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A Study of Impact of Cultural Dimensions on ATM User Experience

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Abstract

User Experience is an overall experience of a user using a product may be a tangible product or an intangible product like software. This study aims to improve the overall user experience of Automated Teller Machines (ATM) by identifying the influence of cultural dimensions using the factors proposed by Hofstede and Bond, Kluckholn and Strodbeck, Hall, Parsons and Shill, Trompenaar, Shwartz frameworks. The Cultural Dimensions related to the User Experience of ATMs (region-wise) based on contextual inquiries and online surveys conducted.

Keywords: *Cultural Dimensions, User Experience, White Label ATMs..*

I. INTRODUCTION *THE FACTORS*

User Experience is a term which was coined by Don Norman during his tenure as the Vice President of the Advanced Technology Group at Apple. According to Don Norman user experience is defined as follows "User Experience encompasses all aspects of the end-user's interaction with the company, its services, and its products."

User experience is a conceptual discipline that refers to the application of certain user end design aspects like contextual design mentality, process management, utility, ease of use, and other human factors. The User Experience design process is usually divided into the following elements:

i. Visual design

Visual design also called the user interface refers to the front end of any device via which the user interacts with the device. It is one of the most essential elements of the design process since the main goal of this element is to exchange messages and instructions with the help of graphic text symbols, images and other visual elements

ii. Information architecture

Information architecture refers to the structuring, organization, and labeling of the data and other information necessary to enhance ease of access and also aid in faster searching.

January - February 2020
ISSN: 0193 - 4120 Page No. 7305 - 7316

iii. Structuring, organization, and labeling

Structuring is the process of identifying the lower most blocks of data in the hierarchy and relating them to other blocks of data. Organization refers to grouping of these units to form a unique and meaningful arrangement. Labeling is the process of using the right words for identification and naming to support navigation and findability.

iv. Finding and managing

Findability as the name suggests is a measure of ease of access for the user i.e. it aims at reducing the cost of searching by making information easily available.

v. Interaction design

It refers to the enhancement of the visual interface to improve the end user experience. It plays a pivotal role in improving the communication between the user and the machine. This element deals mainly with identifying interaction designs that work best with the users.

vi. Usability

Usability refers to the extent to which the true potential of a devices utility is achieved. It refers to the effectiveness and ease of use and satisfaction levels achieved during a user-machine interaction.

vii. Accessibility

Accessibility of a unit refers to the overall comprehensibility, ease of reach and utilization, and understandability the various features and services provided by the unit.

Cultural characteristics are defined as a behavioral pattern that exists in all individuals belonging to a particular cultural group. It is basically a learned form of behavior that exists in all individuals due to continuous exposure to a particular set of surroundings and ideals that usually exists in a society and is unique to each society. The impact of these cultural characteristics extend to all spheres of life of an individual. Studies conducted by have been conducted to understand and classify these cultural characteristics and various theories and models have been developed to explain the impact of these cultural characteristic. Cultural Dimensional theory that was initially proposed by Hofstede and further developed by other researchers like Hall [5], Kluckholn and Strodtbeck [6], Parsons and Shills [8], Trompenaars and Hampden-Turner [10], Schwartz [9].

Measuring the effectiveness of a product of service involves user experience and user satisfaction. According to Jakob Nielsen and Don Norman [17] user experience is defined as "All aspects of the end-user's interaction with the company, its services, and its products. The first requirement for an exemplary user experience is to meet the exact needs of the customer, without fuss or bother. Next comes simplicity and elegance that produce products that are a joy to own, a joy to use. True user experience goes far beyond giving customers what they say they want, or providing checklist features. In order to achieve high-quality user experience in a company's offerings there must be a seamless merging of the services of multiple disciplines, including engineering, marketing, graphical and industrial design, and user experience design."

Alben L. [18] defines it as "All the aspects of how people use an interactive product: the way it feels in their hands, how well they understand how it works, how they feel about it while they're using it, how well it serves their purposes, and how well it fits into the entire context in which they are using it."

Shedroff [19] defines it as "The overall experience, in general or specifics, a user, customer, or audience member has with a product, service, or event. In the Usability field, this experience is usually defined in terms of ease-of-use. However, the experience encompasses more than merely function and flow, but the understanding compiled through all of the senses".

Studies conducted by Inseong Lee et al. [11] have shown that cultural characteristics are important factors that influence user experience of electronic devices.

January - February 2020
ISSN: 0193 - 4120 Page No. 7305 - 7316

User satisfaction level is the next parameter. According to Oliver L. R. [21] "user satisfaction is the consumer's judgment that a product provided (or is providing) a pleasurable level of consumption-related fulfillment".

And studies conducted by Al-Maskari, A. & Sanderson M. [20] have shown that user experience acts as an influencing factor for user satisfaction. Since user satisfaction and user experience are linked to each other, it also suggests that user satisfaction is also influenced by cultural characteristics as well.

This study aims to extend the same concept to user experience of ATMs. The main objective of the study is to identify various cultural dimensions (characteristics) that influence the user experience of ATMs through various expert interviews and region wise online surveys.

II. Literature Review

A. White labeled ATMs

When ATMs are owned and operated by non-banking entities without an outsourcing contract from any particular bank then they are referred to as white labeled ATMs. These ATMs are not part of or owned any particular bank although the cash required for transactions is supplied by a sponsor bank. These ATMs do not have direct access privileges to the settlement system which is taken care of by the sponsor banks.

These kind of ATMs provide a wide array of advantages to the banks as well as its customers like:

- These ATMs systems are highly favored by the banks because by implementation of these ATMs the banking entities no longer have to spend cash on running and maintaining these ATMs hence increasing their profit margins.
- The time required for setting up new ATMs will be drastically reduced as they no longer have to go through the approval processes of the banking entities.
- Since these ATMs are run by non-banking entities they have to compulsorily follow some necessary rules and regulations like setting up ATMs in the rural areas as well ensuring that a prescribed ratio of urban to rural ATMs is maintained thereby providing quality services to a larger customer base.
- As the number of customers increase the transactions charges can be suitably reduced hence benefiting the consumers.
- Once permission from the government is obtained it is relatively easier to set up these ATMs compared to the ATMs run by banking entities.

White labeled ATMs do pose a few disadvantages as well like:

- Settling of customer complaints will be slower as it would involve a three layers:
  1. The non-banking entity.
  2. The sponsor bank.
  3. The bank to which the card belongs.
- The number of transactions made per day should meet a minimum requirement for the service provider to have a good profit margin.
- The non-banking entities have to go through a long set of procedures to get the rights for setting up ATMs and have to follow strict rules and regulations.
- The potential service providers face high uncertainty about the benefits and profits that they would gain by setting up white labeled ATMs.

Since these ATMs cater to a larger population base compared to the brown labeled and bank owned ATMs which are limited to the urban regions of the society it is necessary for these ATMs to have a user interface that enhance the overall user experience. As the studies by Inseong Lee et.al. [11] have shown cultural characteristics of individual have a major impact on user experience. Hence to improve the user satisfaction it is necessary to take into account the cultural attributes of the users as well.

B. Cultural dimensions

Hofstede [1] conducted a large survey between 1967 and 1973 to study the national value differences across the worldwide subsidiaries of IBM. He conducted a survey on 117,000 IBM employees from various parts of the world. The

January - February 2020
ISSN: 0193 - 4120 Page No. 7305 - 7316

survey was initially conducted in the first 40 largest countries and then was extended up to 50 countries and 3 regions. And through his initial analysis he identified four distinct parameters which he referred to as cultural dimensions. Later in the year 1991, Michael Harris Bond and his colleagues conducted a survey on students from 23 different countries and from these results Hofstede added a new fifth dimension to his model. Figure 1 shows the Hofstede and Bond's cultural dimensional model.

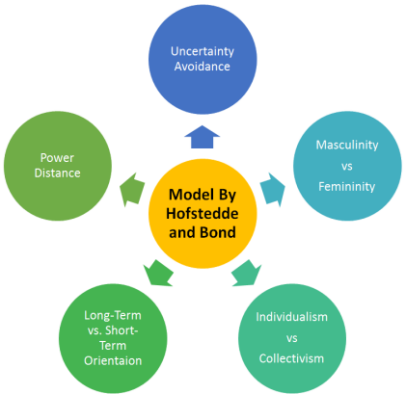


Figure 1: Hofstede and Bond's cultural dimensional model

Kluckholn and Strodtbeck [6] were two anthropologists who developed a classification of cultural values as a response to social problems. These social problems were categorized into:

1 Our view of our surroundings.
2 The structure of relationships in the society.
3 The self-image of an individual.
4 The nature of individuals.
5 The perception of time in terms of a resource.
6 The perception of space.

From the end results collected a cultural model consisting of mainly four cultural dimensions was proposed as shown in the figure 2.

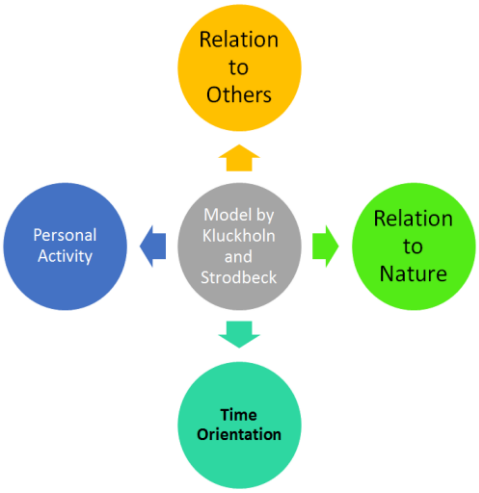
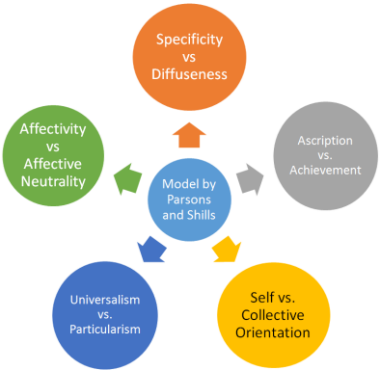


Figure 2: Kluckholn and Strodbeck's cultural dimensional model

Edward T. Hall [5] was an anthropologist who conducted various studies developed the concept of high and low context cultural dimensions. The model proposed was based on this concept of high and low context and compared each cultural factors like time, space, communication etc. is shown in figure 3.

Figure 3: Hall's cultural dimensional model

Parsons and Shills [8] conducted studies in over 50 countries, and identified five dimensions that could explain the national cultural differences. They viewed culture as the difference between individuals in terms of their social interactions. Figure 4 shows the Parsons and Shill's cultural dimensional model.



January - February 2020
ISSN: 0193 - 4120 Page No. 7305 - 7316

Figure 4: Parsons and Shill's cultural dimensional model

Trompenaars and Hampden-Turner [10] developed a cultural dimensional model after spending 10 years researching the preferences and values of people in different cultures around the world. During this study they sent questionnaires to around 46,000 managers in 40 different countries. The results showed that different cultures differed in a very particular, predictable way. They concluded that this was because ach culture had its own methods of thinking, its own values and beliefs, and different preferences placed on a variety of different factors which were mainly categorized into seven factors or dimensions as shown in figure 5.

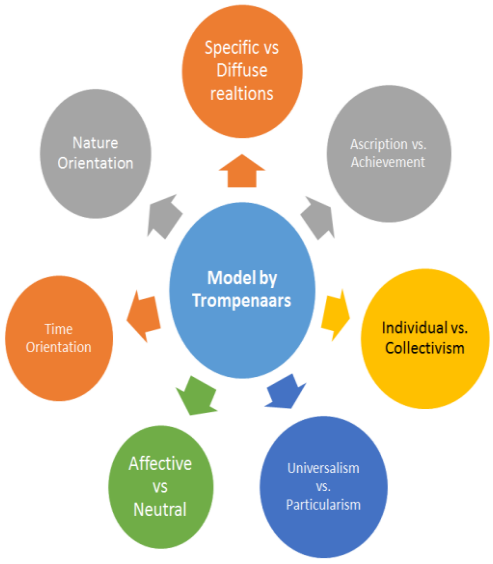


Figure 5: Trompenaar's cultural dimensional model

Schwartz's [9] cultural orientations were first derived from a literature survey which yielded an extensive list of single value parameters from which the seven cultural value orientations and relations among them were formulated. Validity of these orientations and relations was established through the collection of data from 1988 to 2000 from samples of elementary school teachers and college students in more than 50 countries. From the results obtained, a cultural dimensional model consisting of mainly seven dimensions was made. This model can be seen in figure 6.

Table I shows the definitions of different cultural dimensions.

Figure 6: Schwartz's cultural dimensional model

Table I: Definitions of different cultural dimensions

Cultural Dimension	**Definition**
Power Distance	Extent of equal distribution of power in the society. A high score indicates a highly hierarchical society and lower score indicates an equal distribution of power
Individualism vs. Collectivism	Degree of integration that exists between individuals i.e. whether the society supports an individualistic society or aims to exist as a large group or organization
Uncertainty Avoidance	The tolerance of a society towards unexpected or uncertain situations.
Masculinity vs. Femininity	It is measures of distribution of emotional roles between the genders of the society i.e. the masculine values like assertiveness, materialism vs. relationships and quality of life.
Long Term vs. Short Term	It is the degree to which a society values the future compared to the

TEST Engineering & Management

January - February 2020
ISSN: 0193 - 4120 Page No. 7305 - 7316

Orientation	short term benefits of the present.
Relation to others	It is used to indicate the socialization capabilities of a particular cultural group
Personal Activity	Used to indicate importance privacy and space owned by individuals
Relation to nature	Indicates the tendency of individuals to support the ideology to live in harmony with the surroundings
Time Orientation	Similar to long term vs short term orientation
Contextuality	The extent to which individuals need to be provided with contextual information
Specificity vs Diffuseness	Specific cultures have large public spaces and closely guarded small private places. Diffuse cultures have no separate public or private spaces.
Ascription vs Achievement	In ascription societies the status of individuals is more important than their achievements whereas in achievement societies it's the vice versa
Affectivity vs Affective Neutrality	Affectivity is a measure of the extent to which people control the way they express their emotions.
Self vs Collective Orientation	Self-oriented societies give higher preference to personal achievements and freedom whereas in collective societies the group is given more importance than the individuals
Universalism vs Particularism	Universalism is the tendency of individuals to value rules more than relations whereas Particularism is the vice versa.
Mastery	In mastery culture, individuals give more importance to success through personal action.
Egalitarian Commitment	Egalitarian cultures show higher degree of equal distribution of power.
Conservatism	The tendency of individuals resist the changes in the society
Harmony	Harmony is the tendency of individuals to accept their roles in the society and focus less on self-improvement
Hierarchy	It is the tendency of societies to have a hierarchical system
Intellectual Autonomy	Intellectual Autonomy is the tendency of individuals to take independent decisions and actions.

III. METHODOLOGY

Part I:

Extensive literature survey was conducted to identify the various cultural dimensions that can be closely correlated to the user experience of ATM's (Table II).

Part II:

- The second study consists of three qualitative methods: online review analysis, expert interview, and contextual inquiry.
- From the results collected through expert interviews the number of cultural dimensions that closely were related to ATM experience was further reduced down to 8 dimensions viz. Time perception, Power distance, Uncertainty avoidance, Ascription vs Achievement, Controllability, Contextuality, Masculinity vs Femininity and Individualism Vs Collectivism. A questionnaire was prepared employing the Likert scale (Table III).

The responses collected from various regions was grouped into different zones based on the

January - February 2020
ISSN: 0193 - 4120 Page No. 7305 - 7316

banking circles of the State Bank of India which is a government owned Public sector banking and financial service providing company and is one of the largest banks in India with over 9143 branches as of 2007 [22].

Table II: Questionnaire used for online survey

I prefer to use the same set of steps for performing transactions while using an ATM.
When I use ATM's of other banks, if I come across options I am not aware of or face an unexpected situation I ask the other people near the ATM for help
I tend to avoid using new options on the ATM screen
I would prefer to have a personalized ATM screen based on my frequently used options
I would like to use User Interface screens preferred by most of the other ATM users
I think women prefer to have more options on their ATM screens than men do
I think men are better aware of the functionality of an ATM than women are
I think men are better at handling unexpected situations that arise during an ATM transaction than women are
I would prefer to have explanation for each step during an ATM transaction
I think banks should provide detailed documents or manuals on use of ATM's
I frequently access all the options available in the ATM
I am comfortable if some extra information is provided during the transaction process
I feel using ATM's that belong to particular banks can uplift my social status
I don't feel comfortable accessing ATM's used by my subordinates or colleagues
I prefer to use use ATM's belonging to Indian or local banks
I would like to add extra options and functions to the ATM's to meet my personalized needs

Table III: Sub-division of questionnaire based on cultural dimensions

UA	I prefer to use the same set of steps for performing transactions while using the ATM.
	When I use ATM's of other banks if I come across options I am not aware of or face an unexpected situation I ask the other people near the ATM for help
	I tend to avoid using new options on the ATM screen
IC	I would prefer to have a personalized ATM screen based on my frequently used options
	I would like to use User Interface screens preferred my most of other ATM users
MF	I think women prefer to have more options on their ATM screens than women do
	I think men are better aware of the functionality of an ATM than women are
	I think men are better at handling unexpected situations that arise during an ATM transaction than women are
CT	I would prefer to have explanation for each step during an ATM transaction
	I think banks should provide detailed documents or manuals on use of ATM's
TP	I frequently access all the options available in the ATM
	I am comfortable if some extra information is provided during the transaction process
PD	I feel using ATM's that belong to particular banks can uplift my social status
	I don't feel comfortable accessing ATM's used by my subordinates or colleagues

January - February 2020
ISSN: 0193 - 4120 Page No. 7305 - 7316

AN	I prefer to use use ATM's belonging to Indian or local banks
CO	I would like to add extra options and functions to the ATM's to meet my personalized needs

IV. Results

The different states were grouped into 14 different zones based on the banking circles of the 'State Bank of India' which is a government run national banking entity. The division of the zones is provided in Table IV.

Table IV. Banking circles of SBI

Circle	Area of Operation
Ahmedabad	Gujarat, Daman, Diu, Dadra & Nagar Haveli
Bangalore	Karnataka
Bengal	West Bengal, Sikkim, Andaman & Nicobar
Bhopal	Madhya Pradesh, Chattisgarh
Bhubaneshwar	Orissa
Chandigarh	Chandigarh, Punjab, Himachal Pradesh, north Haryana, Jammu & Kashmir
Chennai	Tamil Nadu, Pondicherry
Delhi	Delhi, west U.P., Garhwal, south Haryana, Rajasthan
Hyderabad	Andhra Pradesh
Kerala	Kerala, Lakshadweep
Lucknow	Uttar Pradesh, Kumaon
Mumbai	Maharashtra, Goa
North-East	Assam, Arunachal Pradesh, Meghalaya, Tripura, Nagaland, Mizoram, Manipur
Patna	Bihar, Jharkhand

A. Uncertainty avoidance

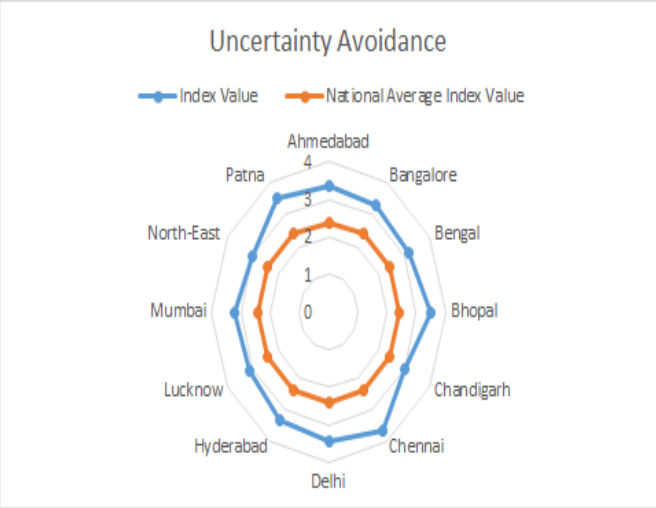


Figure 7: Uncertainty Avoidance

National Average Index Value: 2.4

As shown in the figure 7, all the zones have higher Uncertainty Avoidance index values compared to the Hofstede's National Index value. This higher degree of correlation is an indicative of increased tendency to avoid new and uncertain features of a graphical user interface. GUI's designed for these regions should be as concise and direct as possible i.e. the GUI design should exhibit some restraint on the number of features and implementation of new features should be done at a slower pace to prevent alienation of the users. Majority of users from these zones prefer not to have too many options on the graphical user interface. It also indicates that they prefer not to have drastic changes and updates in the GUI's they use. Also the possibility of ignoring a new function will be highest among the people from these zones hence is becomes essential to implement mechanisms to familiarize the users with new features that are implemented during each update to improve the degree of utilization of the device.

January - February 2020
ISSN: 0193 - 4120 Page No. 7305 - 7316

B. Individualism vs Collectivism

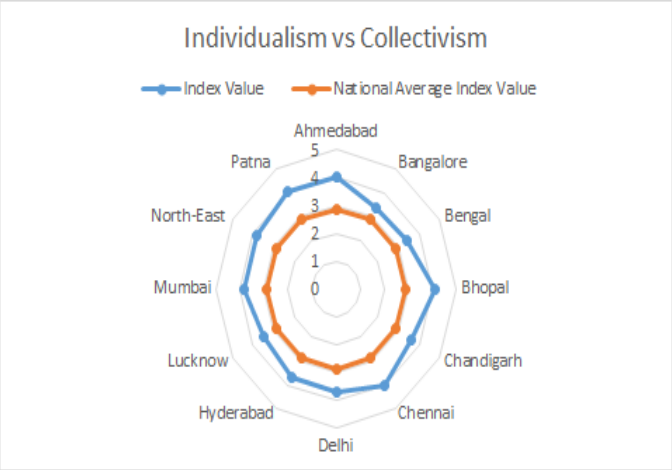


Figure 8: Individualism vs Collectivism

National Average Index Value: 2.88

As shown in figure 8, all the zones have a higher index value than the national average indicating that all the zones have a very high degree of individuality. This can be directly translated into their preference for personalized GUI's over standardized GUI's commonly used. This feature can be difficult to implement given it is not a feasible option to have a personalized GUI for every individual user. This can be tackled by conducting surveys to identify the generalized preference of a GUI design. This method could be feasible in most cases as Individualism vs Collectivism is a measure of the tendency to have a personalized GUI and is not a measure of degree of difference and hence doesn't eliminate the possibility of people having a generalized preference for a certain GUI model.

C. Masculinity vs Femininity

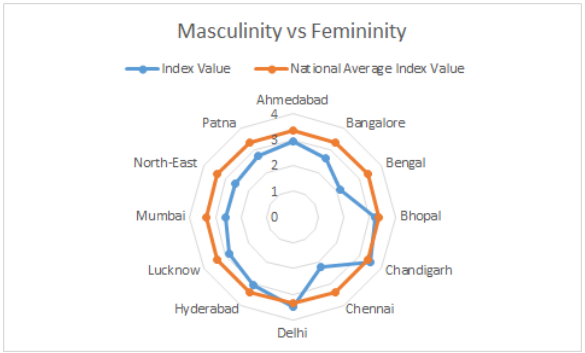


Figure 9: Masculinity vs Femininity

Higher man

National Average Index Value: 3.36

It can be inferred from figure 9 that the Masculinity vs Femininity correlation index varies greatly over the different regions of survey. This can be directly attributed to the difference in the cultural and technical environments in the societies that vary greatly from region to region. A higher index value would be pointer for high degree of masculinity which can be translated into strong preference for better efficiency and implementation of only essential functions in the GUI. A lower index value would indicate a predominantly high degree of femininity which is indicative of the tendency to have better and friendlier GUI designs while maintaining a descent level of efficiency and also at the same time improving the functionality by having a higher number of service features.

D. Contextuality

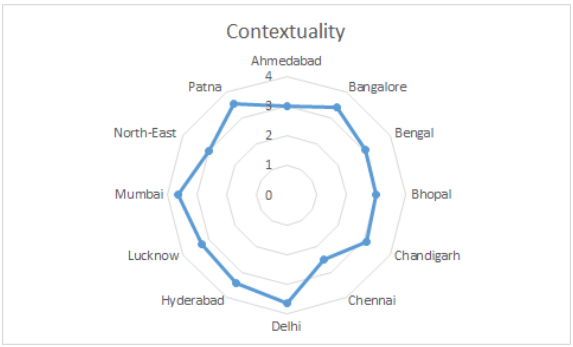


Figure 10: Contexuality

As shown in figure 10, nearly all zones have a moderate Contexuality index with Chennai having the lowest index value and Mumbai and Delhi having the highest index value compared to the other zones. The zones with high Contexuality index prefer to have detailed information on all the functions available in GUIs. The people from these zones lay a high emphasis on the use of an instruction manual and the help function in the GUIs they use. Hence equal importance needs to be given to implementation of the user assisting features to improve the user friendliness. The implementation of this feature also assists in the improvement of the GUI design in terms of the Uncertainty Avoidance dimension as well, hence interlinking contexuality and Uncertainty dimension. Zones with lower Contexuality index tend to give very low importance to the use of user

manuals and assisting functions. Users with low contexuality index tend to determine the functionality of each feature on their own without utilization of any external assistance.

E. Time perception

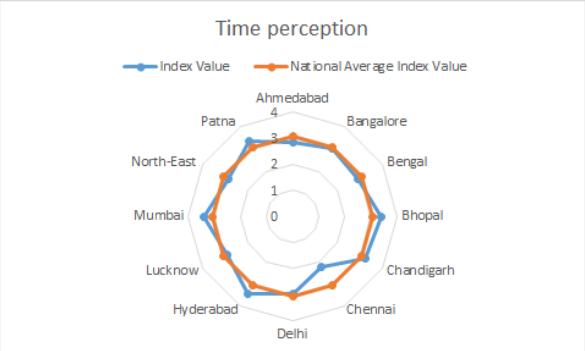


Figure 11: Time perception

National Average Index Value: 3.06

As shown in figure 11, all zones except Hyderabad, Bhopal, Mumbai and Patna exhibit a fairly low Time Perception index.

A lower score would indicate that the people from these zones utilize only a given set of functions frequently thus limiting the utilization potential of the GUI. It also implies that people from these zones prefer not to be overloaded with extra information and prefer to have sequential approach when it comes to work (using GUIs).

Whereas a high index value can be referred to a high level of utilization of the available functions in a GUI. And also better skills at handling and utilizing any extra information provided to them hence giving the GUI designer a lot more freedom in the design approach.

F. Power Distance

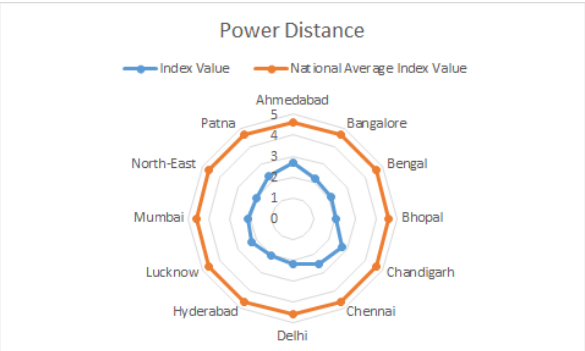


Figure 12: Power Distance

National Average Index Value: 4.62

As shown in figure 12, all zones exhibit a low power index value indicating that in these zones the hierarchical order of the society is not linked with user experience of GUI's. A lower index value is indicative of the fact that personalization of GUI's based on social and economic status of an individual is a concept that is not well entertained in these societies. In these regions the services and featured offered should be uniform for everyone irrespective of their social standing.

Regions with higher index value would prefer to have extra features and services being provided to groups based on their social hierarchy. Individuals with better economic status would prefer to have better and personalized GUI's while the average individual would prefer to have a standardized GUI design.

G. Affective vs Neutral

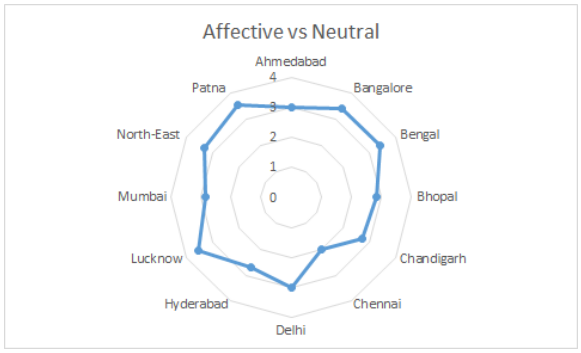


Figure 13: Affective vs Neutral

As shown in figure 13, a large variation is seen among the zones when it comes to their Affective vs Neutral index value.

Zones with a high index value show tend to show correlation between their personal emotions and their user experience (of GUIs). Hence while judging a user interface they would tend look at the emotional aspect as well as the features and functionality.

Whereas zones with low index value would tend to show very low correlation between their emotions and user experience. Their evaluation of a user interface is solely based on its efficiency and functionality.

January - February 2020
ISSN: 0193 - 4120 Page No. 7305 - 7316

H. Controllability

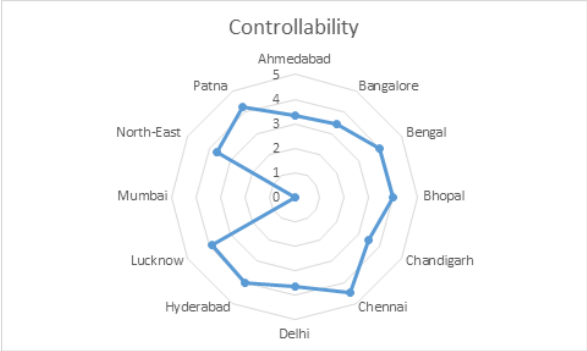


Figure 14: Controllability

It can be inferred from figure 14 that all zones tend to show a high Controllability index implying that the people in these zones prefer to know all the technical details about the device and interface they use in order to maximize its performance to match their own needs. They tend to exercise complete control over the interface and prefer controllability over convenience. This feature of user based optimization may be difficult to implement on a public access interface. Also this may lead to security risks in the system. Hence irrespective of the index it would be ideal to retain the abstraction feature of the system and the GUI.

I. Cross analysis for Masculinity vs Femininity

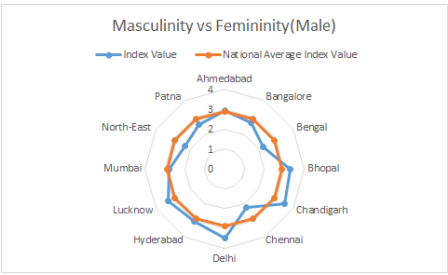


Figure 15: Masculinity vs Femininity (Male)

National Male Average Index Value: 2.90

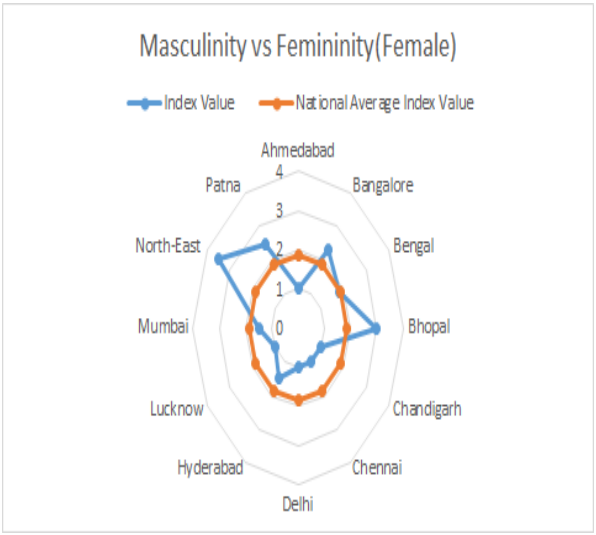


Figure 16: Masculinity vs Femininity (Female)

National Female Average Index Value: 1.86

CONCLUSION

The study identified various cultural dimensions that are closely related to ATM user experience through online surveys which indicated that the regional average varies greatly compared to the national average.

Some cultural dimensions were found to have a constant and higher degree of correlation irrespective of the regions. These dimensions included Uncertainty Avoidance- tendency to avoid new and uncertain features and services, Individualism vs Collectivism- a preference for personalization or generalized models, Controllability- the tendency to establish complete control over the facilities available and Contexuality-the tendency to rely on user manuals and other informative support.

Some dimensions showed higher degree of variation in sensitivity (or correlation) based on region of survey. The dimensions which exhibited the greatest degree of variation were Masculinity vs Femininity and Affective vs Neutral which can be directly attributed to the difference in the cultural and technical environments that exist between the regions. Designing GUI's based on the user preference of these dimensions can be regarded as the main factors for its success or failure in terms of utilization and degree of user-friendliness.

January - February 2020
ISSN: 0193 - 4120 Page No. 7305 - 7316

V. LIMITATIONS OF THE STUDY

Following were the limitations of the study:

1. It has not been proven if the study can be extended to all Cities of the regions in which the survey was conducted.

2. Lack of Time and Financial resources limited the data collection and expert interactions, hence it cannot be clearly established if the user experience is limited to the cultural dimensions that were selected based on expert interviews.

3. The whole survey was conducted using online survey forms. This raises doubts if the response of the participants can be employed to represent the actual population.

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