Chapter 99

The New "ABC" of ICTs (Analytics + Big Data + Cloud Computing):
A Complex Trade–Off between IT and CT Costs

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ABSTRACT

Analytics (discover and communication of patterns, with significance, in data) of Big Data (basically characterized by large structured and unstructured data volumes, from a variety of sources, at high velocity - i.e., real-time data capture, storage, and analysis), through the use of Cloud Computing (a model of network computing) is becoming the new "ABC" of information and communication technologies (ICTs), with important effects for the generation of new firms and for the restructuring of those ones already established. However, as this chapter argues, successful application of these new ABC technologies and tools depends on two interrelated policy aspects: 1) the use of a proper model which could help one to approach the structure and dynamics of the firm, and, 2) how the complex trade-off between information technology (IT) and communication technology (CT) costs is handled within, between and beyond firms, organizations and institutions.

INTRODUCTION

As described by *The Global Information Technology Report 2014* (World Economic Forum- WEF, 2014), data have always had strategic value, but with the magnitude of data available today – and our capability to process them – they have become a new form of asset class. The report stresses that in a very real sense, data are now the equivalent of oil and gold:

And today we are seeing a data boom rivaling the Texas oil boom of the 20th century and San Francisco gold rush of the 1800s. It has spawned an entire support industry and has attracted a great deal of business press in recent years (WEF, 2014).

Data growth is skyrocketing. Over 2.5 quintillion bytes of data are created each day; 90 percent of the world's stored data was created in the last two years alone (Pepper and Garrity, 2014). However, current estimates suggest that only half a percent of all data is being analyzed for insights; furthermore, the vast majority of existing data are unstructured and machine-generated. Applying analytics to a greater share of all data can lead to productivity increases, economic growth, and societal development through the creation of actionable insights (Pepper and Garrity, 2014).

No doubt that applying analytics to a greater share of all data can lead to great economic and social improvements; the important issue, however, is *how*, and *when*, this can be achieved, and at *what* costs. In this way, the main argument advanced in this chapter is that successful application of *Analytics* (which can be described as the discover and communication of patterns, with significance, in data) to *Big Data* (basically characterized by large structured and unstructured data volumes, from a variety of sources, at high velocity - i.e., real-time data capture, storage, and analysis), through the use of *Cloud Computing* (a model of network computing), what is called here as the new "*ABC*" of information and communication technologies (ICTs), depends on depends on two interrelated policy aspects: 1) the use of a proper model which could help one to approach the structure and dynamics of the firm, and, 2) how the complex trade-off between information technology (IT) and communication technology (CT) costs is handled within, between and beyond firms, organizations and institutions.

In this way, this chapter is organized as follows. Section 1 briefly presents the main aspects of the concepts of Analytics, Big Data and Cloud Computing. Section 2 shows a brief discussion of the evolution, applications and emerging research connected to these new *ABC* technologies and tools. Section 3 describes the main players of the support industry created by the *ABC* technologies and tools. In section 4 some of the main aspects of a novel model, called the *Architecture-Governance-Growth Model* (or the *AGG Model*) are shown, taking into account the relevant contributions and limitations of the knowledge-based hierarchy view of the firm to the understanding of the complex trade-off between information technology (IT) and communication technology (CT) costs when firms apply and manage new *ABC* technologies and tools, and offers a way to deal with such a trade-off. Finally, section 5 presents the final conclusions.

BACKGROUND

The modern enterprise is a complex system and is evolving dramatically in recent years. In a world where the digital revolution is accelerating innovation, driving productivity, and irreversibly transforming employment and the economy, as expressed by the 2011 book titled "*Race Against the Machine*", written by Erik Brynjolfsson and Andrew McAffe, the enterprise also is being transformed in a radical way.

In order to deal with such complexity, Cavalcanti (2014) introduced a novel model for dealing with the structure and dynamics of the firm: the *Architecture-Governance-Growth* (*AGG*) model. The main thesis of this model is that *the firm's observable architectural characteristics determine its governance issues, and that the governance agenda of the firm determines its measurable growth conditions*. The observable architectural characteristics of the firm are those related to its design, structure, function-

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