

# Mapping E-banking Models to New Technologies

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## Abstract

Banks operates in a dynamic environment, with a continuous pressure from customers, and stakeholders. As well as set of challenges from banks environments and technological advancements. To determine technological solutions for banks operations and processes, an analysis to the literature were conducted depending on several e-banking models. Where, prior researches show the different requirement for e-banking, which include e-banking requirements; to be determined from the banking models, and then; customer requirements, which includes several operations that meets customer changing capabilities. The current study, proposed a model for e-banking, which is composed of five main domains, mainly; bank functional and non-functional requirements, customer functional and non-functional requirements, bank technological capabilities, customers technological capabilities, and suppliers technological capabilities. And then, matches e-banking systems to latest technologies. Where, two types of bidirectional fit take place; first, the requirements bidirectional fit to supplier's technological capabilities, and second, the requirements bidirectional fit to banks and customers capabilities.

**Keywords:** E-Banking; Banking models; E-Banking technologies; E-Banking success; Banking functionalities

## Introduction

Financial institutions are facing significant pressure to make their operations and processes more efficient and effective. Meanwhile, banks play a crucial role among these institutions, therefore; banks are required to provide solutions, and to cope with the variable changes in the economy, technology, and business and financial laws. Traditional banking models are no longer sustainable, and unable to meet the changing needs of customers [1]. Where, the shift towards e-banking produces many challenges. KPMG [2] report those challenges in four main areas, mainly, regulations and regulators, economic environment, changing customers, and the march of technology. Where, those challenges implies that banking sector have to operate in a dynamic environment in which information systems plays a vital role. Therefore, modern banking has tendency of dynamic evolution, adapting its business to valuable changes occurring in the global marketplace. Milan et al. [3] suggests that banks require new philosophy, new strategies, new structures, and new banking models based on new technologies can provide sustainability to banking system. To achieve that; banks are required to map its business models and strategies with the latest technologies, in order to compete well in the marketplace, and satisfy its customers. Meanwhile, empirical results about this type of mapping are inconsistent; because prior researches didn't take all aspects of e-banking as a whole, but focuses on some aspects of e-banking such as models, or technology, or management, and so forth. Therefore, the main objective of this study is to provide further insight into e-banking, the latest technologies, and then find out e-banking requirements that enable banks to cope the dynamic evolutions in its environments.

## Background and Literature Review

### E-banking

The review by Oyewole et al. [4] to the study of Eglund et al. [5] suggested that; e-banking or internet banking is the employment of a remote delivery channel in performing banking services. Angelakopoulos and Mihiotis [6] indicate that; e banking covers a wide spectrum of banking transactions, which the customer can perform electronically without the need to visit a brick-and-mortar branch. According to this broad definition a lot of services and technologies constitute what is known as e-banking. Rusu and Shen [7] added that; the Internet has been used to support many traditional banking

services, such as managing an account and transferring funds among different accounts. It also enables some new services, such as electronic bill payments and online investment. Where; Devi [8] suggested that the ranges of services provided by the e-banking are: internet banking, electronic transfer fund (ETF), electronic clearing services (ECS), telebanking, mobile banking, electronic data interchange (EDI), automated teller machine (ATM) and so on. Milan et al. [3] added that a new banks model were emerged, this type of banks is called virtual banks; which have a business model that provides online services with a lower operating costs.

The reported statistics in the past few years show that the online banking grows up rapidly. Statista [9] shows that 423.5 million people accessed online banking sites in 2012 from internet audience, i.e. 28.7% of the internet audience worldwide accessed online banking. Where, 45% in internet audience accessed online banking in North America, 37.8% from Europe, 25.1% from Latin America, 22% from Asia, and 8.8% from the Middle East and Africa. In 2013, Pew Research Center reported that 51% of U.S. adults, or 61% of internet users accessed online banking, meanwhile, in Europe the percentage reaches 43%. Eurostate [10] statistics show that 45% of the European internet users accessed the online banking. Factbrowser [11] shows that online users willing to conduct online banking are 46% from Asia Pacific, 45% from Africa and the Middle East, and 36% from Latin America.

The interest with e-banking came from the tremendous amount of benefits from the services covered when using such systems. Salehi and Alipour [12] classified those benefits from several viewpoints, bank's point of view, customers' point of view, economical benefits, and society perspective. From the banks' view point; the benefits are: better branding and better responsiveness to the market, enjoying a better brand image, and offering a perfect opportunity for maximizing profits. From the customers' point of view, the benefits are: increased

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**Received** July 22, 2015; **Accepted** August 17, 2015; **Published** August 19, 2015

**Citation:** Ismail M Romi (2015) Mapping E-banking Models to New Technologies. J Internet Bank Commer 20: 112. doi:[10.4172/2165-7866.1000112](https://doi.org/10.4172/2165-7866.1000112)

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comfort and timesaving, quick and continuous access to information, better cash management, and providing faster, easier and more reliable services. Meanwhile, the economic benefits are lower operational costs of banks, potentially lower margins, and expand reach through self-service. From society perspective e-banking business makes access to finance from banks attractive. E- Finance offers the following attractive benefits for society: ease of use, lower costs of financing, convenience, timesaving's, and operational efficiency.

**E-banking business models**

Romi [13] reviewed the definition of business model in the literature, and find out that a business model is architecture of a business for creating value that incorporates the business strategy and its alignment with information technology that produces value to stakeholders. Table 1 shows the definitions provided by Laudon and Traver [14] to the components of a business model. Milan et al. [3], determined a set of factors that affect the development of e-banking; which are developing

Business Model Components	Question to ask
Value proposition	Why should the customer buy from the firm?
Revenue model	How will the firm earn money?
Market Opportunity	What marketplace does the firm intend to serve and what is its size?
Competitive Environment	Who else occupies the firm's intended marketplace?
Competitive Advantage	What special advantages does the firm bring to the marketplace?
Market Strategy	How does the firm plan to promote its products or services to attract its target audience?
Organizational Development	What types of organizational structures within the firm are necessary to carry out the business plan?
Management Team	What kind of backgrounds should the firm's leaders have?

Table 1: Business model components [14].

information systems using Internet and Web technologies that is suitable for financial transactions, conducting financial transactions digitally, developing business models depending on knowledge and new technologies, enabling financial business systems to operate globally, implementing ISO standards which concerned with safety and information protection.

KPMG [2] argues that banks needs new business models that enables banks to reduce costs, cope with complex value chain, standardized data requirements, and delivers distinctive customer service. KPGM [2] shows that some banks start to implement the horizontally-integrated model; which uses business process that cross functional areas in the bank to provide common services, rather than products, thus the model operates by dividing the value chain into a particular parts across the whole product.

Accenture [1] suggest three business models for banking and called them the next generation banking models. Those models are intelligent multichannel model, socially engaging model, and financial/non-financial digital ecosystem model. Where banks have to consider these models when defining their own models. Accenture provides the definitions and key components Table 2 to each of the suggested models, besides the definition and components of the traditional banking which they called it the "do the basics right" bank model-model 4 in Table 2. Accenture [1] adds that; the selection from the specified models depends on bank potential capabilities, and suggests the capabilities matrix to measure bank capabilities.

**E-banking technological features**

E-banking and e-commerce formulated as the use of Internet, the Web, and other features to conduct transactions electronically. Therefore, the required features for e-commerce can be settled to e-banking. Researchers [14,15] found out the features of e-commerce technology. Those features include ubiquity; which refers to the availability everywhere, and at any time, global reach; which refers

Model	Definition	Key Components
1. Intelligent Multichannel Bank	Engaging with customers on their financial needs effectively. <ul style="list-style-type: none"> <li>• Integrated multichannel architecture, powered by analytics.</li> <li>• Advanced digital advisory.</li> <li>• Need-based offerings optimized by channels.</li> </ul>	<ul style="list-style-type: none"> <li>• Advanced multichannel integration focusing on digital channels and an integrated architecture.</li> <li>• Pervasive analytics based on effective customer data collection, micro-segmentation and predictive modeling to determine the most effective basket of products.</li> <li>• Real-time interactions management that can increase conversion rates from inbound and outbound contacts.</li> <li>• Advanced advisory services leveraging digital channels and personal analytics.</li> <li>• Product offerings and related pricing schemes based on micro-segments and optimized by channel.</li> </ul>
2. Socially Engaging Bank	Interacting with customer to increase customer intimacy. <ul style="list-style-type: none"> <li>• Customer engagement.</li> <li>• Leverage influencers.</li> <li>• Co-creation based on increased customer intimacy.</li> </ul>	<ul style="list-style-type: none"> <li>• Social media monitoring to identify opportunities to engage customers, mitigate risks and promptly react to issues</li> <li>• Social digital marketing building on clustering to enable the bank to better defines the best content for individual customer profiles and attracts them.</li> <li>• Social CRM enriching customer data with social media data, thus facilitating more effective propositions.</li> </ul>
3. Financial/Non-Financial Digital Ecosystem Bank	An ecosystem selling financial and non-financial services, leveraging in particular the power of mobile technology. <ul style="list-style-type: none"> <li>• Bank with an extended proposition (financial and non-financial).</li> <li>• M-payment services</li> </ul>	<ul style="list-style-type: none"> <li>• Mobile payments based on Near Field Communication (NFC) or mobile wallet, that enhances bank competitiveness in the payment arena and helps retain existing customers</li> <li>• Enriched propositions through mobile commerce focused on financial and non-financial offerings, mobile marketing, m-loyalty and m-analytics</li> <li>• Alliances and partnerships with non-banking operators and creation of related content.</li> </ul>
4. The "do the basics right" Bank	<ul style="list-style-type: none"> <li>• Optimized branch network and contact center.</li> <li>• Enhanced digital channels.</li> <li>• Need-based offerings and consistent sales behaviors.</li> <li>• Basic multichannel integration.</li> </ul>	<ul style="list-style-type: none"> <li>• Branch network optimization (number and size of branches), reviewing network architecture (i.e. hub and spoke model)</li> <li>• Basic multichannel integration, alignment of channels and integrated governance processes for real-time banking</li> <li>• Proactive and reactive management interaction based on customer needs</li> <li>• Operational customer segmentation driven by a needs-based offering structure</li> <li>• Sales force effectiveness powered by consistent sales behaviors and tools</li> <li>• Simple and clear communication with customers</li> <li>• Performance management (new customer-oriented metrics) and tailored compensation schemes.</li> </ul>

Table 2: Key components of Accenture models [1].

to the ability of e-banking technology to permit transactions to cross cultural and national boundaries, universal standards; which refers to the technical standards of the Internet, richness is the complexity and content of a message, interactivity; which refers to conducting online dialogues with the consumer, information Density; which refers to the total amount and quality of information available to all consumers, and stakeholders, personalization/and Customization; this component refers to allowing personalized messages to be delivered to consumers, and social technology; which refers to using content generation, distribution, and supporting social networks [14,15].

To achieve those requirements, Laudon and Traver [14] suggests that implementing e-banking requires the banking transactions to be conducted everywhere, at all times, and cross cultural national boundaries taking into consideration global banking and internet standards. In addition to the ability of technology to handle with customer dialogues and messages; which may include all types of presentations, video, audio, and so forth. Laudon and Traver [14] adds that; the used technology must have the ability to handle with huge amount of data in all time including peak time using scalability, and handle with the changes of the delivered message based on a user's preferences.

KPMG [2] provides a clear image of the cross-cultural banking. Where, any proposed model must take into consideration the decentralized and fragmented structure, cutting cost, and using complex IT architecture. Therefore, IT architecture must be capable to operate in a dynamic environment, taking into consideration to operate using service oriented architecture (SOA) principles, standardization and subdivide value chain activities, reporting requirements [2].

**E-banking success factors**

E-banking can be classified as an information system; which consists of computer hardware, software, databases, procedures, and users. Researchers classified information systems success factors, and hence, e-banking success factors as a set of dimensions and aspects that produce the net benefits of information system. Those dimensions include the e-banking system quality, the quality of the produced information, and the quality of the services provided by e-banking, e-banking use, user satisfaction, and net benefits produced from using e-banking [16-20]. Romi [21], tests (Figure 1) the impact of information systems quality, the quality of the produced information, the quality of the services provided by the information systems on the stakeholders requirements, mainly; information system use, information systems user satisfaction and net benefits in the financial institutions, and find out that system quality, and service quality explains 78.2% of the variance in system use, the service quality, and information quality explains 77.2% of the variance in user satisfaction, and the system use, and user satisfaction explains 54.9% of the variance in the net benefits. Therefore, the model (Figure 1) provides a good explanation of information systems success,

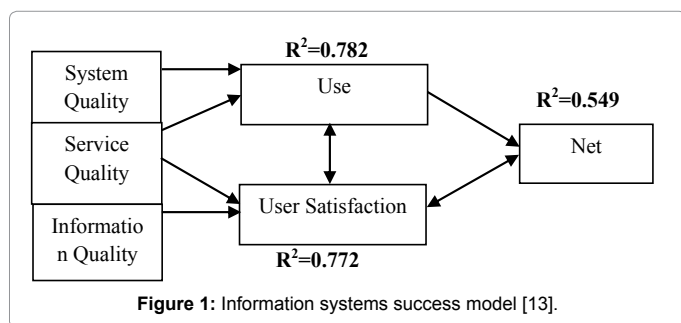


Figure 1: Information systems success model [13].

Success Factor	Definition	Factors Constructs
System Quality	Defined as a set of constructs related to information system that determines the quality of the systems.	System reliability, easy to learn, ease of use, user preemptive, flexibility, and integration with another systems,
Information Quality	The degree to which information presents the required benefits.	Availability, timeliness, relevancy, accuracy, appropriateness, completeness, concise representation, interpretability.
Service Quality	A set of characteristics related to services submitted by information systems to customers.	Services reliability, assurance, empathy, and security.

Table 3: E-banking success factors [13,17].

and thus e-banking success. These results implies that e-banking success depends on many factors, mainly, systems quality, service quality, and information quality. Table 3 provides the definition of Delone and Mclean [17] to these factors, and the constructs of each factor, which are tested by Romi [13].

**E-banking requirements and features**

The literature provides answers to some questions that are essential to use the best technology in banking operation “e-banking”. Meanwhile there are many challenges that have to be considered while implementing this type of banking. Those challenges are reported by KPMG [2], which includes the efforts by regulators to produce a new regulations to avoid new banking crises (regulations and regulators), economic environment; where banks are required to operate in the reduced economy growth and any other expected economic situation, changing customers behavior towards banks; where they are more warily and less trust to banks, and the changing technology; where banks are required to upgrade their information systems to cope with the complicated and rapid changes in technology. Addressing those challenges requires an insight analysis to all aspects of banking processes and operations, as well as the banking environment. Where, the literature provides an analysis to some aspects to e-banking requirements. Accenture [1] suggested three models (Table 2) that can be implemented in banking operations depending on bank capabilities. Where, the key components of the predefined models provide the functionalities of banks. Meanwhile, the study of Rusu and Shen [7], and Devi [8] provides banking functions that are required by customers, such as managing accounts, electronic bill payments, online investment, internet banking, electronic transfer fund (ETF), electronic clearing services (ECS), telebanking, mobile banking, electronic data interchange (EDI), automated teller machine (ATM) and so on. Meanwhile, e-commerce technological features; are determined by Laudon and Traver [14] and Shafiyah et al. [15]; which include global reach, ubiquity, richness, interactivity, personalization/ and customization, information density, universal standards, and social technology. Depending on the success factors provided by Delone and Mclean [17], and tested by Romi [13] in the financial institutions, E-banking success factors include three main constructs (Table 3), mainly; e-banking system quality, the quality of the produced information, the quality of the services provided by e-banking. The provided analysis shows that; even if banks achieve all given requirements, the challenges still need more investigation and analysis. This is consistent with the results of Milan et al [3], which argues that; banks require new philosophy, new strategies, new structures, and new banking models based on new technologies can provide sustainability to banking system.

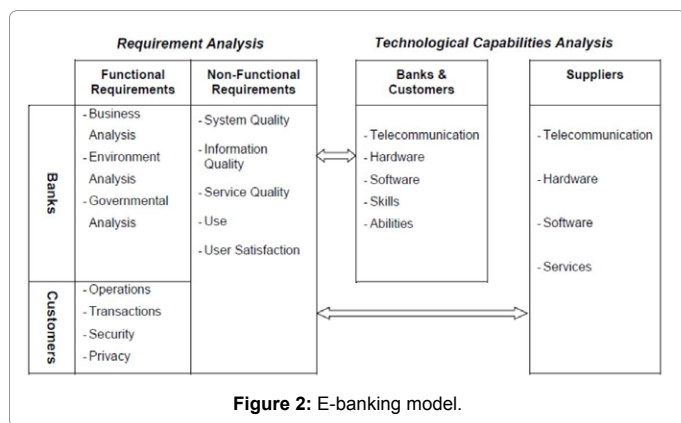


Figure 2: E-banking model.

## Mapping E-Banking to New Technologies

Figure 2 presents a proposed model for e-banking. Where the model is composed of five main domains, mainly; bank functional and non-functional requirements, customer functional and non-functional requirements, bank technological capabilities, customers technological capabilities, and suppliers technological capabilities.

### The e-banking model based on five key domains

**Banks requirements:** Determining banks requirements requires an insight analysis to business, environment, and regulations.

#### a. Business analysis

This phase includes analyzing banks scope, vision, mission, strategy, policies, procedures, programs, daily operations, synergies, core competences, and all aspects of banks daily work. To achieve the best in this step, analysts have to take into consideration the suggested banking models in the literature [1,2].

#### b. Environmental analysis

Analyzing the stakeholders, who have direct or indirect impact on banking, in order to determine alliances, economical situations, and so forth.

#### c. Governmental analysis

This phase includes analyzing governmental and international laws and standards related to financial operations.

**Customer requirements:** Identifying the target customers (individual, business corporations, and governmental) who will use e-banking, and their characteristics. Then determining customer's goals in the form of functional and non-functional requirements.

#### a. Functional requirements

This type of requirements, incorporate all required operations and transactions that the customer needs from banks.

#### b. Non-functional requirements

Non-functional requirements, affect customer satisfaction. Therefore, an analysis to these requirements must be conducted. In general, common non-functional requirements can be considered that have a direct or indirect impact on customers acceptance to e-banking. The information systems success model (Figure 1) presents the main dimension of the user acceptance to an information system, and hence, to e-banking, which includes; system quality, information quality, service quality, use, and user satisfaction.

**Banks technological resources and capabilities:** Information technology (IT) can be defined as all sources of technology, which is used to create, store, disseminate, exchange, and use information, which includes hardware, software, and telecommunications. Meanwhile, IT capabilities include the skills and abilities of IT-workforce, which includes technical skills, management skills, and relationship skills [22]. In this phase, an analysis must be conducted to all technological resource available at banks, and then analyzing the available capabilities.

**Customers technological resource and capabilities:** The information technology resources available to customers; which includes hardware, software, and telecommunications. The customer capabilities include the skills and abilities of customer to use e banking. In this phase, a survey, and analysis must be performed to intended customers, and then analyzing the available capabilities of customers.

**Information technology supplies:** An Information technology supply is the market, where, banks can collect IT requirements and services. This phase includes analyzing the available hardware, software, and telecommunications in the market.

### Requirements Bidirectional Fit to Technological Capabilities

To develop an e-banking system that matches between banks and customer's capabilities that matches the latest technologies, two type of bidirectional fit take place. First, the requirements bidirectional fit to supplier's technological capabilities. Second; the requirements bidirectional fit to banks and customers Capabilities.

### Requirements bidirectional fit to suppliers technological capabilities

Achieving this type of bidirectional fit requires developers to analyze the latest technologies in the market, and then analyze banks and customers requirements as if they use this latest technology. This is an essential step that enables banks to keep up to date with technology. In case the current requirements are less than latest technology capabilities, developers can take into consideration the current requirements, and leave the remaining requirements for future work as a plan.

### Requirements bidirectional fit to banks and customers capabilities

Prior researches find out that the successful system is the one that accepted by customers. Therefore, developers have to match between bank and customers functional and non-functional requirements from one side, and match between banks and customers capabilities from the other side. After that, a match must be conducted between the requirements and actual capabilities.

## Conclusion and Recommendations

This study reviews the literature that is concerned with e-banking requirements, and then conducted an analysis to the available requirements. This can be summarized in:

- E-banking requirements, which can be determined from the banking models, mainly; intelligent multichannel bank, socially engaging bank, financial/non-financial digital ecosystem bank, and the do the basics right" bank.
- Customer requirements, which includes managing accounts, electronic bill payments, online investment, internet banking, electronic transfer fund (ETF), electronic clearing services

(ECS), telebanking, mobile banking, electronic data interchange (EDI), automated teller machine (ATM) and so on.

- c. E-banking features to be considered during the implementation of e-banking, which include global reach, ubiquity, richness, interactivity, personalization/and customization, information density, universal standards, and social technology.
- d. E-banking success factors, which includes e-banking system quality, the quality of the produced information, the quality of the services provided by e-banking.
- e. The results show that prior researches focused on some aspects of e-banking; some of these researches works on banking requirements, others' works on technology, meanwhile; the rest works on customer requirements.
- f. The current study, proposed a model for e-banking, which is composed of five main domains, mainly; bank functional and non-functional requirements, customer functional and non-functional requirements, bank technological capabilities, customers technological capabilities, and suppliers technological capabilities. And then, matches e-banking systems to latest technologies. Where, two types of bidirectional fit take place; first, the requirements bidirectional fit to supplier's technological capabilities, and second, the requirements bidirectional fit to banks and customers Capabilities.

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Citation: Ismail M Romi (2015) Mapping E-banking Models to New Technologies. J Internet Bank Commer 20: 112. doi:10.4172/2165-7866.1000112

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