

SELECT STUDY OF MOBILE SERVICE ADOPTION IN INDIAN TELECOM SECTOR

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SELECT STUDY OF MOBILE SERVICE ADOPTION IN INDIAN TELECOM SECTOR

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“The problem in this business isn’t to keep people from stealing your ideas; it’s making them steal your ideas!”

Howard Aiken

Dedicated to My Mother

Certificate

The thesis entitled “**Select Study of Mobile Service Adoption in Indian Telecom Sector**”, being submitted by **Mr. Abhay Kumar Bhadani** to the Indian Institute of Technology Delhi, for the award of the degree of “**Doctor of Philosophy**” is a record *bona fide* research work carried out by him. He has worked under our supervision in conformity with rules and regulations of the Indian Institute of Technology Delhi. The research reports and results presented in the thesis have not been submitted in part or full for the award of any degree or diploma in any other University or Institutes.

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Abstract

During the last two decades, mobile communication and technology have proliferated within the society at a remarkable pace, opening up several new avenues of business. Mobile phones have played a significant role in connecting and empowering people throughout the world and India is no exception. Intense competition and tariff war among the telecom operators in India have brought down the voice tariffs to a very low level, thereby increasing its customer base. Despite this increase, the Average Revenue Per User (ARPU) has seen a decline in recent years. This negative trend forces the operators to promote additional services to compensate for the declining ARPU. Though telecom facilities have reached almost every part of the country, there are still several barriers associated with adoption of mobile services, especially non-voice mobile services.

The strategy of marketing the existing services in an unplanned way does not seem to work in favor of operators and it becomes indispensable to investigate the users' requirements. Apart from these concerns, modeling users' preferences could help in inferring profitable strategies. Cross-selling, bundling and dynamic pricing may prove beneficial that can help in improving the adoption either by targeting appropriate customer segment base or at an individual level.

This work tries to investigate the underlying gaps between the users' expectation of mobile services and services offered by the operators. This study predominantly helps to address some of the issues of low adoption of utility-based mobile services from two different perspectives, namely, users' perspective and operators' perspective.

The first part of the study deals with users' preferences, where their preferences related to mobile services are modeled. Using recommender systems and frequent pattern mining, interesting rules are derived, which may help the operators to offer various mobile services in the form of bundled pack under a single umbrella. Further, a pricing model is proposed to decide upon the price for the bundled pack based on the associated utility for respective services.

A detailed study is conducted to understand the adoption intent for a citizen-centric utility service such as M-Ticketing. M-Ticketing is a mobile value-added service that can be accessed from both feature phone and smartphone and does not require an Internet connection to use this service. Several factors are studied

and modeled based on a well-established theory, Technology Acceptance Model (TAM), for the adoption of mobile services. It could help the operators and the Indian Railways to improve upon factors that affects the adoption of such services.

In the second part of the research, operators' perspective is captured and important factors (barriers) that lead to the poor adoption of mobile value added services are studied. A hierarchical structural model is developed with the help of Total Interpretive Structural Modeling (TISM). These barriers are then categorized into four clusters with the help of MICMAC analysis. Further, the barriers are ranked using Fuzzy Analytic Hierarchy Process to identify high priority factors. Finally, an index named Mobile Service Adoption Barrier Index (MSABI) is developed with the help of consensus building and graph theoretic approach. The impact of the barriers for a particular operator is estimated using MSABI which helps in comparing different operators.

The thesis concludes with the summary and findings derived from this research which could be helpful for the telecom operators, policy makers, practitioners, and academicians. This thesis has some of the finest contributions in the area of recommender systems which explores deep learning, auto-encoders and support vector machines for recommending the items to the customers. In addition, the bundling and dynamic pricing could be useful for the service providers and could help in developing strategies to enhance the adoption. The contributions to understanding the adoption intent of M-Ticketing could help the government as well as the operators on improving the existing services and future citizen-centric services. It provides a direction on the factors that could help in improving the services, leading to improved adoption. Identification and ranking of barriers would help the operators as well as the policy makers to make informed decision for developing appropriate strategies. MSABI could be used as a guiding tool to overcome the underlying barriers and thus, improve the overall experience of using mobile services irrespective of locational constraints in India.

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Abbreviations

2G	2nd Generation
3G	3rd Generation
AGFI	Adjusted Goodness-of Fit Index
AHP	Analytic Hierarchy Process
AMOS	Analysis of MOment Structures
ANP	Analytic Network Process
ARM	Association Rule Mining
ARPU	Average Revenue Per User
CDMA	Code Division Multiple Access
CDR	Call Detail Record
CI	Consistency Index
CR	Consistency Ratio
CRM	Customer Relationship Management
DOI	Diffusion Of Innovation
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GFI	Goodness-of Fit Index
GLM	Generalized Linear Modeling
GSM	Global System for Mobile
GTA	Graph Theoretic Approach

ICT	I nformation and C ommunications T echnology
IRCTC	I ndian R ailways C tering and T ourism C orporation Limited
ISDN	I ntegrated S ervices D igital N etwork
ISM	I nterpretive S tructural M odeling
MCDM	M ulti C riteria D ecision M aking
MICMAC	M atrice'd I mpacts C roises M ultiplication A pplique'a C lassment
MMS	M ultimedia M essaging S ervice
MNP	M obile N umber P ortability
MSP	M obile S ervice P rovider
NFI	N ormalized F it I ndex
PCA	P rincipal C omponent A nalysis
PCO	P ublic C all O ffice
PEOU	P erceived E ase O f U se
PU	P erceived U sefulness
RI	R andom I ndex
RR	R esemblance R atio
SD	S tandard D eviation
SEM	S tructural E quation M odeling
SMS	S hort M essage S ervice
SSIM	S tructural S elf I nteraction M atrix
TAM	T echnology A cceptance M odel
TOPSIS	T echnique of O rders P reference by S imilarity to I deal S olution
TPB	T heory of P lanned B ehaviour
TRA	T heory of R easoned A ction
TRAI	T elecom R egulatory A uthority of I ndia
TSP	T elecom S ervice P rovider
UBMS	U tility B ased M obile S ervices
UTAUT	U nified T heory of A cceptance and U se of T echnology
VAS	V alue A dded S ervices