RESEARCH MADE EASY SERIES

Information Systems Theories for Student Researchers and Practitioners

RICHARD BOATENG

INFORMATION SYSTEMS THEORIES FOR STUDENT RESEARCHERS AND PRACTITIONERS

FIRST EDITION

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This comprehensive book delves into diverse information systems (IS) theories, models, and frameworks, providing a profound understanding of their constructs, assumptions, and measurable variables. Through an IS and management perspective, it examines strengths and weaknesses, while addressing criticisms and potential revisions. By uncovering gaps in current theories, the book guides readers in conceptualizing research frameworks to address them. Readers will gain critical skills to evaluate and elucidate IS theories, unravel practical implications, and assess their usefulness to managers. This invaluable resource equips readers with techniques to identify theoretical gaps and lay the groundwork for new studies. Though the theories presented in this book are not exhaustive, they will be of help to researchers, both the experienced ones as well as the budding ones, and most importantly students.

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To My Wife, Daughter and Son
You Mean The World To Me

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Preface and Acknowledgments

You are welcome to Information Systems Theories, First Edition. The book discusses some Information Systems (IS) theories, models and frameworks. More specifically, the book explores the constructs and assumptions, criticisms, revisions, measurable variables of the theories and sample papers of the theories from an IS and management perspective. It also looks at the gaps in the theories that can be explored in future research, as well as the usefulness of the theories to managers.

By becoming familiar with these theories, readers can critically examine and explain IS theories and how they are used. Additionally, it is expected that after reading this book, readers can review literature, identify research gaps and conceptualize frameworks and research designs to address research gaps.

Though the theories presented in this book are not exhaustive, it will be of help to researchers, both the experienced ones as well as the budding ones, and most importantly students. The purpose of this book is not to create a 'one best format', but to offer guidelines in understanding IS theories and how they are used, especially in adopting them for research projects, academic papers and the preparation of long essays, theses and dissertations. Additionally, on completion, readers would have acquired the requisite knowledge and research skills in selecting and applying IS theories to research.

Many people contributed to this book both directly and indirectly, and I would like to thank them for their support and patience. First, my profound gratitude goes to Dr Sheena Lovia Boateng for her editorial advice in conceptualising and writing the book. I also wish to thank my listed contributors for sticking with me for four years to complete this book.

Finally, I thank my Research Made Easy Alumni for their objective criticism, which refined the writing of this book and made it a reality.

Foreword

I am delighted to write this foreword, not only because Richard Boateng is a good friend and colleague, but also because I deeply believe in his valuable contributions to the field of Information Systems and the Digital Society. I am a firm believer that every stage of an academic's journey should be enriched and strengthened not only by their teachings but also by their documented work for future generations. Throughout his long and fruitful career, Richard Boateng has delved into the philosophy and practice of information systems through collaborative discussions and education. He has conceptualized the intellectual foundations of information systems research, elaborated on its distinctive pedagogy, and designed unique teaching models to introduce others to the field. Therefore, this book adds to Richard's numerous contributions, showcasing his passion for making a lasting impact on information systems research.

More specifically, this book focuses on theories and serves as a reliable source of information about the use of information systems theories, as well as the gaps within them that can be explored in future research. It serves as an enthusiastic eye-opener, especially for students and budding researchers, providing insights into various theories used in information systems research. The book also contributes significantly to the existing studies and research in the field, shedding light on the application of information systems theories, some of which are presented here. Additionally, it offers valuable insights into the practical usefulness of these theories for managers. While the book primarily emphasizes information systems theories, it contains valuable information for researchers whose interests extend beyond this field.

In conclusion, Richard Boateng's book on information systems theories not only showcases his expertise and dedication to the field but also serves as a valuable resource for researchers, students, and managers seeking to deepen their understanding and application of these theories.

Dr Joseph Budu
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PART A – Overview of Theory in Research

Chapter 0 : Theory in Research

Objectives

This chapter explains the relevance of theoretical and conceptual frameworks, and theorizing in research work[1].

[1] The chapter is culled from the author's book on Research Made Easy (2018) Published by CreateSpace Independent Publishing ISBN-13: 978-1986449106.-

What is a Theory?

The definition of theory can be taken from different perspectives, depending on the objective of the definition. In terms of its consistent elements or components, a theory can be conceptualized as

"a system of constructs and propositions that conjointly demonstrates a logical and yet systematic and coherent account of a phenomenon bounded by some assumptions and conditions"(Bacharach, 1989).

On the other hand, in terms of its purpose, a theory can also be viewed as a

"coherent set of general propositions used as principles of explanation, understanding and/or prediction of the apparent relationships of certain observed phenomena"(Zikmund, Babin, Carr, & Griffin, 2003). A theory has been empirically tested and verified and can be shown as a schematic diagram, mathematical equation and words.

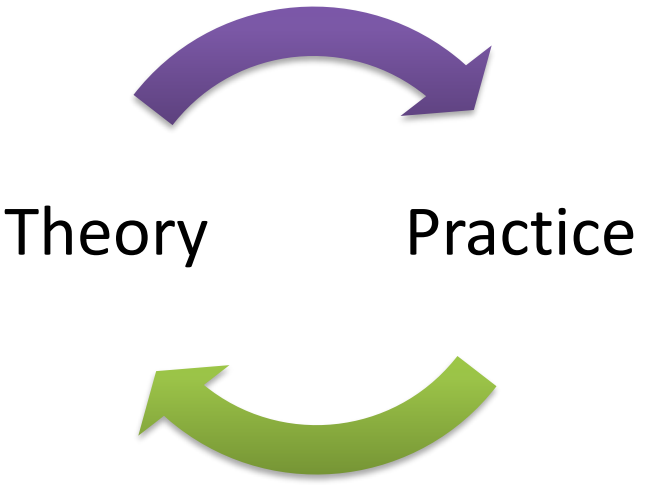
In its essence, a theory presents a way of studying concepts or variables concerning a phenomenon in order to find or investigate the solution for a research problem. A theory also explains or predicts occurrences by outlining the relationships between concepts or variables which underpin a phenomenon. However, to offer explanations or predictions, theories tend to possess certain characteristics. These characteristics, espoused by academics (Bhattacherjee, 2012), include:

- Theory is not data, facts, typologies, taxonomies or empirical findings.

Theories are not an *ad hoc* collection of constructs without relationships; they must have propositions (relationships), explanations, and boundary conditions.

- The explanations offered by theories are nomothetic. Thus, they tend to go beyond explaining single events to offer explanations that are generalizable across situations, events, or people. As such, they are less precise, less complete and tend to focus on patterns of events, behavior or phenomena.
- Theories operate at a conceptual level and stem from logic; however, data and findings operate at the empirical or observational level.

  For a theory to be well understood, there are some foundational premises that need to be set. These are constructs, propositions, logic, and boundary conditions or assumptions (Bhattacherjee,2012). The constructs of a theory define what the theory is about and also explain what concepts are important for understanding a phenomenon. Propositions, on the other hand, are about how these concepts are related to each other. The logic of a theory explains why the concepts are related and the boundary conditions or assumptions probe the "who, when, and where" by bringing out the circumstances under which these concepts and relationships work.


Theory
Practice

Purpose or Goal of Theory

Gregor has identified four primary goals of a theory which can, arguably, be used as a taxonomy for classifying theories (Gregor, 2006).These goals of a theory are briefly outlined as follows:

- **Analysis and description.** The theory provides a description of the phenomenon of interest, analysis of relationships among those constructs, the degree of generalizability in the constructs and relationships, and the boundaries within which relationships and observations hold.
- **Explanation**. The theory provides an explanation of how, why and when things happen, relying on varying views of causality and methods for argumentation. This explanation will usually be intended to promote greater understanding or insights by others into the phenomenon of interest.
- **Prediction**. The theory states what will happen in the future if certain preconditions hold. The degree of certainty in the prediction is expected to be only approximate or probabilistic in research.

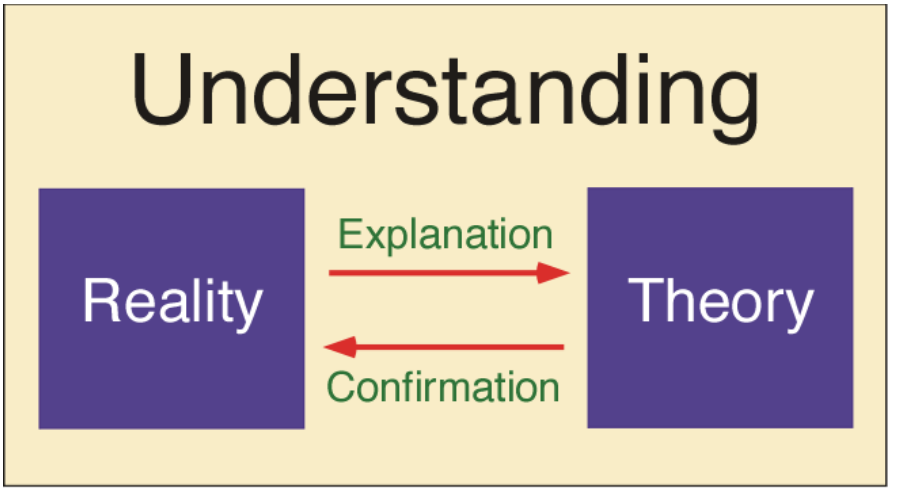
- **Prescription**. A special case of prediction exists where the theory provides a description of the method or structure or both for the construction of an artifact (akin to a recipe). The provision of the recipe implies that the recipe, if acted upon, will cause an artifact of a certain type to come into being.

Apart from informing research and practice, theories also offer many benefits (Bhattacherjee, 2012). First, theories provide the underlying logic of the occurrence of a natural or social phenomenon by explaining what the key drivers are and key

outcomes of the target phenomenon and why, and what underlying processes are responsible for driving that phenomenon.

Second, they aid in sense-making by helping us synthesize prior empirical findings within a theoretical framework and to reconcile contradictory findings by discovering contingent factors influencing the relationship between two constructs in different studies. Third, theories provide guidance for future research by helping identify constructs and relationships that are worthy of further research. Fourth, theories can contribute to cumulative knowledge building by bridging gaps between other theories, and by causing existing theories to be reevaluated in a new light.

However, theories can also have their own share of limitations. As simplified explanations of reality, theories may not always provide adequate explanation of the phenomenon of interest, based on a limited set of constructs and relationships. Theories are designed to be simplified and parsimonious explanations, while the reality may be significantly more complex. Furthermore, theories may impose blinders or limit researchers' "range of vision," causing them to miss out on important concepts that are not defined by the theory (Bhattacherjee, 2012).



Components of a Theory

Constructs

To explain a phenomenon there is the need for a concept or construct. Constructs are **abstract concepts that explain the phenomenon of interest**. They bring out the generalizable properties related to objects, people or events under study. Some constructs consist of a single concept such as age or weight; and others are multi-dimensional, consisting of multiple underlying concepts, such as performance and motivation.

Despite this distinction all constructs must have a clearly spelt out operational definition to specify how the construct will be measured and at what level of analysis it will be applied (individual, group, organizational, industry, national, regional and global). A construct operates at the theoretical level; hence, a variable is used to measure it at the empirical level. *For example*, job performance, as an abstract concept, can be expressed as variable in the form of work samples, absenteeism, and/or production count.

A variable is therefore **a characteristic or attribute of an event or phenomenon under study, that can be measured or observed and that varies among the phenomena being studied (Creswell, 2007)**. It is important for a researcher to understand the differences between operating at the theoretical level and that of the empirical level. At the theoretical level, the researcher is concerned with developing abstract concepts about a phenomenon and what relationships exist between those concepts. This is where theories are built. At the empirical level testing the theoretical concepts and relationships is what is important and this is done to see how well they match with observations of reality. This is to ensure the building of better and more robust theories (Bhattacherjee, 2012).

The constructs are conceived at the theoretical level, while variables are put into use and measured at the empirical (observational) level. The variables at the empirical level are classified as independent, dependent, mediating, or moderating. The independent variables indicate the inputs or causes in the event or phenomenon under investigation, or they are tested to see if they could be the cause. The dependent variable on the other hand represents the output or effect. The dependent variable is tested to see if it is the effect of the independent variable. However, variables that explain a relation or provide a causal link between other variables are known a confounding variable. *For example*, medical care is one of the intervening variables between income and longevity. People with high incomes tend to have better medical care than those with low incomes. Moderating variables influence or moderate the relationship between two variables and thus produce an interaction effect. A moderator may increase the strength of a relationship, decrease the strength of a relationship, or change the direction of a relationship. *For example*,

age is a moderator of the effect of advertising on food preferences if advertising influences food preference in younger children but not in older children (National Research Council, 2006).

Proposition

The second building block of a theory is a proposition. Propositions are the relationships between constructs based on some logic (Bhattacherjee, 2012). Usually they are stated in a form that is declarative in nature and indicate a cause-effect relationship. Propositions are stated at the theoretical level in a similar way as constructs. Since propositions denote relationships between constructs, they can best be tested by probing the measurable variables of the constructs of a particular phenomenon. When the proposition is stated empirically by indicating the relationship between the variables or constructs, then we have what is called a hypothesis.

The difference between a proposition and a hypothesis is seen at the stage or level of formulation or testing. Propositions are formulated at the theoretical level whilst hypotheses are tested at the empirical level.

Logic

When propositions are stated there must be a basis for their justification. To justify the proposition of a theory, logic is needed. This is the third building block of a theory. It acts as the binding force that binds the theoretical constructs together and provides a meaning to the relationships between the constructs. Logic provides the explanations that are the bottom lines of any theory. Without it the propositions are meaningless.

Assumptions

Finally, theories are limited by assumptions. The assumptions control where the theory can be used and where it cannot be used. For a theory to be properly applied or tested, all of its inherent assumptions that form the boundaries of that theory must be properly understood (Bhattacherjee, 2012). Based on the discussions above, what constitutes a theory can be summed up as an interrelated set of constructs or variables which are formed into propositions, or hypotheses, to specify the relationship among variables (Creswell, 2007).

Other authors like, Gregor (2006), have also proposed similar taxonomies for explaining the components of theory. Gregor discusses that there are: **four components,** common to all theories, namely: **means of representation, constructs, statements of relationship** and **scope**; and **three components,** contingent on theory purpose, **causal explanations, testable propositions (hypotheses)** and **prescriptive statements.**

Attributes of a Good Theory

Researchers have proposed a number of characteristics or attributes of a good theory. In this section we will outline a summary of these attributes compiled by the authors, Gregor (2006) and Creswell (2007). The attributes are:

(1) **Logical consistency**: this involves ensuring that the building blocks of a theory (constructs, propositions, boundary conditions, and assumptions) are logically coherent in their relationship with each other. To test

whether a theory is a good one or not, the elements of the theory should not contradict each other (Bhattacherjee, 2012).

(2) **Explanatory power**: when there is a theory about a phenomenon, the theory should be capable of explaining the phenomenon so well that no other existing theory can do it better. This means that theories must possess the overall power of explaining or predicting the behavior of the phenomenon. It is only through this that the theory can be said to be good (Bhattacherjee, 2012).

(3) **Falsifiability**: there should be inherent possibility to refute a theory or prove it to be false. Basically, falsifiability is **the belief that for any theory to have credence, it must be inherently disprovable before it can become accepted as a theory**. Theories are potentially disprovable if empirical data which has been found by researchers does not match with the theoretical constructs or propositions of the theory. There is a distinction between a theory that is falsifiable and that which should be falsified. The two are not the same. The falsifiability of a theory should be based on empirical evidence. When a theory is falsified on this basis, then there is clear evidence to suggest that the theory is not a good one. Bhattacherjee gives an example that, sometimes theories are falsified by their theoretical propositions:

For example, "Tautological statements, such as "a day with high temperatures is a hot day", are not empirically testable because a hot day is defined (and measured) as a day with high temperatures, and hence, such statements cannot be viewed as a theoretical proposition" (Bhattacherjee, 2012, p.30). Thus, what makes a theory a theory is its ability to be tested or examined by empirical data.

(4) **Parsimony**: theories are meant to be very simplified and generalizable explanations of phenomena. This means that if there is a complex phenomenon out there and there is a theory about the phenomenon, the theory must explain the phenomenon and its complexities in a very simple form. The parsimony of a theory is about **how simple the theory is and how it can be generalized to other contexts, settings and phenomena (Bhattacherjee, 2012).** *For example*, the technology acceptance model Davis,(1985) posits that two particular beliefs on the part of users, perceived usefulness and perceived ease-of-use, are of primary relevance for technology acceptance behaviors. The theory espouses that the acceptance level of any technology is fundamentally affected by the user's perception of ease of use and usefulness. This theory leads to testable propositions that can be investigated empirically. The simplicity of the theory makes it applicable to testing the acceptance behavior for a diversity of technologies.

Classification of Theory

Theories can be classified by a number of taxonomies, including the goal and components, degree of theorization, the disciplinary domains, the level of analysis and time. This section of the chapter will discuss the five taxonomies outlined.

General Classification

Grand Theories: Grand theories are broad, encompassing frameworks that seek to explain fundamental aspects of a discipline or field. These theories often provide a comprehensive understanding of complex phenomena and may have a wide-ranging scope. For example, in psychology, Sigmund Freud's psychoanalytic theory explains personality development and mental processes.

Mid-Range Theories: Mid-range theories are more specific and focused than grand theories, targeting a particular area or aspect within a discipline. They provide a narrower explanation of phenomena and often generate testable hypotheses. An example is Albert Bandura's social cognitive theory, which focuses on the reciprocal interaction between behavior, personal factors, and environmental influences in shaping human behavior.

Descriptive Theories: Descriptive theories aim to describe and characterize phenomena or behavior without necessarily explaining why they occur. These theories provide a framework for organizing observations and data, allowing researchers to classify and categorize information. For instance, Tuckman's stages of group development theory describes the various stages that groups go through when working together.

Explanatory Theories: Explanatory theories focus on providing explanations for why and how certain phenomena occur. They seek to identify causal relationships and mechanisms underlying observed patterns or behaviors. An example is Albert Einstein's theory of relativity, which explains the relationship between space, time, and gravity.

Normative Theories: Normative theories are concerned with prescribing and advocating certain principles or norms for guiding behavior or decision-making. These theories often provide guidelines or standards for evaluating actions or outcomes. In ethics, for instance, John Rawls' theory of justice proposes principles for a just and fair society.

Conceptual Frameworks: Conceptual frameworks are theoretical frameworks that outline the concepts, variables, and relationships relevant to a particular research study. They provide a structure for organizing and guiding the research process, helping researchers develop hypotheses and design studies. Conceptual frameworks are commonly used in social sciences and interdisciplinary research.

Further reading for the explanation of theory:

- Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage Publications.
- Neuman, W. L. (2013). *Social Research Methods: Qualitative and Quantitative Approaches.* Pearson.

Further reading for the types of theory:

- Smith, J. K. (2008). *Qualitative Psychology: A Practical Guide to Research Methods*. Sage Publications.
- Flick, U. (2018). *An Introduction to Qualitative Research*. Sage Publications.

Types of Theory by Goal/Purpose

The goals of theory, as discussed earlier, can be combined to formulate five types of theory (Gregor,2006) outlined below (see Fisher, & Buglear, 2010 for examples):

(5) **Analysis** - says what is.
- The theory does not extend beyond analysis and description. No causal relationships among phenomena are specified and no predictions are made.

(6) **Explanation** - says what is, how, why, when, and where.
- The theory provides explanations but does not aim to predict with any precision. There are no testable propositions.

(7) **Prediction** - says what is and what will be.
- The theory provides predictions and has testable propositions but does not have well-developed justificatory causal explanations.

(8) **Explanation and Prediction (EP)** - says what is, how, why, when, where, and what will be.
- Theory provides predictions and has both testable propositions and causal explanations.

(9) **Design and Action** - says how to do something.
- The theory gives explicit prescriptions (*For example* methods, techniques, principles of form and function) for constructing an artifact.

Degree of Theorization

This classification was previously discussed in Chapter 0. A theory, as earlier defined, is a "coherent set of general propositions used as principles of explanation, understanding and/or prediction of the apparent relationships of certain **observed** phenomena" (Zikmund, Babin, Carr, & Griffin, 2003).

Theories have been empirically tested and have gained some degree of acceptance to explain phenomena by the scientific community in a particular research discipline. Conceptual frameworks or approaches, on the other hand, are analytical schemes which simplify reality to make it easier to discuss, analyze or research. They simplify reality by selecting certain phenomena/variables and **suggesting** certain relationships between them (Fisher, & Buglear, 2010). Conceptual approaches are suggestive in nature, and are, arguably, yet to gain sufficient empirical testing to be accepted as theory. Thus, theories and conceptual approaches can be differentiated according to a hierarchy moving from shallower conceptualization to deeper theoretically-based approaches as follows(Heeks, 2006):

(1) **Theoretically-based approaches** which make clear use of an identifiable theory that can be applied or tested.
(2) **Framework-based approaches** that make use of a framework for analysis that is derived from a body of theoretical work.
(3) **Model-based approaches** that are applied, but without reference to a deeper body of knowledge.
(4) **Concept-based approaches** that make use of a defined concept such as 'information poverty', but which is not theoretically grounded.
(5) **Category based approaches** that make use of a prescribed set of factors to carry out analysis.

Level of Analysis

Theories can be classified according to the level of application or analysis. As such they can be:

(1) **Micro-level Theory: Seeks to analyze, explain or predict actions and interactions at the individual level.** However, it may also take the local context in which the

actions and interactions occur into consideration. *For example*, the technology acceptance model tends to explain technology
acceptance at the individual level.

(2) **Meso-level Theory: Seeks to analyze, explain or predict actions and interactions at the meso-level**. These may include theories of organizations, social movements and communities. *For example*, the Resource-Based Theory of the Firm explains how firms compete based on their resources. Other theories may go beyond one firm to examine a collection of firms or an industry.

(3) **Macro-Level Theory: Seeks to analyze, explain or predict actions and interactions at the macro-level**. These theories explain larger aggregates such as social institutions and cultural societies, and whole societies. Examples are the Modernization Theory in development studies and Hofstede's Cultural Dimensions in Management.

Other authors attest to these classifications using different or comparable taxonomies (Neuman, 2011). Reeves, Albert, Kuper and Hodges (2008) classify theories as micro-level, mid-range (local systems; recognition of cultural or contextual variations) and grand theory (universal, societal level theories). The importance of these classifications is for researchers to understand and identify the appropriate theories to address research problems within a specific unit of analysis. *For example*, it may be challenging to use a micro-level theory to analyze actions and interactions at the macro-level.

Disciplinary domains

Researchers tend to develop theories to analyze, explain or predict phenomena in their respective disciplines. Hence, each discipline has theories to study society within the assumptions and beliefs espoused by researchers in that discipline. That said,

researchers can also borrow theories from different disciplines to conduct disciplinary, and interdisciplinary or cross-disciplinary research. *For example*, information systems theories originate from social science and other disciplines. A number of them have been compiled and can be assessed at: http://istheory.byu.edu/.

Theories in Economics and Finance include: the Arbitrage Pricing Theory, Rational Choice Theory, Prospect Theory, Cumulative Prospect Theory, Monte Carlo Option Model, Binomial Options Pricing Model, Gordon Model, International Fisher Effect, Black Model, and Legal Origins Theory. The Arbitrage Pricing Theory, *For example*, addresses the general theory of asset pricing. Read more at: www.tinyurl.com/financetheories

Time

Classifying theories by time refers to **how long the theory has been around,** other words, when was it developed. Thus, some theories may be viewed as mature theories. *For example*, a theory that was first proposed in some period, like 1960s or 1990s, is likely to have been widely applied and tested in different disciplines, revised to make it applicable to different contexts, and perhaps, used as the basis of new theories. Arguably, the Theory of Reasoned-Action can be considered a mature theory. The very popular Technology Acceptance model (TAM) was formulated by Davis (1985) from the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980), as a concise, complete reliable and valid model for predicting user acceptance.

On the other hand, theories that are now gaining acceptance or being tested may be considered as emerging theories. An example is the Process Virtualization Theory which provides constructs to

assess the amenability of 'physical' processes to virtual environments (Overby, 2008).

Classification of Theories Featured in this Book

Category	Theory	Level of Application
Technology Acceptance and Adoption	Diffusion of Innovation Theory Technology Acceptance Model Theory of Planned Behaviour Unified Theory of Acceptance and Use of Technology	Individual
Technology Adoption and Usage Outcomes	Delone and McLeans's IS Success Model Task-Technology Fit Model	Firm Individual
Socio-Technical Approaches	Social Shaping Psychological Ownership and the Individual Appropriation of Technology	Firm
Markets	Lemon Market Theory	Business Environment and Firms
Strategy and Competition	Resource-based Theory Dynamic Capabilities	Firm
Organizational Learning	Absorptive Capacity Theory	Firm
Virtualization	Process Virtualization Theory	Processes of Entities
Impact	Sustainable Livelihoods Framework	Primarily Individual but includes Institutional Effects
Institutional	New Institutional Theory	Institutions
Media	Media Richness Theory	Individual

How are Theories Generated?

Theories are generated through a systematic and iterative process of observation, inquiry, and analysis. The process typically involves the following steps:

Observation: The generation of theories often begins with careful observation of phenomena or patterns in the world. Researchers may identify an interesting phenomenon or an unanswered question that sparks their curiosity. They observe and gather information about the phenomenon, seeking to understand its nature, characteristics, and potential explanations.

Literature Review: Researchers then review existing literature and theories related to the observed phenomenon. They examine previous studies, theoretical frameworks, and empirical evidence to gain insights into existing knowledge and identify gaps or inconsistencies. The literature review helps researchers build upon existing theories and identify areas where new theories can be developed.

Conceptualization: Based on observations and insights from the literature, researchers start to conceptualize and form preliminary ideas or concepts about the phenomenon. They identify key variables, relationships, and underlying mechanisms that may explain the observed patterns. This stage involves brainstorming, conceptual mapping, and theoretical discussions to refine the initial ideas.

Data Collection: Researchers collect empirical data to further explore and test their conceptual ideas. Data collection methods can vary depending on the research approach, such as surveys, interviews, observations, or experiments. The data collected is used to gather evidence and gather additional insights into the phenomenon under investigation.

Analysis: Researchers analyze the collected data using various analytical techniques and approaches. They examine patterns, themes, relationships, and discrepancies within the data. The analysis helps to identify emerging patterns, validate or refine initial conceptual ideas, and generate new insights or hypotheses.

Iteration and Refinement: The process of theory generation is often iterative, involving cycles of data collection, analysis, and theory refinement. Researchers revise and refine their initial ideas based on the findings and feedback from the analysis. They may go back to the literature to compare and contrast their emerging theories with existing ones, seeking further validation and refinement.

Evaluation and Testing: The generated theory is evaluated and tested for its validity, applicability, and generalizability. Researchers may conduct additional studies, seek peer feedback, or engage in academic discourse to further refine and strengthen the theory. The theory may be subject to empirical testing, where predictions derived from the theory are tested using new data or experimental designs.

Publication and Peer Review: Finally, if the theory withstands scrutiny and provides valuable insights, researchers may publish their findings in academic journals or present them at conferences. The theory becomes part of the scholarly discourse and undergoes peer review, which involves evaluation and feedback from experts in the field.

It is important to note that the process of theory generation is not linear or rigid. It is highly flexible and iterative, allowing for adjustments, modifications, and further exploration as new

evidence and insights emerge. Theories are continually refined and expanded as researchers build upon existing knowledge and explore new frontiers of understanding.

Theory and the Research Framework: The Linkages

The research framework outlines the processes to study the variables or concepts concerning phenomena under investigation. It is called a research framework because it frames the research. It gives boundaries to the research by indicating what should be part of the research or not. It also helps the researcher to formulate the research questions. Thus, a researcher needs a research framework to steer research. However, this research framework can be developed purely from theory, and thus, can be called a theoretical framework or it can be developed from a review of literature, concepts and theories to develop a tentative (suggestive) *theory* and thus can be called a conceptual framework.

Research frameworks can, therefore, exist in the form of a theory/theoretical framework or a conceptual framework. The conceptual framework consists of the system of concepts, assumptions, expectations, beliefs, and theories that guide and inform the research (Miles & Huberman, 1994; Robson, 2011). The conceptual framework is a conception or model of what is out there that the research seeks to investigate, and also what is going on with these issues or phenomenon and what is causing it to change in the way that it does. It is therefore a tentative (suggestive) *theory* of the phenomenon that is being investigated. The *theory* is considered 'tentative' at this stage because of its unsettled nature as compared to an existing theory which is

already out there and can be drawn upon to inform the research. The 'tentative' theory in the conceptual framework is a provisionary guide that will inform the rest of the research work or design in terms of refining the goals of the research and developing the right research questions.

Another view of the conceptual framework is to see it as something that the researcher *constructs, and* not something that will be found by the researcher in the literature. It means, therefore, that a lot can be borrowed from elsewhere, and with some coherence this framework can be built by the researcher. However, the researcher cannot do this without paying attention to what theories are already out there and how this can inform the development of the conceptual framework.

Finally, the research framework can form part of the literature review or be an outcome of the literature review (see Davis, 1985). Other authors also separate the research framework from the literature review (see Olivares, 2004). Both approaches are welcome; it is a matter of preference, paper submission requirements and the structure of the research paper.

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Summary

A theory is an organized, coherent, and systematic articulation of a set of issues that are communicated as a meaningful whole. Theories provide complex and comprehensive conceptual understandings of things that cannot be pinned down: how societies work, how organizations operate, and why people interact in certain ways.

In this chapter we explored the relevance of a theory, components of a theory and the classification of theories.

PART B -

COMMON INFORMATION SYSTEMS THEORIES

Chapter 1: Absorptive Capacity Theory

Objectives

This chapter introduces readers to the Absorptive Capacity Theory as used in Information Systems research. The chapter further explains the Assumptions, Constructs, Criticisms to the theory, its Usefulness to Managers, and makes Recommendations on gaps in application of the theory in existing studies that can be explored in further research.

Background

Absorptive capacity (ACAP) has been used significantly in the field of information systems (IS) (Fichman & Kemerer, 1997), strategic management (Lane & Lubatkin, 1998), organizational economics (Glass & Saggi, 1998) and technology management (Schilling, 2002). Cohen and Levinthal (1990) originated ACAP in their seminal paper 'Absorptive Capacity: A New Perspective on Learning and Innovation'. In their paper, they defined ACAP as the ability to identify, assimilate, transform, and apply external knowledge. This is the most commonly used definition of ACAP. Mowery and Oxley (1995) refer to ACAP as the set of skills that deals with the tacit constituent of transferred knowledge and the need to change this imported knowledge. The capacity to learn and solve problems is another definition ascribed to Kim (1997, 1998).

Based on the various definitions, ACAP can be said to be a multidimensional construct that depicts the capacity to value, assimilate and apply knowledge (Cohen & Levinthal, 1990) or an amalgamation of effort and knowledge bases (Kim, 1998; Mowery & Oxley, 1995). Many researchers have applied ACAP in various areas such as mergers, acquisitions, inter-organizational learning, product development and innovation. This indicates the enormous contribution that ACAP has made to firm performance and competitive advantage (Lane et al., 2006). In IS, ACAP has been applied in a wide array of research streams, notably IT innovation (Fichman & Kemerer, 1997), and IT business value (Bhatt & Grover, 2005), IT governance (Sambamurthy & Zmud, 1999) and knowledge management (Alavi & Leidner, 2001).

ACAP is a multidimensional construct as evidenced by the multiplicity of definitions by scholars (e.g., Cohen & Levinthal, 1990; Kim, 1998; Mowery & Oxley, 1995; Zahra & George 2002). ACAP is a function of ***Prior Knowledge*** and the ***Intensity of Effort*** exerted to ***Acquire New Knowledge*** (Cohen & Levinthal, 1990).

Constrict of Absorptive Capacity

These factors interrelate to determine the four constituents of absorptive capacity of organizations namely *Acquisition*, *Assimilation*, *Transformation*, and *Exploitation* of external knowledge (Lane & Lubatkin, 1998; Zahra & George, 2002).

Acquisition is the capacity of a firm to recognise and acquire knowledge generated externally that is vital to the operations of the firm. Intensity, direction and speed are three characteristics of the effort used in knowledge acquisition. The effectiveness of a firm's knowledge acquisition can be determined by the intensity and speed involved. A firm can build the required acquisition capabilities more quickly if greater effort is applied (Kim, 1997). A firm's capacity to achieve this speed has no limits since the shortening of learning cycles cannot be done easily and some resources required for building the capabilities cannot be easily assembled (Clark & Fujimoto, 1991). In obtaining external knowledge by a firm, the direction of knowledge accumulation affects the path the firm follows to acquire that knowledge. To successfully import external technologies, it is necessary for a firm to have different areas of expertise, since intensity, speed and the direction of activities vary in richness and complexity (Rocha, 1999).

Assimilation is the capacity of the firm to analyse, process, interpret and comprehend information from external sources (Szulanski, 1996; Kim, 1997). Discoveries and ideas that a firm cannot easily understand are considered to be out of the reach of a firm's search zone (Rosenkopf & Nerkar, 2001; Cyert & March, 1963). The understanding of knowledge may be delayed where the externally acquired knowledge differ considerably from that used by the firm. The context specific nature of external knowledge often prevents knowledge replication and understanding by outsiders (Szulanski, 1996). In addition, complementary assets that are not available to the firm make understanding difficult when the value knowledge relies on the existence of these assets. Therefore, knowledge assimilation is facilitated by understanding, which permits firms to process and make use of new knowledge internally.

*Transformation*_refers to the capacity of a firm to develop and improve routines that expedite the combination of assimilated knowledge, existing knowledge and freshly acquired knowledge. This leads to new insights and opportunity recognition. It involves addition or deletion of knowledge or by the interpretation of knowledge in a different way. A firm's capacity to identify two seemingly incompatible aspects of information and combine them into a new schema is referred to as transformation capability. Transformation capability shapes the mind-set of an entrepreneur (McGrath & MacMillan, 2000) and fosters the action of the entrepreneur (Smith & De- Gregorio, 2002). The new insights gained help the firm to see itself within the competitive landscape. The beginning of new competencies emerges. Transformation therefore aids in opening up the black box that prior research on organization transformation and strategic change had neglected.

Exploitation is the organizational capability founded on the routines that permit it to improve, extend and make use of existing competencies or create new ones through the integration of acquired and transformed knowledge into the firm's operations (Tiemessen et al., 1997). The routines that permit firms to exploit knowledge are the key areas of emphasis. Without systematic routines, a firm exploits knowledge serendipitously. Structural, systemic, and procedural mechanisms permit a firm to exploit knowledge over longer periods. The ability of a firm to harvest and incorporate knowledge into its operations reflects its exploitation capability. This requires the retrieval of already created knowledge that has been internalized for use in the firm (Lyles & Schwenk, 1992). Systemic exploitation leads to the continuous creation of new goods, processes, systems, knowledge or new organizational forms (Spender, 1996). New ventures, that form their market, competition and customers, capture knowledge that is used to create new competencies, the evidence of exploitation.

Similarly, routines make use of knowledge to enhance existing initiatives or encourage new ones are likely to be established by successful companies (Rumelt, 2005). Zahra and George (2002) argued that for ACAP to be a coherent dynamic capability that fosters organizational change and evolution, the acquisition and assimilation dimensions of ACAP constitute 'potential' capacity (PACAP) and the transformational and exploitation dimensions of ACAP constitute 'realized' capacity (RACAP). PACAP drives the receptiveness of a firm to external knowledge acquisition and assimilation. It does not guarantee knowledge exploitation. RACAP on the other hand leverages the knowledge absorbed by the firm.

Assumptions of Absorptive Capacity

Absorptive capacity has some key assumptions that underlie it. Firstly, ***it depends on prior related knowledge.*** Prior related knowledge enables a firm to determine accurately the potential value of external knowledge. Secondly, an organization's absorptive capacity depends on the ***absorptive capacities of its individual members.***

This is not simply the sum of its members' absorptive capacities. Rather, it depends "on the links across a mosaic of individual capabilities' (Cohen & Levinthal, 1990). Thus, a firm's absorptive capacity is formed from an overlap of its individual members' knowledge structures as well as the knowledge transfers generated across and within organizational subunits. These overlaps imply that absorptive capacity is firm-specific and therefore cannot be imported quickly into a firm.

Finally, absorptive capacity is ***Path-dependent,*** meaning accumulating absorptive capacity in one period enables efficient accumulation in the next. For instance, accumulated absorptive capacity enables a firm to make predictions that are more precise on the potential viability of new technologies. That is, the cumulative effect on expectation formation features of absorptive capacity implies that its development is path dependent.

Criticisms and Critique

Several authors have conceptually and empirically used ACAP. However, Lane et al. (2006) in a thorough review of literature came up with two main criticisms. Firstly, the greater number of citations on ACAP has little or no discussions of ACAP. Out of 289 articles, Lane et al. (2006) reviewed, only 64 discussed ACAP fully and only 4 attempted to make a major contribution to extend the concept. A further inter-citation analysis indicates that only six articles averaged one inter-citation per annum. Lane et al. (2006) concludes that a cumulative and coherent development of the ACAP construct has not been done resulting in a reification of ACAP as a taken-for-granted concept that is not closely or critically examined.

Revisions to Theory

ACAP has enhanced various studies. Notably, Zahra and George (2002) have reconceptualised ACAP into PACAP which looks at the acquisition and assimilation of external knowledge and RACAP which looks at the transformation and exploitation of knowledge to produce dynamic organizational capability. Zahra and George (2002) argue that a firm may have PACAP, but may not have RACAP...

Todorova and Durisin (2007) request a comeback of the traditional conceptualization of Cohen and Levinthal (1990). They reintroduce the need to recognize the value, redefine the transformation, and elaborate on the concepts of PACAP and RACAP. Despite their differences, all conceptualizations recognise ACAP as a capability to address rapidly changing environments. ACAP is assumed to be a higher-order competence that consists of different individual

capabilities building on each other to give the foundation on which a firm achieves a competitive.

Measurable Variables

Various studies use indicators as proxies for measuring absorptive capacity. These indicators are either ***Input oriented*** or ***Output-oriented.*** Some researchers also use ***Perceptive instruments.***

Input Oriented measures

R&D Efforts: Cohen and Levinthal (1990) did the first measurement of ACAP. R&D efforts were used as a basis for carrying out the measurement. They stated that while R&D clearly creates innovations, a firm's ability to identify, assimilate, and exploit knowledge from the environment is also developed by R&D. Thus, they used R&D intensity as a proxy for measuring ACAP. Using R&D expenditures (Rocha, 1999) or R&D intensity (Rocha, 1999) are still the most common ways to measure ACAP.

R&D Professionalism: Other studies go beyond the financial opinion of R&D and use indicators such as the presence of a formal R&D department (Veugelers, 1997), a completely staffed R&D department, or the number of R&D departments involved in key research (Veugelers, 1997) as proxies for ACAP. These authors note that the presence of R&D departments show that the firm has an advanced knowledge base. Since ACAP depends on knowledge base (Cohen & Levinthal, 1990), the firm's capability for developing in-house has a substantial positive influence on its ability to translate external knowledge into new products, processes, or services. Allen (1984) shows that firms that carry

out their own R&D are better able to use externally available information.

R&D Human Capital: R&D human capital reflects the quality of R&D work. It is defined as R&D employees divided by total employees (Gao, Xu, & Yang, 2008), percentage of higher-educated workforce (Kleinknecht & Reijnen, 1992), technology staff divided by total staff number of octorates in the R&D department (Veugelers, 1997), percentage of R&D personnel with a doctorate degree (Veugelers, 1997), investment in R&D personnel or a percentage of total sales devoted to personnel training (Becker & Peters, 2000).

The input oriented indicators provide some information about the presence of organizational ACAP. However, we cannot assume that these indicators reflect the knowledge absorption process of a firm.

Output Oriented Measures

Publications: Another way of measuring absorptive capacity is to use publications as output variables. Counts of scientific publications are significant indicators of research activity (Cockburn & Henderson, 1998). This is predominantly true of basic science research investments, which are often understood as building ACAP (Gambardella, 1992). Since publications are relatively uninformative about interaction between researchers at different institutions, Cockburn and Henderson (1998) also look for co-authorship of papers by researchers working in different organizations

Patents: A second method of measuring ACAP is the use of patents as a measure of a firm's capacity to apply or exploit knowledge (George *et al.*, 2001). Some researchers argue that for the firm to gain a patent, it must demonstrate some degree of newness that reflects a change in its own knowledge base. Evolving and emerging knowledge in a firm is recorded in its patents and thus represents a major landmark in a firm's discovery and innovative progress. Hence, patents reflect learning that has gone on in a firm and show the firm's ability to understand, assimilate, and use external knowledge.

Perceptive Instruments: Some studies measure absorptive capacity through perceptive instruments (Jansen, Van den Bosch, & Volberda, 2005; Lane & Lubatkin, 1998; Szulanski, 1996). Researchers have developed single questions or a set of questions that reflect absorptive capacity as a whole or parts of it at the operational level. This research stream includes large-sample empirical work, which estimates the significance and value of absorptive capacity. Absorptive capacity is used as an independent or dependent variable. The construct is measured as one or multidimensional. One-dimensional measures capture absorptive capacity as a whole (Szulanski, 1996). Some authors assume more than one dimension of absorptive capacity. Hence, they develop a multidimensional measure of the construct (Liao, Welsch, & Stoica, 2003). The problem with these perceptive instrument analyses is the diversity of the studies.

Sample Papers from IS Research and Management

Chen, J. S., & Ching, R. K. (2004). An empirical study of the relationship of IT intensity and organizational absorptive capacity on CRM performance. *Journal of Global Information Management (JGIM)*, *12*(1), 1-17.

Davids, M., & Verbong, G. (2007). Absorptive Capacity in Solid-State Technology and International Knowledge Transfer: The Case of Philips. *Comparative Technology Transfer and Society*, *5*(1), 1-8.

Elbashir, M. Z., Collier, P. A., & Sutton, S. G. (2011). The role of organizational absorptive capacity in strategic use of business intelligence to support integrated management control systems. *The Accounting Review*,*86*(1), 155-184.

Harrington, S. J., & Guimaraes, T. (2005). Corporate culture, absorptive capacity and IT success. Information and Organization, *15*(1), 39-63.

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Gaps for Future Research

A review of previous empirical treatments of ACAP shows the need for advancing research in that area (Duchek, 2013). Previous methods of measurement do not address the complexity of the construct and barely recognize its routine-based character. Thus, there is the need for developing alternative methods for capturing the ACAP construct. A future analysis of knowledge absorption practices, especially in different firms and industries, can make important contributions to opening the 'black box' of ACAP and indicate how to capture the complex construct empirically. It can also offer valuable implications for practitioners, particularly with regard to the implementation of innovative initiatives and the successful management of ACAP. Future research should demonstrate an understanding of ACAP's original assumptions and then test them through replications and extensions that build on the theory, metrics, and findings of prior studies via tests in several contexts, not just R&D. Empirical exploration of non-R&D environments should be explored using metrics that capture the ACAP processes (acquisition, assimilation, transformation and exploitation). Longitudinal research must be done in the future to address current issues with tautological measures.

Usefulness to Managers

ACAP is regarded as an important factor in both corporate innovation and general competitive advantage. To managers, gaining competitive advantage is paramount to their survival in their industry. Furthermore, ACAP helps managers to steer their organizations to develop new and better products based on prior and exploited knowledge. It also helps managers to build on the capabilities of their human resource base in harnessing much from their knowledge base.

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Test of Understanding

Discussion Question 1

Identify a research paper in the context of Information systems (IS) that have utilized the Absorptive Capacity Theory and discusses how the theory was applied in the study conducted

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Chapter 2: Delone and Mclean's IS Success Model

Objectives

This chapter discusses Delone and Mclean's Information Systems Success Model. It also looks at the model's Constructs and Assumptions, Criticisms, Usefulness to Managers, and makes Recommendations on Gaps in application of the model in existing research that can be explored by way of further research.

Historical Background

Since the commencement of Information Systems (IS) as a discipline, many IS researchers have tried to determine the factors that make up IS success. The dependent variable, which defines, IS success has been quite elusive. During the 1980 International Conference on Information Systems, Keen (1980) asked about what the IS success dependent variable is. Keen argued that a user satisfaction variable or an hours of usage variable are misleading to IS researchers in handling the IS success construct. Following from Keen's question on the IS dependent variable, many IS researchers have tried to solve the IS success question from different angles making it difficult to correlate the different aspects of IS success.

In bringing orderliness to the vast body of literature that existed on IS success and to integrate its diverse concepts and findings, DeLone and McLean (1992) presented a comprehensive nomenclature on IS success by reviewing 180 articles from the existing literature. From the classification, DeLone and McLean identified six IS success dimensions. These dimensions were: *Use, System quality, User satisfaction, Information quality, Organizational impact, and Individual impact.* DeLone and McLean accomplished this by relying on Shannon and Weaver's (1949) three information levels coupled with the expansion of information influence level (Mason, 1978).

Following the development of the DeLone and McLean (D & M) IS success model many researchers who used the model in its original or extended form, found the model incomplete and suggested the inclusion of more dimensions or the presentation of an alternative success model (Seddon, 1997; Seddon & Kiew, 1994; Ballantine *et al.,* 1996).

DeLone and McLean (2002, 2003), after ten years, introduced an updated IS success model after the introduction of the first model.
The new model was made up of: *Information quality, Service quality, System quality, User satisfaction, Intention to Use or Use* and *Net Benefits* as its distinct dimensions.

Constructs and Assumptions

System Quality, Service Quality, Information Quality, User Satisfaction, Intention to Use or Use and ***Net Benefits*** constitute the constructs of the D&M IS success model. The dependent constructs consist of (Intention to) Use, User Satisfaction and Net Benefits. Information quality, System quality, and Service quality make up the independent constructs.

System Quality measures the anticipated characteristics of an IS. They are availability, usability, adaptability, reliability and response time as valued by users (DeLone & McLean, 2003).

Information Quality relates to the content associated with the IS system. This is primarily in the form of reports. The content must be accurate, relevant, timely, complete, current, personalized, easy to understand and secure (DeLone & McLean, 2003). A typical example of information quality is the quotation prices or current sales statistics that a company employee can produce using the IS of the company. Information quality is generally from the perspective of the user and therefore is subjective.

Service Quality indicates the quality of support provided by IS personnel to users of the system (DeLone & McLean, 2003). This

includes training, a hotline, a helpdesk and many more support related activities.

The extent and manner in which an Information system is utilized by users is referred to as ***Intention to Use/or Use.*** The utilization of an IS may be seen from varied perspectives such as frequency of use, connect time and functions utilized (DeLone & McLean, 2003). ***User satisfaction*** is paramount in measuring user opinion of an IS utilization.

It covers user experience in its entirety ranging from the retrieval of information through to purchase, payment, receipt and service (DeLone & McLean, 2003). A user satisfaction measurement is deemed essential when IS use is obligatory and the level of use is not a suitable indicator of IS system success.

A key measure of IS success which looks at the balance of positive and negative impacts of IS on users of the system, organization, industries, markets, economies, and societies is net benefits (DeLone & McLean, 2003). The measure of ***Net Benefit*** is determined by context and goals of an IS investment. Net benefits cannot be examined or understood without information quality and system quality measurements.

Exhibit 1: Updated Information Systems Success Model (DeLone & McLean, 2002, 2003)

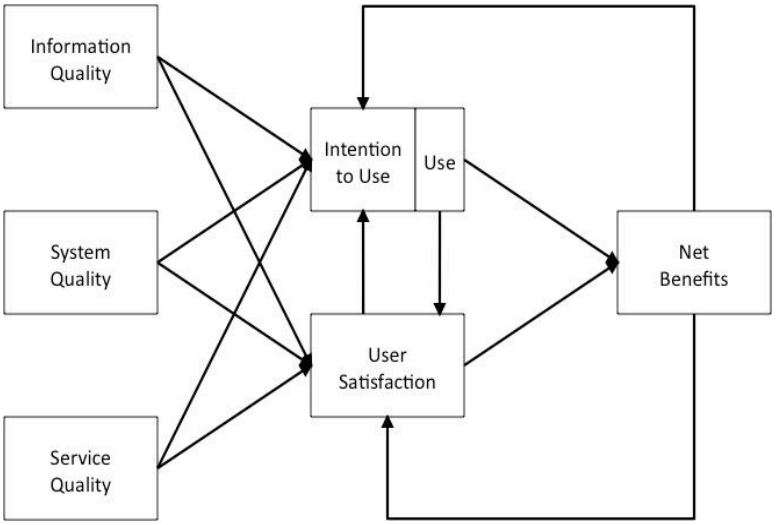
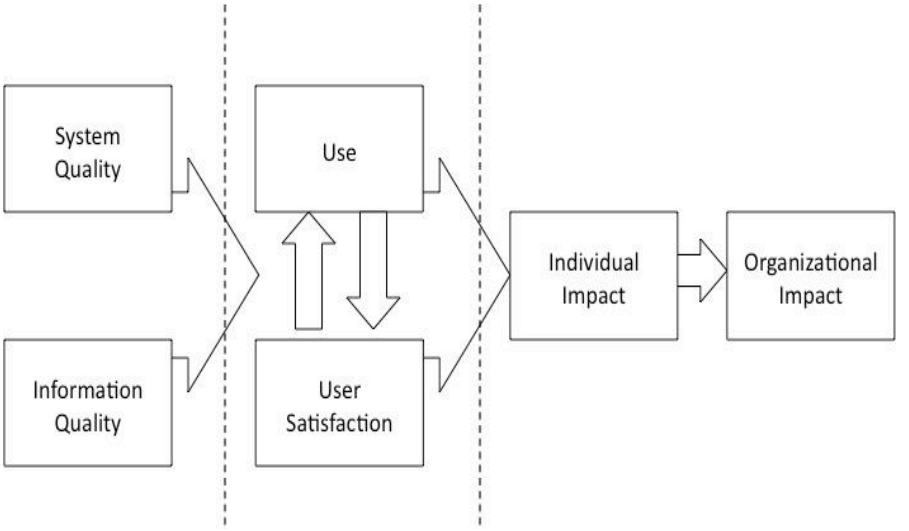


Exhibit 2: Original Information Systems Success Model (DeLone & McLean, 1992)



Criticisms and Critique

The D&M IS success model has been critiqued, challenged and extended by several articles (Delone & McLean, 2003). The criticisms and critiques led to Delone and McLean to update the model in 2003 to include other dimensions. They can be summarised into ***Process*** versus ***Causal Models***, ***Role of Context***, ***System Use as a Success Measure*** and ***Independent*** versus ***Dependent Variables.***

Process versus ***Causal Models****:* Seddon (1997) in citing a paper by Newman and Robey (1992) argues that in variance and the process models, the boxes and arrows represent different concepts and thus they cannot be merged into one model meaningfully. Thus the D&M IS success model, which attempts to combine variance and process models leads to many potentially confusing meanings (Seddon, 1997). Based on this argument Seddon proposed a revised variance IS success model.

System Use as a Success Measure: DeLone and McLean in their model tried to combine process and causal reasons of IS success (Seddon, 1997). Seddon (1997) further suggested the removal of the 'system use' as an IS success variable arguing that use is a behaviour and thus inappropriate to be used in a causal model. According to Seddon, use does not cause impacts and benefits but rather use precedes impacts and benefits.

Role of Context: In order to define and operationalize the D&M IS success model several IS researchers have encountered difficulties in specific research contexts. For example, Jiang and Klein (1999) found that depending on the type of system being evaluated, different success measures are preferred by users. Seddon *et al.* (1999) proposed a two-dimensional matrix for

categorizing IS effectiveness measures based on stakeholder interest and the kind of system being evaluated.

Independent versus ***Dependent Variables:*** There have been several criticisms as to what an independent variable is and what is part of the dependent variable in the D&M IS Success Model flow (Delone & McLean, 2003). Two additions to the model that critiques have suggested are 'User involvement' and 'top management support', which are variables that may cause success instead of being part of success (Delone & McLean, 2003). For example 'Investing in ERP' may cause improved 'information quality'. The independent variable in the example is 'investment' and 'information quality' is part of the independent variable, hence it is important for IS researchers to make a distinction between management control variables and desired results.

Revisions to Theory

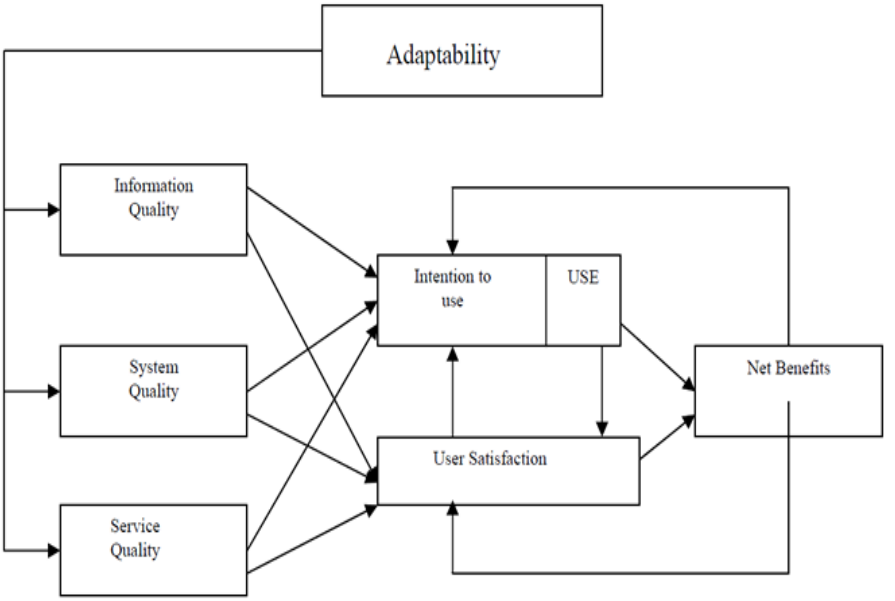
Since the original inception of the D&M IS success model, several revisions have been proposed by IS researchers. Among these revisions are a change to the original theory by Delone and McLean in 2003 and in 2011 a proposed revision by Zachary Wong.

DeLone and McLean in 2003 revised their IS Success Model in response to many of the criticisms of the original version. The updated model has helped to reduce the criticisms and has received extensive credit as one of the watershed studies in IS. The model has been tested in more than 200 studies fully and in part. Petter *et al.* (2008) note that the original authors of the D&M IS success model indeed carried out a far-reaching review of both empirical and conceptual literature on IS success which informed their 10 year update of the model's original version.

In recent times, based on the assumption that all industries are susceptible to emergent technologies, Wong (2011) suggests that IS success depends on the ability of an IS to adapt to the changes in its environment. Thus the need to include adaptability in the D&M IS success model. The inclusion of adaptability, according to Wong (2011), will transform the independent variables in the model to dependent variables. Wong (2011) suggests that adaptability affects systems quality. The need for adaptability is enhanced by the knowledge growth within corporations. Wong (2011) uses the example that the emergence of Java and AJAX has improved usability of systems, and thus organizations that do not adapt to these emerging technologies risk losing their customers to other competitors. Furthermore adaptability causes information quality to change. ERP solutions, for example, provide much richer information based on existing data. In addition, adaptability improves service quality.

Adapting to the use of virtual teams and to outsourcing helps lower cost in organisations and assign resources to technologies that help to realise future growth. Thus being more open, IS helps to deliver quality service and to improve the efficiency of an organization. Based on adaptability modifications, there can be an increase or decrease in organizational efficiency.

Exhibit 3: Wong's proposed revised D&M IS success model.



Measurable Variables

The D&M IS success model has several metrics for measuring its variables with some being more thorough than others. The measurable variables in the model are ***Systems Quality, Information Quality, Service Quality, Use, User Satisfaction and Net Benefits.***

Measuring Systems Quality: Though perceived ease of use does not capture system quality in its entirety, it is the most commonly used measure of system quality due to the enormous research relating to TAM (Davis, 1989). Other researchers have also developed and tested their indexes for measuring system quality. Among these researchers are Rivard *et al.* (1997) who developed and tested an instrument that measures eight system quality factors, namely understandability, maintainability, portability, verifiability, reliability, economy, user friendliness and effectiveness. Coombs *et al.* (2001) using dimensions of original model have also created their own index for measuring system quality. In addition, Gable *et al.* (2003) have created another scale for measuring system quality based on their review of system quality literature.

Measuring Information Quality: Normally Information quality is a significant measurement of end-user satisfaction instruments (Ives *et al.,* 1983; Baroudi & Orlikowski, 1987; Doll *et al.*, 1994). Thus, information quality is measured as a component of user satisfaction. A generic scale of information quality has been developed by Fraserand and Salter (1995). Other scales for information quality have been developed (Coombs *et al.*, 2001; Wixom & Watson, 2001; Gable *et al.*, 2003) based on available literature relevant to the type of IS being studied.

Measuring Service Quality : SERVQUAL is the most commonly used measure for service quality in IS, though it has been criticised (Pitt *et al.*, 1995; Kettinger & Lee, 1994). However, Jiang *et al.* (2002), using a confirmatory factor analysis, established that SERVQUAL is an acceptable instrument for measuring service quality in IS. Experience, skill and capability of support staff are other measures of service quality (Yoon & Guimaraes, 1995). For outsourcing of systems development and support, the vendor's responsiveness affects the perception of the level of service quality that is offered (Gefen, 2000).

Measuring Use : There are several measures of IS use. These include intention to use, self-reported use, frequency of use and actual use. The varied measures of IS use can potentially lead to misleading results between use and other constructs. For example, a key difference may be established between actual use and self-reported use (Collopy, 1996; Payton & Brennan, 1999) - light users may overstate use, while heavy users may underestimate it. Hence self-reported use is not an appropriate substitute for actual use. For intention of use and actual use Venkatesh *et al.* (2003) established an important relationship between them. In addition, Doll and Torkzadeh (1998) developed an instrument for measuring effects of IS use instead of frequency or duration based on suggestions that more use is not always better. Burton-Jones and Gallivan (2007) suggested a multilevel perspective for measuring IS use at the organizational and individual levels to facilitate much understanding of the IS use construct.

Measuring User Satisfaction: The most commonly used user satisfaction instruments are the End- User Computing Support (EUCS) instrument (Doll *et al.*, 1994) and User Information Satisfaction (UIS) instrument (Ives *et al.,* 1983). In the context of

accounting IS, Seddon and Yip (1992) established that the EUCS outperforms the UIS.

The EUCS and UIS, however have item constituents that are associated with information quality, system quality and service quality rather than with measuring overall user satisfaction alone. Scales for attitude, which are compatible with the user satisfaction concept, have been used by other research (Coombs *et al.*, 2001).

Measuring Net Benefits : Net benefits can be measured at both the individual or organizational level and there are a number of methods to carry out this measurement. Though there are occasional problems with perceived usefulness or job impact they are the most frequently used measure of net benefits at the individual level (Adams *et al.*, 1992; Segars & Grover, 1993). Profitability measurements seem to be the most favoured choice to measuring net benefits at the organisational level. Researchers need to make sure that respondents in measuring organizational net benefits are in a position to answer the questions. For example, asking users of a system to assess improved profitability instead of senior managers or referring to data from annual reports is not the best approach to measuring organizational benefits.

Sample Papers from IS Research and Management

Almutairi, H., & Subramanian, G. H. (2005). An Empirical Application of The Delone and Mclean Model in The Kuwaiti Private Sector. *Journal of Computer Information Systems*, *45*(3).

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Gaps for Future Research

Though there have been quite a considerable research done on the interrelationships that exist among D&M IS success constructs, there is the need to determine the strength of interrelationships of constructs through empirical research across varied contextual boundaries such as system voluntariness, success timing measurement and the type of system under consideration (Petter et al., 2008). The system use construct, according to Petter et al. (2008), is a source of worry to most IS researchers as they struggle to measure it. Future research is needed to achieve a more consistent measure of use with a better understanding of the effect of use on user satisfaction and net benefits.

Usefulness to Managers

The D&M IS success model to mangers of an organisation helps to establish the relevance of an IS to the organization. A manager can establish whether the organizational goals in relation to IS are being met or not, based on the net benefit results obtained from the D&M IS success model. Furthermore managers can assess whether their investments in IS are achieving the desired results or whether the budgetary allocations assigned to IS are adequate.

In relation to support, results obtained from the D&M IS success model can inform managers on areas within the IS system where enough attention should be given for improvements. Finally it helps managers to ascertain whether users of the system are happy with the system or not and to receive suggestions from users as to how to improve the IS ultimately. Li (1997) in a study on the significance of several D&M IS success factors to managers concluded that the reliability of output, accuracy of output, timeliness of output, relationship between users and user confidence in systems were the most important factors useful to managers.

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Test of Understanding

Discussion Question 2

Discus the new dimensions of DeLone and McLean (2003) model.

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Chapter 3 : Diffusion of Innovation Theory

This chapter discusses Diffusion of Innovation Theory. It also looks at the theory's Constructs and Assumptions, its Criticisms, Usefulness to Managers, and makes Recommendations on Gaps in application of the theory in existing research that can be explored by way of further research.

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Information Systems Theories for Student Researchers and Practitioners

This comprehensive book delves into diverse information systems (IS) theories, models, and frameworks, providing a profound understanding of their constructs, assumptions, and measurable variables. Through an IS and management perspective, it examines strengths and weaknesses, while addressing criticisms and potential revisions. By uncovering gaps in current theories, the book guides readers in conceptualizing research frameworks to address them. Readers will gain critical skills to evaluate and elucidate IS theories, unravel practical implications, and assess their usefulness to managers. This invaluable resource equips readers with techniques to identify theoretical gaps and lay the groundwork for new studies.

Though the theories presented in this book are not exhaustive, they will be of help to researchers, both the experienced ones as well as the budding ones, and most importantly students. The purpose of this book is not to create a 'one best format', but to offer guidelines in understanding IS theories and how they are used, especially in adopting them for research projects, academic papers and the preparation of long essays, theses and dissertations. Additionally, on completion, readers would have acquired the requisite knowledge and research skills in selecting and applying IS theories to research.

Prof. Richard Boateng is a Professor of Information Systems at the University of Ghana Business School. He is a technology researcher who focuses on developing, communicating, protecting, promoting ideas and concepts into sustainable projects of commercial value and development impact. He is the convenor of the Bright Research Group, which spearheads new perspectives in research into the digital economy of emerging economies. The Bright Research Group published two books with Springer and Taylor Francis in 2022.

The AD Scientific Index (Alper-Doger Scientific Index) 2021 and 2022 ranked Prof. Richard Boateng as the number one (#1) Scholar in ICT for Development/E-business Research in Ghana and 9th in Africa. He was also ranked the number four (#4) Scholar in General Business and Management Research in Ghana and 24th in Africa in 2022.

On three occasions, Prof. Boateng has been invited to contribute to global reports on the digital economy. First, by the Renowned Economist, Diane Coyle for the Vodafone Global PLC.'s Socio-economic Impact of Mobiles (SIM) Report; second, by the World Wide Web Foundation for the 2019 Women's Rights Online Survey; and third as a panelist at 2022 UNCTAD Global eCommerce Week, speaking on The AfCFTA and Data Governance Frameworks in Africa.

He is an avid songwriter and the co-founder of the contemporary Christian Music Band, Believe Over Hope. His music, spanning nine albums, four EPs and nineteen singles, is available on all the leading music streaming platforms including Apple Music, YouTube and Spotify.

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