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The Two Dimensions of Virtual and Collocated Project Teams or What Project Team Members WANT and GET: An Empirical Study

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Abstract

The current paper compares and investigates the discrepancies in motivational drives of project team members with respect to their project environment in collocated and distributed (virtual) project teams. The set of factors, which in this context are called ‘Sense of Ownership’, is used as a scale to measure these discrepancies using one tailed t tests. These factors are abstracted from theories of motivation, team performance, and team effectiveness and are related to ‘Nature of Work’, ‘Rewards’, and ‘Communication’. It has been observed that ‘virtual ness’ does not seem to impact the motivational drives of the project team members or the way the project environments provide or support those motivational drives in collocated and distributed projects. At a more specific level in terms of the motivational drives of the project team (‘WANT’) and the ability of the project environment to provide or support those factors (‘GET’), in collocated project teams, significant discrepancies were observed with respect to financial and non financial rewards, learning opportunities, nature of work and project specific communication, while in distributed teams, significant discrepancies with respect to project centric communication, followed by financial rewards and nature of work. Further, distributed project environments seem to better support the team member motivation than collocated project environments. The study concludes that both the collocated and distributed project environments may not be adequately supporting the motivational drives of its project team members, which may be frustrating to them. However, members working in virtual team environments may be less frustrated than their collocated counterparts as virtual project environments are better aligned with the motivational drives of their team members vis-à-vis the collocated project environments.

I. Research Background and Rationale

Introduction

The growth of information led economy has lead to the emergence of virtual teams. However, quantitative field studies on virtual teams may be lacking (Bell, Kozlowski, 2002, Lipnack, Stamps, 1997). On the other hand, the study on human aspects in project management ignored the team members’ perspective of project team (Wilemon, 2002). The present paper attempts to address these issues. Progressing within the framework of team performance and motivation in a project environment, this paper identifies the factors which have been perceived to be most important by the members in a project setting (‘WANT’). Then, the ability of the project environment to provide or support these factors is measured and juxtaposed with the expectations of the project team members (‘GET’). These discrepancies are compared in collocated and distributed project teams to observe if either of these environments (collocated or distributed project environments) achieves a better fit between the WANT-GET as compared to the other.

The Research Study

The present paper is a part of the larger research study which studies the role of project environment in supporting the motivational drives of the project team members. The theory base for the present study is presented in Part II of this paper. The specific factors used as a scale to identify and measure the expectations / motivational drives (‘WANT’) of collocated

and distributed project team members and the ability of the project environment to provide/support those expectations ('GET') are presented in part III of this paper (see figure 1, page 10, see figure 2, page 11). Part IV presents the theory base on Virtual teams. The research design is detailed in Part V, followed by presentation of observations of results in Part VI of this paper. Part VII of the paper presents discussion of results, and conclusion.

II. Theory Base for the Research

Theory Base - Motivation

Motivation in Project Setting

Motivation has been defined in terms of goal directed behaviour (Armstrong, 2003) and Individual effort (Mitchell, 1997). This emphasis on individual and performance orientation is relevant to project contexts as projects are characterized by goals and a strict adherence to the Behavioral approach to motivation may not necessarily stimulate a high level of performance. However, "the need for achievement" coupled with "goal setting" and "reward system" is effective in the project environment (Harrison, 1992). This now leads to a discussion of motivation theories, which are suited to a project context.

McClelland's Theory of Needs

McClelland (McClelland, 1961) defined "Need for Achievement" as "The drive to excel, to achieve in relation to a set of standards, to strive to succeed". Translating this to the project environment, Harrison (1992) observes that individuals working in project settings are ambitious; are driven by a need to achieve their goals and hence would value incentives such as advancement, money, good assignment, and feedback. This discussion on individual's need to achieve his goals leads to the Goal-Setting Theory (Locke, 1968).

Goal-Setting Theory

The Goal-Setting Theory (Locke, 1968) suggests that specific goals produce a higher level of output and that when coupled with feedback on performance, motivates the person, as this would help a person to know how well he has achieved his targets. However, it has to be ensured that the individual's targets are aligned with the overall project targets (Harrison, 1992), to be able to achieve the dual benefit of motivation and team performance.

It may be inferred from the above discussion on motivation that the undercurrent theme, running parallel to motivation is the emphasis on performance. Hence, this is discussed next.

Theory Base - Team Performance

The characteristic of a project team and its ultimate performance depends on factors related to people, task, organization, and the extent to which the objectives related to these factors are met. Specific dimensions to measure team performance include adherence to budget, time, customer responsiveness, strategic value of the project for future business, organizational learning (Thamhain, 1998), adherence to schedule, achievement of project goals, and overall satisfaction from the company's perspective (Wang *et al*, 2004). The next question which is discussed is how can this high team performance be achieved? Team effectiveness is the answer.

Team effectiveness includes the set of conditions relating to work, issues concerning the teams involved in doing the work, and the context and the processes, which direct the work effectively towards the planned performance objectives and expectations of the team. This is explained in the Team Effectiveness Model.

Theory Base - Team Effectiveness

Team Effectiveness Model

The team effective model (Campion et. al., (1996), Hyatt and Ruddy (1997), Cohen and Bailey (1997), Neuman and Wright (1999), and Thompson (2000)) is a generic representation of factors that contribute to team performance and member satisfaction. The model posits that interesting, significant and autonomous nature of work, training opportunities for learning, suitable financial rewards mapped to performance, and specific goals lead to motivation, and team performance. The Job Characteristic Model seconds similar observations:

The Job Characteristic Model (Hackman and Oldham, 1980).

The model posits that any job may be described in terms of five core job dimensions: 1). Skill Variety, 2). Task Identity, 3). Task significance, 4). Autonomy, and 5). Feedback. Further, the presence of skill variety, task identity and task significance, and feedback would translate to the job being perceived as important by the incumbent. This, along with autonomy, which gives a sense of personal responsibility for results, leads to motivation and enhanced performance. Extending this to projects, Thamhain (1998) contends that a professionally stimulating team environment, characterized by interesting and challenging work, enhances the effectiveness of the team. Further, when the team members take higher levels of responsibility and authority, which may be understood as having greater autonomy at work, it leads to enhanced team performance.

Framework for 'Sense of Ownership' factors

To recapitulate this discussion on Motivation, Team Performance, and Team Effectiveness, it is observed that factors which have been presented, and which have been expected to contribute to Motivation and Team Performance can be summarized in 3 dimensions:

- Nature of Work,
- Rewards, and
- Communication.

Nature of Work

Interesting nature of work leads to motivation and enhances team performance (Kovach, 1987). In the context of the projects, these observations are seconded by Kerzner (2003), when he states that interesting work and a stimulating environment is motivating and leads to team performance (Thamhain, 1998). The different facets to interesting work have been significant tasks, enjoyable nature of work, and feedback on performance, as seen in the Job Characteristics Model. A key aspect to enhance the performance of the project team is to impart the skills and the knowledge required to the project team to effectively perform the tasks (Baron, Kreps, 1999). Pfeffer (1998) and further Thamhain (1998) suggest that interesting nature of work may also be associated with a high clarity of potential for professional rewards, which is discussed below.

Rewards

The link between motivation-performance-rewards is brought to fore by the expectancy theory on motivation (Vroom, 1964) which emphasises on the link between effort-performance-rewards, which in this case may be expected performance outcomes from the team members and the proportionate performance based financial rewards which the team member may get. Apart from the tangible rewards such as the financial benefits, intangible rewards such as security of advancement (Herzberg *et al*, 1959), good work-life balance (Huws, 1999), and mentoring (Armstrong, 2003) have been found to enhance motivation and team performance. Mentoring involves the protégé receiving continuous feedback on his performance from the

mentor, which lends the protégé to view the job to be meaningful (Beech, Brochbank, 1999) which again maps to ‘Nature of Work’.

Communication

Communication impacts team effectiveness and leads to increased job satisfaction and productivity (Verma, 1997). As seen in the definition of motivation, and in the McClelland’s theory of needs (1961), knowledge of goals and job specific information motivates employees. In a project environment, this translates to information exchange about scope definitions, quality, schedules and feedback apart from project objectives within the project teams, and with the project manager (Verma, 1997) fostering team spirit in project teams leading to motivation and performance (Kerkfoot, Knight, 1992). A key issue related to projects to be addressed here is that of the communication between the end-users and the project team. Knowledge of the end-user requirements would help the project team understand the bigger picture in terms of customer satisfaction and competitiveness of the organization, which is motivating (Kaplan, Norton, 2001) and enhances team performance (Wang *et al*, 2004).

III. The Sense of Ownership Factors

Following the discussion on Motivation, Team Performance, and Team Effectiveness, which are summarized in 3 dimensions- ‘Nature of Work’, ‘Rewards’, and ‘Communication’, the ‘Sense of Ownership’ factors are presented (see figure 1, page 10). These factors are used as the survey items for the present study.

IV. Theory Base for Virtual Teams

A Virtual team is a Group of project team members, linked via the internet or the media channels to each other and various project partners (Cleland, Ireland, 2002). They are geographically distributed (Maznevski, Chudoba, 2000) and culturally diverse (Geber, 1995, Townsend, 1996). Studies by Alge *et al*, (2004) suggest that virtual teams are temporary project teams; disbanded after the project is completed. Hence, unlike the collocated teams, team spirit may be lacking among virtual team members. Also, information exchange and communication may be stunted vis-à-vis the collocated teams (Athanasidou, Yoshioka, 1973). The other shortcoming of the virtual teams is the lack of learning opportunities (Strauss, 1996). Hence, virtual team members are in general less satisfied on their jobs (Warekentin *et al*, 1997).

V. Research Design

Research Questions

Based on the above discussion on motivation, team performance, team effectiveness, and virtual teams, which bring to fore the aspects of ‘nature of work’, ‘communication’, ‘rewards’ and the role of environment, the following research questions are presented:

1. Is there a difference between the motivational drives of the project team members and the ability of the project environment to provide or support those motivational drives in collocated project teams and in distributed project teams?
2. Do the motivational drives of project team members vary in collocated and distributed project environment?
3. Does the ability of the project team environment to support the motivational drives of its team members vary in collocated and distributed project team environments?
4. Does a collocated project team environment offer a better fit between the motivational drives of the project team members and the ability of the project team environment to provide/support those expectations than the virtual environment?

Premises:

Based on the above discussion on Motivation, Team Performance, Team Effectiveness, and Virtual teams, it is inferred that members of the project team have higher expectations in terms of 'Nature of Work', 'Rewards', and 'Communication'. Further, members in the virtual team may not be satisfied in general (Warekentin *et al*, 1997). Hence, the following premises are presented:

Premise 1: There is a significant discrepancy between the expectations of the project team members (WANT) and the ability of the project team environment to provide or support those expectations (GET) in collocated project teams with respect to the factors related to 'Nature of Work', 'Rewards', and 'Communication'.

Premise 2: There is significant discrepancy between the expectations of the project team members (WANT) and the ability of the project team environment to provide or support those expectations (GET) in distributed project teams with respect to the factors related to 'Nature of Work', 'Rewards' and 'Communication'.

Premise 3: There is a better alignment of the member expectations and the ability of the project team environment to support or provide those expectations in collocated project environments than the distributed environments and hence the collocated team members are less frustrated than the virtual team members.

Research Methodology

A t-test was best suited as it determines the statistical significance between a sample distribution mean and a parameter-comparing means and specifically, the difference between the means (difference between the mean scores of 'WANT' and 'GET'). The survey instrument is based on the research instrument used by Marvick (1958). The survey instrument included questions related to 'Nature of Work', 'Rewards', and 'Communication and was based on the 'Sense of Ownership' factors (see figure 2, page 11) and were rated on a 7-point Likert scale.

VI. The Results

In collocated project teams, the overall difference between the expectations of the team members and the project team environment's support to those expectations is very significant ($t = 11.78$, $P = .00000003$, $N=43$). Discrepancies specific to the different factors are summarized in Table 2 (page 13). In case of distributed project teams, the overall difference between the team members' expectations and the project team environment's support to those expectations is also significant ($t = 6.15$, $P = .00002$, $N=42$). Discrepancies specific to the factors are summarized in Table 2 (page 13). The overall difference between the motivational drives of collocated and distributed project team members however, is insignificant ($t = 0.24$, $P = .4$, $N=13$) as shown in Table 1 (page 12). The overall difference in the mean scores of the ability of the project environment to support project team motivation in collocated and distributed teams is quite significant ($t = -5.66$, $P = .00005$, $N=13$) as shown in Table 1 (page 12). Finally, the t-test results comparing the overall relative alignment of the motivational drives of the project team members (WANT) and the ability of the project team environment to provide or support those expectations (GET) between the collocated and virtual projects is also quite significant ($t = 4.87$, $P = .00019$, $N=13$).

VII. Conclusion

The t test results comparing the motivational drives of collocated and distributed project teams suggest that the expectations of the team members do not vary and that the degree of 'virtualness' does not affect team members' motivational drives. But there is a significant discrepancy between the expectations of the project team members ('WANT') and the ability of the project team environment to provide or support those expectations ('GET') in collocated and distributed project teams with respect to the factors related to 'Nature of Work', 'Rewards', and 'Communication'. Thus, Premises 1 and 2 can be accepted.

It is further concluded that though there exist significant differences between the WANT and the GET in *both* collocated and distributed project teams, in case of collocated project teams, the discrepancies are highest with respect to the factors 'Performance Based Financial Rewards', 'Comprehension of End-User Requirements', 'Training for Learning', 'Future Career Opportunities', and 'Enjoyable Nature of Work' in that order. In the case of virtual project teams, the differences are most with respect to the factors 'Comprehension of End-User Requirements', 'Easy Access to Project Related Information', 'Post Project Evaluation Feedback', 'Performance based Financial Rewards', and 'Enjoyable Nature of Work', in that order. To summarize, in collocated projects the discrepancies are most with respect to 'Financial Rewards', followed by 'Communication', and then 'Nature of Work', whereas in distributed teams, the differences are most with respect to 'Communication', followed by 'Financial rewards', and 'Nature of Work'.

Last but not least, it is observed that the virtual project environments better accommodate the motivational drives of their project team members vis-à-vis the collocated project environments. Hence, premise 3 is rejected because the exact opposite is clearly supported here. This result is a bit surprising and deserves to be further investigated as some elements of the literature would suggest that collocation is an important factor in creating team spirit and enjoyable nature of work.

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Appendix

Figure 1: Organization of the Present Paper & Sense of Ownership Factors

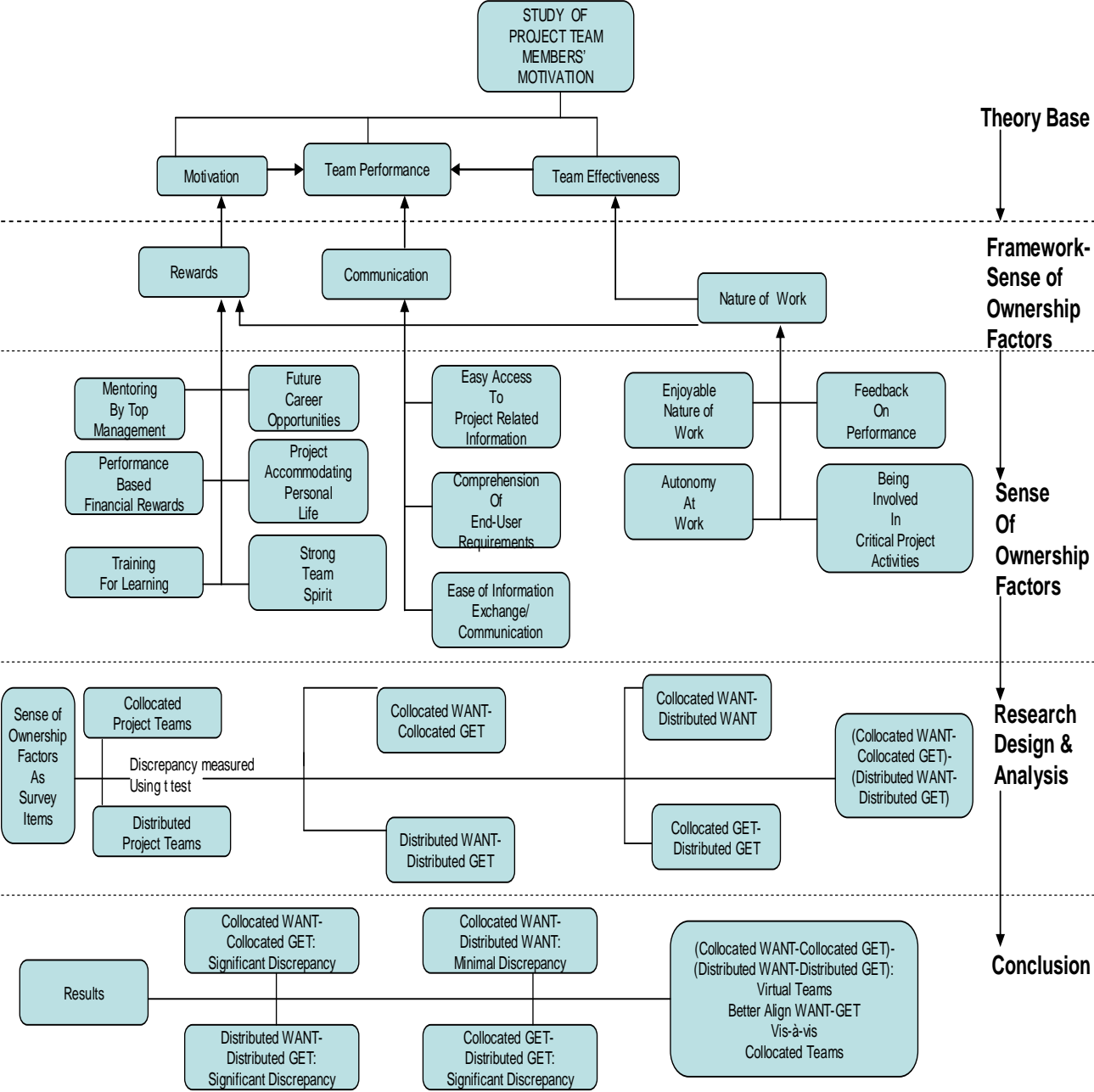


Figure 2: Organization of the Key Literature Review for the Study

| Sense of Ownership Factors | Framework for Sense of Ownership Factors | Focus variables of Study |
|--|--|---|
| Mentoring by Top Management (Beech, Brochbank, 1999) | Rewards | MOTIVATION (McClelland, 1961) (Harrison, 1992) |
| Performance based Financial Rewards (Vroom, 1964) | | |
| Training for Learning (Pfeffer, 1998) | | |
| Future Career Opportunities (Herzberg et.al, 1959) | | |
| Project Accommodating Personal Life (Thompson, 2000) | | |
| Easy Access to Project Related Information (Thamhain, 1998) | Communication (Thamhain, 1998) | TEAM PERFORMANCE (Armstrong, 2003) |
| Comprehension of End User Requirements (Lynn et.al, 1999) | | |
| Ease of Information Exchange/ Communication (Cummings, 2004) | | |
| Strong Team Spirit (Kerkfoot, Knight, 1992) | | |
| Enjoyable Nature of Work (Herzberg, et.al, 1959) | Nature of Work (Campion et.al, 1996) | TEAM EFFECTIVENESS (Team Effectiveness Model 1996, 1997 1999, 2000) |
| Autonomy at Work (Hackman, Oldham, 1980) | | |
| Feedback on Performance (Hackman, Oldham, 1980) | | |
| Being Involved in Critical Project Activities (Hackman, Oldham, 1980) | | |

Table 1: Comparative t test results-Collocated and Distributed Project Environments

| | Comparing Project Team Environment with Team Members' Motivation | | Comparing Collocated and Virtual Project Team Environments | |
|--------------------------|--|----------------------------------|--|-------------------------------------|
| | Collocated Want-Collocated Get | Distributed Want-Distributed Get | Comparing Motivational Drives | Comparing Project Team Environments |
| | Collocated Want-Collocated Get | Distributed Want-Distributed Get | Collocated Want-Distributed Want | Collocated Get-Distributed Get |
| Mean Score Difference | 0.72 | 0.45 | 0.01 | -0.25 |
| Observations | 13 | 13 | 13 | 13 |
| t- value | 11.78 | 6.16 | 0.24 | -5.66 |
| P(T<=t) Unilateral value | 0.0001 | | 0.40 | 0.000052 |

Table 2: Summarized t- test results- ‘WANT’-‘GET’: Collocated and Virtual Project Teams

| Factor | Collocated Project Teams | | | | | Distributed Project Teams | | | | |
|---|--------------------------|-------------|-------------|---|-------------------|---------------------------|-------------|-------------|---|-------------------|
| | Mean Score | | want -get | P(T<=t) [•] Unilateral value | rank [♦] | Mean Score | | want -get | P(T<=t) [•] Unilateral value | rank [♦] |
| want | get | want | | | | get | | | | |
| Autonomy at Work | 5.95 | 5.55 | 0.39 | 0.002 | 12 | 5.87 | 5.78 | 0.07 | 0.36 | 13 |
| Future Career Opportunities | 5.59 | 4.66 | 0.93 | 0.00005 | 4 | 5.36 | 5.11 | 0.25 | 0.11 | 11 |
| Post Project Evaluation Feedback | 5.54 | 4.66 | 0.88 | 0.0004 | 8 | 5.72 | 5.18 | 0.53 | 0.0005 | 3 |
| Training for Learning | 5.90 | 5.01 | 0.89 | 0.000048 | 2 | 5.82 | 5.34 | 0.47 | 0.01 | 8 |
| Project Accommodating Personal Life | 4.82 | 4.54 | 0.28 | 0.12 | 13 | 4.82 | 4.93 | -0.10 | 0.34 | 12 |
| Enjoying Work Itself | 6.34 | 5.82 | 0.51 | 0.00009 | 5 | 6.47 | 5.91 | 0.55 | 0.0016 | 4 |
| Comprehension of End-User Requirements | 6.14 | 5.30 | 0.83 | 0.00004 | 2 | 6.09 | 5.54 | 0.55 | 0.00017 | 1 |
| Performance-based Financial Rewards | 4.87 | 4.03 | 0.84 | 0.00001 | 1 | 5.08 | 4.22 | 0.86 | 0.0017 | 4 |
| Mentoring by Top Management | 4.97 | 4.08 | 0.89 | 0.0007 | 9 | 4.99 | 4.53 | 0.45 | 0.01 | 8 |
| Being Involved in Critical Project Activities | 5.94 | 5.45 | 0.48 | 0.001 | 10 | 4.99 | 4.43 | 0.45 | 0.035 | 10 |
| Ease of Information Exchange/ Communication | 6.16 | 5.23 | 0.92 | 0.0002 | 6 | 5.91 | 5.28 | 0.62 | 0.005 | 7 |
| Easy Access to Project Related Information | 5.85 | 5.04 | 0.80 | 0.0002 | 6 | 5.94 | 5.19 | 0.75 | 0.00030 | 2 |
| Strong Team Spirit | 5.86 | 5.09 | 0.77 | 0.0014 | 11 | 5.71 | 5.10 | 0.61 | 0.002 | 6 |
| Overall Score | 5.68 | 4.96 | 0.72 | 0.00000003 | | 5.67 | 5.21 | 0.45 | 0.00002 | |

[•] For P(T<=t) < 0.05, the results are highly significant, implying that the two groups differ significantly

[♦] rank order of the ‘Sense of Ownership’ factors according to Ascending Value of P(T<=t) Unilateral Value

