Measuring Convenience for Human Preferences and Decision Making using Modified Utility Function

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Abstract:

Structuring an improved consideration about people's choices and their earnings is very essential since these are the important issues which have direct impact on the whole financial system form. Living in today's competitive world of offerings, considerable variety in consumer preferences, rapid propagation of products, consumer behaviour turn out to be enormously crucial for financial decisions. Individuals' behaviour is measured by the choices they made while purchasing a product which are represented by utility functions or indifference curves. The paper introduces the convenience factor that provides certain potentials to consumers for amplifying their knowledge while acquiring commodities and facilities. Convenience must require because the goods that the consumer needs demand a value in the marketplace and the consumer possess a restricted earnings. Therefore, convenience factor reproduces the recognizable and invasive financial detail which is appropriate for the individual consumer. As the needs of consumers are limitless, so in any situation to go beyond his/her capability to keep all of them happy it is essential that the consumer spend income must maximize their contentment. The purpose of this work is to examine the social and economic features of individuals like age and income that affects their purchasing behaviour. Thus, a discounted utility function is implemented to demonstrate and forecast how a rational individual widens their level of satisfaction, knowing his or her choices and provision for convenience factor that the consumer faces.

Keywords: Decision making, Rational action, Time inconsistency, Preference ordering, Utility function, Hyperbolic discounting, Convenience.

1. Introduction:

Decision theory is the assumption of rational decision making which depends upon the model of rationality. Many economists, computer scientists and statisticians contribute their expertise in this decision theory for which it is believed as the interdisciplinary field. Decision theory try to find the information's about what decision makers are *rationally necessitates* – or *have* to do so. Rationality is the basis of decision theory. Rationality means individuals perform in such a way that their behaviour go well with appropriate set of situations which is not restricted to the options they faces. For selection, an individual must inevitably have a number of preferences for the choices they are provided with.

Decision science based on study of human behaviour i.e. the individual who faces unplanned or non-strategic situations. Human beings who think rationally have consistent preferences. For making any decisions we have beliefs on that subject. So belief is the subjective prior in decision theory which lies between choices and payoffs. But how these choices and payoffs are made under the conditions of uncertainty is provided by the behavioural decision-making theories.

From simple promotional idea to generate marketing idea for consumer leaning marketing culminates in the discipline of consumer behaviour which is considered as a self-governing practice. How people make decision to invest their incomes or consumption connected features is known as

consumer behavior. It is generally the learning of persons, systems and the techniques individuals use to explore, choose, employ and organize the goods, services, knowledge or thoughts to fulfill the wants and its influence on the individual and society.

Information about consumer behavior influences straightly the financial plan. Due to this financial perception, organizations generate ideas how to fulfill the consumer wants [1]. Organizations must be competent of satisfying those wants only when they recognize their consumers in that extent. Because of this, marketing tactics must integrate with the information of consumer behavior in all aspect of deliberate financial plan [2]. There is a well known consideration that for successful trendy marketing consumer behavior has the key role [3].

In this article, we introduced how consumer behavior can be measured while purchasing a product to take decision by giving more preferences to which product that they like according to their need through **different types of preferences measuring function** (i.e. utility function) which are presently engaged by associations to fascinate fresh consumers.

Lots of resources are flowed on by businesses and marketers for the developing, acuminating and effecting marketing streams having objectives: funding the business for getting "maximum profit potential" and carry it to the appropriate position so that it can maintain itself for extended time period. Basically we can say that profitability and growth are the two major goals for businesses.

Now days can we imagine a person without a mobile phone. For present age group mobile phones are somewhat unavoidable. Not a single individual can actually exist devoid of mobile phone. It can be considered as the fashion statement for each people because it supports in attaching persons all over the globe. There is increased in the criterion of manufacturing mobile phones. Nevertheless, with the development of a lot of new brands and enormous use of the phones, the price of these commodities is going low for the basis that the equipment must reach to each standard of people.

Communication through cell phones increases the fastest sharing of information for uniform operation of a business. These tools are also efficiently used for the reasons for booking appointments, interacting with emails so that it can save lots of valuable time for the business.

The services that mobile apps and Smartphone provide are plenty which includes communication, text messaging, style and expressiveness, amusement, comments and mementos, schedules and organization, concurrent videos, maps, navigation, and tour, e-banking and Finance, Crime Prevention and Evidence Gathering, Learning and Research, Online shopping, Food delivery and taxi service apps, Banking apps, E-tickets, Entertainment apps, Reading and educational apps, Social media apps and video calling apps.

Behavioural decision theory focuses on consumer investigating and buying behaviour. However this theory argued that humans possess preference inconsistency where persons unknown about what their preferences which is considered as an mistake in decision maker's preference function.

But this paper shows that preferences are already known by the individuals and by adding the present situation of the individuals to the selection space excludes inconsistency preference. Addition is required as preference function has no value unless the knowledge for the present situation about the individuals is not added. For example our preference ordering is adjusted according to our daily need basis. The behavioural decision theory targets on individual's current state. Sometimes due to incorrect belief human's violet preference consistency in a systematic way over the appropriate choice space.

To know why this occurs, hyperbolic discounting function is used where time is involved. Here humans are tested by using analytical model that how human choose in such situations. But this does

not mean that in real life they will make the same choices. Although having number of experiments, choices in uncertainty even have enormous significance. As in current scenario people come up with so many unnatural choices which are depends on scientific evidence regarding payoffs and probabilities.

The method through which individuals take decisions regarding various situations at different time periods where options available at one time period have impact on the chances available at another time period is known as intertemporal choice. These options are directly inclined by the relative value that the individuals allocate at different time periods to more than two payoffs. Majority of choices of decision makers needs exchange of this expenses and paybacks at various time periods. Decisions can include discounts, insurance, edification, nourishment, and work out, physical condition etc.

Intertemporal choice means at different point of time when decisions have various outcomes. Human behaviour shows that individuals discount much more the delayed rewards. The discount function which is widely used is the exponential discount function however empirical data are better explained by hyperbolic and quasi-hyperbolic functions. There are different ways present to measure the individual discount rates. If discount rates are higher, it leads to misuse and hasty circumstances such as alcoholism, smoking, betting and dangerous health habits but less discount rates related to high mental skill.

2. Related Works

Kemptner and Tolan [4] examined the consequences of preferences involving time-inconsistency in educational decision making and equivalent strategies based on novel identification approach using a structural dynamic choice model that derived from the innovative study to identify the discount factor of hyperbolic time preferences.

Schaffer et al. [5] modelled one decision support interface towards Diner's Dilemma and carried out an examination to learn human decision making through a variety of UI (User Interface) support to enhance individual decision making for mutual setup which is maintained by selfishness of co-actor. J Hu et al. [6] dealt with the trouble of uncertainty and unpredictability in a decision maker's (DM) measured utility function and proposed a strong optimization model being covered by uncertainty for evaluating utility function by using a maxmin framework.

Maayke Suzanne et al. [7] considered that at what extent individuals discount the reward value and optimize the reward rate while generating intertemporal decisions and noticed that together hyperbolic discounting and rate maximization appropriately calculate the choices made in a variety of situations. This result shows that development preferred hyperbolic discounting as it sub serves maximization of rewards by adapting the preference for lesser, earlier or bigger, later earnings which is measured as the common standard for intertemporal decision making and over a great variety of choice problems.

Finn Muller-Hansen et al. [8] analyze the strategies for the representation of social interaction that covers the structure of game theory, forms of social influence and network models and discusses which social and economical factors are probably essential for Earth system models (ESMs) and also evaluate the models for personal decision making. These correlate to alternative behavioural theories which create various modelling principles regarding persons' preferences, beliefs, decision laws, and intuition.

Adam karbowski [9] discusses the links between general degree of discount and behavioural economics analysis on intertemporal and interactive selections and presents the discounted utility

structure along with its significance. Yaacov Schul and Noam Peri [10] highlight how distrust can influence decisions bound by uncertainty and value regarding distrust on decision quality.

Considering the issue of most favourable decision making under uncertainty, Armbruster B. & Delage E. [11] presents tractable approach to dealing through insufficient information concerning utility function and gives tractable formulations for such decision-making problems as robust utility optimization problems along with arbitrary dominance parameters.

Ion Juvinaa et. al. [12] designs a computational psychological model which describes sharing of knowledge over both the games for tactical dealings i. e. Prisoner's Dilemma and Chicken that culminates in a trust method to determine how rewards vary based on the changing aspects of the relations among players.

Joseph Kable [13] brings concentration towards the area of intertemporal choice in the larger sphere of self-control, the area in which much powerful discussion requires regarding the fundamental characteristics and essence of the valid psychological processes.Mathew L [14] et. al. suggest that individuals measures the worth of rewards for others, although in a discounted rate, which is apparently similar to the delayed discounting rewards.

Andrew Musau [15] discusses the advent of the hyperbolic discount functions in the behavioural economics and evaluates their behaviours and also presents an outlined description of IPD (Iterated Prisoners' Dilemma) model and evaluates Ainslie's points of contention. Adrian Haith et. al. [16] presents the framework that slower actions can improve trustworthiness so amplifying the chances of getting reward, however larger durations of slow actions create decline of reward.

Muffy Calder et.al.[17] provides a model for the procedure of authorising, developing and employing models over a broad variety of domains from general strategy to science and engineering. Takahashi T. [18] proposes novel schemes for examinations towards neuroeconomics of intertemporal choice.

T. Grandon Gill [19] depicts cognitive psychology and goal setting theory to present a different sight of utility which is highly adapted for apprising situations and also states that for a particular task the utility function of an individual develop with knowledge, and from fulfilling the general objectives into a distinctly formulated monitoring function.

John Monterosso and George Ainslie [20] enumerate self-control experience derived from hyperbolic discounting, especially applicable to the area of addiction and propose that the bundling effect may be encountered. Warren Bickel et.al.[21] reconsider behavioural science which give details as well as records the influence of temporal discounting for addiction, and also give reason why the drug addict persons bargain tomorrow in addition specifies an innovative scheme by depicting efficient elimination of drug and therapeutic events.

Philip Streich and Jack Levy [22] inspect the most efficient alternative discounting models; along with relate the quasi-hyperbolic discounting model to the cooperation problem of iterated Prisoner's Dilemma games. Herbert Gintis [23] argue that the rational actor model is finely represented as the beliefs, preferences, and constraints model (BPC model), because the name "rational" is loaded with inappropriate and ambiguous implications.

In consideration of consistency assumption, Thomas Nielsen and Finn Jensen [24] suggest two algorithms to study decision maker's utility function from the conflicting behaviour which is represented as accidental divergence from a utility function. Samuel McClure et al. [25] evaluates the discounted time when people build a sequence of selections amid financial payment options

which assorted by late payments as well as reveals that different approaches are engaged in this type of decisions.

Peter Diamond and Botond Koszegi [26] add self retirement to Laibson's quasi-hyperbolic discounting model for savings. In this case the expenditure plan is quite dissimilar from that of the exponential discounting. Other experimental inequalities comprise the occupation incentives on savings with a probably negative irrelevant inclination for better future incomes.

Nira Liberman and Yaacov Trope [27] studies temporal construal theory and noticed that far-away future performances were build at a superior position than close future performances and also displayed that decisions concerning far-away future performances, competed with decisions about nearby future actions, that are more convinced by the attractiveness of goal state and less convinced by the possibility of getting the goal state.

Moreover, the new findings and related studies which include various concerns about decision making with discounting models including utility values, preference orderings, multiplicative preference relations and additive preference relations are illustrated in following table 1.

Table1. Literature review on Human Preferences and Utility Function.

Sl. No.	Title	Authors and Year	Method
1	Group decision making in manufacturing systems: An approach using spatial preference information and indifference zone.	(Yu Chunlong et al., 2020)	The article conveys a method for the decision making group to diminish differences in a group and to get a general answer with uses of indifference zone notion that imprisons the uncertain character of preference expression.
2	Selection of Unmanned Aerial Vehicles by Using Multi-criteria Decision-Making for Defense.	(Hamurcu Mustafa et al., 2020)	Claims a unified approach derived from the analytic hierarch process (AHP) and technique for order preference by similarity to ideal solution (TOPSIS) to estimate unmanned aerial vehicle (UAV) alternatives for choosing procedure.
3	Integrated data envelopment analysis and multicriteria decision-making ranking approach based on peer-evaluations and subjective preferences: case study in banking sector.	(Jolly Puri et al., 2020)	To choose the finest option amongst the DMUs for the problem of MCDM, the ordered weighted averaging (OWA) calculation method is used to add ultimate cross-efficiencies and to attain absolute ordering of the DMUs.
4	Consensus reaching and strategic manipulation in group decision making with trust relationships.	(Yucheng Dong et al., 2020)	Presents a confidence relation consensus reaching process (CRP) by means of a feedback method that includes two strategies to support to reach an agreement: 1) adjusting the leader-based preference and 2) improving the trust relationships.
5	An adaptive decision making method with copula Bayesian network for location selection.	(Yue Pan et al., 2020)	Gives a new multi-criteria decision making method developed on an adaptive copula Bayesian network (CBN) model which is approached efficiently under uncertainty situations to carry out the multifaceted dependence problems.
6	Dealing with group decision-making environments that have a high amount of alternatives using card-sorting techniques.	(Morente Molinera et al., 2019)	Present an innovative group decision-making approach which can handle high number of alternatives that is grown via card-sorting techniques, and for diminishing the size of the alternatives, expertise knowledge has been invested to cope with such situation by the experts.
7	Group decision making with heterogeneous preference	(Bowen Zhang et al., 2019)	Present a group decision making approach having heterogeneous preference structures like

	structures: An automatic mechanism to support consensus reaching.		utility values, preference orderings, multiplicative preference relations and additive preference relations for an optimization-based consensus model.
8	Decision-making techniques in supplier selection: Recent accomplishments and what lies ahead.	(Chai, Junyi et al., 2020)	Present a variety of state-of-the-art improvements by the implementation of DM techniques that are chosen and analyzed under a finely accepted framework that are well expressed in a Supplier selection (SS) method.

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Table 1 (Continued)

Sl. No.	Title	Authors and Year	Method
9	Group decision making based on a framework of granular computing for multi-criteria and linguistic contexts.	(Callejas Edwin Alberto et al., 2019)	Gives an inventive method on the ground of granular computing framework which is capable to deal with the problems of group decision-making that detailed in multi-criteria contexts, for which various criterions are taken into consideration to calculate the probable alternatives for problem solving.
10	Prospect Theoretic Utility Based Human Decision Making in Multi-Agent Systems.	(Geng Baocheng et al., 2020)	Present a novel approach through utility based method for human decision making in a binary hypothesis testing framework which incorporates the thought of individual behavioural inequalities.
11	Evaluation of black-start scheme based on risk utility function.	(Mengke Lu et al., 2020)	Suggests a latest evaluation technique of black-start indicator weight and a novel black-start scheme calculation model established on risk utility function to judge the biased motivation of decision maker, and manipulates the association of Gini coefficient and Pearson coefficient to compute indicator weight that formulated on the dissimilarity of weight values and the divergence amongst weights.
12	Decision Making with Dynamic Uncertain Continuous Information.	(Reches Shulamit et al., 2020)	Offers a new structure and algorithm that is planned to tackle the challenges pretended when the potential measures are depicted as continuous random variables. In particular, identify a mathematical illustration to model the utility functions of the individuals and initiate most favourable and estimated algorithms to evaluate the best time, and take a decision so as to optimize the utility.
13	Dealing with value constraints in decision making using MCDM methods.	(Abdelli Abdelkrim et al., 2020)	Introduces, a novel approach i.e. ISOCOV (Ideal SOlution with COnstraint on Values) which is a MCDM method that intends, supports the decision maker for a more precise result while coping with the known constraints.
14	Visual Reasoning Strategies and Satisficing: How Uncertainty Visualization Design Impacts Effect Size Judgments and Decisions.	(Alex Kale et al., 2020)	Present a mixed design experiment on Mechanical Turk which tests eight uncertainty visualization designs: 95% containment intervals, hypothetical outcome plots, densities, and quantile dotplots, each with and without means added.
15	A new approach of utility function based on fractional Gini aggregation operator for intelligent access web selection.	(Ibrahim Rabha, 2019)	Put forward a fresh single-vision and multi-vision utility processes to define a new class of utility functions that derived from the utility theory by employing the notion of Gini aggregation operator jointly with the conception of well-ordered weighted average.
16	Reformulating prospect theory	(Francis Jack	This article updates the Kahneman–Tversky's

Sl. No.	Title	Authors and Year	Method
	to become a von Neumann–Morgenstern theory.	Clark, 2020)	(KT's) cumulative prospect theory to develop into a von Neumann–Morgenstern (vNM) theory which is well-matched with various current disciplines of economic, finance, psychology and decision science.
17	Linking subjective and incentivized risk attitudes: The importance of losses.	(Johannes G Jaspersen et al., 2020)	The paper established "general risk question" (GRQ) which is considered as a fast method to significantly draw out the individuals' approach in the direction of risk and connects finely with the actual behaviours that involves risk.

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Table 1 (Continued)

Sl. No.	Title	Authors and Year	Method
18	Managing consensus reaching process with self-confident double hierarchy linguistic preference relations in group decision making	(Xunjie Gou et al., 2020)	Recommends a new relation on preferences which is known as self-confident double hierarchy linguistic preference relation (DHLPR) along with developed a weight-determining method that estimates three types of information: the subjective weights and two kinds of objective weights. In addition to, a concurrence model is designed to handle the GDM problems by means of DHLPRs rely on the priority ordering theory.
19	An alternative consensus model of additive preference relations for group decision making based on the ordinal consistency.	(Xu Yejun et al., 2019)	Derives an alternative consensus model for an additive preference relation (APRs) which is established on ordinal consistency (OC) and applied an algorithm for APRs to identify and regulate the ordinal inconsistent elements.
20	Large-Scale Group Decision-Making with Non-cooperative Behaviors and Heterogeneous Preferences: An Application in Financial Inclusion.	(Chao Xiangrui et al., 2020)	Establish a consensus reaching model to deal with heterogeneous i.e. large-scale group decision-making (LSGDM) through non-cooperative behaviours and talk about its relevance in financial inclusion.
21	Large-scale group decision making with multiple stakeholders based on probabilistic linguistic preference relation.	(Song Yongming et al., 2019)	This manuscript established a probability based computational model through mathematical programming to obtain the lost probabilities of probabilistic linguistic preference relation (PLPR) which is derived from the distinct expected multiplicative consistency of PLPR.
22	Evolutive Preference Analysis with Online Consumer Ratings.	(Li Xue et al., 2019)	Recommend a new set of Evolutive Preference Analysis (EPA) methods to manage the changing online ratings along with the arbitrary rating distribution that estimates all the historical ratings into examinations and sends an all-inclusive ranking evolution.
23	Estimations of utility function and values of sustainable mining via the choice experiment method	(Narrei Somaye et al., 2019)	The paper uses the choice experiment technique for valuation of mine along with estimating the sustainable development criteria. In addition evaluating the preferences given by the individuals regarding the mining attributes can be helpful in managing the effects.
24	An Improved Task Scheduling Mechanism Using Multi-Criteria Decision Making in Cloud Computing	(Suvendu Chandan Nayak et al., 2019)	Intend to employ the TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) which is a MCDM technique, to enhance the effectiveness of the backfilling algorithm with the help of scheduling deadline sensitive tasks in cloud computing.
25	A method for aggregating ranked services for personal preference based selection.	(Kenneth Fletcher et al., 2019)	Put forward a technique that combined multiple ranked lists of services towards a single aggregated ranked list, while the high ranked services are chosen for the individual for which two algorithms are recommended; 1) Rank Aggregation for Complete Lists (RACoL), which

Sl. No.	Title	Authors and Year	Method
			combine the whole ranked lists and 2) Rank Aggregation for Incomplete Lists (RAIL) to combine partial ranked lists
26	Business intelligence system design and its consequences for knowledge sharing, collaboration, and decision-making: an exploratory study.	(Lapo Mola et al., 2019)	The manuscript investigates the consequences of the technological and organisational aspects of business intelligence systems (BIS) on the sharing of knowledge, association, and on the processes of decision-making.
27	Decision Analysis in Financial Marketing Using Multi-Criteria Decision-Making Methods.	(Prabadevi Boopathy et al., 2019)	The paper analyses that for achieving the final decision, multi-criteria decision-making (MCDM) methods can be practised and this method is regarded as the contradictory factor to estimate the money and marketing performances.

(Continued)

Table 1 (Continued)

Sl. No.	Title	Authors and Year	Method
28	Managing Asymmetric Information Effects in Decision-Making Productivity-Based Model.	(Zina Houhamdi et al., 2020)	The paper recommends a proper model for examining the capability of an agent based upon his throughput and the major assessment. Outcome of the model aids the agent to take right decision.
29	Using Sentiment Analysis for Evaluating e-WOM: A Data Mining Approach for Marketing Decision Making.	(Zehra Nur Canbolat et al., 2020)	Proposes to examine e-wom concept with sentiment analysis methodology in service industry context.
30	A Hybrid AI-Based Conceptual Decision-Making Model for Sustainable Maintenance Strategy Selection.	(Soumava Boral et al., 2020)	A conceptual decision-making model is depicted which is based on hybrid artificial intelligence (AI)- that takes the advantages of both the expert system and the case-based reasoning methodology to resolve sustainable maintenance strategy selection problems.

3. Theoretical/Computational Framework

In 18th century though the utility theory was originated which basically inferred consumers being able to rank preferences, but the real work takes place on the commencement of 20th era because this utility presented an experimental, reasonable organization to many fields. In the early 1920s Frisch was a pioneer in this discipline, but in 1940s Samuelson who possibly endorsed the exact confinement of consumer behaviour as a science of trade and industry. To rank the consumer preferences there are many continuous utility functions are used to represent it. Utility function is a vital component which evaluates the preferences of a set of goods and services widely used for rationality model to interpret human behaviour.

For achieving the target of constructing the utility function, it indicates that the preferences must follow axioms of rationality rules which are reasonable statements of consistency among the preferences. If these rules are followed strictly then it is assured that the utility function exists. While defining preference relations such as $\prec$ and $\approx$ if the rules of rationality are followed by the decision maker then h/she will be considered as rational [28].

The decision maker who is rational must follow these axioms (1) completeness means all possible alternatives have to be measured and must describe preferences for all the alternatives (2) transitivity means preferences must be consistent for which if A is favoured to B and B to C then A is favoured to C (3) Diminishing Marginal Utility and Diminishing Rate of Substitution means that when an individual have more of one specified commodity then the marginal value of the given commodity becomes less compared with other commodities (4) Non-Satiation denotes individuals do not possess

so much of everything that they are not required any more (5) Reflexivity – refers to a scientific premise that means X is as much importance as X [29].

The fundamental basis of demand is the behaviour of the consumer. A particular consumer possess a set of preferences and values whom purpose is exterior to the area of finances which are undoubtedly rely on civilization, edification, and personal choices, along with overabundance of other issues. So as to accomplish the required conditions of being categorised as rational, the preference relation must fulfil a set of criterion.

In behavioural properties set consumers can be considered as maximizers of preference where consistency is the outstanding feature of behavioral properties.

- For example on set X, binary relation Θ_x is a subset of X xX. The proposition can be written as (a, b) $\in \Theta_x$ as a Θ_x b. Less than (<) is an arithmetical operator is a binary relation, written as a < b. The $\succeq$ is the preference ordering symbol, so binary relation $\succeq_x$ on X which is applicable for all a, b, c $\in$ X and any set Y having the properties as:
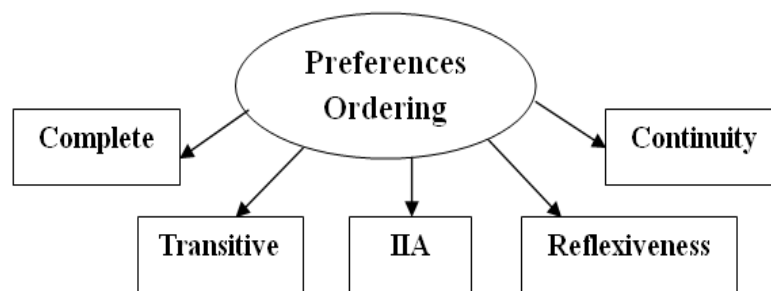

Fig.1: Axioms of Preferences

Complete: Consumer can compare two sets of good

If a $\succeq_x$ b or b $\succeq_x$ a, it is complete, which indicates any elements of X is weakly preferred to it (a $\succeq$ a). So the binary relation Θ is reflexive.
So, completeness represents reflexivity. The symbol $\succeq$ represents "weak preference" and $\succ$ represents "strong preference".
We define x $\succ$ y to mean "it is false that y $\succeq$ x." so we can say that x and y are equivalent if x $\succeq$ y and y $\succeq$ x, that means x $\approx$ y.
We may use basic reason to demonstrate that if $\succeq$ supports the completeness status, then $\succ$ supports the exclusion status: if x $\succ$ y, we cannot say that y $\succ$ x.
The completeness state shows that, a set of alternatives can be ranked by the consumer as superior, inferior, identical or as much good/bad as another.

Transitive: Individuals choices are internally consistent
The transitivity condition basically implies that consumers order their preferences in a rational way that means it shows that if a $\succeq$ b and b $\succeq$ c, then it denotes a $\succeq$ c. It also demonstrates that if a $\succ$ b and b $\succeq$ c denote a $\succ$ c, and a $\succeq$ b and b $\succ$ c denote a $\succ$ c. The elementary logic proves that if $\succeq$ denotes the completeness condition, then $\approx$ implies transitive.
The symbols that are represented in binary form are:
a $\succ$ b => a is superior to b
b $\prec$ a => b has less usefulness than a
a $\sim$ b => a and b are unresponsive
a $\succeq$ b => a is not less good as b and
for transitive if a $\succeq$ b and b $\succeq$ c then a $\succeq$ c.

Independent of irrelevant alternatives (IIA): Human behavior and overall individual's preferences are presented with independent of irrelevant alternatives that come into view in the individual choice theories. For a, b ∈ Y, a $\geq_y$ b if and only if a $\geq_x$ b.

From set A if an option x is selected and x is also belongs to subset B of A, then from B, x must be selected. In other words, by removing a few of the unselected options must not influence the choice of *x* as the top alternative. Suppose from the choice set {A,B} if A is preferred to B, by launching a next alternative C, the choice set can be expanded to {A,B,C}should not create B is preferred to A. IIA shows that if any choice available to the individual does not affect the strong relationship between other two choices.

Reflexiveness: Reflexive property is shown by preferences as x $\geq$ x for all x (x is as slightest superior as its own). This assumption is considered as the weakest among all the assumptions. For example it states that "I like one apple and one mango at least as well as one apple and one mango."

Continuity: Continuity is used to measure the preference ordering mathematically. It generally shows that people preferences are not jump from one to another. Mathematically we can derive that if A>B , then subjects properly nearer to A should also preferred to B i.e. persons influenced by comparatively slight variations in income and expenditure which permit the indifference curve to be differentiated from each other.

Note: -- Utility rankings are ordinal in nature. Utility measures are not unique. Among individuals it is implausible to differentiate utilities between them. The situations which affect utility are the spending on substantial commodities, mental perspective, peer group pressures, individual experiences and the common cultural surroundings.

3.1 Rational Action

Decision making process which involved making choices from among various alternatives is refereed as rational behavior which helps an individual to get most favorable level of profits or utility. Majority of conventional decision theory build upon the assumption that the person who takes part in an action or activity behave rationally.

In today's world there is a huge advancement for the concern about the beliefs and the issues for rational action and rational decision-making. Financial experts, accountants/analysts, mathematicians, architects, philosophers and theorists all took the pains to find out the common issues of rationality at different stages. In any circumstances all the individuals attempt to dynamically maximize their benefits and for which every time they try to minimize their losses is known as rational action. But for individuals it is very difficult to always make utility-maximizing decisions so frequently make irrational decisions and try to analyze why this happen.

The most complicated behavior to address is the irrational behavior. Somebody who doesn't pay attention to causes, reason or even judgment is called irrational. They are engaged to fulfill the requirement and till the requirement is satisfied or they get over of it, the irrational individuals can be changeable and occasionally considered as harmful.

Human brain also influenced in same way when there is a sale in a product. For example the percentage discount on a product biased our decision-making process than the actual price of a product. Percentage gives a consistent range to the prices in different situation. If a dress cost $20, it is very difficult to know how much we are gaining from that purchase and if the dress advertised as

25 percent off, then we consider as it's a reasonable price, but nothing to grab it. But if the same dress gives 80 percent off then we tend to buy it, thinking that there is no better deal than that.

3.2 Consistent Preferences

Preferences are considered as certain qualities that a consumer wants that present in a commodity and facilities to generate it superior to him. It may be the state of pleasure, level of contentment, usefulness from the commodity and so on. The concept behind it is that rational individuals choose consistently. Irrational consumers have inconsistent preference. Our thought is that individuals who are rational select consistently.

Given, a person selects over P to Q and Q to R. Then it shows that he must select A to C. this statement denotes to the rule of revealed preferences. But in actual case, we come across with individuals' irrational and inconsistent behavior which results in intransitivity.

3.3 Time Inconsistency

Time inconsistency, also called dynamic inconsistency, is the phenomenon whereby a person's choice and preference changes with time, which leads to separate assessment of the prices and profits of some decisions. For instance, time inconsistency may refer to the difference between the value a person puts to anticipating something, the value the person puts to experiencing it, and the value the person places on having experienced it.

Inconsistency that dynamically change with time is a condition where the preferences of a decision maker varies over time as if a preference turn out to be inconsistent at some position of time. The inconsistency occurs when not all preferences are aligned properly. The real problem occurs while a decision maker or a policy maker selects a policy in time but selects another one policy at the time of implementation reaches. By acknowledging this other policy maker will not assured about the policy credible.

Human behavior show weakness of will, which means if the time gap is longer amid selecting and understanding the prices and profits of the option, human able to select intelligently, however if the prices and profits are urgent, human opt for bad selections, for which far away in the future payoffs are being forfeit in support of instant payoffs.

For instance, chain-smokers understand that the smoking tendency drives them to trouble in the future, however they ought not to give up the present impulse to spoil in support of the distant return of a hale and hearty upcoming; this is known as time-inconsistent behavior. Observations confirmed that human show a regular inclination to concession the close future with a larger scale compared to far-away future.

3.4 Utility Function

While shopping or purchasing commodities individuals make calculated decisions which bring them the highest profit is called utility maximization.
For example an individual have to select from the intake bundles $x = x_0, x_1, \ldots$ or $y = y_0, y_1, \ldots$ As stated by exponential discounting, the individual has a constant $\delta \in (0, 1)$ and a utility function $u(x)$ for which the total utility of bundle x is specified by equation (1),

$$U(x_0, x_1 \ldots) = \sum_{k=0}^{\infty} \delta^k U(x_k)$$

(1)

Where δ is the individual's discount factor and $\delta = e^{-r}$ (where r > 0) is the consumers interest rate which is continuously-compounded for one-period. So the above equation (1) turns out to be equation (2),

$$U(x_0, x_1, \ldots \ldots \ldots) = \sum_{k=0}^{\infty} e^{-rk} U(x_k)$$
(2)

The structure shows the condition of exponential discounting. Here the individual bound to choose consumption bundle x over bundle y only when U(x) > U(y).

Exponential discounting is a discount function, which shows how choices vary over time. It may be certain or uncertain. At the end of the period when interest grows in case of simple compounding the δ is represented as δ=1/(1+r), and the equation (2) can be express as,

$$U(x_0, x_1, \ldots \ldots \ldots) = \sum_{k=0}^{\infty} \frac{U(x_k)}{(1+r)^k}$$
(3)

3.5 Hyperbolic Discounting

Discounting is the multiplication of a certain amount with a discount rate to calculate its present value. **Hyperbolic discounting** referred that people are habituated to prefer a lesser-earlier payment over a higher-delay payment where the delay happens earlier rather than afterwards in time. While people are presented with a higher payment in transition to wait for some time span people reacts rarer towards it since the payment take place farther away. People keep away from delaying for a longer time as the wait is near to the present time. This discounting is the foundation of behavioural decision theory. The delay discounting time-inconsistent model is the hyperbolic discounting model [30][31].

Discounted utility approach defines that like other choices intertemporal choice is not different, except that few delayed consequences are present that's why it must be foreseen and discounted. When humans offered with same types of payments, they select the option which comes earlier instead of that arrives afterwards. So that humans rebate the worth of the delay payment that rises with the delay accordingly. Traditionally this process modelled as exponential discounting which is a time-consistent model of discounting. In exponential discounting there is a constant rate of discount [32].

Another mathematical model which considers for these types of deviations is known as hyperbolic discounting model [33]. The graph of hyperbolic discounting compares the immediate preferences with the long-period preferences. For example: "would you prefer 20 minute massage now or 25 minute massage an hour later?" or "would you prefer 20 minute massage in a week or 25 minute massage in a week and one hour?" Researchers found that a notable amount of people wants to get smaller quantity today, but enthusiastically wait for one more week to take delivery of the more quantity in its place [34].

This discounting model generates short-lived preferences for little payoffs which happen earlier over bigger, later ones. An individual who uses hyperbolic discounting shows a powerful inclination towards options which are inconsistent over time period [35]. It's a type of human behaviour that makes our brains prioritize more immediate rewards over those that might come our way in the distant future.

To a broad variety of things hyperbolic discounting can be applicable which comprise negligence in self-control, fitness consequences, and expenditure options for time period, and individual investment choices.

3.6 Intertemporal Choice

An individual's present decision have an effect on the options that are available in the future is called intertemporal choice. Hypothetically if the consumption not occurs at present then the level of consumption raises considerably in the future and conversely. Present consumption depends only on present income which is stated by the absolute income hypothesis by Keynes' but this supposition is not true always. In real case while making decisions about consumption and savings individuals think about both the current and the future income.

The consumption of individuals if increases in the present period, then they save less for which they consume less in the future. Therefore between present consumption and future consumption there is always an option present. So while taking any decisions for consumption individuals have to consider about their expected future income, the level of consumption of goods and services which they can provide.

4. Consumer Preference and Convenience

We are all consumers: each of us undertakes many forms of consumer behaviour in every day of our lives. Consumer behaviour involves more than just how a person buys a products or services. Consumer behaviour is the learning of individuals' decision of how to invest their wealth established on their self preferences. Current outburst of the mobile net, businesses and brands are depending progressively on inward retailing, concentrating on producing debates and presuming clients with appropriate and modified advertisement content. Intervals that were frequently used as eye-catching strategies appear to be outdated with increasing privacy affairs. In global media electronic publicity and marketing are predicted to conduct the growth to invest.

Digital advertising and marketing are expected to conduct the growth in global media focus for the next few years and to arrive at the stages of television ad costs. It's beyond our imagination that the global mobile users are 6.9 billion and infiltration level is of 95.5 per cent which clearly enhanced the internet usage and publicity [36].

A SIM (subscriber identity module) card used in GSM phones/smart phones globally is a movable memory chip. It is a vital part in mobile telecommunications which highlights and keeps the telephone number and transits cell phone to the mobile carrier's network. Because SIM card possess limited memory, it can store identification information that distinguishes a smart phone to a particular mobile network which includes identity, location and phone number, network authorization data, personal security keys, contact lists and stored text messages.

For recharging the SIM cards mobile vouchers are required which is used as a basis for motivating business as a trademark. Voucher contains a recharge number which is sold to client with some money to recharge their SIM card and also for the validity of the card for some time period. The voucher helps in accessing the secured content but which is not imposed on the organisational network. Mobile device are vouched individually and vouchers are valid for the issued individual. So, influential voucher promotion helps in fabricating a brand and making demarcation, particularly in extremely competitive markets.

The main objective of the consumer to select the commodities those are responsible for the highest level of satisfaction as per the need of the consumer. However consumers have some limitations in their options. The limitations are drawn from the consumer's earnings, and the fees that paid by the consumer for the commodities.

Customers are selecting those products that give convenience as per the manner they akin to, not about any other way. Customer convenience is the trustworthiness on a particular brand which is measured as the key driver in business. Convenience means when an individual considers some product is convenient to him/her which may not be convenient for others, or we can say that thing is convenient in the morning but may not be convenient in the evening?

Convenience is regarded as the greatest vital issue for the selection of various mobile recharge vouchers that has a bigger influence on the decision of a customer to avail the facility. The intention of the work is to recognise the convenience factor that has impacts on the consumer to provide preferences on the consumed good. This work conducted on the salaried individuals beginning from the age group of 30 years and continuing above 50 years thus the generalization of the result is confined. This research supports awareness to traders and managers to convince their convenience customers with the products for mobile marketing strategies.

Convenience defines in Webster's Dictionary as "anything that adds to one's comfort or saves work; useful, handy or helpful device, article, service, etc." The notion of convenience was brought in by Copeland [37] in the marketing literature that the goods are convenience when the consumer buying it regularly and instantly at nearby markets. Copeland with other researchers Bucklin [38] assemble convenience within the area of convenience categorization of manufactured goods that involved less threat or less participation in buying by Brown [39].

5. Experimental Results and Analysis

Although convenience denotes to dissimilar things to dissimilar customers all over the globe, based on their situations, society, place, market maturity and entrée of technology, these requirements are supported by consumers for simplicity, usefulness and effortlessness in the areas of: expenditure, marketing and engagement experiences.

5.1 Examining Preferences Through Utility Function

Consider the following experiment which is based on real data voucher scheme where individuals were offered with a mobile data/recharge plan to choose between Rs 19 talk time + 0.2GB data in two days that is on the day from the beginning of the test and Rs 48 talk time + 3GB data after 28days. Several of them select to get Rs 19 talk time + 0.2GB data without wait which is shown in figure-2 and figure-3. But, while the similar individuals provided with Rs 19 talk time + 0.2GB data to be distributed in a year from the day of the test and Rs 48 talk time + 3GB data to be distributed in a year and 28 days from the test day, the individuals who are not willing to wait for 28 days currently for the extra value are now showing interest for the same that shows **reverse preference** which is shown in figure-4, when the distant to the future/tenure increases.

In this example, violation of consistency conditions occurs. Here x refer "Rs 19 talk time + 0.2GB data at some time t + 2" and y refer "Rs 48 talk time + 3GB data at time t + 28," as time t is calculated in days. So

$$x : t + 2 \rightarrow \quad \text{Rs } 19 + 0.2\text{GB}$$
$$y : t + 28 \quad \rightarrow \quad \text{Rs } 48 + 3\text{GB}$$
So, when time (in days) t= 2, $x \succ y$ but
$$x : t + 365 \rightarrow \text{Rs } 19 + 0.2\text{GB}$$
$$y : (t + 28) + 365 \rightarrow \text{Rs } 48 + 3\text{GB}$$
here, at time (in days) t=365, $y \succ x$

If the individuals are modeled with choosing over a more complicated choice space then time inconsistency disappears because the gap between the choice time and delivery time of the item is externally added in the item of choice. For example, x_0 refers to "Rs 19 talk time + 0.2GB data delivered immediately" where as x_{365} refers to "Rs 19 talk time + 0.2GB data delivered a year from now," and in the same way for y_1 and y_{393}. After that the examination shows that $x_0 \succ y_1$ and $y_{393} \succ x_{365}$ which has no contradiction.
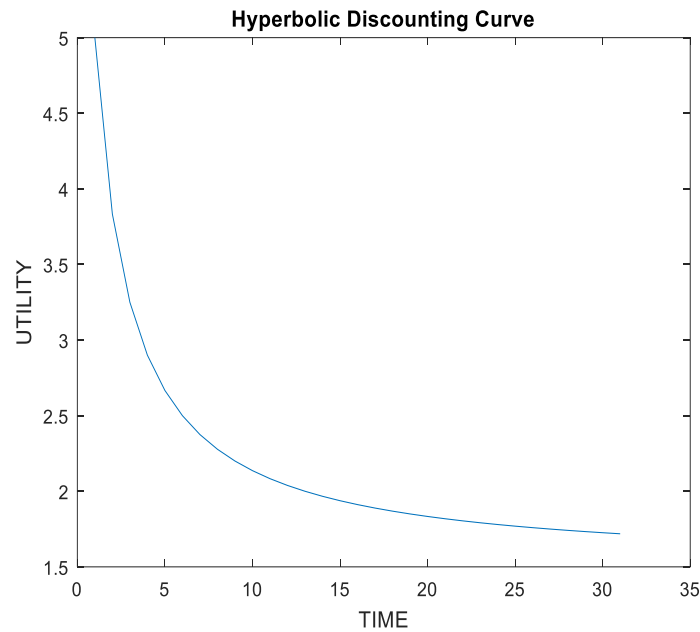
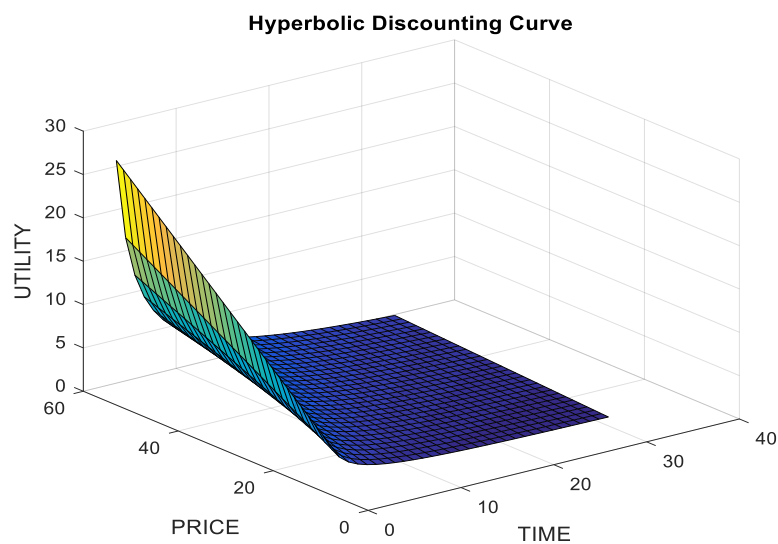*Fig.2: Hyperbolic Discounting Graph for Preferences usingUtility Function*

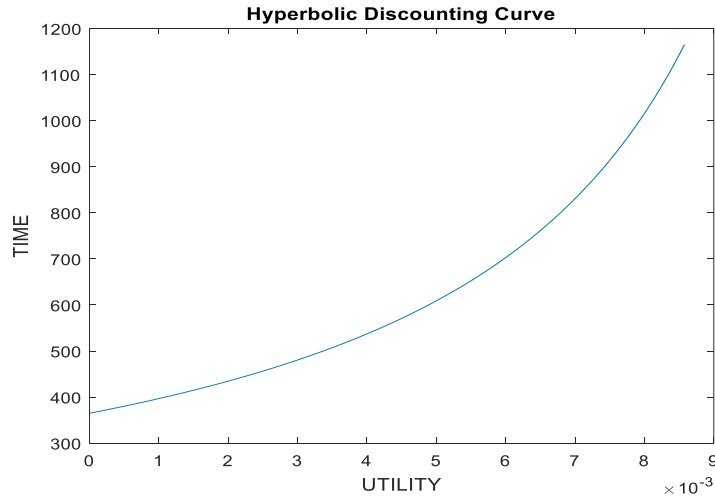*Fig.3: 3D Hyperbolic Discounting Graph for Preferences*

Fig.4: Hyperbolic Discounting Graph for Reverse Preferences using Utility Function

Outcomes of time consistency considered that over time periods utility is supplement and in all time periods the instant utility function is same where at present, future utilities are discounted at a fixed rate. This type of discounting is called exponential discounting which is extensively used for financial representation.

Generally the cost of the future payoff should be discounted by a factor which increases according to the span of the delay. So to evaluate this exponential discounting function is used which is a time-consistent discounting. But investigation rises that individuals do not use constant rate discounting. For this condition another discounting function comes about which is called hyperbolic discounting function.

The irrational behavior of individuals is represented by hyperbolic discounting function. If the future reward E discounted rationally, subsequent formula is used

$$B = \frac{E}{(1 + r)^t}$$

(4)

Here future reward is E, the discount rate is r, present value is B, and time in days i.e. t. when the current cost of the future payoff surpasses the cost of current payoff, then the future payoff is selected. While executing hyperbolic discounting function if there is any logical error occurs in discounting then this formula is used

$$B = \frac{E}{(1 + r \cdot t)}$$

(5)

In this formula t and r is considered as delay in payoff and the discount rate respectively. The above two equations shows that the discount rate is high signifies that the current consumption worth more than the far future consumption. But, if the hyperbolic discounting function is used, then distant reward is discounted too much.
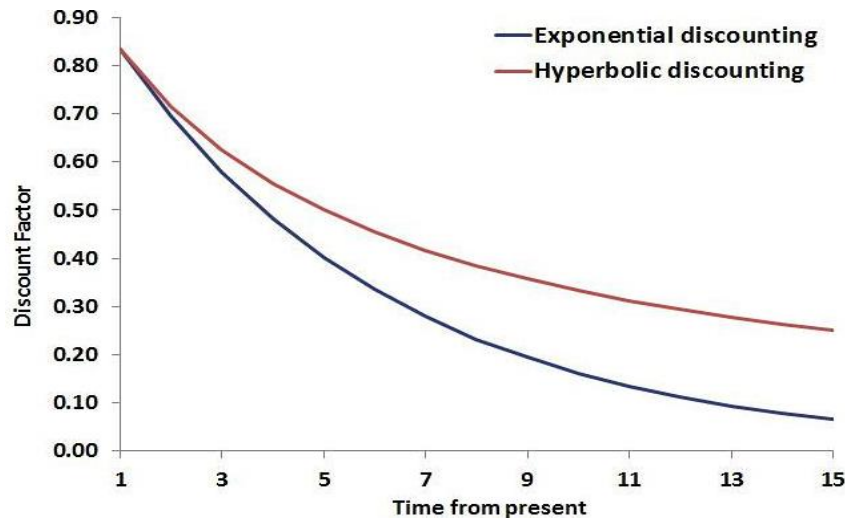
236

Fig.5: Exponential and Hyperbolic Discounting Graph for Preferences

Hyperbolic discounting is highly accepted in financial approaches which persuade time-inconsistent behavior. Studies that give proof in support of hyperbolic discounting whether are simply qualitative or they rely on suppositions regarding, or meet boundary of utility functions. This calculates the hyperbolic factor and also gives basis of preference to majority of trendy discount functions. Further it is simply evaluated from data and there is no need of utility information. For hypothetical preference base, serious experimental analysis, and quantifiable measurements of hyperbolic discounting this hyperbolic factor offers a simple tool.

In hyperbolic discounting payoffs assessment drops quickly having little intervals of delay and then gradually for larger intervals. This distinguishes it from exponential discounting, where payoffs evaluation drops by a fixed price with respect to unit of delay, in spite of the span of delay which is shown in figure 5.

Despite the nobility of the exponential discounting function, experimental results shows that the intertemporal choice of individual's are more inclined to the hyperbolic discounting model.

To illustrate, with the earlier case,
Allow $z_t \rightarrow$ quantity of cash issued in t days from now
Then the utility of z_t will be

$$u(z_t) = z / (t+1)$$

(6)

The value of x_0 (for t = 2) is thus
$\qquad$ $u(x_0) = u(9.5_0) = (19/(2+1)) + 0.2 = 6.5$, and
$\quad$ the value of y_1 is
$\qquad$ $u(y_1) = u(48_1) = (48/(28+1)) + 3 = (48/29) + 3 = 1.7 + 3 = 4.7$,
so, $x_0 \succ y_1$
But the value of x_{365} is
$\qquad$ $u(x_{365}) = (19/(365+1)) + 0.2 = (19/366) + 0.2 = 0.2519$
$\quad$ while the value of y_{393} is
$\qquad$ $u(y_{393}) = (48/(365+1+28)) + 3 = (48/394) + 3 = 3.121$,
so, $y_{393} \succ x_{365}.$

Pseudo code for the above function

Step-1: Procedure z
Step-2: input z, t as real
Step-3: calculate x=z/(t+1)
Step-4: write x
Step-5: end proc

The researcher found the proof that an individual faces various rates of discount for various types of results. No doubt that there is existence of time inconsistency which is crucial for designing human behavior, however that does not mean that in the weak sense of preference consistency individuals are irrational. Modeling of the behavior of rational individuals who are time-inconsistent can be possible if they maximize their preference functions that are time-dependent.

Pertaining to the improved awareness of neuro-perceptive engineering concerned with intertemporal choice, which is also essential under risk condition to inspect the association amid intertemporal choice and decision. Researchers projected a structure for intertemporal choice that can be adopted for decision under uncertainty.

5.2 Examining Convenience Through Modified Utility Function

The purpose of the work is to examine effects of gender, age, income and employment status on consumer response to various types of mobile voucher schemes. The data used in this study were collected through direct contact with the consumer. This survey is conducted on above 500 consumers. Basic structure of the population includes gender, age, income, and employment status which are helpful in designing and forecasting the consumer behaviour respecting to the choices of different mobile vouchers by various peoples which is shown in figure 6. Therefore, the results described in this article should help traders to propose campaigns which give more focus to the target customers. While maintaining continuity with existing work, this article contribute outcomes which ease the research attempts purposeful on mobile media and assist professionals in their mission to attain the achievement on mobile advertising.
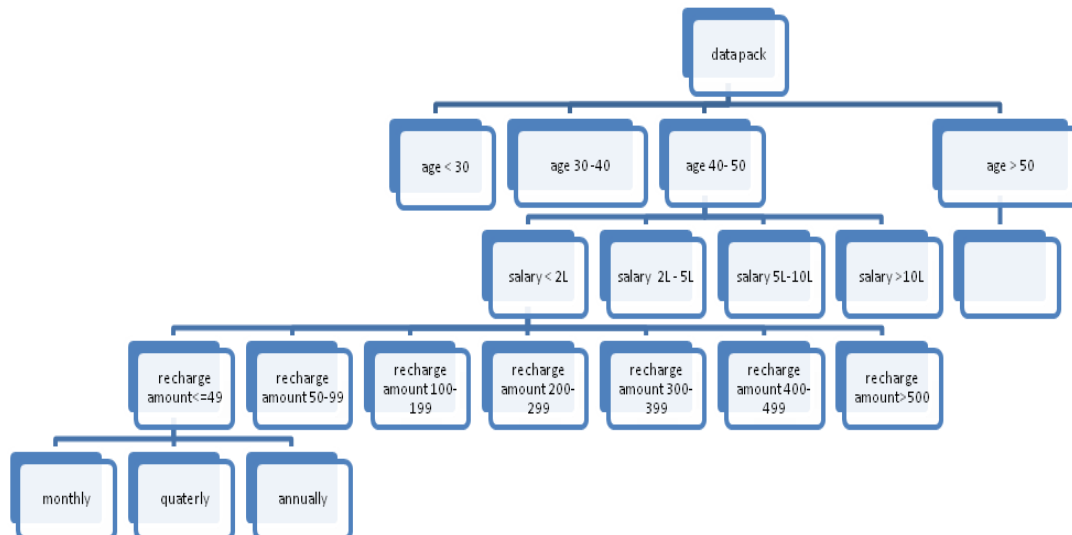

Fig.6: Variances of Customer Recharge Data

Table 2: Customer Recharge Voucher with Age

		\<=49	50-99	100 - \<=199	200 - \<=299	300 - \<=399	400 - \<=499	>=500
Recharge Amount								
	\<30	50	15	50	60			
Age	30-40	20	25			80	100	

Range	40-50				60		60	50
	>50			25	10			
Total		70	40	75	120	90	160	50

Table 3: Customer Recharge Voucher with Voucher Type

		Recharge Amount						
		<=49	50-99	100 - <=199	200 - <=299	300 - <=399	400 - <=499	>=500
Voucher Type	Monthly	40	30		50	10	60	20
	Quarterly			50	60	60	80	35
	Annually			10		40		55
Total		40	30	60	110	110	140	110

This study is aimed at exploring the impact of age and income on consumers' purchasing responsiveness to mobile SIM cards at retail stores. With regard to analytics, younger consumers were more inclined to monthly and quarterly recharge type as shown in table 2 and 3, whereas different income groups had no significant differences in this respect [40].

$$C_t = (X / (t + 1)) + \Delta X \tag{7}$$

Where $\Delta x = \left(\frac{x_1 - x_0}{x_0} * 100 \right)$

Here, x_0 is the base price and
x_1 is the change in price

If there is an increase in the amount by Δx / actual x then the data for that increases 1.5 times the actual data.

$$U(c_t) = \frac{u(x_0)}{t+1} + \Delta x \tag{8}$$

Here **ΔX** is the convenience factor which is added to the utility function having preferences. This convenience factor depends upon number of conditions which are changed frequently. According to this factor the consumer convenience varies from time to time which has also impact on consumer age, salary and social status. Convenience factor of the consumer on a certain commodity directly depends on the preference ordering of the consumer which is measured through utility function. The consumer preference with the goods consumed fluctuates as per their need.

So while purchasing a product the consumer have to take decision that which product is convenient to him/her? When the time is fixed there are number of alternatives are present to select among them which is suitable for the consumer. But when the time varies there is also change in price. The convenience fee which is added with the discounted utility function to make the product more preferable to the consumer.

Measuring convenience factor

28 days (utility comparison)

Rs 279

1 day = Rs 9.964   u= 9.964/2 = 4.982

84 days = Rs 836.976   u = 836.976 /85 = 9.8467

365 days =Rs 3636.86   u = 3636.86/366 = 9.9367

84 days

Rs 598

I day = 7.119   u = 7.119/2 = 3.5595

28 days = 199.332   u = 199.332/29 = 6.8735

365 days = 2598.435   u = 2598.435/366 = 7.0995

365 days

Rs 2,398

1 day = 6.5698   u = 6.5698/2 = 3.2849

28 days = 183.9544   u = 183.9544/29 = 6.3432

84 days = 551.8632   u = 551.8632/85 = 6.4925

From the above recharge voucher scheme which is based on real data voucher scheme from a company we conclude that when the time gap is more, then the discounted utility function shows the higher value that mean it is convenient to the consumer if he/she chooses the future data pack. But this convenient factor also depends upon the income of the consumer and the level of the consumption which varies from individuals to individuals.

Suppose if we try to pay Rs 219, we get 1 GB data but if we pay Rs 30, then we get 1.5 GB data i.e. cost of 1 GB data is Rs 30. Then if we pay Rs 60 more i.e. Rs 279, we should have 2 GB of data: whereas for this we have to pay Rs 299(i.e. at a loss of Rs 20). Next for 3 GB data it should cost Rs 180 so that price should be Rs 219 + Rs 180 = Rs 399 which it is. All these data packs shows that if the price is increased then the convenience for customer is more.

Actual data price

for 28 days => 1GB / day = Rs 219

1.5 GB / day = Rs 249

2 GB / day = Rs 299

3 GB / day = Rs 398

So when we fixed the time (i.e. 28 days) for different GB of data, then the price also varies according to the GB of data consumed which has impact on the individuals' income and the requirement of the data as he/she is a researcher that which pack is convenient to which customer according to their requirement.

For 1.5 GB => 28 days = Rs 249

56 days = Rs 399

84 days = Rs 598

365 days = Rs 2398

Here the GB of data provided to the consumer is fixed but the time varies which carries different prices to the customer. Here the convenient factor is the number of days individuals required to recharge their voucher. Here GB of data has no influence on the purchasing behaviour of the mobile data pack because here the convenience factor for the customer is the time where individuals have no time to recharge voucher frequently. Majorly this type of data pack is convenient for senior age groups.

Here the convenience fee is the price of the data pack and the amount of data which varies from customer to customer. Low salaried person required less price data pack which is provided with less amount of data. Certain persons require more amounts of data whatever the price may be because the need of data is convenient to him. Some persons need the talk time more which satisfies their requirement so convenient to them.

For those companies provides different types of recharge vouchers according to the demand of the consumer and also the companies gain profit from it. While selecting a recharge voucher consumer have to take decision which voucher is convenient to fulfil their need. According to human behaviour human always choose sooner and lesser reward rather than the later and larger reward which is also known as the intertemporal choice. Due to the nature of intertemporal choice companies take advantage from the consumer by making more profit.

For example if a person choose Rs 279 recharge voucher the he will get 1.5 GB data/day for 28 days. But the same person when select the recharge voucher for 365 days he/she will get the benefit of 1.5 GB data and the price amount is Rs 2398.

Because if a person pays Rs 279 for 28 days then he has to pay Rs 3736.5 for 365 days. But if the person take the recharge pack for 365 days which costs Rs 2398 then that person will get the benefit of Rs 3736.5 - Rs 2398 = Rs 1338.5. But this has a direct influence on the income of that person. If the person has annual income of < 2 L it's very difficult for him to take the advantage.

So if the salary < 5 L the 2% of the salary is invested in recharging voucher i.e.

0.02% *S

Else if salary > 5 L the 5% of the salary is invested in recharging voucher i.e.

0.05% * S

The convenience factor changes according to the frequency of change in time, fluctuation of price in the market, Psychological factors etc.

Maximum individuals do not know what amount of data they are going to use and the companies promised to inform consumers prior to striking any excess charges, so while choosing data packs don't take it surprisingly. Customers when offered with more GB of data then companies limit the high speed to couple of giga bytes and it is trouble for loading pages quickly.

Applications

There are many significances for hyperbolic discounting in the regions of investment (small pain now for future gain), global warming (impact of energy policy now on future environmental conditions), approaches to healthiness (some discomfort now for future health), choices in everyday life (amount of exercise now for reducing obesity) and activities regarding climatic forecasts (how many crops to plant for future benefit).

Conclusion

The important cause of the study depicted here is the inflated consequences of contemplating decision making in day to day lives. In a non-conventional community persons must depends on their logical possessions instead of practice in conducting their activities. Different streams of people like economists, engineers, operations researchers, decision analysts and others are engaged for building refined methods for these difficulties. All known that the Smartphone has a substantial influence on our community and every facets of being existence. The well-known fields, where the influences of Smartphone are noticeable contain commerce, edification, physical condition, and social interaction. Social customs and personal behaviour has significantly transformed by the mobile technology whose effects are positive and negative also.

Individuals' behaviour adjusts accordingly to the nature of hyperbolic discounting function because of its short sightedness. By acknowledging the nature of hyperbolic discounting that how it performs

we can ensure the consequences of it and we can take decisions more deliberately having the future effects. To compile the outcomes of examinations on sensitivity to delayed payoffs the level of discounting by delay is widely used. Between instant and delayed rewards the quantitative models of choice gather a huge volume of inconsistency data from various classes, populations, and payment types. Such type of sensitivity study of individual behaviour helps in constructive methods and exact images of hypothetical models of behaviour. Further it motivates and conducts research as a heuristic and adaptable construct. Due to the scope and impact of investigation in this field, delay discounting is considered as one of the achievements in the area of behavioural study. Luckily, the selection of instant payoffs also may be impressionable in humans and nonhumans, despite the fact that it is hereditarily resolved.

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