Competitiveness of High Level Educational Institutions: IT-Governance maturity level as vital indicator?

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Abstract. High Level Educational Institutions (HLEI) are valuable assets for the future of Europe and the European Higher Education Area (EHEA). Since the introduction of IT improvements into daily operations of educational institutions certain threats have appeared e.g. exceeding expenditures, data breaches, data theft, and research loss. We propose that there exists a correlation between the standardization to a predefined framework of an IT organization resp. department – labeled IT-Governance maturity level, and the cost - resp. risk reduction of the same institution [1–4]. The collected results reveal the elementary IT-Governance maturity level within the Management Center Innsbruck. Case study research (46 surveys, 5 interviews) with simultaneous consideration of COBIT 5 and ITOMAT was used. The evaluation of maturity level provides indication for other HLEIs, whether their level of IT-Governance is suitable to cope with the fast changing competitive environment in academia.

Keywords: IT-Governance, IT-Governance Maturity Evaluation, IT-Governance Maturity Level,

1 Introduction

High Level Educational Institutions (HLEI) are valuable assets for the future of Europe and the European Higher Education Area (EHEA) [5]. Further importance of education comes from the broadly shared perception, that it is the foundation for societal prosperity and has played a crucial role in shaping the world as we know it [6, 7].It comes as no surprise that recent technological advancements in IT influenced and improved the process of transferring knowledge by educational systems [8, 9]. Furthermore, close collaboration between educational institutions and SMEs (e.g. % of SMEs in Tirol - 99.7%) is also very beneficial. It represents one way how to improve innovation, how to foster the economy of a region [10, 11] and how to increase awareness of information security and other threats like environmental issues [12].

On the contrary however, ever since the introduction of these information & communication technology into the daily operations of educational institutions, certain threats have been on the rise. The threats exist in the business world as they are no other than: higher expenditures on IT when compared to other costs, or for example the ITRC (Identity Theft Resource Center) found that 116 of the total 1,339 data breaches in 2017

happened in educational institutions [13, 14], other data breaches like Victoria University [15], data theft [16], and research loss [17, 18].

As a further matter, educational institutions face other serious problems such as: inadequate resources [19–21], low number of university-owned patents [22] and uninspired scientific teaching [20]. If these major issues remain unaddressed, they could have remarkably negative impact on the well-being of Europe [20, 23]. One of the issues, the serious under-funding has already shown its impact as it is stated for being one of the reasons of an "exodus" of academic talent from the continent [20].

What is more, Europe when compared with its international peers, is lagging behind [19, 22]. European Investment Bank (EIB) shows the alarming proportion of the innovation gap between Europe and the US with a study conducted by its EIB economists. The revealed sum of approximately €330 billion a year, is required to invest in educational institutions to catch up [21]. Since the budgeting process of the European Union is a matter of fact, other possibilities need to be reviewed. This is where IT-Governance could play a beneficial role. Recent research in IT-Governance shows promising results. A study by Lunardi et al. unveiled; „companies which correctly adopted IT-Governance practices improved their profitability when compared to the control group, in all three evaluated measures (ROA, ROE and PM)" [23]. A study by McKinsey further shows, that once an enterprise has implemented the IT-Governance principles on high level and included it as an internal part of supporting processes, it can expect investors to be willing to pay a premium of more than 20% on shares of an organization [24]. Further improvement comes from the IT-Governance tool named RACI chart, which requires clearly identified role of CIO for effective use of IT-Governance. IBM global CIO study conducted on over 2 500 CIOs revealed important role of CIO on innovation, as he spends over 55% of his time on: "activities that spur innovation." [25]

Previously mentioned improvements are closely connected to business goals which are not shared by educational institutions. Although, HLEIs' goals could hardly be quantifiable in business terms, afore mentioned benefits can influence their performance. We hypothesize that adopting a predefined IT-Governance framework can improve performance of HLEIs in multiple areas, such as costs savings, additional funding attraction, competitiveness and IT risk awareness.

2 Research Methodology

Research investigates on the possibilities of using IT-Governance by educational institutions to lessen some of the mentioned threats. IT does so by conducting an explorative study of evaluating maturity level of IT-Governance at Management Center Innsbruck (MCI) as a representative of HLEI. MCI is located in Innsbruck, and has already previous experience with IT-Governance. The IT department covers three main areas: system administration, software engineering and service desk.

COBIT 5 was chosen as IT-Governance theoretical framework and ITOMAT assessment tool was selected for evaluation of the maturity level of IT-Governance at MCI. The authors chose Case Study Research as the research method for conducting the explorative study. This method was an ideal match for our research, since we not only

needed to elaborate on a complex real world scenario (IT-Governance at a HLEI), but we also had to apply a predefined framework (COBIT 4.1 and ITOMAT) to the current adapted version COBIT 5 with one delimitation instead of SPICE, ISO 15504 CMMI was used. As the most fitting data collection we chose to conduct interviews with the MCI's main stakeholders (CIO, CTO and CSO) and carried out a questionnaire survey (sample size 47) with key employees from the department's concerned.

2.1 Research Background

Study follows the guiding principles for model based IT-Governance maturity evaluation as presented in previous work [26, 27]. The scope of the research is limited to the use of the framework, which enables the evaluation. The previous studies are completed using COBIT 4.1 and thus our research had to be adjusted to the most current version of the framework, which is COBIT 5. As a first draft only 11 out of 37 COBIT 5 processes are used. The evaluation assessment benefited from using ITOMAT framework since it is already used in the evaluation process and is easier and more comprehensible for evaluators. One of the refinements comes from the simplified version of roles introduced by ITOMAT. Instead of 27 specific roles proposed in COBIT 5, ITOMAT allows evaluators to use a model of five representative groups of roles. Further exploitation benefits from the usage of ITOMAT evaluation tool combined with COBIT 4.1 maturity model instead of the new evaluating version COBIT 5 process assessment model, or sometimes called Software Process Improvement and Capability Determination (SPICE). The decision, not to use SPICE was made before the execution of the study. According to, SPICE when compared to COBIT 4.1 maturity evaluation, is more demanding on the evaluation process and evaluating capabilities of respondents. It requires a set of steps to be done by the organization before the evaluation can take place and also has a very strict evaluation process. MCI does not fulfill all of these prerequisites and research would have little to no added value and benefits for the research, if the maturity level of tested processes would receive a score of 0. ITOMAT on the other hand, uses COBIT 4.1 processes and links them with correlation to the performance, as external efficiency of the services delivered. The performance correlation of processes comes from an extensive study by Simmonson where he confirms his hypothesis "There exists a positive correlation between IT-Governance maturity and IT-Governance performance" [28]. However, due to the fact that the current version of the framework is COBIT 5, the closest equivalents to COBIT 4.1 processes had to be carefully selected from the new version.

2.2 Evaluation Assessment

IT-Governance maturity level evaluation consists of 5 steps, which are summarized with an illustration on Figure 1.

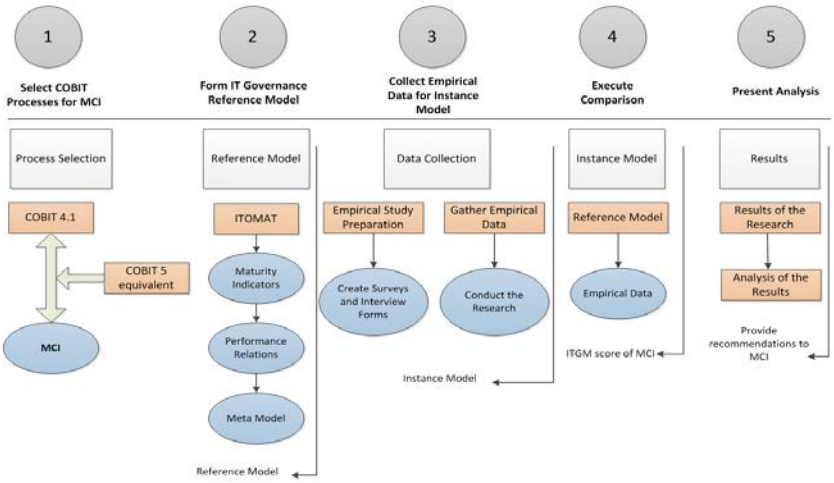

Fig. 1. IT-Governance maturity level evaluation process. Own interpretation based on the work of [26]

As the first step, IT-Governance takes form by selecting of 11 processes with the highest correlation to performance from ITOMAT. These processes must be recognized within MCI's IT department and be updated to the most current version, thus COBIT 5. The next step is to model reference models, which stand for the ideally evaluated process with the highest scores and levels possible. Reference model is only half of the evaluation procedure, and have to be compared with the instance model to offer any meaningful score. Instance model on the other hand, represents the actual status of an evaluated process. This model consists of data collected through surveys which are evaluated by employees with identified roles within a process. Having both reference and instance model prepared, research evaluates the maturity level of IT-Governance of a company by comparing the reference and instance models. Greater difference between the two will provide a lower obtained level of IT-Governance maturity and vice versa. Afterwards, the collected maturity levels are presented combined, selected into domains and also as single processes. Further information revealed by interviews is used in discussion as a form of a triangulation.

2.3 IT-Governance Model

According to the assessment model, it is necessary to recognize IT-Governance processes at an organization whose maturity level is to be evaluated. Figure 2 shows which COBIT 5 processes were selected during the IT-Governance maturity level evaluation. For our explorative research we selected 11 processes from 4 domains. The specific 10 processes were selected because of their highest correlation to IT-Governance performance [28]. The 11th process EDM04 was chosen, as [28] did not incorporate the new Governance processes in COBIT 5. As a result, EDM04 was chosen additionally according to the interview results where the interviewees most important rated the process

to the highest extent with cost containment and thus vital for the success of the IT-department.

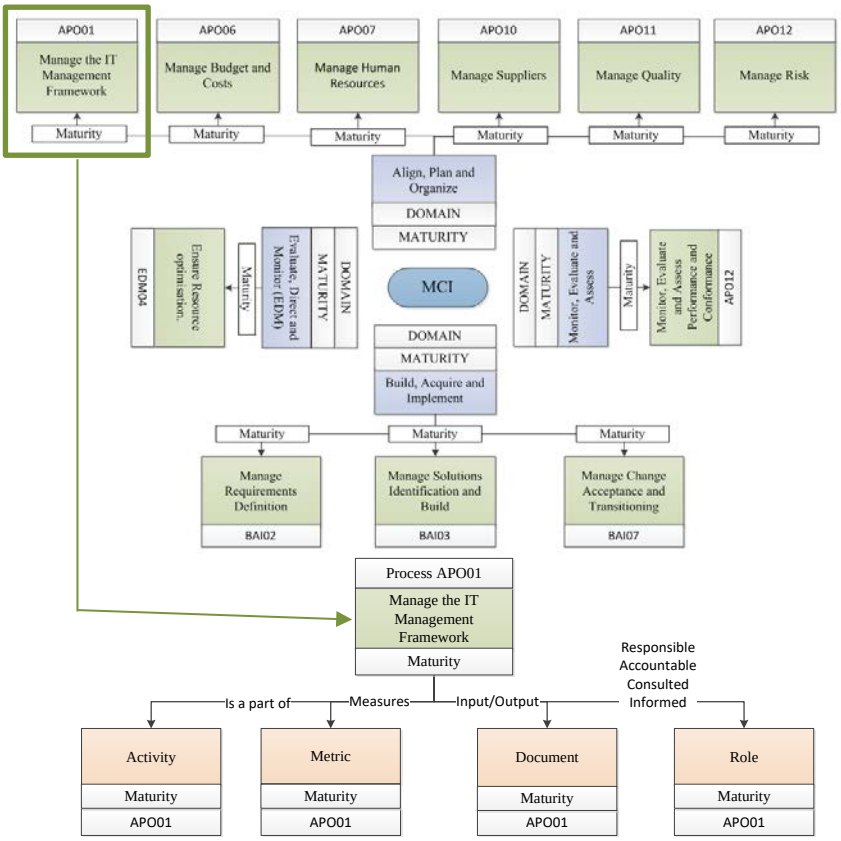

Fig. 2. IT-Governance maturity model - adapted in accordance with [26, 27]

Every selected process consists of 4 maturity indicators (Activity Maturity, Metric Maturity, Document Maturity, Roles) in accordance with [26, 27]. Figure 2 provides a closer look at one of the processes and the maturity indicators which form the maturity level.

3 Results

Preliminary results indicates that the weighted average maturity level of IT-Governance at MCI is 1.9. The score is constructed from the combined weighted average value of 11 selected processes, which levels varied between 1.25 and 2.32. This suggests, that every process exists within the organization on at least 'initial/ad hoc' basis as described by maturity level 1. Processes with a maturity level 2 and higher are performed as 'repeatable but intuitive' scheme. The result is considered as first indication, because MCI's IT department is rather small, has limited amount of staff at disposal and does

not started an official IT-Governance initiative. Finally, to provide an appropriate settlement 60% of HLEIs identify themselves according to [29] within the level of 1 to 2.

3.1 Further Observations

MCI as a HLEI representative has on average a rather high level of maturity indicator 'documents in place' and 'activities executed' with a score of 2.1 and 2.46 respectively. On the contrary, 'metrics monitored' indicator was evaluated with a lower score of 1.08 due to the fact that MCI's department is limited in size and focuses more on proper execution of processes rather than monitoring the execution. One of the higher scoring processes, 'APO10 manage suppliers' was evaluated with a high maturity level of 2.23, which is explained by strict regulations, as educational institutions must follow precise rules when deciding on a supplier. MCI is developing most of its supporting applications and software in house and on premise. This is further supported by agile software development processes achieving higher score than average.

3.2 Further Research

Further focus of research lies in the implementation of the remaining COBIT 5 processes in the maturity evaluation while including multiple HLEIs in the process. If successful, rudimentary guidelines would be made available to public, which would allow institutions to test themselves and create a sort of 'benchmark' in academia. The goal is not to foster competition but rather create incentives for closer collaboration between HLEIs. After all, a close collaboration between institutions in IT-Governance could foster innovation and improve their performance in multiple areas.

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