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Integrated management systems assessment: a maturity model proposal

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ABSTRACT

This article intends to report the Integrated Management Systems Maturity Model, a hybrid six-level maturity model that allows the comparison between integrated management systems regarding their relative stage of evolution. This maturity model has a three-dimensional nature considering the following axes: the key process agents, externalities and the excellence management pillars. In addition, some potential guidelines to assess each key process agent, externality and pillar are proposed. This model considers, on one hand, a Capability Maturity Model integrated-based component and, on the other hand, a statistical-based component which expresses the relationships between three independent variables that encompass a multiple regression linear model and the remaining variables. The statistical relationships were ascertained by the analysis of the results collected from two surveys. Integration excellence may be achieved throughout an itinerary encompassing six maturity levels. Statistically, three variables contribute the most to the latent variable “Integrated management systems maturity”: the audits typology, the integrated vision revealed by top management and the attained level of organizational integration. Based on the revised literature, this appears to be the first attempt to “normalize” integrated management systems, which can be, hopefully, a relevant contribution to this research field enabling the comparison of integrated systems implemented on different companies or contexts.

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1. Introduction

A significant amount of research work has been reported over the last years concerning the domain of integrated management systems (IMSS). This research topic is particularly relevant if one consider the revisions issued in 2015 of both the ISO 9001 and ISO 14001 standards, namely the annex SL, where are described the common requirements or the high level structure that the MSs should comply with. The research methods traditionally adopted (case studies, surveys, cross-sectional analysis) are useful to disclose some features regarding specific topics that revolve around and within the wide topic of IMSS and seem appropriate taking into account a barely controllable contemporary phenomenon such as the integration of management systems (MSs) (Cassell and Symon, 2004; Silverman, 2000; Yin, 2009). Among these studied features, one may include the main motivations, drawbacks and benefits of MSs integration, the adopted strategies and models, the attained

integration level and how to increase it, the audit function and how to conduct it, and the issues concerning information flow in an integrated context. These research methods have some shortcomings and one hardly finds reported research that “normalizes” IMSS, *i.e.*, that enables the comparison of IMSS implemented on different companies or contexts.

Several studies pointed out that the implementation and further certification of MSs by the companies contributes to an overall improved performance including the financial component (Chatzoglou et al., 2015). The MSs integration phenomenon began as soon as more than one MS standard became available for certification and, conversely, managers felt that two or more MSs coexisting in the same company without any “strings attached” looked like a poor approach and contradicted the best practices of management. In addition, the MSs more often implemented and certified share the same philosophy (continuous improvement by the adoption of the PDCA cycle), as well as the same principles and values. Currently, there is evidence of the integration of MSs in companies operating in different activity sectors, in the majority of the countries and with a wide range in what concerns to their

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dimension. Several models for implementation were proposed considering different strategies, which led to different integration levels. As a matter of fact, one of the major research questions to be answered concerns with the comparison between IMSs and how this integration can be developed. The current paper intends to contribute to fulfil this scientific “gap” and deals, ultimately, with the question on how companies may assess IMSs and plan their activities and operations in order to avoid wastage of resources.

This paper follows with a brief description of the current topics addressed by the mainstream research concerning IMSs, where one can observe the topicality of the theme. The following section concerns with maturity models and points out the different domains where they have been developed, where they have been adopted, their main distinctive characteristics and shortcomings. After the description of the research methods adopted, the last sections deal with the Integrated Management Systems Maturity Model (IMS-MM[®]), presenting the two main components that sustain the model, how to interact with them and listing some of the potential information sources to assess each key process agent (KPA), externality and management pillar. The last section of the paper is devoted to conclusions and some final remarks and it sums up all the topics addressed concerning the IMS-MM[®].

2. Literature review

2.1. Integrated management systems

A great deal of literature addresses various topics on the matter of IMSs and several reference publications are available. Concerning the most recent published contributions one should point out the work of Bernardo et al. (2015), Simon et al. (2012), Zeng et al. (2011) and Almeida et al. (2014) addressing the attained benefits from the proper integration of MSs. The major obstacles, difficulties and drawbacks concerning the implementation of IMSs was a topic focused by the work of Bernardo et al. (2012) and Simon et al. (2012). Karapetrovic (2002), Karapetrovic and Casadesús (2009) and Sampaio et al. (2012) discussed the strategies adopted during the implementation of an IMS, whereas the levels of integration attained were dissected by Bernardo et al. (2011, 2012) and Jørgensen et al. (2006). Throughout the years models and approaches to integrate MSs were proposed, among others, by Karapetrovic and Willborn (1998), Zeng et al. (2007) and, more recently, by Bernardo (2014), El Idrissi et al. (2014), Genaro and Loureiro (2015) and Rebelo et al. (2014). The specifics of the audit function were detailed by Beckmerhagen et al. (2003), Bernardo et al. (2009), Domingues et al. (2015b) and Kraus and Grosskopf (2008) and, lately, Kauppila et al. (2015) dissected the major developments and patterns within IMSs and Domingues et al. (2015a) dissected the underlying complexity of an IMS. Other scientific issues, not yet addressed by the IMSs literature, emerge namely those related to the supply chains and how to manage them properly and sustainably (Seuring and Müller, 2008). Table 1 summarizes the recent topics addressed by the mainstream research concerning IMSs, the main findings as well some reference publications.

The published research concerning the assessment of the IMS as a whole, its features and the level of articulation between the various components is very scarce. Moreover, and despite the relevant and crucial information reported in the mainstream literature, the conclusions derived seldom are easily incorporated in IMSs where and when the context changes or evolves.

2.2. Maturity models

Looking back from the last decades of the previous century, a remarkable fast-paced change occurred in the degree of complexity

of the goods, products and services that are available to the consumer. This same consumer “grew” on the demands from the producer and today, those demands, encompass more than just quality requirements, but consider also requirements related to environment, occupational health and safety and sustainability, amidst others. To deal with this increasing complexity, a set of new methods were developed overcoming the limitations of traditional methods. The statistical and stochastic approaches to production systems, the forecasting, heuristic and structural equations models, the black box, grey box and levelling methods, the fuzzy networks and maturity models are some of the new generation “tools” available to manage and to retrieve information from what it seemed a chaotic and impenetrable field of research. Concerning maturity models, a brief revision of the literature (2009 onwards) shows the extension of its applicability (Table 2). Concerning specifically organizational issues and quality MSs one should mention the maturity approach adopted by the European Foundation for Quality Management (EFQM) model.

A maturity model can be defined as a set of sequential levels that, together, describe an anticipated, desired or logical path, from an initial stage to a final maturity stage (Röglinger and Pöppelbuß, 2011). The development of a maturity model is a multi-method task however, concerning their design, all maturity models present, among other, some common features such as a limited number of maturity levels sequentially ordered, a discrete number of KPAs ascribed to each maturity level and an algorithm that describes how the object of maturation evolves usually developed by iterative related methods. Several authors, such as Becker et al. (2009), pointed out several shortcomings of maturity models and stressed that the major concerns relate with the development of maturity models lacked of methods commonly accepted by the mainstream scientific community, which leads to the recurrent criticism on the excessive simplification of a phenomenon when compared to its real performance.

3. Materials and methods

The development of the IMS-MM[®] relied on a multitude of methods. The initial process of literature review provided some insights on the identification of the KPAs that impact on the maturity of a generic IMS. Several queries were performed in the soundest data bases, such as the “Web of Science”, “Scielo” and “Scopus” and in the repositories of e-journals such as “Elsevier Sciencedirect”, “IEEE Xplore”, “Springer” and “Taylor and Francis” containing academic bibliographic resources. The papers considered for analysis were the ones containing keywords such as “Integrated Management Systems”, “Management Systems Integration”, “Auditing Management Systems” and “ISO 9001” plus “ISO 14001” plus “OHSAS 18001” in the title and/or topic. Furthermore, although the desirable contribution from all the papers, a theoretical sampling took place of the bibliographical resources considering the topics closely related to the specific topic addressed in this paper- IMSs. Furthermore, based on the revised literature a 30 questions/statements (Q/Sts) survey focussing IMS managers was developed and held online (Table A.1). This initial process of revision of literature provided some insights on the identification of the KPAs that impact on the maturity of a generic IMS which enabled the development of this first survey. The collected results, amid other information sources, were taken into account throughout the development of the IMS-MM[®] and enabled the development of a second survey addressing a selected group of industrial and academic experts (auditors, Quality awarded personalities, consultants, ASQ fellows, members of APQ – Portuguese Quality Association, etc). The results from this latter survey proved to be crucial to classify the relevance of several concepts concerning the integration level attained by an IMS through the adoption of a triangulation approach between the

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