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CONTEXTUAL AMBIDEXTERITY AND PRODUCT INNOVATION IN TWO SOFTWARE DEVELOPMENT ORGANISATIONS IN KERALA

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Introduction

One of the more enduring ideas in organization science is that an organization's long-term success depends on its ability to exploit its current capabilities while simultaneously exploring fundamentally new competencies (Levinthal and March 1993, March 1991). Earlier studies often regarded the trade-offs between these two activities as insurmountable, but more recent research describes *ambidextrous* organizations that are capable of simultaneously exploiting existing competencies and exploring new opportunities. Building upon earlier work by Duncan (1976), Tushman and O'Reilly (1996) were first to present a theory of organizational ambidexterity. They suggest that superior performance is expected from the ambidextrous organization and describe structural mechanisms to enable ambidexterity In recent years, the concept of organizational ambidexterity has gained momentum in research on organizations particularly with regard to contextual ambidexterity .Ambidexterity is the heart of innovation. Despite increasing interest in ambidexterity as a concept, an examination of the literature indicates that several important research issues remain unexplored, ambiguous, or conceptually vague. The study focus on the following research questions: First, whether the contextual ambidexterity has any role in mediating the relationship between ambidextrous organization culture and Innovation in two software development organisations at Kochi? Second, which organisation shows more mediating effect and why? Third, to make a comparison between the scores of the variables under study to find out which organisation strives to provide a better picture of software development and innovation?

Theoretical Background

Ambidextrous organisation culture

The word ambidexterity is derived from the Latin word *ambos* which means "both" and Dexter *means* "right. Thus ambidexterity is 'right on both sides' (Simsek, 2009). Organizational culture is 'the underlying values, beliefs, and principles that serve as a foundation for an organization's management system as well as the set of management practices and behaviors that exemplify and reinforce those basic principles' (Denison, 1990, p. 2). It forms the informal, behavioral part of organizational Context (Denison, 1996), complementing the formal, structural component (e.g. processes and systems). Organizational culture is developed as an organization learns to cope with the dual problems of direction and flexibility as well as external adaptation and internal integration (Schein, 1990). From various literatures on innovation and creativity eight factors have been identified as higher order components of ambidextrous organization culture. These are as Organizational Diversity(OD), Shared Vision(SV),R&D strategy, top management support (TMS), customer focus (CF), organizational learning capability (OLC), creative capability (CC), organizational collaboration (OC).

Organisation context:

Sumantra Ghoshal and Chris Bartlet (1994) were the first to define the context as the "often invisible set of stimuli and pressures that motivate people to act in a certain way". (Gibson and Birkinshaw, 2004).The top management shapes the context through systems, incentives and controls and actions which they take on a day to day basis. It is then reinforced through the behaviors and attitude of the people throughout the organization. Ghoshal and Bartlett argue that four set of attributes-stretch, discipline, support and trust-interact to define an organizations context. Gibson and Birkinshaw (2004) further reduced these four into two dimensions of organization context: the first Performance Management (a combination of stretch and discipline) is concerned with stimulating people to deliver high quality and making them accountable for their actions; the second social support(a combination of support and trust)is concerned with providing people with the security and latitude they need to perform. PM and SS are equally important and mutually reinforcing. The strong presence of each will create high performance organizational context that give rise to truly ambidextrous organization (Gibson and Birkinshaw 2004).That means higher the 'high performance context', higher will be exploitation and exploration of competence of the employees which makes the so called ambidextrous organization. However, if there is an imbalance in these organizational characteristics or lack of both, a less than optimal organizational context will exist (Gibson and Birkinshaw,2004). Infact Ghoshal and Bhartlett(1994) framework for organizational effectiveness talks about how when the leaders in the business unit when provided the employees a supportive environment develops contextual ambidexterity.

Innovation

"The innovation point is the pivotal moment when talented and motivated people seek the opportunity to act on their ideas and dreams." **– W. Arthur Porter**

Innovation is not a single action but a total process of interrelated sub processes. It is not just the conception of a new idea, nor the invention of a new device, nor the development of a new market. The process is all these things acting in an integrated fashion." Innovation is the degree to which changes are intentionally implemented that is new to the organization" (Mohr, 1969). Damanpour (1991) defined innovation as "the generation, development, and adaptation of novel ideas on the part of the firm". The European Commission Green paper (1999) on innovation defines innovation as "the successful production, assimilation and exploitation of novelty in the economic and social spheres.

Radical and Incremental Innovation

Ambidextrous organization excel at exploiting existing products to enable incremental innovation and at exploring new opportunities to foster more radical innovation (Andriopoulos and Lewis,2009).The very need to survive, excel or prosper calls for excellence in both exploratory and exploitative Innovation (Tushnam and O'Reilly, 1996). That is the innovation requires for exploiting existing competences and exploring new competences. Drawing on such insights, it is conceptualized for the study that the Innovation which is required for ambidexterity is the radical innovation and incremental innovation.Radical innovation is often defined as the commercialization of products and technologies that have strong impact on two dimensions: First the market, in terms of offering wholly new customer benefits relative to the previous product generation in the category, and Second the company, in terms of its ability to create new businesses. Radical innovations (sometime referred to as breakthrough, discontinuous or disruptive innovations) provide something new to the world that we live in by uprooting industry conventions and by significantly changing customer expectations in a positive way. Ultimately, they often end up replacing existing methods / technologies (Martin Gilliards). Discontinuous Innovation is the innovation that, if adopted, requires a significant change in behavior. ex: listening music on MP3 player v/s cassette tapes, watching blue ray movies v/s DVd player. Disruptive Innovation is a term coined by Clayton M. Christensen the Robert and Jane Cizik Professor of Business Administration at the Harvard Business School. He first used the term in his 1997 book *The Innovator's Dilemma* Harvard Business School Press, Cambridge, MA. An innovation is disruptive if it ultimately replaces the technology that preceded it. Disruptive innovation initially underperforms along these dimensions. They introduce products and services that are not as good as what exists in the market, but which are simpler in function, more convenient and cheaper on the pocket than existing items. They often start with much market uncertainty and therefore small market share. Companies established in the market are cautious about embracing the new technology as this may mean abandoning their current, profitable customers while they aim for initially a new smaller market with inferior technology. What happens over time though is that the new technology improves, the performance increases and the disruptive innovation starts to gain customers from the established product or service. Disruptive technologies usually have more flexibility, are cheaper and have a wider applicability and so ultimately outsell what they replace.

Incremental innovation (sometimes referred to as sustaining innovation) uses existing forms or technologies as a starting point. It either makes incremental improvements to something or some process or it reconfigures it so that it may serve some other purpose. Gillette used to make razors with a single blade. Later, one of its diligent students of stubble asked, wouldn't two blades be better than one? Thus was born the Trac II. Next came a razor with three blades – the Mach III. Another example is that of Apple iPod which was initially launched only for MP3 music playing but recently with different colors having brand-new features. Incremental innovation or sustaining innovation improves the performance of established products or services along the dimensions of the expectation of that product or services mainstream customers. Several literatures have uncovered the vast significance of the relationship between exploration and exploitation of the competences of the employees. The integration of the two activities improves the performance by making the organization 'innovative, flexible and effective without losing the benefit of stability, routinization and efficiency' (Simsek, 2009, p 603). It is found that contextual ambidexterity has a profound impact on innovation (Wang and Rafiq, 2012).

It is through contextual ambidexterity (as a distinctive organizational capability) that the organization content generates performance outcomes. This is in line with the resource-based view of the firm arguing that it is firms' distinctive capabilities of reconfiguring, bundling and deploying resources (Amit and Schoemaker, 1993) that create differential performance.

OBJECTIVES OF THE STUDY

1. To find out whether ambidextrous organization culture, Organization context and New product innovation significantly differs between the two software development organizations.
2. To compare the mediation effect of Organization context (OC) mediate the relation between ambidextrous organization culture (AOC) and new product innovation (NPI) between two IT organizations namely Nest and Arbitron.
3. To verify whether the score ambidextrous organization culture, Organization context and New product innovation significantly differs between the two organizations.

Methodology

The study is explanatory and correlational. The questionnaire for this study has been pretested for checking its validity and reliability. Two items of the instrument had to be discarded for having low Cronbach alpha scores. It is also a cross sectional study. The data has been collected from two organisations namely.

Analysis and results

Sampling

The target population for this study was employees of the *NEST and ARBITRON*. A simple random sample procedure is adopted to obtain the information. The following table gives Characteristics of the participants in the survey.

Table-1: Characteristics of the participants

Characteristics of the participants-Age

Age		***NEST***	***ARBITRON***	***Total***
21-30 years	Count	42	32	74
	%	56.80%	43.20%	100.00%
Above 30 years	Count	22	21	43
	%	51.20%	48.80%	100.00%

Table-2 Characteristics of the participants-Gender

Gender		***NEST***	***ARBITRON***	***Total***
Male	Count	37	22	59
	%	62.70%	37.30%	100.00%
Female	Count	27	31	58
	%	46.60%	53.40%	100.00%

Table 3- Characteristics of the participants-Designation

Designation		***NEST***	***ARBITRON***	***Total***
Programmer	Count	46	27	73
	%	63.00%	37.00%	100.00%
Team leader	Count	11	11	22
	%	50.00%	50.00%	100.00%
Project leader	Count	2	9	11
	%	18.20%	81.80%	100.00%
Project manager	Count	5	6	11
	%	45.50%	54.50%	100.00%

Table 4- Characteristics of the participants-Organisational type

Organisational type		***NEST***	***ARBITRON***	***Total***
>500 employees	Count	0	53	53
	%	0.00%	100.00%	100.00%
200-500 employees	Count	64	0	64
	%	100.00%	0.00%	100.00%

Table 5- Characteristics of the participants-Experience in present organisation

Experience in present Organisation		***NEST***	***ARBITRON***	***Total***
Less than 1 year	Count	14	5	19
	%	73.70%	26.30%	100.00%
1-5 years	Count	30	30	60
	%	50.00%	50.00%	100.00%
5-10 years	Count	19	15	34
	%	55.90%	44.10%	100.00%
Above 10 years	Count	1	3	4
	%	25.00%	75.00%	100.00%

Table 6- Characteristics of the participants-Total experience in IT

Total Experience in IT		***NEST***	***ARBITRON***	***Total***
1-5 years	Count	25	17	42
	%	59.50%	40.50%	100.00%
5-10 years	Count	30	31	61
	%	49.20%	50.80%	100.00%
Above 10 years	Count	9	5	14
	%	64.30%	35.70%	100.00%

Table 7- Characteristics of the participants-Experience in Non IT

Experience in Non IT		***NEST***	***ARBITRON***	***Total***
Nil	Count	53	45	98
	%	54.10%	45.90%	100.00%
1-5 years	Count	7	1	8
	%	87.50%	12.50%	100.00%
Above 5 years	Count	4	7	11
	%	36.40%	63.60%	100.00%

Instrument

The survey instrument was developed by the researchers after an extensive review of literature and scales used indifferent educational backgrounds guided by the theoretical base of the study. This instrument was sent to experts who were working in the field of management in different universities to determine its face and content validity. The instrument was improved in the light of the feedback from these experts. A pilot study was conducted to establish its internal consistency and reliability. After analysing the data resulting from the pilot study, two items were removed from the instrument. The following table gives the reliability of the measures considered.

Table-8 Reliability of variables considered

Variables	**Cronbach's Alpha**	
	NEST	**ARBITRON**
Competence Exploration	0.775	0.934
Competence Exploitation	0.894	0.916
Radical Product Innovation	0.918	0.944
Incremental Product Innovation	0.927	0.902

Speed to market	0.904	0.911
Organisational diversity	0.705	0.81
Shared vision	0.839	0.781
Top management support	0.758	0.822
Organisational learning capability	0.001	0.867
Creative capability	0.765	0.808
Customer focus	0.783	0.827
Research and Development strategy	0.918	0.908
Organisational collaboration	0.788	0.842
Performance management context	0.838	0.875
Social support context	0.544	0.947

Data Analysis

The data were analysed via SPSS 20.0 for Windows. Descriptive statistics were used to describe and summarize the properties of the mass of data collected from the respondents. Parametric statistics like Two way ANOVA and t-test pair-wise comparison were conducted to analyse any differences between ambidextrous culture and other dependent variables. To determine the relationship between ambidextrous culture, Organisation context and New Product Innovation mediation analysis is carried out using hierarchal regression and Sobel test is carried out. A level of 0.05 was established a priori for determining statistical significance.

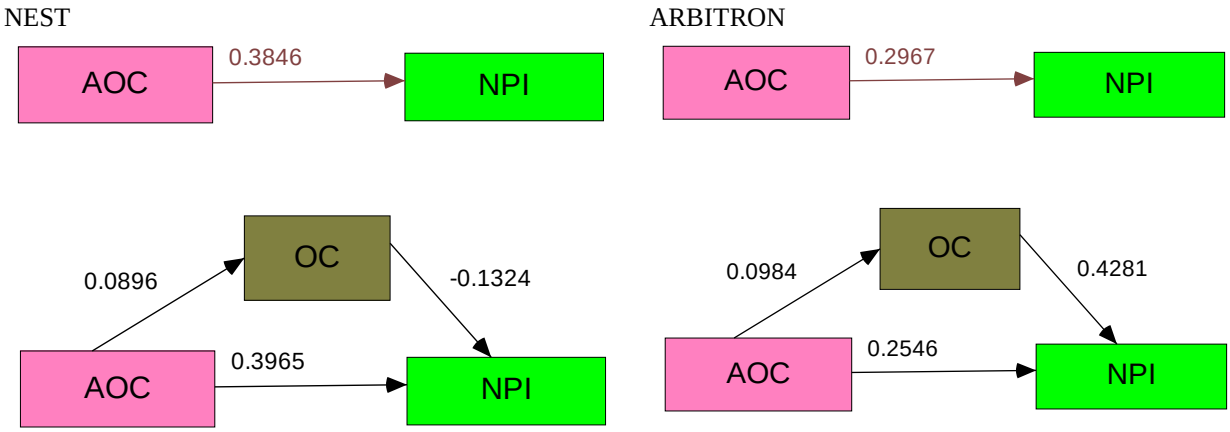
One of the main objectives of the paper is to compare the mediation effect of Organisation context (OC) mediate the relation between Ambidextrous organisation culture (AOC) and New product innovation (NPI) between two IT organisation namely Nest and Arbitron. For this we use Sobel test. SOBEL estimates the total, direct, and indirect effects of causal variable AOC on outcome variable NPI through a proposed mediator variable OC. That is it establish three conditions

1. The AOC predicts the NPI
2. The AOC predicts the OC
3. The OC predicts the NPI

The following table gives the result of hierarchal regression and Sobel test for the two companies. The result shows that the Organisation context significantly mediates relation between ambidextrous organisation culture and new product innovation for Nest but the mediation analysis is not significant. In other word Organisation context significantly reduces the relationship between ambidextrous organisation culture and new product innovation for Nest.

Table 9: Result of Sobel Analysis

Company	AOC-OC-NPI	Value	Se	t	p
NEST	AOC-OC	0.0896	0.0078	11.5298	<0.001
	OC-NPI	-0.1324	0.531	-.2494	0.0835
	AOC-NPI DIRETCT	0.3846	0.0441	8.7246	<0.001
	AOC-NPI THROUGH OC	0.3965	0.065	6.1002	<0.001
	Indirect effect	-.0119	.0478	-.2484	0.8038
	Sobel test			-2.437	0.015
ARBITRON	AOC-OC	0.0984	0.0141	6.9880	<0.001
	OC-NPI	0.4281	0.7446	.5749	.5679
	AOC-NPI DIRETCT	0.2967	0.0744	3.9908	0.0002
	AOC-NPI THROUGH OC	0.2546	0.1047	2.4315	.0187
	Indirect effect	.0421	.0742	.5673	.5705
	Sobel test			0.573	0.567



The second aim of the study is to verify whether the score Ambidextrous organisation culture, Organisation context and New product innovation significantly differs between the two organisations. An independent sample t test is carried out to verify this and the result is exhibited in Table 10. The test shows that the mean score of the Ambidextrous organisation culture, Organisation context and New product innovation is significantly more for Arbitron than Nest.

Table 10- Means and Standard Deviations and t –value Comparing to Nest and Arbitron

Variable	***Gender***	***N***	***Mean***	***Std. Deviation***	***t***	***P***
Ambidextrous organisation culture	NEST	64	128.59	20.96	-6.207	<0.001
	ARBITRON	53	152.74	20.92		
Organisation context	NEST	64	47.88	10.16	-3.082	0.003
	ARBITRON	53	54.08	11.6		
New product innovation	NEST	64	39.97	12.65	-6.366	<0.001
	ARBITRON	53	54.96	12.72		

The third aim for this study was to investigate whether the scores of the Ambidextrous organisation culture, Organisation context and New product innovation significantly differs between the two organisation and also with the Characteristics of participants like Age, gender, Experience in present Organisation, Total Experience in IT and Total Experience in non IT. An independent sample Z-test was conducted to compare the mean scores of ambidextrous organisation culture, Organisation context and New product innovation by gender and age. A one-way between-groups analysis of variance was conducted to explore the impact of Experience in present Organisation, Total Experience in IT and Total Experience in non IT. The result is exhibited in Table 11. The results of Z or F test shows that the demographic characteristic does not play any significant role.

Table-11: The result of Z and F test

Variables	Source of Variation	F	p
Ambidextrous organisation culture	Age group	1.716	0.193
	Gender	0.025	0.875
	Designation	1.532	0.210
	Experience in present organisation	3.123	0.029
	Total experience in IT	2.997	0.054
	Experience in Non IT	1.259	0.288
Organisation context	Age group	1.478	0.227
	Gender	0.125	0.724
	Designation	0.432	0.730
	Experience in present organisation	2.153	0.098

	Total experience in IT	2.612	0.078
	Experience in Non IT	0.885	0.416
New product innovation	Age group	0.00761	0.931
	Gender	0.0752	0.784
	Designation	0.929	0.429
	Experience in present organisation	2.011	0.117
	Total experience in IT	2.476	0.089
	Experience in Non IT	0.0702	0.932

Conclusion

The paper reveals that Contextual ambidexterity is a significant factor in the organisation which infact positively mediates the relationship between ambidextrous culture and new product innovation outcomes. Through the research, effort has been made to understand the effect of ambidextrous organisation culture and innovation and examine its relationships when contextual ambidexterity is present in both the organisations. The paper also throws light on the fact that the degree of presence of ambidextrous culture, the ability of the unit to explore and exploit and innovation is higher in Arbitron. Also its found that the demographic variables such as age, gender, designation,total experience in IT company and total experience in Non IT company has no significant role in the relationship in both the companies.

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