



**PALGRAVE STUDIES IN DIGITAL BUSINESS
AND ENABLING TECHNOLOGIES**
SERIES EDITORS: THEO LYNN · JOHN G. MOONEY

palgrave▶pivot

Measuring the Business Value of Cloud Computing

Edited by

Theo Lynn · John G. Mooney
Pierangelo Rosati · Grace Fox

 Open Access

palgrave
macmillan

www.dbooks.org

Palgrave Studies in Digital Business & Enabling
Technologies

Series Editors

Theo Lynn

Irish Institute of Digital Business

DCU Business School

Dublin, Ireland

John G. Mooney

Graziadio Business School

Pepperdine University

Malibu, CA, USA

This multi-disciplinary series will provide a comprehensive and coherent account of cloud computing, social media, mobile, big data, and other enabling technologies that are transforming how society operates and how people interact with each other. Each publication in the series will focus on a discrete but critical topic within business and computer science, covering existing research alongside cutting edge ideas. Volumes will be written by field experts on topics such as cloud migration, measuring the business value of the cloud, trust and data protection, fintech, and the Internet of Things. Each book has global reach and is relevant to faculty, researchers and students in digital business and computer science with an interest in the decisions and enabling technologies shaping society.

More information about this series at
<http://www.palgrave.com/gp/series/16004>

Theo Lynn
John G. Mooney
Pierangelo Rosati • Grace Fox
Editors

Measuring the Business Value of Cloud Computing

palgrave
macmillan

Editors

Theo Lynn
Irish Institute of Digital Business
DCU Business School
Dublin, Ireland

John G. Mooney
Graziadio Business School
Pepperdine University
Malibu, CA, USA

Pierangelo Rosati
Irish Institute of Digital Business
DCU Business School
Dublin, Ireland

Grace Fox
Irish Institute of Digital Business
DCU Business School
Dublin, Ireland



ISSN 2662-1282

ISSN 2662-1290 (electronic)

Palgrave Studies in Digital Business & Enabling Technologies

ISBN 978-3-030-43197-6

ISBN 978-3-030-43198-3 (eBook)

<https://doi.org/10.1007/978-3-030-43198-3>

© The Editor(s) (if applicable) and The Author(s) 2020. This book is an open access publication.

Open Access This book is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence and indicate if changes were made.

The images or other third party material in this book are included in the book's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the book's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Palgrave Macmillan imprint is published by the registered company Springer Nature Switzerland AG.

The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

PREFACE

The fourth volume in the Palgrave Studies in *Digital Business & Enabling Technologies* aims to advance knowledge and offer multidisciplinary insight into the area of business value associated with enabling technologies. Specifically, the book seeks to better understand approaches for conceptualising and measuring business value from the implementation of cloud computing technologies. The importance of demonstrating the value achieved from IT investments is long established in the Computer Science (CS) and Information Systems (IS) literature. However, the complexity and convergence of next generation technologies, including cloud computing, presents new challenges and opportunities for demonstrating how IT investments lead to business value. Recent reviews of extant literature highlight the need for multi-disciplinary research which both explores and further develops the conceptualization of value in cloud computing research, and research which investigates how IT value manifests itself across the chain of service provision and in inter-organizational scenarios.

At the heart of business value research is the desire to understand how information technology can improve the performance of an organisation. Due to the multi-disciplinary nature of the business value domain, the extant literature is characterised by a broad range of methodologies including qualitative case studies and quantitative calculations of value, as well as a myriad of different IT artefacts across varying units of analysis from a business process, unit, organisational, inter-organisational, and value chain levels. Traditionally, business value research was concerned with providing a justification for IT investments. Recent advances in information technologies and the advent of so-called third platform technologies (e.g.

mobile, social, Big Data analytics, Internet of Things, and as cloud computing technologies) enable shifts in the distribution of costs over time based on resource allocation as opposed to the large upfront investment required in traditional system implementations such as enterprise resource planning systems (ERP). Furthermore, the flexible and interdependent nature of cloud computing may introduce new intangible benefits. It is thus important to examine the different approaches to measuring the value of cloud computing investments across the various cloud service provision models and deployment models.

In response to the call for multi-disciplinary research, contributors to the book have been drawn from an international group of scholars in IS, CS, and accounting. *Measuring the Business Value of Cloud Computing* reviews the state of the art from these varying perspectives to detail the prevailing techniques for measuring business value for cloud computing across a variety of scenarios and illustrative mini-cases. Chapter 1 begins by laying the foundational justification for measuring business value in the cloud computing context by highlighting the growth in cloud computing expenditure. The introductory chapter reviews the established measures of business value and seeks to determine the relevance of these measures to the cloud computing context. The traditional measurement of IT business value involves the calculation of different metrics including Net Present Value (NPV), Return on Investment (ROI), Payback Period, Internal Rate of Return (IRR), Economic Value Added (EVA), and Total Cost of Ownership (TCO). However, cloud computing introduces new metrics such as resilience, speed of deployment, scalability, and organisational agility, as well as new intangible benefits which make measurement of value more difficult. To overcome this, the authors suggest the potential of assessment approaches such as scoring, value linking, and value acceleration or holistic approaches such as the Business Value Index (BVI) grid. The authors conclude by highlighting the importance of measuring not only the value but the realisation of proposed benefits following the adoption of cloud computing.

Building on the broad foundation laid by Chap. 1, the subsequent two chapters focus on specific cloud provision models. When an organisation is considering the adoption of cloud computing, it is imperative to determine what cloud service model meets the organisation's needs. Chapter 2 focuses on Infrastructure-as-a-Service (IaaS) and Platform-as-a-Service (PaaS) and discusses the suitability of calculating Return on Investment (ROI) as a measurement of value as opposed to the most used measure of

TCO. The chapter details a six step process for calculating ROI which encompasses both costs and benefits. The proposed process is illustrated by calculating ROI in a case study of an IaaS migration project by a global financial services organisation. Moving on from IaaS and PaaS, Chap. 3 focuses on Software-as-a-Service (SaaS), the dominant cloud service provision model. Taking a broader perspective, the chapter focuses on identifying the business model payoffs fostered by SaaS technologies. Adopting a case study approach to compare two large, multi-national incumbent IT service providers leading SaaS provision, the chapter identifies six tangible payoffs categorised as economic, business and transformative payoffs.

Moving on from the perspectives of customers and providers detailed in Chaps. 2 and 3 respectively, it is important to understand the wider cloud computing landscape and the stakeholders that operated or affected by it. The subsequent three chapters adopt broader approaches to exploring the role of value in cloud computing across multiple organisations. Chapter 4 deals with another important player in the cloud landscape namely B2B cloud marketplaces. The chapter focuses on the role of B2B cloud marketplaces within the cloud service brokerage (CSB) landscape. The chapter discusses B2B cloud marketplaces both in terms of the structural level and the functional level detailing the characteristics and benefits of B2B cloud marketplaces such as ease-of-use, ease-of-integration, enhanced security, increased manageability, faster implementation, and cost reduction. Leveraging two mini case studies to represent the two types of B2B cloud marketplaces (business application marketplace and the API marketplace), the chapter details how cloud customers can utilise both marketplaces to derive measurable value.

When considering adopting cloud computing, cloud consumers must first identify their requirements. Chapter 5 details the ten prevailing cloud deployment models including public clouds, private clouds, and federated clouds. Each cloud deployment model is characterised by differing costs and benefits. To aid cloud consumers in differentiating between different cloud deployment models and guide the identification of the appropriate deployment model, Chap. 5 develops and presents a comprehensive cost model which details the pertinent cost factors at play and the underlying economic models. Building upon this discussion, the chapter identifies the potential of federated clouds for overcoming some of the economic challenges and develops a ten-step use case scenario for applying an economic model in cloud federation deployments implemented through three modules of service placement, accounting, and revenue sharing. To round off

the exploration of value in terms of cloud computing, Chap. 6 focuses on the wider digital ecosystem and the role of digital platforms in influencing the value creation structure of ecosystems. Specifically, the chapter reviews the role of power asymmetry in impacting value creation on a digital platform. Using the example of a cloud-based gaming platform, the chapter details the direct and indirect value that network actors create for each other and the end customer.

The final chapter builds upon a recent literature review of the extant knowledge base on measuring the impact of cloud computing investments. While the previous chapters seek to address gaps in our knowledge identified in this review around approaches to measurement, this chapter focuses on emerging paradigms which may impact cloud computing including the heterogeneity, fog and edge computing, and machine learning and artificial intelligence for IT operations (AIOps). The chapter explores how these technological advancements may further complicate the measurement of business value derived from implementation. The chapter highlights a number of research pathways in business value in cloud computing research to guide IS and CS researchers on future avenues of research.

The seven chapters comprising “Measuring the Business Value of Cloud Computing” provide a multidisciplinary perspective on the measurement of business value in the cloud computing context discussing different business value measurement metrics, various cloud service provision models, deployment models, and case studies representing cloud consumers, suppliers, and intermediaries. Cloud computing technology continues to advance in ways that will undoubtedly complicate value measurement. These advances coupled with the dependencies between cloud computing and other advanced technologies such as IoT and Big Data further highlight the need for greater clarity on the definition and appropriate metrics of business value, comprehensive measurement techniques. There is also a need to further untangle the relationships between cloud assets and capabilities, other IS assets and capabilities, and socio-organisation capabilities. To further advance this field of understanding, collaboration between information systems and computer science researchers is both recommended and paramount.

Dublin, Ireland
Malibu, CA
Dublin, Ireland
Dublin, Ireland

Theo Lynn
John G. Mooney
Pierangelo Rosati
Grace Fox

ACKNOWLEDGEMENT

This book was partially funded by the Irish Institute of Digital Business at DCU Business School and by the Irish Centre for Cloud Computing and Commerce, an Enterprise Ireland and IDA funded Technology Centre.