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A COMPARATIVE STUDY ON THE RELATIONSHIP BETWEEN AMBIDEXTROUS ORGANISATION CULTURE, CONTEXTUAL AMBIDEXTERITY AND PRODUCT INNOVATION IN TWO RENOWNED SOFTWARE DEVELOPMENT ORGANISATIONS AT KOCHI,KERALA

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ABSTRACT
Purpose – The main purpose of this paper is to investigate the significance of contextual ambidexterity in the relationship between ambidextrous organization culture which is a higher order construct comprising of eight component factors such 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) and product innovation. The second purpose is the extent of existence of the three variables in the two software development organisations at Kochi,Kerala and to make a comparison between the two organisations on this basis. Design/methodology/approach – The paper formulates two hypotheses from the literature review. These hypotheses are tested using Sobel test and mean scores with data collected from the software development professionals of Nextech private limited and Oriental software incorporated at Kochi.

Findings – The findings indicate that Contextual ambidexterity mediates the relationship between ambidextrous organization culture and new product innovation in both organisations. The mediation effect is more in Oriental software incorporated than Nextech. Also the scores of ambidextrous culture, Contextual ambidexterity and Product innovation is high in Oriental softwares incorporated than Nextech private limited. However, it could be seen that the relationship between AOC, contextual ambidexterity and new product innovation is significant in both organisations.

Practical implications – The results of this study could be used by any manager of the IT organization concerned to improvise the existence of the ability of the organisation to simultaneously explore and exploit. The results also provide companies operating IT sector in kerala with useful information on how their policies and actions might affect exploration and exploitation of employee competences and consequently firm innovation.

Keywords: New Product innovation, Software development Organization, Ambidextrous culture, contextual ambidexterity.

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? 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?

REVIEW OF LITERATURE AND RESEARCH HYPOTHESES

Ambidextrous Organizational 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).

Contextual Ambidexterity

Contextual ambidexterity is the behavioral capacity to simultaneously demonstrate alignment and adaptability (Gibson and Birkinshaw, 2004) or exploration and exploitation (Tushman and O'Reilly ,2004).It is called contextual because it arises from the features of its organizational context(Gibson and Birkinshaw,2004).Under the traditional bi-polar view of ambidexterity, exploitation is seen as associated with efficiency and productivity through the use of existing or similar solutions, but the existing knowledge frame hinders breakthrough innovations. Therefore, exploitation facilitates learning through knowledge refinement with moderate but certain and immediate returns (Hughes, Hughes and Morgan, 2007), increasing incremental product innovations but hindering radical innovation (Christensen and Bower, 1996). Conversely, exploration promotes learning through knowledge creation with potentially high but uncertain returns (Hughes, Hughes and Morgan, 2007), but often at the expense of efficiency. Therefore, exploration increases radical product innovations but impedes incremental innovations (Atuahene- Gima, 2005). As a result, extant research has largely examined the respective effects of exploration and exploitation on radical and incremental product innovations, and a balance of exploration and exploitation is often gauged through their interaction effect (Atuahene-Gima, 2005) or aggregate dimension (He and Wong, 2004). Interestingly, Atuahene-Gima (2005) finds that the interaction effect of exploration and exploitation negatively impacts on radical product innovations and has no significant effect on incremental product innovations. He then suggests that exploration will be more valuable to the firm when it is matched with a lower level of exploitation, and vice versa. This finding essentially contradicts the principles of contextual ambidexterity. Hence, more research is needed to examine the effect of contextual ambidexterity on new product innovation outcomes, responding to the call for research to examine the organizational outcomes of contextual ambidexterity (Simsek et al., 2009). Conceptually, the integration of exploration and exploitation enhances performance by enabling an organization to be 'innovative, flexible, and effective without losing the benefits of stability, routinization, and efficiency' (Simsek, 2009, p. 603)Contextual ambidexterity is achieved by building a set of processes and systems that enable an encourage the individuals t make their own judgments about how to divide their time between conflicting demands for alignment and adaptability.(Gibson and Birkinshaw 2004)Gibson and Birkinshaw (2004) recognize that an organizational culture supporting contextual ambidexterity is a causally ambiguous organizational resource, which is time-consuming to develop, difficult for others to imitate, and hence invaluable to the business unit. Such an organizational culture enables the development of the business unit's ability to integrate exploration and exploitation – a performance-enhancing distinctive capability (Yang and Atuahene-Gima, 2007). It is through contextual ambidexterity (as a distinctive organizational capability) that ambidextrous organizational culture (as a causally ambiguous organizational resource) 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. Accordingly the hypothesis is

H1: Contextual ambidexterity mediates the relationship between ambidextrous organizational culture and new product innovation outcomes.

Innovation

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 organisation" (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". Nohria and Gulati (1996) defined innovation to "include any policy, structure, method or process, or any product or market opportunity that the manager of an operating unit perceives to be new."Zaltman et al.(1973) defined innovation as "any idea, practice, or material artifact perceived to be new by the relevant unit of adoption"."Innovation is the creation of a new product–market–technology–organization combination" (Boer and During, 2001).

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 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. 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. 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.

H2 There is a significant difference between the mean scores of AOC,CA and PI between the two organisations under study.

OBJECTIVES OF THE STUDY

1. To determine the extent of existence of ambidextrous culture, contextual ambidexterity and product innovation in the two software development organizations at Kochi , Kerala..
2. To find out whether contextual ambidexterity affects the relationship between ambidextrous organization culture and new product innovation in the two software development organizations.
3. To verify whether the variables under study differ significantly on the basis of the demographic features relevant for the study.

SCOPE OF THE STUDY

The proposed study intend to diagnose the corporate culture roots from the facts that the there is a set of values that act as the nucleus of organization culture. As such the research study will excavate the relevant values that are operational in the organization which particularly foster the organizational performance and innovation. Infact, the study would be done keeping in view, the enhancement of the performance of Manpower in the organization. Firstly, the research would throw light on the acquisition of competences and exploration of the new ones of the employees, which would infact help the organization to improve the Knowledge repertoire of the

software Industry. Secondly, the research would which would be of immense use for maneuvering and upgrading the human power in the organization. It would in turn ensure a good organizational learning for the employees. It would indeed help the managers of the IT sector in prudent managerial decision making.

BRIEF PROFILE OF THE COMPANIES – NEXTECH TECHNOLOGIES PRIVATE LIMITED AND ORIENTAL SOFTWARE INCORPORATED.

Nextech Technologies private limited, an International Corporate group of 15 companies employing over 2000 people worldwide, has a global export business turnover of over $ 50 million. The Group has a strong presence in futuristic Computer & Communication technology areas like Networking, Fiber Optics, RF & Microwave and Software. The company has many hardware and software facilities spread across Trivandrum, Cochin, Bangalore, Mysore in India and in the USA. All these units are ISO 9001 certified and the Group now is all set to reach Six Sigma status in quality. The software units of the group operating at Trivandrum and Cochin are assessed at CMM Level 5. Apart from the software development facility in India, the Group has setup a number of world class manufacturing facilities and has established worldwide operations with offices which provides onsite consulting and development services in USA, CANADA, AUSTRALIA, JAPAN, UK & QATAR.

Oriental softwares incorporated India was established in Aug 2007 at Kochi, Kerala, India as the wholly owned subsidiary of Oriental Inc. (NYSE: ORI). Oriental Inc is an international media and marketing research firm serving the media—radio, television, cable and out-of-home; the mobile industry as well as advertising agencies and advertisers around the world. Oriental's businesses include: measuring network and local market radio audiences across the United States; surveying the retail, media and product patterns of U.S. consumers; providing mobile audience measurement and analytics in the United States, Europe, Asia and Australia, and developing application software used for analyzing media audience and marketing information data. The research study has been done the software development unit of oriental at Kochi.

The comparison between the two companies is made in terms of the firm/unit size on the ground that Oriental softwares incorporated has greater unit size(>500 software development professionals) than Nextech private limited(250-500 software development employees).

METHODOLOGY

Sample Selection

NEST Information Technology Private Limited was selected for the research study on the basis of the criteria set by OECD,1999 which sets out following criteria was to select the firm which belonged to the Software development Sector in Kerala (a) firms in operation for at least three years; (b) firms with at least 50 employees; (c) firms that had introduced at least one radically or incrementally new product in the past three years; (d) firms that operate in a High-tech, producing technologically sophisticated products and services (OECD, 1999).Consequently, the data has been collected from sixty- four software development professionals of Nextech technologies Pvt Limited and fifty- three software development professionals of Oriental softwares Inc, who belonged to four levels namely Programmer, team lead, project lead and Project Manager. The data has been collected through the standardized questionnaire whose validity and reliability was checked and personal interview. The research study is explanatory and correlational.

Testing the Reliability and Validity of the Questionnaire

To test the reliability of the instrument in the Indian culture and context reliability test –retest study was conducted among 55 employees of NEST information technologies limited.

Figure 2.

Item number in the instrument	Statement	Discrimination value
1	Frequently introduced radically new products/softwares that are totally new to the firm	.35
2	Introduced more radically new products compared with the	.55

	competitors	
9	Frequently introduced incrementally new products into new markets	.68
10	Frequently introduced more incrementally new products compared with major competitors	.87
16	New products have been developed and launched faster than the competitor for a similar product.	.88
17	New products have been completed in less time than was considered normal or customary for the industry.	.61
18	New products have been launched ahead of the original schedule developed at initial product go ahead.	.64
19	Top management has been pleased with the time it took us from specification to full commercialization.	.5

A re- test was done again with the same sample within a period of two weeks (the 4th day after the first test) to find out the correlation between the two responses from the same sample at two time periods. The correlation(r for 55 employees =.9463, tow tailed probability is zero) between the two responses from the two test revealed a very high significance level indicating a high reliability of the instrument.

To check the quality of the items, discrimination value of each item was worked out from 55 employees of Nest. The discrimination values were found to ensure the variability of the responses between the two groups, who voted on the existence of high innovation and low innovation in the organization.

From the pilot study, it was found that items in the Wang and Rafiq ,2012 constructs was very well accepted (Discrimination value >.3) and hence Wang and rafiq 2012 was accepted as the final questionnaire for the main research study . Along with the same certain items from IIker Murat Ar, Birdongan Baki,2011 construct and Gibson and Birkinshaw also formed a part of the final questionnaire for the research study.

ANALYSIS AND RESULTS

Sampling

The target population for this study was employees of the *NEXTECH and ORIENTAL*. 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

Characteristic	***Group***		***NEXTECH***	***ORIENTAL***	***Total***
Age	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%
Gender	Male	Count	37	22	59
		%	62.70%	37.30%	100.00%
	Female	Count	27	31	58
		%	46.60%	53.40%	100.00%
	Programmer	Count	46	27	73
		%	63.00%	37.00%	100.00%
	Team leader	Count	11	11	22
		%	50.00%	50.00%	100.00%

Designation	Project leader	Count	2	9	11
		%	18.20%	81.80%	100.00%
	Project manager	Count	5	6	11
		%	45.50%	54.50%	100.00%
Experience in present Organisation	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%
Total Experience in IT	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%
Experience in Non IT	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-2 Reliability Variables Considered

Variables	**Cronbach's Alpha**	
	NEXTECH	**ORIENTAL**
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	0.810
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

From the table we can conclude that a high reliability exist for all the variables considered.

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, contextual ambidexterity 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 contextual ambidexterity (CA) mediate the relation between ambidextrous organisation culture (AOC) and new product innovation (NPI) between two IT organisations namely Nextech and Oriental. 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 CA. That is it establish three conditions

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

The following table gives the result of hierarchal regression and Sobel test for the two companies. The result shows that the contextual ambidexterity significantly mediates relation between Ambidextrous organisation culture and New product innovation for both the organisation. In other words contextual ambidexterity significantly reduces the relationship between Ambidextrous organisation culture and New product innovation for both the organisation. Also the mediation effect is more for Oriental than Nextech.

Table 3: Result of Sobel Analysis

Company	Regression coefficient	Value	Se	t	p
ORIENTAL	AOC-CA	0.3378	0.0873	3.8677	0.0003
	CA-NPI	0.5497	0.0919	5.9788	<0.001
	AOC-NPI DIRETCT	0.2967	0.0744	3.9908	0.0002
	AOC-NPI THROUGH CA	0.1111	0.0652	1.7029	.0948
	Indirect effect	-.1857	.0577	3.2159	0.0013
	Sobel test			3.249	0.001
NEXTECH	AOC-CA	0.3556	0.0459	7.7475	<0.001
	CA-NPI	0.6047	0.0699	8.6516	<0.001
	AOC-NPI DIRETCT	0.3846	0.0441	8.7246	<0.001
	AOC-NPI THROUGH CA	0.1696	0.0424	3.9961	<0.001
	Indirect effect	-.2150	.0374	5.7503	<0.001
	Sobel test			5.771	<0.001

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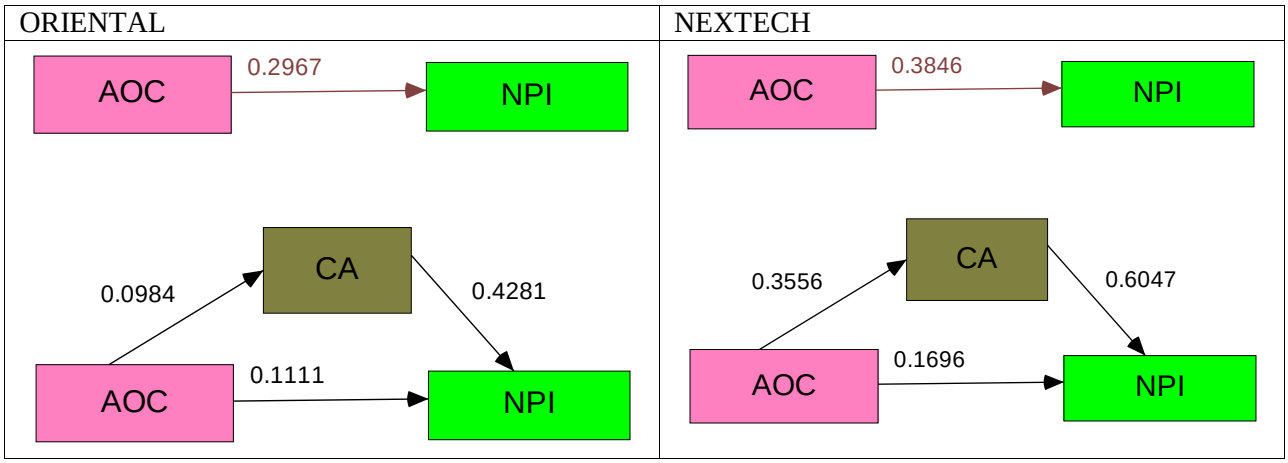
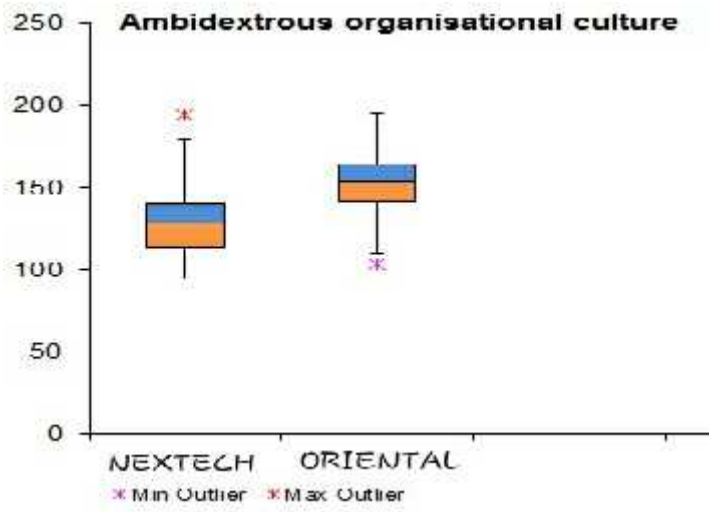


The second aim of the study is to verify whether the score Ambidextrous organisation culture, Contextual ambidexterity and New product innovation significantly differs between the two organisation. An independent sample t test is carried out to verify this and the result is exhibited in Table 4. The test shows that the mean score of the Ambidextrous organisation culture, contextual ambidexterity and New product innovation is significantly more for Oriental than Nextech.

Table 4: Means and Standard Deviations and t –value Comparing to Nextech and Oriental

Variable	***Gender***	***N***	***Mean***	***Std. Deviation***	***t***	***P***
Ambidextrous organisation culture	NEXTECH	64	128.59	20.96	-6.207	<0.001
	ORIENTAL	53	152.74	20.92		
Contextual ambidexterity	NEXTECH	64	55.75	10.82	-6.062	<0.001
	ORIENTAL	53	70.15	14.84		
New product innovation	NEXTECH	64	39.97	12.65	-6.366	<0.001
	ORIENTAL	53	54.96	12.72		



Box plot AOC

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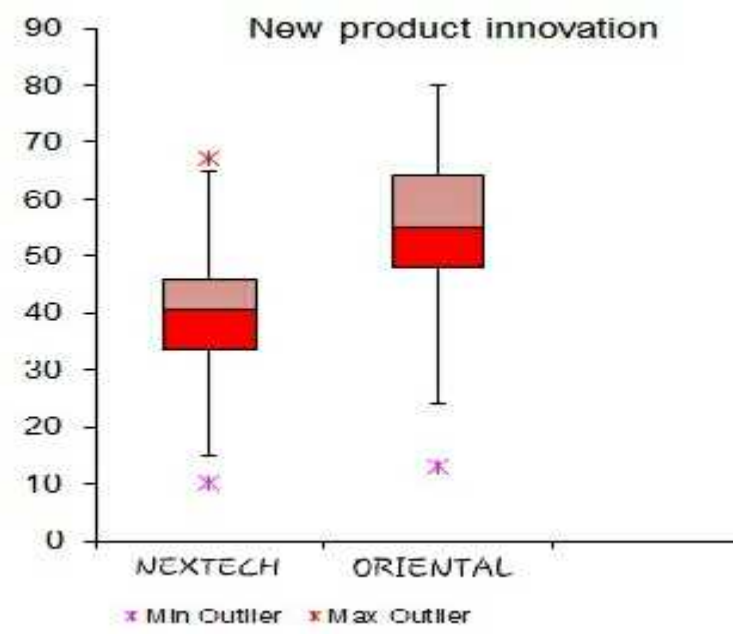
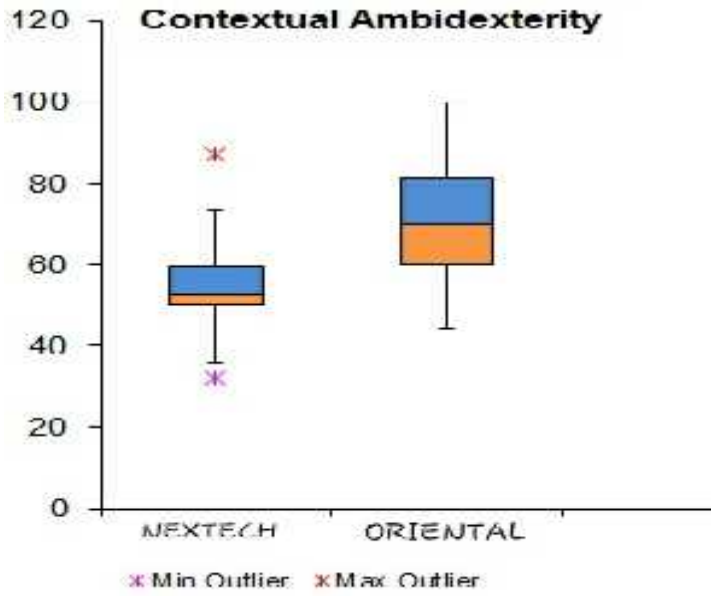


BOX plot NPI



BOX plot CA

The third aim for this study was to investigate whether the scores of the Ambidextrous organisation culture, Contextual ambidexterity 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, Contextual ambidexterity 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 5. The results of Z or F test shows that the demographic characteristic does not play any significant role.

Table-5: The result of Z and F test

Variables	Source of Variation	F/Z	p
AOC	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
CA	Age group	1.487	0.225
	Gender	0.0362	0.850
	Designation	0.507	0.678
	Experience in present organisation	0.255	0.858
	Total experience in IT	0.156	0.856
	Experience in Non IT	0.172	0.842
NPI	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. It is found that when CA mediates the relationship, the mediation effect is even more in the bigger organisation namely Oriental Inc. 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 oriental Inc. 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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