
# INTEGRATED HEALTH INFORMATION SYSTEMS FRAMEWORK IN POST NATAL CARE FOR MODERN AND TRADITIONAL MALAY MEDICINE

RAJA RINA BINTI RAJA IKRAM

DOCTOR OF PHILOSOPHY

2017


## Faculty of Information and Communication Technology

# INTEGRATED HEALTH INFORMATION SYSTEMS FRAMEWORK IN POST NATAL CARE FOR MODERN AND TRADITIONAL MALAY MEDICINE

**Raja Rina binti Raja Ikram**

**Doctor of Philosophy**

**2017**

# INTEGRATED HEALTH INFORMATION SYSTEMS FRAMEWORK IN POST NATAL CARE FOR MODERN AND TRADITIONAL MALAY MEDICINE

**RAJA RINA BINTI RAJA IKRAM**

**A thesis submitted**
**in fulfillment of the requirements for the degree of Doctor of Philosophy**

**Faculty of Information and Communication Technology**

**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**2017**

## DECLARATION

I hereby declare that this thesis entitled "Integrated Health Information Systems Framework in Post Natal Care for Modern and Traditional Malay Medicine" is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degrees.

Signature : ……..

Name : Raja Rina bt Raja Ikram

Date : ……

**APPROVAL**

I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in terms of scope and quality for the award of Doctor of Philosophy.

Signature : ……

Supervisor Name : Prof. Dr Mohd Khanapi Abd Ghani

Date : ----------

## DEDICATION

To my beloved family who has encouraged me from day one, particularly my husband, Yasser Ariff who has assisted and provided me with a strong support system and environment to conduct my research and complete my thesis writing. Thank you for the encouragement and patience. My children, Zahratul Husna, Muhammad Ammar and Nur Izzah who has endured me during this period. Also I would like to thank my supervisors, particularly Prof. Dr. Mohd Khanapi bin Abd Ghani, BIOCORE team members and lecturers, laboratory friends who have together supported each other throughout this period. I will always appreciate the friendship and guidance received.

## ABSTRACT

The overall aim of this research is to produce an integrated health information systems framework for Traditional Malay Medicine (TMM) and modern medicine in the field of postnatal care. A qualitative study based on grounded theory was conducted via healthcare experts in the field of modern medicine, Traditional Malay Medicine, and information technology (IT) subject matter experts. This research examined health information systems applications in modern and traditional medicine systems, provide an overview of TMM services in Malaysia and critically analyse the existing electronic health records structures and interoperability standards available. A conceptual framework was initially proposed from the literature review and analysis of interviews of the current framework. This research also investigated the critical data attributes required for Traditional Malay Medicine in postnatal care. A set of critical data attributes was developed and proposed from the analysis of results of the structured interviews. An information model was then developed from the set of critical data attributes. A common TMM data attributes in postnatal care may assist in making the proposed framework more flexible and interoperable, particularly when applied with relevant healthcare interoperability standards. The conceptual framework was then validated via healthcare practitioners and IT industry experts. A prototype system of electronic health record was also examined by the respondents to validate the proposed conceptual framework via exploratory prototyping. Consequently, the validation findings was analysed and new themes that emerged from the findings was highlighted to be included in the revised framework. A revised integrated health information systems framework proposed included health record information, interoperability standards, training, support, awareness, separation of authority, accreditation, regulation and enforcement, and adoption incentives. This research may significantly contribute to four main audiences – software developers, healthcare providers, Malay medicine practitioners, and Malay confinement users. Malay women who are the main users of postnatal treatment shall benefit from information availability to compare services delivered by providers. Healthcare providers shall benefit from the standardization of information exchange with other healthcare providers. Software developers may use this study to assist them in developing healthcare related applications in the postnatal domain, particularly in the design of a generic and extensible information model.

## ABSTRAK

*Penyelidikan ini bertujuan untuk menghasilkan suatu rangka kerja penyepaduan sistem maklumat perubatan yang telah disahsahihkan untuk perubatan Melayu tradisional dan perubatan moden sewaktu penjagaan semasa tempoh pantang. Suatu kajian kualitatif telah dijalankan dan melibatkan pakar dalam bidang perubatan moden, tradisional Melayu dan teknologi maklumat. Penyelidikan ini telah mengenalpasti rangka kerja teknologi maklumat kesihatan yang sesuai dalam perubatan tradisional dan moden, mengemukakan suatu analisa terhadap perkhidmatan perubatan tradisional Melayu di Malaysia, menganalisa secara kritikal struktur rekod perubatan kesihatan elektronik dan piawaian saling beroperasi yang sedia ada. Suatu konsep rangka kerja telah dicadangkan melalui kajian literatur dan analisa melalui temubual pakar dalam bidang perubatan terhadap rangka kerja yang sedia ada. Penyelidikan ini juga akan mengenalpasti data-data kritikal dalam perubatan tradisional Melayu untuk penjagaan sewaktu berpantang. Suatu dataset umum telah dihasilkan dan dicadangkan daripada analisa hasil temubual. Suatu model maklumat dirangka dari set data kritikal yang dihasilkan. Suatu set data umum dalam bidang penjagaan selepas bersalin boleh membantu menghasilkan rangka kerja yang lebih fleksibel dan saling beroperasi. Rangka kerja yang dicadangkan kemudiannya disahsahihkan melalui temubual menggunakan pakar-pakar kesihatan dan teknologi maklumat. Suatu sistem prototaip rekod kesihatan elektronik juga telah dianalisa oleh pakar-pakar yang terlibat melalui kaedah prototaip eksploratori. Keputusan akhir dari latihan pengesahsahihan ini telah dianalisa dan tema atau topik baru yang timbul dikenalpasti untuk dimasukkan dalam rangka kerja yang disemak. Akhirnya, suatu rangka kerja penyepaduan sistem maklumat kesihatan yang disemak dicadangkan termasuk maklumat kesihatan, piawaian operasi, latihan, sokongan, kesedaran, proses penyepaduan, pemisahan kuasa, akreditasi, peraturan and penguatkuasaan, dan insentif penggunaan. Para pesakit juga akan mendapat manfaat melalui kebolehsediaan maklumat untuk membandingkan perkhidmatan yang disediakan oleh pusat kesihatan yang berbeza. Pusat-pusat kesihatan akan mendapat manfaat melalui pemiawaian pertukaran maklumat dengan pusat kesihatan lain. Rangka kerja ini juga dijangka akan membantu pembangunan perisian ketika dalam fasa pembangunan perisian, terutamanya sewaktu merangka model maklumat yang generik dan mudah diperluas.*

**ACKNOWLEDGEMENTS**

I would like to thank my husband, mother and children who has supported me throughout my study duration. Thanks also to my supervisors who has guided me throughout my PhD journey. I would like to also thank friends who have supported and provided ideas on improving my research. I would also like to thank UTeM for providing financial assistance in this research under the Fellowship Scheme. Finally, I would like to thank all who was directly or indirectly involved in this research.

## TABLE OF CONTENTS

## LIST OF TABLES

## LIST OF FIGURES

## LIST OF APPENDICES