due to these sectors' close connection with universities there has been increasing number of studies on team performance among university R&D teams (De Luis Carnicer et al., 2005).

The academia is not only a top-level education and research services provider but a significant resource of knowledge, as well as business start-ups (Breitenecker, Schwarz and Claussen, 2011). However, the university community seems to be less studied itself by its own scholars. *This paper intends to contribute at bridging this gap.*

The entrepreneurialism in universities started to be a topic of increasing interest among higher education policy makers since Burton Clark has published the first results of his studies on entrepreneurial universities (1998). Other studies have followed: the Organization for Economic

Cooperation and Development has devoted a special issue of the *Journal of Higher Education Management and Policy* to this subject (OECD, 2005) and *The Society for Research into Higher Education* has edited a collection of articles on entrepreneurialism in universities (Shattock, 2009).

Based on the Stevenson's theory on entrepreneurial organization (Stevenson and Jarillo, 1990) and Clark's studies on entrepreneurial university (Clark, 1998), Scarlat and Brustureanu (2009) have shown that international dimension of the universities is a characteristic of the dynamic, innovative, entrepreneurial universities.

In the European Union, the internationalization of the higher education has a more specific name: the creation of a European higher education and research area. In the globalized world of higher education, the quality of the higher education and ranking of the universities are unavoidable. However, the ranking of universities is not an objective per se; it aims at achieving higher academic performances and better quality of the educational process - on one hand – and, on the other hand, to stimulate international exchanges of faculties, students, best practice and teaching methods. And, as said, the international dimension is a measure of dynamic, innovative, entrepreneurial universities (Martinez and Kitaev, 2009).

Towards the entrepreneurial university, the quality of higher education is a complex result and effect of a multitude of influencing factors. Amid international dimension, quality of the competency-based curricula and academic staff, the entrepreneurial perspective of the teaching and learning process (Temple, 2009) is of foremost importance. *From this entrepreneurial perspective of higher education, this study's scope of work includes international students attending project management courses at under-graduate level in a multicultural, higher education environment, as members of project teams.*

2. RESEARCH OBJECTIVES AND METHODOLOGY

The objective of this study is multifold:

to explore the possibility to apply the Belbin's theory on teams structure in an international, multicultural higher education environment – namely teams of students with different cultural backgrounds, in a Western European university; (ii) to assess the students' satisfaction of working in teams built according to different criteria; (iii) to assess the quality of the students' performance while working in teams; (iv) to check if there is any relationship between the quality of the performance and the way the team is built.

The study was completed by one of the authors while teaching *Project Management Skills* course to international under-grad students at University of Applied Sciences in Mikkeli, Finland, over a period of three years (September 2008 – September 2011). The sixth experiment was conducted in September 2012 and data processing is currently in progress.

There were 148 active students surveyed in total. They reported 28 different cultural backgrounds (countries). There were 5 series of experiments as presented in Table 1.

Table 1: The samples of students surveyed – while working in teams

No.	Month, Year	No. of students	Team size	No. of teams	No. of countries
1.	September, 2008	21	3	7	11
2.	September, 2009	30	5	6	13
3.	February, 2010	25	5	5	12
4.	September, 2010	36	4	9	14
5.	September, 2011	36	6	6	9
Total		148	3 ... 6	33	28 ¹

Source: own research

¹ The total number of different cultural backgrounds does not match – as some of them are repeating over years. There were students from all continents and 28 countries: Argentina, Armenia, Australia, Belgium, Cameroon, Chile, China, Czech Republic, Estonia, Finland, France, Germany, Hong Kong, Mexico, Moldova, Netherlands, Nigeria, Pakistan, Poland, Romania, Russia, Slovakia, South Korea, Spain, Sudan, Turkey, Ukraine, and Vietnam.

As far as methodology:

- During each series of experiments, the students were given team assignments (small projects to work on); the teams were equal as size, and assignments were quite similar as difficulty and duration;
- The size of the teams varied from experiment to experiment (3 to 6 students, depending also on the class size) as presented in Table 1;
- There were two types of assignments: type I assignments completed in teams built randomly; type II of assignments completed in teams built according to the individual team roles, as described;
- The students' individual team roles were assessed by *A self-perception inventory* test (Belbin, 2002, pp. 147-152);
- The average performance of the students in the context of an experiment was assessed as the average of the individual team grades, depending on the quality of the projects completed (grades on the 1-to-10 scale, 10=max); it was calculated for each team experiment in two cases – teams built randomly (Assignment I) and teams built considering the team roles (Assignment II);
- The satisfaction level in the context of an experiment was calculated as an average of the team members' satisfaction, assessed by the end of the course, for each type of assignment (1-to-5 scale, 5=max); for homogeneity of results, the average score was multiplied by 2-factor.

3. RESEARCH RESULTS AND DISCUSSION

The results of the 5 series of experiments are synthetically displayed in Table 2.

Table 2: The survey results – by experiments

No.	No. of experiment	Assignment I		Assignment II	
		Performance	Satisfaction	Performance	Satisfaction
1.	Experiment 1	7.33	8.43	8.21	8.90
2.	Experiment 2	8.50	7.77	8.33	7.25
3.	Experiment 3	8.20	8.37	8.30	7.46
4.	Experiment 4	7.88	6.71	8.38	8.86
5.	Experiment 5	8.50	8.12	8.22	7.69
Average score		8.08	7.88	8.29	8.03

Source: own research

The experiments were conducted as planned and all the research objectives were matched. There were built teams of students of different sizes, in line with the Belbin's theory on team roles, in a multicultural higher education environment (i); their work satisfaction and performance were assessed while working in such teams against satisfaction and performance while working in teams built randomly (ii and iii, respectively); the results lead to some comments and interpretations, and some relationships are identified (iv).

Overall, the students' average performance is higher in case of the teams built in line with the team roles (8.29 compared to 8.08). The same conclusion is valid in case of the students' satisfaction while working in such teams (8.03 compared to 7.88).

By experiments, the results are different: only the experiments 1, 3 and 4 are evidence for an increase in quality of the performance; and only the experiments 1 and 4 show a higher satisfaction. However, one should notice that "Belbin teams" contribute to a homogenisation of the quality of performance: the lower values in case of Assignment I increase (7.33 to 8.21; 7.88 to 8.38; 8.20 to 8.30; *lower the value, higher the increase Δ*), and, conversely, the higher values decrease (8.50 to 8.33; 8.50 to 8.22). Consequently, it is worth to continue a deeper analysis.

The data processed and re-presented in the Table 3 allow a closer look at the results and more comments. The gain in students' performance (Δ performance) continuously decreases with the size of the team. Thus: *the team size matters: the quality of the teams of 3 or 4 students can probably be improved by building the teams in line with the team roles*. For teams of 5 the results are not conclusive while teams of 6 seem to be too large in case of students' projects (the didactic projects

are, in general, small). In addition, it should be mentioned that student teams are not necessarily managerial teams.

Table 3: The survey results – by experiments and team size

No. of experiment	Team size	Δ^2 performance	Δ satisfaction
Experiment 1	3	0.88	0.47
Experiment 2	4	0.50	2.15
Experiment 3	5	0.10	- 0.91 / 0.11
Experiment 4	5	- 0.17	- 0.52
Experiment 5	6	- 0.28	- 0.43

Source: own research

The class size seems to matter too: in the context of the type I assignments, the satisfaction level is higher in smaller size classes (the classmates know better each other than in larger classes) – experiment 1 (21 students) and experiment 3 (25 students).

The satisfaction level is measured subjectively and is subjective itself. However, it is remarkable that variations in satisfaction levels follow the variations in performance levels – excepting, surprisingly, the experiment 3. Closer inspection of the comments written by students in the satisfaction evaluation forms identified the reason: strong individual conflicts of personality in two teams and extreme low satisfaction. Eliminating those values and re-calculating the level of satisfaction (experiment 3, II), the level 7.46 (Table 2) becomes 8.48 and Δ satisfaction (in experiment 3) becomes 0.11 instead of - 0.91 (Table 3).

New set of data demonstrates that variations in the level of satisfaction, yet subjective, follow the sense of variations in performance; i.e. satisfaction is in relationship with performance. *Summarizing: building the smaller teams (3, 4 and, partly, 5 members), in line with team roles proposed by the Belbin's theory on the team structure, both quality of the team performance and team members' satisfaction increase.*

4. CONCLUSIONS AND RECOMMENDATIONS

In case of teams of international students, while working on didactic projects in teams, it is possible to increase the quality of the students' performance as well as their work satisfaction by building smaller teams (3, 4 students), and in line with the theories on team roles.

The implications are important for higher education managers and professors, adding value to the teaching and learning process, by using interactive methods and stimulating teamwork, ultimately leading to higher quality in higher education.

5. LIMITATIONS AND FURTHER RESEARCH

This study explored some aspects related to the process of building teams of international students, aiming to increase quality of their performance and satisfaction. However, in spite of authors' intention to continue the study, the research was limited to a few experiments.

The study could be extended in several areas and directions as: finer analysis of the correlation between performance, satisfaction, team and class size; study of larger or smaller teams; teamwork against individual work; influence of cultural background; explore performance and quality when teams are built differently (by personal affinity, friendship).

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² Δ = value (Assignment II) – value (Assignment I)

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