

# An Investigation of Benefits Affecting SOA Adoption in e-Banking

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**Abstract**—Banking is a leading industry in the development of e-business and e-banking grows rapidly due to the numerous potential benefits associated with it. E-banking brings up unique types of challenges and requires innovative integration solutions as Service Oriented Architecture (SOA). Integration is one of the most important challenges for e-banking success and many issues related to this area remain unexplored. In addressing integration issues, SOA has emerged and adopted by many banks. Nevertheless, numerous banks fail to achieve the benefits from SOA adoption for various reasons. Literature suggests that one of the reasons is attributed to the lack of understanding benefits associated with successful SOA adoption. For this reason, the absence of a methodological framework that would explain benefits affecting SOA adoption in e-banking forms an important research problem that requires deeper investigation. This paper attempts to fill in this literature void by (a) identifying and analyzing e-banking benefits, (b) identifying and analyzing SOA benefits, (c) proposing a conceptual framework, (d) testing this conceptual framework in a large European Bank and (e) revising this conceptual framework by incorporating new findings. Such a conceptual framework of benefits affecting SOA adoption in e-banking is essential for banks to make right and robust decisions, realizing benefits associated with SOA adoption in e-banking.

**Index Terms**—Benefits, e-banking, integration, service oriented architecture (SOA).

## I. INTRODUCTION

The rise of Internet and e-business use, along with improved technology and security, are the core reasons for penetration of e-banking. By 2011, 2.3 billion people were online and the percentage of individuals using the Internet continues to grow worldwide. In developed countries 70% of the total households had Internet access by 2011. Total mobile-cellular subscriptions reached almost 6 billion by end 2011, corresponding to a global penetration of 86% [1]. Internet and smart phone users are important target groups and banks seek for secure, advanced integrated IT infrastructures to provide efficient e-banking services to them.

E-banking services have been adopted and used by the majority of banks for numerous potential benefits associated with it. Currently, the one third of Europeans uses e-banking with estimates predicting an average adoption rate of 60% in the EU by 2020. This indicates that e-banking is an interesting fast growing area. In addition, international organizations highlight the importance of e-banking matters,

publishing surveys which underline the potential of e-banking on greater financial access [2], [3].

Service Oriented Architecture (SOA) is another key issue of high importance [4]-[10]. Banks continue to face integration problems and SOA is a promising solution. SOA improves efficiency and reduces operating costs by promoting a faster flow of information throughout banks. Furthermore, SOA optimizes the business processes and adds corporate business value. However, many banks fail to achieve the benefits from integration efforts in e-banking for various reasons [11] and organizations are confused over how to adopt SOA successfully [7]. One of the primary reasons why organizations fail to achieve successful SOA adoption is attributed to a lack of understanding benefits related to SOA adoption [9], [10], [12]-[16]. For this reason, the absence of a methodological framework that would explain benefits affecting the adoption of SOA in e-banking forms an important research problem that requires deeper investigation. Before adopting SOA, there is a need for banks to identify and analyse benefits associated with SOA adoption in e-banking.

This paper focuses on key issues like: (a) e-banking benefits and (b) SOA benefits in e-banking in order to identify and analyse benefits affecting the adoption of SOA in e-banking and it is organized as follows. The next two sections provide a review and critical analysis of the normative literature. Section II-A introduces e-banking benefits and the importance of e-banking and Section II-B SOA benefits. Then, Section III presents a conceptual framework that illustrates possible benefits that might impact SOA adoption in e-banking. Research methodology is outlined in Section IV. In Section V we present a case study in a large European Bank and key lessons that can be learnt from practice. Conclusions are drawn in Section VI.

## II. LITERATURE REVIEW

To situate the current study and to provide context related to benefits affecting SOA adoption in e-banking we review the normative literature. Literature review is conducted through an extensive search on books, journals, conference proceedings and working papers published after 2005 using libraries and database search engines like AISel, IEEE Xplore, ProQuest, Science Direct, Google Books and Google Scholar. In a first step we use keywords like: “Integration in e-banking”, “SOA adoption in e-banking” and “Benefits of SOA adoption in e-banking” and no matches are found for the criteria specified. We request for related literature to SOA adoption in e-banking via AIS world mailing list without any success.

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For that reason, we use keywords like: “e-banking” and “SOA adoption” to investigate this area and to identify and select from a large amount of hits 134 literatures for deeper investigation and analysis. A review with a procedure outlined by Webster & Watson [13] downsize literature to 71 e-banking or SOA literatures, used in this paper to describe, summarize, evaluate and clarify benefits affecting the adoption of SOA in e-banking.

A. E-Banking Benefits

E-banking spreads rapidly all over the globe. According to a recent research, one third of Europeans uses e-banking with estimates predicting an average adoption rate of 60% in the EU by 2020 [2]. Northern European countries are at the top with high adoption rates till 83%. Germany, France, and UK constitute a second cluster with rates between 43 to 53%. USA has an e-banking adoption rate of 45% (Table I). Investments by banks in secure-transaction technologies and robust IT practices make e-banking more reliable [8]-[11].

TABLE I: E-BANKING ADOPTION (SOURCE: DEUTSCHE BANK RESEARCH 2010)

Country	E-Banking Adoption, % of all individuals (2010)	Country	E-Banking Adoption, % of all individuals (2010)
NORWAY	83%	LITHUANIA	37%
ICELAND	77%	IRELAND	34%
NETHERLANDS	77%	SLOVAKIA	33%
FINLAND	76%	SLOVENIA	29%
SWEDEN	75%	SPAIN	27%
DENMARK	71%	POLAND	25%
ESTONIA	65%	CZECH REPUBLIC	23%
LUXEMBOURG	54%	CROATIA	20%
FRANCE	53%	HUNGARY	19%
BELGIUM	51%	PORTUGAL	19%
LATVIA	47%	ITALY	18%
UNITED KINGDOM	45%	GREECE	6%
USA	45%	ROMANIA	3%
GERMANY	43%	BULGARIA	2%
AUSTRIA	38%		

The main reason behind e-banking success is the various benefits that e-banking provides to: (a) customers, (b) banks and (c) other enterprises. Customers are significantly positive affected by e-banking as e-banking is convenient. It allows customers to perform transactions, pay bills and check balances 24 hours a day, 7 days a week. E-banking allows banks to operate 24 hours per day and banks are always accessible from any: (a) PC, (b) Laptop, (c) Tablet, (d) Smart Phone and (e) Television.

Technology makes it convenient for the customer to access to a large amount of services by simply logging in. E-banking offers to customers a wide range of services on a real time basis such as: (a) information on accounts (balances & statements), (b) credit cards information and payment, (c) fund transfers, (d) payment of bills, (e) share trading and information on the stock exchange transactions and (f) standing orders. Furthermore, e-banking services include financial planning capabilities, functional budgeting and forecasting tools, loan calculators, investment analysis tools

and equity trading platforms which are available as applications on the bank's website. In addition, most banks provide online tax forms and tax preparation [18]-[21].

TABLE II: E-BANKING BENEFITS

E-banking benefits	Description	Reference
Transaction speed	Online bank sites execute and confirm transactions quicker as Branches and ATMs.	Shah <i>et al.</i> , (2009).
Flexibility	Personal accounts can be accessed at any time day or night, regardless of a banks opening hours, as well as the inconvenience of public holidays and festive periods. Balances can be checked online, funds can be transferred, direct debits and standing orders can be set up and overdrafts can be amended.	Ellatif <i>et al.</i> , (2008), Shah <i>et al.</i> , (2009), Barclays (2012), Bank of America (2012), Hoehle (2009), Sherah Kurnia <i>et al.</i> , (2008).
Better control	Most banks offer a seamless and consolidated interface to customers for managing their debt and credit accounts, mortgages, investment portfolio and other financial assets.	Shah <i>et al.</i> , (2009), Barclays (2012), Bank of America (2012), Ellatif <i>et al.</i> , (2008), Hoehle (2009), Sherah Kurnia <i>et al.</i> , (2008).
Time	Time saved from traveling to bank branches for conducting banking transactions and other key banking activities can be used productively for other pursuits.	Sherah Kurnia <i>et al.</i> , (2008), National Bank of Greece (2012), Ellatif <i>et al.</i> , (2008), Hoehle (2009).
Low interest rates	As online banks are cheaper to run than high street branches, savings can be passed directly to the customer.	Hua <i>et al.</i> , (2008), Shah <i>et al.</i> , (2009), Barclays (2012), Bank of America (2012), Hoehle (2009).
Green banking	Green banking is a practice of protecting the natural environment. Paperless e-banking keep paper out of landfills and also cut energy and wood consumption, greenhouse effect, gas emissions and toxic air pollutants.	HSBC (2012).
Effectiveness and reduced cost for banks	A face-to-face transaction with a teller costs banks considerably more for labor and paper than an online transaction. Furthermore, e-banking reduces costs by decreasing lobby traffic, customer phone calls and the need to print and mail paper statements.	Ellatif <i>et al.</i> , (2008), Shah <i>et al.</i> , (2009), Hua <i>et al.</i> , (2008), Hoehle (2009).
Effectiveness and reduced cost for other enterprises	Enterprises have the same benefits like customers but with a greater impact. They make a large amount of payments to employees, vendors, insurance funds and bill pay.	Deutsche Bank Research (2007).

Over the Internet, transactions are typically performed and executed at a faster rate as branches and ATM's. E-banking is also stress free as customers have the ability to handle several bank accounts from one site and e-banking never closes unlike traditional branches. Cost savings comes from reducing customers' visits to the banks and lower transaction costs. Especially for elderly and ill people e-banking services improve their life by releasing precious time, decreasing the bureaucracy, eliminating visits to the banks and spending time in queues. To encourage e-banking, banks often offer higher rates on deposits, lower rates on loans, lower fees and lower penalties on early withdrawal of fixed deposits [22].

Nevertheless, e-banking implies multiple benefits to the banks. The growth of e-banking help banks in controlling their overheads and operating cost. For instance, a face-to-face transaction with a teller costs banks considerably more for labor and paper than an online transaction and e-banking reduces costs by decreasing lobby traffic, customer phone calls and the need to print and mail paper statements. Many tasks are fully automated resulting in greater efficiency, better time usage and enhanced control. E-banking help banks in accurate documentation of records and transactions. E-banking utilization reduces banking errors. Automation of financial activities ensures payments are made on time and may prevent errors caused by keyboard slips or user error. E-banking eliminates errors due to poor handwriting or mistaken information [21].

Apart from banks, other enterprises realized the significant advantages provided by e-banking services. The majority of enterprises (72%) across the 27 European Union Members States manage part or all of their financial tasks online [2]. Enterprises have the same benefits like customers but with a greater impact. They make a large amount of payments to employees, vendors, insurance funds and bill pay.

In addition, there are numerous benefits for the society. Due to the pressures of population and technology the biophysical environment is being degraded. This has been recognized and green banking could be a practice of protecting the environment. Paperless e-banking keep paper out of landfills and also cut energy and wood consumption, greenhouse effect, gas emissions and toxic air pollutants. Finally, e-banking electronically controlled and thoroughly monitored environment discourage many illegal and illegitimate practices associated with banking like money laundering, frauds and embezzlements.

These significant e-banking benefits lead banks to improve and develop new e-banking services and channels. E-banking brings up unique types of challenges and requires innovative solutions. The integration of heterogeneous, autonomous and distributed data sources is an essential and hard issue in e-banking. Banks seek for secure and efficient ways to integrate data, applications, systems and e-banking channels. In addressing integration issues, Service Oriented Architecture is adopted by many organizations including banks for successful, integration. The role of SOA is investigated in Section II-B.

### B. SOA Benefits in e-Banking

Investments by banks in secure-transaction technologies and robust IT practices make e-banking more reliable [8]-[11]. Banks look into advanced information systems,

development tools, methods and techniques to improve their business processes and services. New integrated systems, which are designed to improve efficiency and reduce operational costs, offer transparent processing for all commercial banking operations through an integrated working environment and a solid security framework. As shown in Table III organizations invest a large amount in IT to provide fast and efficient services to their customers.

TABLE III: WORLDWIDE IT SPENDING (SOURCE: GARTNER GROUP 2012)

IT Spending	2011 Spending	2011 Growth (%)	2012 Spending	2012 Growth (%)
Computing Hardware	404	7.6	424	5.1
Enterprise Software	268	9.6	285	6.4
IT Services	848	6.9	874	3.1
Telecom Equipment	444	7.7	475	6.9
Telecom Services	1,701	6.1	1,740	2.3
<b>Total</b>	<b>3,664 (trillion)</b>	<b>6.9 (trillion)</b>	<b>3,798 (trillion)</b>	<b>3.7 (trillion)</b>

Specifically banks are large IT investors and therefore an interesting research area. Bank IT spending across North America, Europe, and Asia-Pacific grow to US\$173.3 billion in 2012 [23]. Banks adopt Information Technology solutions and attempt to deploy integrated IT architecture, to reduce technical complexity and offer scalable and easily manageable environments. For that reason, banks attempt to combine SOA in e-banking.

The adoption of SOA in e-banking might lead to faster replies to end-clients, human-error elimination and finally lower costs. E-banking has to provide user-friendly banking operations but at the same time e-banking has to keep the highest level of security and confidentiality for all participants. To achieve that banks turn to SOA.

SOA services have the following basic features: (a) loosely coupled (b) discoverable, (c) contract based-with service level agreement, (d) reusable and (e) abstracted. These characteristics as presented in Table IV provide advantages to the organizations using them, such as: SOA (a) enables/improves business agility, (b) simplifies integration, (c) achieves higher return on investment, (d) enables IT agility and alignments with business, (e) reduces cost, (f) increases scalability and availability, (g) improves reusability of services, (h) increases financial benefits, (i) reduces time to market and (j) reduces system downtime [24], [6], [10]-[12].

As mentioned before, Service Oriented Architecture is a main concept to achieve reusability and reduce high cost and risk [5], [15]. An interesting opportunity for applying SOA in e-banking is to increase reuse and standardization provided by those functions that are used across systems, departments, and channels. SOA provides an environment in which functions can be standardized and used across systems and processes [24]. Another benefit of SOA is an increase in business agility to respond to future changes by adapting and restructuring existing services, as well creating new ones, to fit in the existing IT architecture and to address changed business requirements [25]. One more important aspect is SOA governance [26], [15]. The purpose of SOA governance

is to align software governance and business governance including coordinating software development, acquisition, and reuse across domains to achieve maximum agility and economies of scale/scope. In other words, SOA Governance can be characterized as an extension of IT governance that focuses on managing services and the related service-level abstractions [27], [28].

TABLE IV: SOA BENEFITS

SOA Benefits	Description	Reference
<b>Financial Benefits</b>	Increased revenues and / or decreased expenses from increase in services uptime, reduction in time to market for new services, savings in total service management costs.	Lawler <i>et al.</i> , (2008), HP. (2008).
<b>Agility, Efficiency and Flexibility of Processes</b>	New processes can quickly and efficiently be created from the existing set of services.	Rosen <i>et al.</i> , (2008), Gold-Bernstein and Ruh, (2004), Marks (2008), Papazoglou (2007).
<b>IT Agility – Business Alignment</b>	Use services and combination of them to create new products for rapid response to business.	Graves (2009), Baskerville <i>et al.</i> , (2010), Luthria & Rabhi (2009), Ignatiadis <i>et al.</i> ,(2008).
<b>Higher Return on Investment</b>	The financial benefits and the definition of reusable business services maximize their IT investments.	Yoon and Carter (2007), Greenbaum (2005).
<b>Reduced Time to Market</b>	SOA lets developers dynamically grow application portfolios more quickly.	Graves (2009), Yoon and Carter (2007), Baskerville <i>et al.</i> , (2010), HP. (2008), Lawler <i>et al.</i> , (2008), Papazoglou (2007).
<b>Reduced Costs</b>	Better controlling of budgets, timelines, and priorities from a central point in the IT organization and service reusability due to lesser need for developing, testing and debugging might provide cost reduction.	Gold-Bernstein and Ruh (2004), Marks (2008), Luthria & Rabhi (2009), Ignatiadis <i>et al.</i> , (2008).
<b>Improved Reusability of Services</b>	Through enhanced reuse of existing IT resources and shared services.	Hau <i>et al.</i> , (2008), Rosen <i>et al.</i> , (2008).
<b>Easier to Integrate Systems</b>	SOA promises to simplify application and data integration by providing universal connectivity to existing systems and data.	Rosen <i>et al.</i> , (2008), Yoon and Carter (2007).
<b>Reduced System Downtime</b>	Measuring service performance and prioritizing threats lead to a reduction in system outages.	Erickson & Siau (2008), HP. (2008).

The SOA benefits showed in Table IV are identified and analyzed through an extensive literature review as more important possible benefits for SOA adoption in e-banking. For that reason, these benefits form the basis of our conceptual framework for SOA adoption in e-banking. This

conceptual model is proposed for investigation in a real e-banking environment and is presented in the next section.

### III. CONCEPTUAL FRAMEWORK OF BENEFITS AFFECTING SOA ADOPTION IN E-BANKING

From literature review we identify and select the more important benefits that might influence SOA adoption in e-banking. These benefits are selected for investigation in a real e-banking environment. We propose that potential benefits of SOA adoption in e-banking are: (a) financial benefits, (b) agility, efficiency and flexibility of processes, (c) IT agility – business alignment, (d) higher return on investment, (e) reduced time to Market, (f) reduced costs, (g) improved reusability of services, (h) easier to integrate systems and (i) reduced system downtime. These benefits are presented and briefly described in Table IV and form the basis of our conceptual framework (Fig. 1). The limited literature on benefits affecting SOA adoption in e-banking and the absence of a methodological framework that would explain these benefits, form an important research problem that requires further study and deeper investigation. In an attempt to bridge this literature void we propose the conceptual framework on benefits affecting SOA adoption in e-banking presented in Fig. 1.

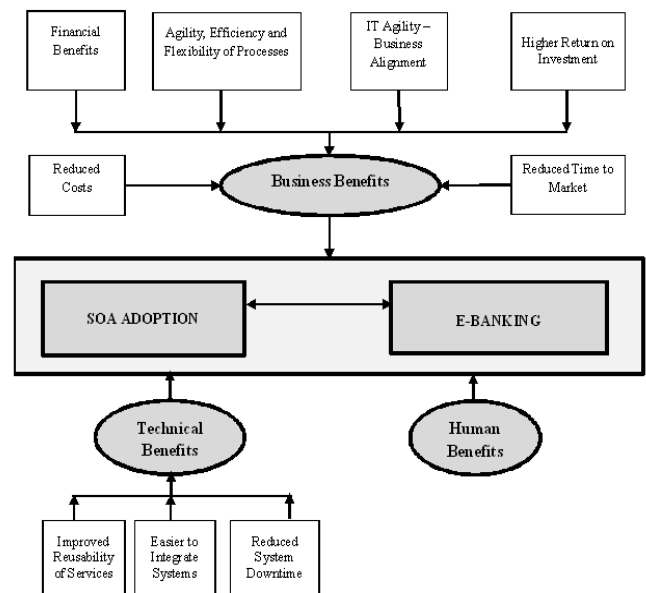


Fig. 1. Proposed conceptual framework for benefits affecting SOA Adoption in e-banking.

The conceptual framework illustrates the relationship between benefits, e-banking and SOA adoption, providing a research framework for examining benefits affecting SOA adoption in e-banking. Our classification forms the framework for the methodology of research presented in this paper. In order to classify these benefits we espouse our taxonomy used in earlier research related to influential factors of SOA adoption [10]. In our understanding this classification can be used in the same manner to investigate benefits of SOA adoption in e-banking. Our classification divides benefits into three different categories: (a) business benefits, (b) technical benefits and (c) human benefits. We add a human benefits category into our framework as: (a) extensive literature review indicates that benefits for human

are crucial in many areas [18] and (b) human related benefits might be important for SOA adoption in e-banking and need to be investigated [10]-[12]. The research methodology we choose to test this conceptual framework is presented in Section IV.

#### IV. RESEARCH METHODOLOGY

In our research an exploratory research approach is used. Exploratory research often relies on secondary research such as reviewing available literature related to SOA, or qualitative approaches such as discussions with bank employees, bank management and more formal approaches through in-depth interviews, focus groups, projective methods, case studies or pilot studies. As SOA remains a relatively new research area [4], [7] the qualitative research method seems to be the appropriate approach to investigate and analyze in depth benefits affecting SOA adoption in e-banking [19]. The main focus in qualitative research is to understand, explain, explore, discover and clarify situations, feelings, perceptions, attitudes, values, beliefs and experiences. Benefits that influence SOA adoption cannot be separated from its organizational, technical and cultural context. Therefore, there is a need for a qualitative research approach that allows understanding the process of SOA adoption and the benefits that influence SOA adoption in e-banking.

In this paper a case study strategy is used to test the proposed framework since it seems more appropriate for the banking sector [6]. A case study offers a 'holistic' view of the processes involved, as well as a realisation of the topic under research [20]. Baskerville *et al.*, [14] use a case study approach to study the strategic value of SOA. In their understanding case studies facilitate multi-perspective analyses that lead to a holistic understanding of cultural systems of action, providing the insight that satisfies exploratory questions. Considerable work on SOA takes the form of case studies to identify SOA success [7]. The need for rich empirical data related to benefits affecting SOA adoption in e-banking indicates that the use of a case study approach is appropriate, since it allows examining in depth processes. An important aspect of a case study is the use of multiple methods to collect data that leads to obtain rich empirical data for this research.

Various data collection methods such as interview, documentation and observation are used in this research. We develop an interview agenda to ensure desired coverage of the areas of enquiry and comparability of information across respondents. Empirical data derived from a case study related to SOA adoption in e-banking are triangulated and then analyzed to draw empirical conclusions. The purpose of triangulation in qualitative research is to increase the credibility and validity of the results. In this research, (a) data triangulation, (b) methodological triangulation and (c) interdisciplinary triangulation are used.

The proposed framework of factors affecting SOA adoption in e-banking is tested through a case study in e-banking. The case study is conducted in a bank that had recently adopted SOA in e-banking. The case organization is a European Bank with more than 1,000 branches and more

than 15,000 employees and a presence in a many European countries. The name and country of the bank is not revealed due to confidentiality restrictions. Thus, we use the name Teubank to refer to the European bank under investigation. We collect applicable documents and records during a period of 3 months and we interviewed 4 professionals who played a key role in a project related to SOA adoption in e-banking. Empirical data and findings are presented in the next Section.

#### V. EMPIRICAL DATA AND FINDINGS

Empirical data revealed from this case study confirm that SOA provides Teubank with robust, resilient IT architecture it needs to grow. SOA achieves speed-to-market and optimizes customer service. Furthermore, it provides a platform to help meet compliance requirements and assure security and integrity of information assets. As stated from a top manager of the Banks IT Division:

*"Our SOA platform enables us to provide customers hosted on different systems in Europe with Web-banking access to their accounts through one unique interface by using one unique user name and password".*

All benefits related to SOA adoption in e-banking, indicated in literature review, were confirmed as significant through the case study analysis. These benefits are: (a) financial benefits (increased revenues and / or decreased expenses from increase in services uptime, reduction in time to market for new services, savings in total service management costs), (b) agility, efficiency and flexibility of processes (new processes can quickly and efficiently be created from the existing set of services), (c) IT agility – business alignment (use services and combination of them to create new products for rapid response to business), (d) higher return on investment (the financial benefits and the definition of reusable business services maximize their IT investments), (e) reduced time to market (SOA lets developers dynamically grow application portfolios more quickly), (f) reduce costs (better controlling of budgets, timelines, and priorities from a central point in the IT organization and service reusability due to lesser need for developing, testing and debugging might provide cost reduction), (g) improved reusability of services (through enhanced reuse of existing IT resources and shared services), (h) easier to integrate systems (SOA simplifies application and data integration by providing universal connectivity to existing systems and data), (i) reduced system downtime (measuring service performance and prioritizing threats lead to a reduction in system outages). According to Teubank when customers use several products with overlapping service parts, they experience the exact same handling in each product offering. Apart from benefits from improved customer service, SOA also helps decrease costs through shared usage and leads to faster project and application implementation. The ability to build applications faster allows Teubank to bring products to market more quickly and to improve their value.

The application and database platform that supported e-banking of Teubank grew antiquated, making it difficult for IT staff to bring new services and products to market. For that

reason, Teubank redesigned the call center to develop a new customer service agent desktop application for managing relevant information provided to customers through e-banking. This desktop application is integrated through SOA with other banks applications. The new call center application based on the Customer Care Framework helps to improve productivity. Employees only have to learn one application. Hence, time for training has decreased considerably. In addition, as all needing tools are in one application, the time employees need to spend with customers on the phone has decreased. With this application the bank now provide effective and quick customer service through only one user interface. Teubank achieve a 10% decrease in average call-handling time.

Customer data is now stored and managed in a centralized, integrated database. Teubank built a business intelligence solution for analyzing logs, transactions, and customer subscription data. This solution has empowered decision makers across the bank to generate their own reports from a more comprehensive set of data on a day-to-day basis and to reduce the time to produce them by 50%. As mentioned by a top manager:

*“A real-time view of the customer not only includes customer data, but it also includes credit rating, risk management, a multiproduct portfolio, hedge management and so on. To create such a view was very difficult hindered by legacy systems, integration issues and costs. SOA creates a real-time customer view that allows banks to offer more personalized e-banking services and to sell services with greater success”.*

SOA gains complete visibility into Teubanks information and eliminates the need to consolidate multiple reports. On a day-to-day basis the bank can now measure all the transactions through all the channels such as: (a) performance, (b) habits and (c) demographic characteristics.

Furthermore, in interpreting the empirical data, it appears that other benefits such: (a) reduced risk of IT initiatives, (b) time and (c) long-term growth are crucial benefits for banks related to SOA adoption in e-banking. These factors were reported by the interviewees and the existence was observed. For that reason, these benefits need to be further investigated. Teubank establishes through SOA a more open and extensible infrastructure, enabling the bank to further pursues the development of new e-banking services for its customers, while fostering easier systems maintenance. As stated by the Project Manager:

*“Even Teubank make huge changes across many business areas, applications and infrastructures the bank is able to reduce the risks by working closely with an experienced vendor. After SOA adoption it is easier for IT to build something new whenever business wants”.*

In addition, after adopting SOA in e-banking the IT team spends less time in a role of reactive support and more time developing applications that let the bank supports internal processes and serves bank customers. Finally, as reported by a senior Manager:

*“Teubank has established a foundation that will successfully support future business needs for many years.*

*That is a main benefit of SOA adoption in e-banking. It is not easy. SOA is a new approach to application development that requires people to work and think more cohesively and collaboratively than before. A framework of factors affecting SOA adoption in e-banking would help banks to make the right decisions.....”*

Empirical data revealed from this case study lead to a revision of our conceptual framework. As shown in Fig. 2 four new benefits are added to framework namely: (a) Reduced Risk of IT Initiatives, (b) Time (c) Long-Term Growth and (d) Staff to our conceptual framework. These benefits were reported and observed as crucial for SOA adoption in e-banking through this case study and need to be further investigated.

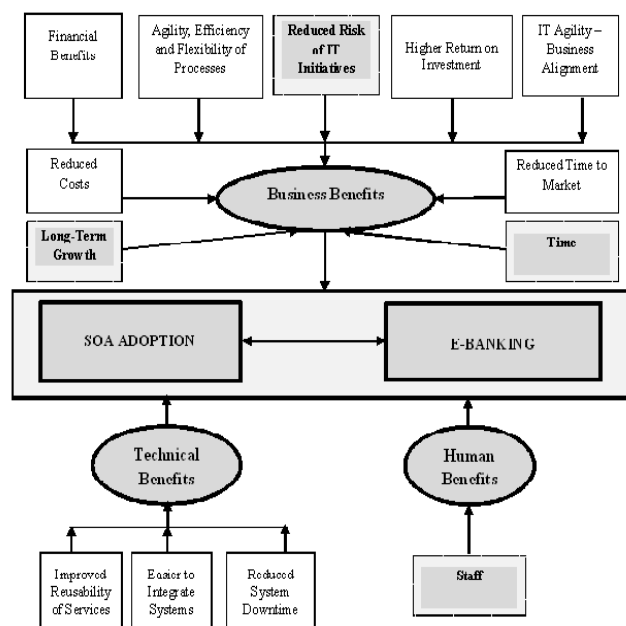


Fig. 2. Revised conceptual framework for benefits affecting SOA adoption in e-banking

## VI. CONCLUSIONS AND FUTURE RESEARCH AGENDA

E-banking spreads rapidly all over the globe and most banks offer multiple e-banking products and services because of the numerous potential benefits associated with it. At the same time, e-banking brings up unique types of challenges related to channel, data, application and system integration. Integration is one of the most crucial factors for e-banking success and banks seek for robust IT practices and secure integration solutions such SOA in order to make e-banking more reliable and popular. However, many banks fail to achieve the benefits from integration efforts in e-banking for various reasons. One of the key reasons is attributed to a lack of understanding benefits related to SOA adoption. Such a framework is essential for banks to make robust decisions related to SOA adoption in e-banking, realizing benefits, barriers, risks, costs and changes associated with it.

In order to investigate this area we analyzed the importance of: (a) e-banking - e-banking benefits and (b) SOA - SOA adoption benefits in e-banking. Critical literature review indicates that there is no completed study related to

benefits affecting SOA adoption in e-banking. For that reason, based on the literature review findings, we identify and select the more important benefits that might influence SOA adoption in e-banking. These benefits are: (a) financial benefits, (b) agility, efficiency and flexibility of processes, (c) IT agility – business alignment, (d) higher return on investment, (e) reduced time to Market, (f) reduced costs, (g) improved reusability of services, (h) easier to integrate systems and (i) reduced system downtime. We propose a conceptual framework based on these benefits for investigation in a real e-banking environment. This conceptual framework is tested through a case study and the main findings are presented in this paper.

The Teubank case confirms the importance of the benefits in our model for successful SOA adoption in e-banking. All the above benefits related to SOA adoption in e-banking were confirmed as significant through the case study analysis. In addition, it confirms that human benefits for staff are crucial and need to be further investigated. The case also reveals other new benefits. In interpreting the empirical data, it appears that benefits such: (a) reduced risk of IT initiatives, (b) time and (c) long-term growth are important benefits for banks related to SOA adoption in e-banking. These benefits were reported by the interviewees and the existence was observed. For that reason, these benefits need to be further investigated. The new significant insights and findings lead to revise our framework and to include these new benefits (Fig. 2). We are planning to test our new conceptual framework again through a new case study in another bank.

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