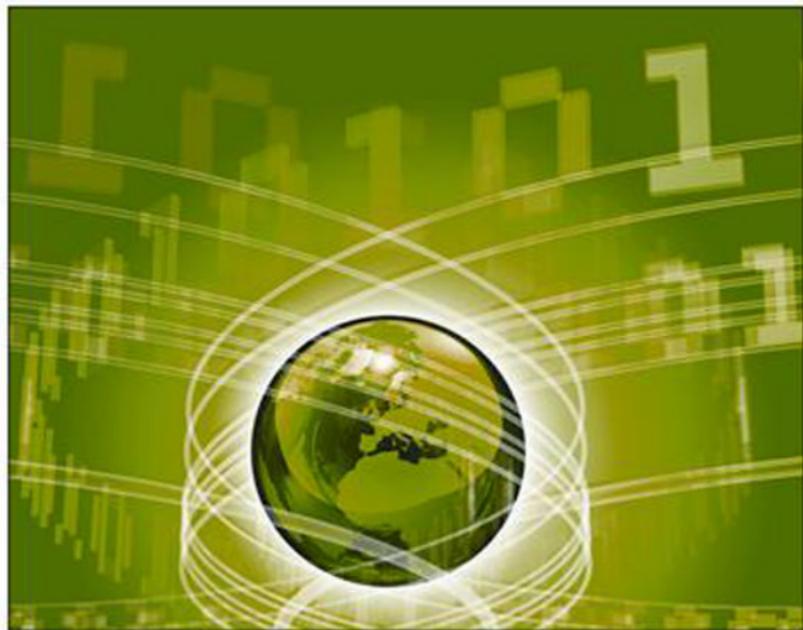


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Mobile Information Communication Technologies Adoption in Developing Countries

Effects and Implications



Ahmed Gad Abdel-Wahab & Ahmed Ahmed A. El-Masry

Mobile Information Communication Technologies Adoption in Developing Countries: Effects and Implications

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Section 1 **M-Technology and Communications**

This section provides the reader with an introduction and background of m-technology and contains four chapters. It starts from Chapter 1 and ends with Chapter 4. Chapter 1 deals with the critical mass of wireless communications in developing and developed economies. Chapter 2 explores the competitive growth pattern of mobile telecommunications in Korea. Chapter 3 investigates mobile information communication technologies and construction project management with case study from India. The fourth chapter presents for the requirements engineering in the ICT4D domain.

Chapter 1

The Critical Mass of Wireless Communications: Differences between Developing and Developed Economies.....	1
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Kaisu Puumalainen, Lappeenranta University of Technology, Finland

Lauri Frank, University of Jyväskylä, Finland

Sanna Sundqvist, Lappeenranta University of Technology, Finland

Anni Tuppuru, Lappeenranta University of Technology, Finland

This chapter provides an introduction and background on mobile telecommunication diffusion and then moves in to the economic development and critical mass point in the innovation's diffusion process and then economic development and diffusion of wireless communications. The chapter also presents for data analysis and main results. The chapter ends with conclusions and suggestions for future research.

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Moon-Soo Kim, Hankuk University of Foreign Studies (HUFS), Korea

Sungjoo Lee, Ajou University, Korea

This chapter provides an introduction and an overview of Korean mobile telecommunications addressing some issues such as technology market in Korea. The chapter also presents for data, analysis model, diffusion models, and LVC model for empirical analysis. The chapter also presents for strategic and policy implications and the success factors of Korean mobile communications market. The chapter ends with concluding remarks.

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Vanita Ahuja, Project Management Consultant, Teacher and Trainer, India

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Kristina Pitula, Concordia University, Canada
Daniel Sinnig, Concordia University, Canada
Thiruvengadam Radhakrishnan, Concordia University, Canada

This chapter starts with a detailed introduction of requirements engineering and ict4d context. The chapter also presents for storytelling and how it constitutes. Then the chapter compares storytelling with conventional elicitation techniques. In the chapter, the authors also present for incorporating ‘SDS’ in requirements gathering process. Then they move to requirements elicitation, requirements abstraction, and requirements specification and validation. The chapter also demonstrates for validation of the SDS approach with a preliminary experiment and then presents for the next generation e-tool. The chapter ends with a summary.

Section 2 M-Technology Applications

Section two mainly focuses on m-technology applications and consists of six chapters. It starts from Chapter 5 and ends with Chapter 10. Chapter 5 demonstrates some defences of mobile technologies with exploring the socio-technological dimensions of m-learning. While Chapter 6 deals with mobile learning in China, Chapter 7 explores m-learning in developing nations and environments with variable access. Chapter 8 presents for mobile technologies and rich media-expanding tertiary education opportunities in developing countries. The last two chapters in this sections deal with m-government. Chapter 9 presents for the role of m-government in Western China development, and Chapter 10 explores civil servant resistance to m-government in Turkey.

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<i>Yuqin Yang, Nanyang Technological University, Singapore</i>	
<i>Qiyun Wang, Nanyang Technological University, Singapore</i>	

This chapter starts with an introduction of mobile learning and provides some statistics on mobile users in china. Then the authors define m-learning based on mobile devices, the context of learning experiences and learning environments, and the context of e-learning. The chapter presents for educational policies and initiatives and telecommunications policies and reforms in China. It also discusses the challenges in adopting m-learning such as illiteracy, poor infrastructure, digital divide, and political/social climate. The chapter details m-learning projects in Chinese universities and companies. The chapter ends with conclusion and future research directions and challenges.

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<i>Susan Smith Nash, AAPG (American Association of Petroleum Geologists) & University of Oklahoma, USA</i>	

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Mobile Technologies and Rich Media: Expanding Tertiary Education Opportunities in Developing Countries 103

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Belinda Tynan, The University of New England, Australia
Andrew Berriman, The University of New England, Australia
Deborah Vale, The University of New England, Australia
Richard Caladine, The University of Wollongong, Australia

This chapter details for mobile technologies and rich media and the authors claim that m-technology and rich media can enable greater opportunities for situated and personal learning in both real and virtual higher education contexts in developing countries. The chapter provides some statistics on mobile phone usage in developing countries. The chapter discusses factors influencing adoption of mobile technologies such as infrastructure, affordability, and government policy. The chapter also discusses the key Issues relating to use of mobile technologies and rich media and considerations for tertiary education in developing countries. Then the chapter moves into discussing the implications for m-learning practice in developing countries and forecasting issues for higher education institutions for adopting mobile technology and Rich Media in m-learning.

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Jesper Schlæger, University of Copenhagen, Denmark

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Chapter 10

Exploring Civil Servant Resistance to M-Government: A Story of Transition and Opportunities in Turkey 134

Ronan de Kervenoael, Sabanci University, Turkey & Aston University, UK
Mark Palmer, Aston University, UK
N. Meltem Cakici, Gediz University, Turkey

This chapter introduces for civil servant resistance to m-government in Turkey. The authors provide a detailed background and definition of m-government in general and in Turkey in particular. The chapter presents for empirical study and data analysis. The authors presents for important results and different concepts of resistance to m-government in Turkey such as functional resistance, ideological resistance, market driven resistance and geographic resistance.

Section 3

M- Technology: Economic and Social Effects

Section three provides the readers with some economic and social effects of m-technology. It consists of six chapters. It starts with Chapter 11 and ends with Chapter 16. Chapter 11 presents for the connection between mobile telephony and economic growth in developing economies. Chapter 12 explores mobile phone usage while driving with empirical study on Mini-bus and taxi drivers' experiences in Istanbul, Turkey. Chapter 13 demonstrates to perception and attitude on mobile technology in the Gulf countries with case study from UAE. Chapter 14 presents for BlogWall system as it promotes social communication through mobile technology in Sri Lanka. While Chapter 15 presents the role of information communication technologies within the field of communication for social change, Chapter 16 confirms the health hazards of mobile information communication technologies.

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<i>Heli Virta, Lappeenranta University of Technology, Finland</i>	
<i>Kaisu Puumalainen, Lappeenranta University of Technology, Finland</i>	
<i>Anni Tuppuraa, Lappeenranta University of Technology, Finland</i>	

In this chapter, the authors assess how mobile phone penetration impacts on economic growth in developing economies. They present for a good literature review, then their model specification, dataset, and method of estimation. They demonstrate their results using the GMM technique. The chapter ends with conclusion and ideas for future research.

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<i>Ronan de Kervenoael, Sabanci University, Turkey & Aston University, UK</i>	
<i>Canan Devletkusu, Dogus University, Turkey</i>	

The chapter starts with an introduction of how dominant dangerous behaviour in the absence of an enforced legal framework is often described as becoming routine practice for many mobile phone users. The authors point out how advanced motorisation affects road traffic safety mechanisms in Turkey. The authors present for a detailed literature review on the topic under study and then the methodology used in their study. The chapter discusses the main results and then presents for conclusion and implications of the study.

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<i>Khaled A. Sabry, Hamdan Bin Mohammed e-University, UAE</i>	
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<i>Khalid W. Alrawi, Al-Ain University, UAE</i>	

This chapter introduces of mobile phone technology and its effect on attitudes and perceptions of mobile users in Gulf countries. Then the authors explore the advancements of mobile technology and the gulf region. The authors present for research objectives and methodology and then the survey results in UAE. Then the chapter ends with discussion and future work.

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BlogWall: Promoting Social Communication through Mobile Technology in Sri Lanka 205

Adrian David Cheok, National University of Singapore, Singapore

Owen Noel Newton Fernando, National University of Singapore, Singapore

Nimesha Ranasinghe, National University of Singapore, Singapore

Kening Zhu, National University of Singapore, Singapore

Chamari Edirisinghe, National University of Singapore, Singapore

This chapter starts with an introduction of Mobile Technology and its social effects. The authors then discuss Mobile culture in developing countries. The authors also discuss mobile culture and Poetry culture in Sri Lanka. They introduce the Blogwall system. The authors then presents for the user evaluation and acceptance of BlogWall. The chapter also discusses the results of the user evaluation and ends with a discussion and conclusion.

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Jan Servaes, University of Massachusetts, USA

The chapter starts with summarizing the field of communication for development and social change addressing development paradigms, communication paradigms and research priorities. The author moves to detail information and communication technologies for development and social change focusing on technology and culture, technology transfer and consequences for policymaking. Then the author discusses ICTs and the millennium development goals. The chapter ends with conclusion.

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Sohayla M. Attalla, Mansoura University, Egypt

The chapter discusses how mobile phones affect health through radio frequency. The chapter starts with what RF energy is and how it can affect the body. The chapter points out health hazards of cell phone base stations and neurobehavioral deficits. The author discusses the health hazards of cell phone base stations and human head. The author points out some hazards such as thermal effects, cancer, and audiovestibular functions. The author also discusses the effects of cell phone stations on parotid gland, metallic implants in the body, chemical and hormonal, Blood Brain Barrier, Genotoxic effects,

Sleep and EEG effects and pregnancy. The author extends his analysis to the effect of mobile phones on children.

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Preface

Now more than ever, the mobile technology field is growing with emerging research and new discoveries that expand to all walks of life. Mobile technology may have its greatest impact in the developing world, because it brings telephony to districts that had never been reached before. With the introduction of third generation mobile network services and the convergence of mobile and traditional internet services, Mobile will be one of the key enablers for achieving competitive advantages in developing countries.

Titled *Mobile Information Communication Technologies Adoption in Developing Countries*, the target audience of this book will be composed of researchers and professionals working in the field of mobile information and communication technology, investors, health care organizations, telecommuters, international traders and businessmen, students and their families, governments, bank managers, and economy as a whole.

The book contains three sections:

- Section One: M-technology and communications,
- Section Two: M-technology applications and,
- Section Three: M-technology: Economic and social effects

Section one **M-Technology and Communications** contains four chapters, first chapter entitled *The Critical Mass of Wireless Communications: Differences between Developing and Developed Economies*, by Kaisu Puumalainen, Lauri Frank, Sanna Sundqvist, and Anni Tuppuru. It identifies and analyzes the timing and level of critical mass in the development of market penetration for wireless communications. The findings suggest considerable differences between developing and developed countries. The second chapter entitled *The Competitive Growth Pattern of Mobile Telecommunications in Korea*, by Moon-Soo Kim and Sungjoo Lee. Through the empirical study on Korean mobile market, the authors investigate not only the effects on demand diffusion patterns by the competition between technologies and operators, but also strategic implications for the service providers and the policy-makers.

The third chapter entitled *Mobile Information Communication Technologies and Construction Project Management – Indian Scenario: Case Study* by Vanita Ahuja. This chapter presents a case study of mobile communications adoption at a major construction project in India and further discusses the factors leading to sustainable mobile communication adoption by construction project teams. The fourth chapter entitled “*Requirements Engineering in the ICT4D Domain*” by Kristina Pitula, Daniel Sinnig and Thiruvengadam Radhakrishnan. The authors propose a requirements management process especially suited for ICT4D projects. The process supports both bottoms-up and top-down development.

Section two **M-Technology Applications** contains six chapters. The first chapter entitled *In Defence of Mobile Technologies: Exploring the Socio-Technological Dimensions of M-Learning* by Ayse Kok, The aim of this chapter is to improve understanding of the expanding use of mobile phones for the delivery of the learning experience in developing countries. The second chapter entitled *Mobile Learning in China*, by Yuqin Yang and Qiyun Wang. In this chapter; the authors present an overview of the development of m-learning in China, including the construction of m-learning infrastructure, and research projects conducted by universities and companies.

The third chapter entitled *Blended Mobile Learning in Developing Nations and Environments with Variable Access: Three Cases* by Susan Smith Nash. The author presents an overview of the experience of implementing mobile technology solutions in developing nations in conditions of limited Internet access, challenging logistics, and informal learning settings. The fourth chapter entitled *Mobile Technologies and Rich Media-Expanding Tertiary Education Opportunities in Developing Countries* by Trish Andrews, Robyn Smyth, Belinda Tynan, Andrew Berriman, Deborah Vale and Richard Caladine. This chapter focuses on the emerging possibilities and issues arising from the rapid adoption of mobile technologies for learning in tertiary and higher education contexts in developing countries. In particular, it explores the implications for developing nations of the rapid proliferation of mobile device.

The fifth chapter entitled *The Role of M-Government in Western China Development*, by Jesper Schlæger. This chapter describes the content of ideas, institutions, and technologies of m-government to understand how fitting these levels, has led to such an improvement in governance. The sixth chapters entitled *Exploring Civil Servant Resistance to M-Government: A Story of Transition and Opportunities in Turkey*, by Ronan de Kervenoael, Mark Palmer, and N. Meltem Cakici. Drawing on the resistance and mobility literature, this chapter investigates how civil servants' behaviours, in an emerging country technological environment, through their everyday practice, react and resist the influence of m-government transition.

Section three **M-Technology: Economic and Social Effects** contains six chapters. The first chapter entitled *Mobile Telephony and Economic Growth in Developing Economies*, by Heli Virta, Kaisu Puumalainen, and Anni Tuppuru. The chapter investigates the influence of mobile phone penetration on economic growth in developing economies. The results suggest that extensive mobile cellular network coverage facilitates economic development in developing countries. The second chapter entitled *Understanding Mobile Phone Usage While Driving: Mini-Bus and Taxi Drivers' Experiences in Istanbul* by Ronan de Kervenoael and Canan Devletkusu. This chapter claims that dominant dangerous behavior in the absence of enforced legal framework is being deployed and has become routine for many m-users. This chapter adopts a qualitative case study approach (20 cases) to examine the public transport drivers' motives, logic and legitimacy processes.

The third chapter entitled *Mobile Technology and the Gulf Society: Perception and Attitude*, by Khaled Sabry, Ahmed Al-Nakeeb, and Khalid Alrawi. This chapter reviews and explores mobile technology growth in the Gulf region with particular focus on the use of mobile phones in the UAE. It further explores, through a snapshot survey, people's perception, attitude, and possible implications of the technology on their behavior. The fourth chapter entitled *BlogWall: Promoting Social Communication through Mobile Technology in Sri Lanka*, by Adrian David Cheok, Owen Noel Newton Fernando, Nimesha Ranasinghe, Kening Zhu, and Chamari Edirisinghe. Taking into account the speedy progress of the mobile technology, especially the SMS, the evolution of the Sri Lankan way of living the authors explore the possibility to use mobile technology, especially SMS (Short Message Service), to promote social interactivity in Sri Lankan community using Blogwall system.

The fifth chapter entitled *The Role of Information Communication Technologies Within the Field of Communication for Social Change*, by Jan Servaes. The author indicates that there is a lot of talk about the ‘newness’ of mobile and wireless information and communication technologies (ICTs) these days. What is so ‘new’ about them? And in what way will they solve the still unresolved problems of poverty, inequality and information divides in the world? This chapter takes a bird’s eye perspective and presents a number of observations regarding the role of ICTs within the field of Communication for Development and Social Change (CDSC). The last chapter entitled *Health Hazards of Mobile Information Communication Technologies* by Sohayla Attalla. The author states that in this age, it is very difficult not to have technology. But with technology, come certain hazard Inhabitants living nearby mobile phone base stations are at risk for developing neuropsychiatric problems and some changes in the performance of neurobehavioral functions either by facilitation or inhibition. Therefore, revision of standard guidelines for public exposure to RER from mobile phone base station antennas and using NBTB for regular assessment and early detection of biological effects among inhabitants around the stations are recommended.

The diverse coverage of mobile information communication technologies adoption in developing countries in this book will contribute to a better understanding of all topics, research, and discoveries in this developing, significant field of study. Furthermore, the contributions included in this book will be fuelling the research initiatives in emerging fields. We hope that you will find the discussion about present day reality and future challenges of mobile information communication technologies adoption in developing countries as useful as we hope it to be.

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Section 1

M-Technology and Communications

Chapter 1

The Critical Mass of Wireless Communications: Differences between Developing and Developed Economies

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ABSTRACT

The aim of this chapter is to identify and analyze the timing and level of critical mass in the development of market penetration for wireless communications. The authors assume that critical mass is fulfilled at the point when the acceleration of the diffusion process is at its maximum. In practice, this point is determined by estimating the diffusion function and calculating the second derivative with respect to time. The diffusion of mobile subscription is modelled using the Bass diffusion model. The penetration levels and points of time of critical mass of 209 countries or areas of the world are identified and subsequently subjected to regression analysis against population and economic characteristics. The findings suggest considerable differences between developing and developed countries.

INTRODUCTION

During the last two decades mobile telephone technology has diffused all over the world. In addition to the drastic impact it has exercised on

the habits and styles of everyday communication, it has had a noticeable impact on business and entrepreneurship. Diffusion of telecommunications is desirable since by decreasing the costs of transactions and speeding up the propagation and dissemination of knowledge it exerts a posi-

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