



MANAGING MULTICULTURAL VIRTUAL ENGINEERING TEAMS

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With the global trend towards internationalization, there is a need to understand the parameters that determine the success of the multicultural and multi-located teams. This research is intended to explore the performance of multicultural and multi-located teams operating in Egypt and the various managerial approaches required to enhance these teams' work efficiency. The research employed a qualitative-quantitative experiment on multicultural and multi-located teams in one of the foreign firms operating in Egypt. The groups' performance was analyzed using Porter's Model and a framework was proposed. The proposed framework was verified through three phase experiment. The final framework developed included organizational culture, mechanism for staff recruitment, communication, leadership styles and decision making approaches. This framework is intended to assist in enhancing the operation of the multicultural and multi-located design engineering teams in Egypt.

Keywords: Multiculturalism, Team management, Cultural diversity, Leadership.

1 NEED FOR THE RESEARCH

Various studies indicated that the multicultural engineering teams have a significant impact on productivity like the work of Ng and Tung (1998). Other researchers like Watson *et al.* (1993) noticed that multicultural team's performance can be 15% higher than that of the homogenous team only if the former is well managed. Managing multicultural teams enforce various parameters on the management like (i) handling geographic distances and dispersion of teams, (ii) managing cultural diversity, (iii) understanding the differences and conflicts, (iv) developing team cohesiveness, (v) maintaining communication richness, and (vi) dealing with coordination and control issues. Another approach to manage the multicultural groups is to benefit from the diversity through allocating every individual in the right position utilizing their skills like problem solving, decision making, marketing expertise etc. (Cox 1991). Most of the studies conducted focused on the European, American and the Asian market and few focused on the MENA region. The aim of this research is to analyze the management techniques required for the multicultural and multi-located teams operating in Egypt and to propose a framework to manage these teams effectively.

2 RESEARCH METHODOLOGY

The research methodology was to conduct a qualitative experiment on Firm A, a Saudi based consultant that outsources its GCC (Gulf cooperation council) work to its branch located in Egypt. The data gathered was analyzed and the parameters generated were ranked and examined using the Porter's (Diamond) Model, analytical hierarchy order (AH) and Relative Importance

Variable (RIV) values. These parameters were validated using external validation approach by conducting a quantitative survey and a framework was proposed which was verified through three-phase experiment.

2.1 Process of the Qualitative Experiment

A total of six groups were formed (table 1): two based in Egypt, two in Saudi Arabia and two virtual groups who worked online. This research was conducted assuming that certain parameters - age, gender, and employee's year of experiences- have negligible influence on the multicultural teams' performance.

Table 1. Data of the groups participating in the quantitative experiment.

Group	Nationality	Position at Firm A	Group 's Type		Communication Approach
A	Egyptian Egyptian Egyptian	Design Team Leader Structural Engineer Coordinator	Monocultural Team	Traditional Team	Face-to-Face
B	Egyptian Egyptian Lebanese	Design Architect Senior Structure BIM Coordinator	Multicultural Team	Traditional Team	Face-to-Face
C	Egyptian Lebanese Syrian	Design Architect BIM Coordinator MEP Engineer	Multicultural Team	Virtual Team	Online
D	Philippines Philippines Philippines	Design Architect Structural Engineer Technical Coordinator	Monocultural Team	Traditional Team	Face-to-Face
E	Egyptian Lebanese Philippines	Architect Engineer Structure Engineer Coordinator	Multicultural Team	Virtual Team	Online
F	Jordanian Lebanese Philippines	Coordinator Structural Engineer Design Architect	Multicultural Team	Traditional Team	Face-to-Face

In order to study the performance of these multicultural multi-located teams, the following experiment was conducted:

- (1) The design brief (including the client's requirement, the project objective, mandatory technical specifications and the area requirement) was given to the architect. The architect worked on the conceptual plans and the engineer (structural/MEP) functioned on the regulations, codes and technical specifications. Concurrently, the coordinator was in charge of compiling the work together and verifying the output in accordance with the design brief.
- (2) The time required to finalize a decent conceptual approach was assumed to be five hours. However, according to Tuckman (1965) insufficient time should be allocated while testing a hypothesis in order to analyze the prioritization of the group. Therefore, a total of four hours was allocated for the completion of the project.

- (3) All team members were asked to work on the final presentation to encourage: (i) cohesive output, (ii) promote decision making techniques, and (iii) clarify the leadership style used among the team members.

2.1.1 Findings of the qualitative experiment

The experiment conducted was observed and the findings are as following:

- (1) Organizational culture: Groups (D and F) located at the company's headquarter showed a clear understanding of the company's organizational culture, communication, and work methodology. The output of the groups (A and B) located in Egypt showed that the company's organizational culture is not well-defined and the team members are either working with previous managerial approach or influenced by their cultural diversity. The virtual teams (C and E) showed different responses with unclear output and inconsistent communication. Among the six groups, the multicultural and multi-located teams' performance was the least impressive.
- (2) Communication: The main challenges that encountered the multicultural teams were: (i) the inability to find a platform for exchanging and documenting information and (ii) unsuccessful attempt to translate the client's requirement to the team members located overseas. Another issue was the presence of grapevine communication which increased the informal negative communication between the employees and the outsiders.
- (3) Multicultural teams: The rise of the cultural differences along with the regular technical discrepancies caused tension among the team members. This issue was highly notable among the virtual teams (Group C and E).
- (4) Decision-Making: The teams located at the company's headquarter were used to having the upper hand in the decision making process because of their direct contact with the client. This discouraged the managerial skills and decision making of the engineers at the Egyptian branch which added up to the tension between the multi-located teams and explained the inefficient performance of the teams located at this branch.

3 PROPOSED FRAMEWORK AND VERIFICATION CASE STUDY

The group performance was analyzed using the four conditions (Factor, Demand: Internal and External, Related Industry and Firm's strategy) of the Porter (Diamond) Model. Parameters for the four conditions were generated and compared using AH and RIV value which were validated using a quantitative experiment (survey). The survey targeted 62 Engineers working in multicultural firms in Egypt with more than 10 years experience. The proposed framework included the parameters that (i) scored above the condition's average score and (ii) graded four or five by 50% of the responses. These parameters with the described managerial approach form the proposed framework which is to be tested in section 3.1. The proposed framework is:

- (1) Organizational style: In the Egyptian Design firms, the organizational culture is wrongly classified as both mean-oriented and employee-oriented which confuses the employees as to whether to be risk takers or not. Other indicators are the open system, easy working discipline, and external driven factors.
- (2) Mechanism of staff recruitment: The technical experience is the main criteria for selection.

- (3) Leadership style: The Egyptian engineer performs well under a participative-supportive and bureaucratic leadership style.
- (4) Decision making approach: Both command and consent are powerful decision making approaches among the multicultural Egyptian design teams.
- (5) Communication: Although various time breaks are scheduled to be included during various project's phases, the actual status usually includes an unorganized communication scheme between the disciplines. Among the virtual teams, the communication scheme is harder due to the absences of a common platform for documentation and collaboration.

3.1 Verification of the Proposed Framework

The proposed framework was verified using inspection method (case study). The proposed framework was tested on the same team members who were involved in the qualitative experiment.

During the first phase of the experiment, multicultural teams had low performance as compared to monocultural teams. However by the second phase of the experiment, the multicultural teams were able to identify approaches to overcome their cultural differences. Group F was able to use the diversity to resolve various discrepancies which is compatible with the research conducted by Comu *et al.* (2011) who showed that the multicultural teams are able to introduce various tactics to resolve discrepancies. Virtual Teams like group C which encountered major challenges due to cultural diversity during the first phase were able to elevate their performance after introducing job responsibilities and allocating the leadership task to a specific team member. The monocultural teams, group A and group D, had consistent outputs throughout the two phases of the experiment and no improvement was noticed in their ways of resolving discrepancies and means of communication. A third phase of the experiment was conducted after two days.

The performance of the six groups was evaluated and scored based on the key parameters of the proposed framework (except the mechanism for staff recruitment since the groups were formed by the researcher). Each of the five parameters was scored out of 50 by the technical manager of the company who evaluated the teams based on the workability of the project, the final output, the collaboration throughout the allocated four hours, organizational culture, leadership style, communication approaches and decision making techniques. The standard deviation, mean and p value were calculated using R program.

Although initially the monocultural teams had higher performance, the second and third phase showed that the multicultural teams were higher in terms of their efficiency and consistency with company's organizational culture. On the leadership level, according to Hofstede (1980) studies, the Egyptian society is a highly emotional society and thereby using leadership techniques like participative and supportive is encouraged. Groups like A, D and F used the participative leadership approach during the first phase and the second phase. The groups that had difficulties applying this leadership approach were B (multicultural team) and C (multicultural and multi-location team). In order to know whether the participative-supportive leadership approach is the most suitable style for the team members, a short questionnaire was developed which showed a high acceptance of the participative-supportive major roles with R value of 0.93. On the other hand, the virtual group showed relatively low acceptance to the participative-supportive approach and high acceptance to the bureaucratic leadership style with R value of 0.91.

Table 2. The statistical analyze showing the performances of the six groups.

Groups	Project 1	Project 2	Project 3	SD	T-test	P value	Mean
Group A	190	180	150	20.81	14.42	0.0047	173.3
Group B	200	220	240	20	19.05	0.0027	220
Group C	100	130	170	35.11	6.57	0.0223	133.3
Group D	240	240	210	17.32	23	0.0018	230
Group E	150	190	210	30.55	10.39	0.009	183.3
Group F	180	220	240	30.55	12.09	0.0067	213.3

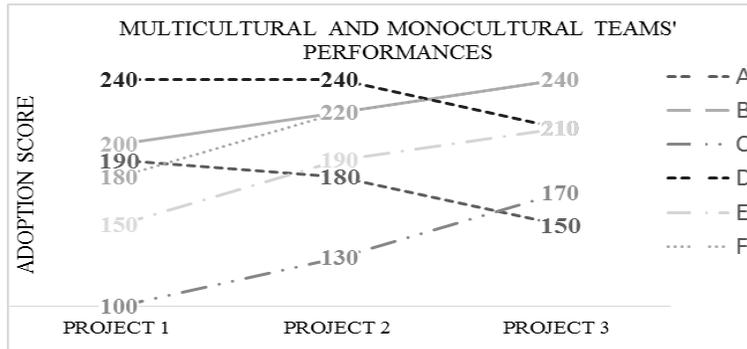


Figure 1. Performance of the Multi and Mono cultural teams throughout the three phase experiment.

4 FRAMEWORK DEVELOPED

Based on the three phases of the experiment conducted above, the final framework includes the following five parameters with a more specified managerial approach, adjusted based on the enhancement in the performance of the teams:

- (1) **Organizational culture:** The organizational culture should facilitate the team development activities and define approaches to enhance the productivity of the multicultural teams. Open system, employee oriented methodology, clear hierarchy, detailed job responsibility- including the managerial and technical responsibilities-should be clarified. A follow-up orientation should be created for new employees to familiarize them with the company’s regulations.
- (2) **Mechanism for staff recruitment:** Specific criteria should be specified while composing the team, including individual profiling, technical experience, value of money candidate, and the ability of candidate to adapt with the company’s culture.
- (3) **Leadership style:** The leadership style to be followed can be a combination of participative and supportive styles to ensure the multicultural teams’ efficiency. Virtual teams need a more bureaucratic leadership style due to the absence of face to face communication. The leaders of the industry should also consider the task’s culture while exercising their duties. While working with multicultural teams, the individuals should be encouraged to lead a phase of the project. The tasks are to be allocated based on the team member’s initiatives which are to be determined from the individual’s profiling and culture.

- (4) Decision making approach: Both command and consent are powerful decision making approaches. In case of command style, it is advised that the decision should be taken by involving all team members either through consent or majority voting.
- (5) Communication: Various means of communications should be introduced for multicultural and multi-located teams which include forms, regular meetings, online discussions, and decision-making sessions. Grapevine communication is to be suppressed through communicating the difficulties and constraints faced through a fixed form system.

5 CONCLUSIONS

The qualitative experiment confirmed the hypothesis of implementing an amended managerial approach while managing multicultural teams. The framework developed is verified and validated to ensure its generalization on the Egyptian design engineering firms. The main parameters are: Organizational culture, mechanism for staff recruitment, leadership style, decision making, and communication techniques.

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