UNIVERSIDADE DE LISBOA

INSTITUTO SUPERIOR DE ECONOMIA E GESTÃO

MANAGEMENT CONTROL SYSTEMS USE IN MILITARY DEFENSE ORGANIZATIONS:
A LEVERS OF CONTROL ANALYSIS OF THE PORTUGUESE ARMED FORCES

Luís Manuel Madeira Godinho

Orientador: Professor Doutor Alcino Tiago Cruz Gonçalves

Tese especialmente elaborada para obtenção do grau de Doutor em Gestão.

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GLOSSÁRIO

BDS – Boundary Systems Control

BLS – Beliefs Systems Control

DCS – Diagnostics Systems Control

ICS – Interactive Systems Control

JEL – Journal of Economic Literature

LOC – Levers of Control

MCS – Management Control Systems

MDO – Military Defense Organization

MGA – Multigroup Analysis

NATO – North Atlantic Treaty Organization

PLS-SEM – Partial Least Squares Structural Equation Modelling

RESUMO

A nova gestão pública introduziu o managerialismo, obrigando à adoção de sistemas de controle de gestão para apoio à tomada de decisão, implementação da estratégia e comunicação, enquanto a austeridade governamental e *stakeholders* exigem eficiência, eficácia, sustentabilidade, transparência e prestação de contas do setor público, organizações de Defesa inclusive.

Os gestores das organizações militares devem explorar os efeitos preditivos dos sistemas de controle de gestão e enfatizar o uso das alavancas de controle para executar a estratégia, identificar estratégias emergentes, permitindo-lhes gerir, promovendo processos que produzem mudanças, para que a estrutura possa seguir a estratégia para alcançar os resultados esperados.

Esta tese é pioneira na investigação do uso de sistemas de controle de gestão em organizações militares. O nosso objetivo principal é o de compreender o uso dos sistemas de controlo de gestão, consubstanciado na evidência empírica dos dados obtidos das perceções do uso das alavancas de controlo de Simons, para responder à questão de investigação: como os gestores militares fazem uso dos sistemas de controlo de gestão para gerir. São estudadas as associações entre o uso das alavancas de controlo de gestão, características individuais, incerteza, aprendizagem organizacional e atenção dos gestores militares, expandindo os estudos no âmbito da teoria da contingência, da teoria do escalão superior, e do modelo das alavancas de controlo de Simons.

A técnica de investigação é exploratória, sendo usada uma plataforma eletrónica na Internet para questionários como instrumento de recolha de dados junto dos gestores militares. A investigação empírica resulta dos dados de 281 questionários realizados em 2021. Os modelos de equações estruturais, por regressão dos mínimos quadrados parciais, foram calculados por software e efetuada análise avançada de múltiplos grupos.

Os resultados são significativos e relevantes, confirmando a complementaridade e interdependência do uso das alavancas de controlo, conforme literatura. O uso das alavancas de controlo pela amostra revela resultados estaticamente significativos que sugerem a existência de condições para identificar novas estratégias, mas também um desenho deficiente dos sistemas de controle de gestão. Os resultados sugerem ainda que os usos dos sistemas de convicções têm efeitos significativos e positivos na aprendizagem organizacional e na atenção dos gestores, sendo esta última enfatizada por todas as alavancas de controlo.

Em relação aos efeitos de moderação das características individuais, verificamos que os gestores militares mais velhos revelam maiores níveis de uso dos controlos interativos, e os formados em economia ou gestão revelam maior propensão para aceitar os princípios da nova gestão pública. Além disso, o uso de controlos interativos pelos gestores militares mais velhos sugerem efeitos positivos na eficiência da sua atenção. A análise com múltiplos grupos sugere que os efeitos da variável idade são significativos e relevantes como moderadores nos proveitos, apoiando a teoria do escalão superior.

Os resultados da investigação sobre como a demografia dos gestores militares influencia o uso das alavancas de controlo contribuem para expandir a teoria das alavancas de controlo de Simons relativamente ao uso dos Sistemas de Controlo de Gestão pelos gestores de militares, e a teoria do escalão superior de Hambricks. A investigação do uso dos Sistemas de Controlo de Gestão em organizações militares pode recorrer à aproximação metodológica do nosso estudo, bem como das nossas conclusões. Também se identificam duas contribuições para os gestores militares gerir as organizações militares. Ao nível estratégico, os decisores das políticas podem desenvolver regulamentos e orientações para mitigar as ameaças e promover os pontos fortes por nós identificados no uso dos Sistemas de Controlo de Gestão pelos gestores militares. Ao nível operacional, os gestores militares podem moderar as decisões de gestão com base nas conclusões identificadas a fim de melhor compreender os seus subordinados, pares e superiores, incrementando a eficiência da comunicação e dos respetivos processos.

Palavras-chave: Setor Público, Forças Armadas, Sistemas de Controlo de Gestão, Alavancas de Controle, Aprendizagem Organizacional, Atenção dos Gestores

Códigos JEL: C31; H41; H56; H83; M41; Y40.

ABSTRACT

The new public management introduced managerialism in public sector organizations, compelling management control systems adoption to support decision-making, strategy implementation and communication, while Governmental austerity and State stakeholders demand public sector efficiency, effectiveness, sustainability, transparency, and accountability, including Defence organizations.

The military organizations managers must explore management control systems predictive effects and emphasize the levers of control use to execute the intended strategy and identify emergent strategies, so managers can manage, promoting processes (ways) that produce changes, so structure (means) may follow strategy to achieve the expected outcomes (ends).

This thesis is the first management control systems use research in military organizations. Our main objective is to study management control systems use in military organizations, and support with empiric data Simons' levers of control use perceptions, to answer the research question how military managers use management control systems in Armed Forces organizations to manage. We investigate the associations between levers of control use, individual's roles and characteristics, uncertainty, organizational learning, and management attention, expanding Simons' levers of control framework and contingency approach studies. The methodological choice follows an exploratory approach using an online survey tool, to collect data through an adapted structured questionnaire, targeting military managers. Our empirical research is based on data from 281 cross-sectional survey participations, in 2021. We use partial least squares structural equation modelling software and advanced multigroup analysis to analyze the data.

We find significant and relevant results of levers of control use complementarity, inter-dependency in support of extant literature. The sample perceived levers of control use identify conditions to pursue new strategies, and a poor management control systems design. Our findings suggest that beliefs systems use have significant and positive effects on organizational learning and management attention, being the latter emphasize by all levers of control.

Regarding the individual characteristics' moderation effects, we find that older military managers reveal higher levels of interactive controls use, and those with economic or management background are more compliant to new public management principles. Furthermore, older military managers results suggests that interactive controls use positively effects management attention efficiency. The multigroup analysis suggests that age variable effects are significant and relevant moderator on outcomes, supporting the upper echelon theory.

Theoretical contributions of our findings expand Simons' LOC literature management control systems use research to military organizations management, and upper echelon theory, with the study of how military managers demographics influence

LOC use. Military organizations management research in management control systems use can build on this approach and conclusions. On the other hand, two main practical contributions are identified. Policy makers may develop regulations or policies to mitigate threats and promote strengths which we identify in military managers management control systems use. Secondly, military managers can moderate their management decisions based on our conclusions to understand their subordinates, peers, and superiors to increase communication and processes efficiency.

Keywords: Public Sector, Armed Forces, Management Control Systems, Levers of Control, Organizational Learning, Management Attention

JEL Codes: C31; H41; H56; H83; M41; Y40.

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MANAGEMENT CONTROL SYSTEMS USE IN MILITARY DEFENSE ORGANIZATIONS: A LEVERS OF CONTROL ANALYSIS OF THE PORTUGUESE ARMED FORCES.

By Luís M. Godinho

1. INTRODUCTION

The managerialist approach to public sector management, introduced with the new public management approach, increased Management Control Systems (MCS) research, foreseen by Chenhall (2003) and identified by Lapsley & Miller (2019).

In public sector organizations we find evidence that MCS supports management decision making, strategy implementation and organizational change (Simons, 1995; Chenhall, 2003; Heinicke & Guenther, 2020; Bracci & Tallaki, 2021), and the communication system with executive Governments (Anthony, 1965; Felício et al., 2021). Public sector studies reveal significant associations of managers MCS use with context, personal interests, characteristics and backgrounds (Hambrick & Mason, 1984; Abernethy & Brownell, 1999; Naranjo-Gil & Hartmann, 2006, 2007b; Hambrick, 2007; Deschamps, 2019; Bukh & Svanholt, 2020; Pilonato & Monfardini, 2020; Heinicke & Guenther, 2020; Bobe & Kober, 2020b, 2020a), and roles (Kastberg & Siverbo, 2013; Deschamps, 2019; Heinicke & Guenther, 2020; Matsuo et al., 2021).

Holistic approaches to increment knowledge on why and how managers use MCS are complex, but needed (Ferreira & Otley, 2009; Tessier & Otley, 2012; Deschamps, 2019). Simons (1995) focus on how managers use four levers to communicate and gather intelligence in their organization: beliefs systems, boundary systems, diagnostic control systems and interactive control systems. Simons' Levers of Control (LOC) framework is identified to be a valid approach in organizational MCS use research (van der Kolk, 2019). The dynamic relation among beliefs, boundary, diagnostic, and interactive control systems levers are policed by internal controls, and the major tensions balanced between unlimited opportunity and limited attention, intended and emergent strategy, self-interest and the desire to contribute (Simons, 1995). Simons' LOC framework is comprehensive to MCS dimensions, instruments, and roles, relating them to organizational strategy (van der Kolk, 2019). Although, extant research has mainly focused on diagnostic and interactive control systems use (Otley, 2016; Martyn et al., 2016), the investigation that studies the four levers identifies complementarity and interdependency between all LOC (Simons, 1995; Widener, 2007; Oyadomari et al., 2009; Martyn et al., 2016). We also find evidence that any MCS package may have an interactive or diagnostic use (Widener, 2007; Bisbe & Malagueño, 2009; Deschamps, 2019), and that LOC use perceptions can be associated to managers choice more than MCS design (Naranjo-Gil, 2016; Deschamps, 2019).

The austerity measures in Central Government organizations call for improved resource management practices to maintain or improve services quality and impacts MCS use which, in turn, require a better communication of the implemented strategies in the public sector organizations from the different levels of public services managers (Deschamps, 2019). The sovereign debt crisis, since 2007, led to continuous periods of financial and economic crisis and austerity budgets for the public sector (Bracci et al., 2015), including at the Defense. The 2020 decade, due to the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) outbreak, 2019 coronavirus disease (COVID-19) mitigation measures, and the NATO allies re-engagement to increase the military investment and expenditure, in response to 2022 Russian Federation military offensive in Ukraine, adds to the relevancy of management processes within the military organizations in a context of increased transparency and accountability for public funds management in times of austerity (Navarro-Galera et al., 2014; Steccolini, 2018).

Government new public management policies compels Defense organizations to publicly adopt private sector management processes and performance metrics, in a context of increased accountability and sustainability demand (Navarro-Galera et al., 2014; George et al., 2019; Godinho & Gonçalves, 2020). MCS can improve Defense organizations performance and communication, in austerity budgets context (Navarro-Galera et al., 2014; Letens et al., 2017). The same austerity policy that, after World War II, was adopted by public sector to reduce the State budget deficit by a mix of increasing revenues and lowering expenses, thriving rigorous and accountable use of public resources (Cangiano & Sarmento, 2016).

Defense studies have not focused on the management perspective, but rather on the economic, studying country level military expenditures determinants, factors, and their economic impacts (Godinho & Gonçalves, 2020)[1]. Godinho & Gonçalves (2020) identifies the management perspective research shortfall relative to MCS use at the military organizational level, which is developed in the literature review chapter. We find a relevant Simons' LOC framework literature gap relative to MCS use by military managers, at the organizational level of military organizations.

The management control idea presented by Simons (1995) is closer to the North Atlantic Treaty Organization (NATO) and United Nations current military term for command and control to designate resources management (Alberts et al., 2014), than the traditional 1960 philosophy of control and management (Otley, 1994). lmqvist et al. (2011) Sweden Armed Forces' research identify that balance of control should be in the research agenda due to their specific sector contingencies challenges to management control based on new public management. Military managers have management functions responsibility to staff top management, plan, organize, lead and control, within the defined political Defense strategy framework and Armed Forces Services approved budget. The military managers accumulate administrative bureaucratic functions to register, report, validate, authorize, and prepare public budgeting and contracting procedures.

The military Defense organizations (MDO) provides the Defense public sector management perspective, by opposition to an economic view of the country's Defense. More specifically, we argue that the increase of educated citizens in military organizations demand that the Academy expand management research, as MCS use at the military units and Subunits organizational level, so it may improve military managers actions to manage politically imposed restrictions, austerity budgets, military operations goals efficiency and effectiveness, transparent reporting, and legitimacy.

Military organizations are complex and unique due to their organizational mission, always ready to engage and enforce with arms as an extension of political power, having the resources and missions of political choice (Soeters et al., 2010; Almqvist et al., 2011). The complexity in military organizations management research is partially explained by

[1] The authors find relevant management control systems literature gaps in Defense organizations, as are the military Services. Their literature survey of 2768 papers published, from 2000 to 2019, reveals no research in management control systems research at the organizational level (paper reprinted in Appendix A, under license number 5396731126360).

the difficulty in measuring performance and balancing political and military power in country's specific context (Almqvist et al., 2011; Beeres & Bogers, 2012a; NATO, 2020; Soares et al., 2022), which concurs to the literature conclusions of different MCS use in public and private sector organizations (Felício et al., 2021). Hence, military organizations can share similarities and also be distinct from private and public sector organizations, such as political local power organizations municipalities or similar, hospitals, universities, social support, or public agencies. There is a persistent search to find processes to separate politics and administration in practice, although the information available is contingent and unreliable without being contextualized with its political influences (Radin, 2016). Nevertheless, the military organizations are object of new public management reforms as other public sector organizations and have significant economic weight in countries central budget and political context, consequently they are relevant to scholars, practitioners, and general public (Felício et al., 2021).

Extant research identifies that military managers increase competing and political behaviors to achieve career promotions (Soeters, 2020a; Beeres et al., 2021; Heeren-Bogers, 2021). Understanding how managers use MCS to pursue organization's intended strategy and stimulates strategy change is relevant (Simons, 1995; Deschamps, 2019). The interactive control system use can interactively induce strategic organizational changes (Simons, 1995) to contribute for a more agile, flexible, and resilient organization, focusing their management practice on core functions, knowledge transfer, and innovation rather than on bureaucratic routines or reporting, particularly when in presence of central budget's austerity context (Essens et al., 2007; Eisenberg et al., 2018).

This dissertation investigates the association between MCS use and their relationship to organizational and managerial focus in military organizations, a primer on management by military managers. The main objective is to study MCS use in military organizations, and support with empiric data Simons' LOC use perceptions of its inter-dependencies, complementarities, and effects on organizational learning and management attention, and impact of individual's characteristics, to military organizations management. This investigation aims to answer the research question how military managers use Management Control Systems in Armed Forces organizations to manage. Our specific objectives are to identify how military managers perceive MCS use, who is using MCS diagnostically or interactively, identifying manager's LOC use level to manage, promote organizational resiliency or to assure bureaucratic compliance, respectively through organizational learning and management attention concepts measurement (Simons, 1995; Widener, 2007). In addition, the management impacts of the findings are compared to public or private sector organizations extant literature. Derived from the research question we investigate how military managers use MCS, what individual's moderating role association are significant, and what influence LOC use have on uncertainty, organizational learning, and management attention.

We conduct the research in the Defense public sector military organizations setting for three reasons. First, because there is a literature gap in peer reviewed journals on Simons' LOC framework to study the use of MCS perceived by military managers. The military organization, by opposition to a macroeconomic view of the country's Defense, provides the Defense public sector management perspective. Lastly, military managers are responsible to pursue the management functions of planning, organizing, leading, and controlling within the defined political Defense strategy framework and Armed Forces Services approved budget, and not merely bureaucratic functions.

We focus on Portuguese Armed Forces Services organizations. These organizations have responded to new public management reforms with the adoption of MCS. In the first decade of 2000, Portugal's Ministry of Defense initiated the implementation of a unique set of MCS common to all military Services to improve and standardize strategic control, with the acquisition of SAP software, adapted to the Portuguese military organizations. Portuguese Naval, Army, and Air Force Service strategy directives are being developed to be consistent between Services at the methodological and structure level (*Diretiva Estratégica do Estado-Maior-General das Forças Armadas 2021-2023*; *Diretiva Estratégica da Marinha 2022*; *Diretiva Estratégica do Exército 2022-2023*; *Diretiva Estratégica da Força Aérea 2022-2025*). The performance of Portuguese military Services are recognized either nationally, in national public interest missions, and internationally, in missions approved by the United Nations, European Union, and other strategic alliances or international agreements. This investigation will allow to understand how Portugal's military organizations use MCS, within the aim to reach higher management efficiency without compromising mission effectiveness (Moreno & Gonçalves, 2021).

The present study expands Simons' Levers of Control framework (Simons, 1995) research literature in public sector organizations to the military, adapting Widener's (2007) framework to present empirical study. We develop Simons' LOC framework to study MCS use by military managers to manage, analyzing LOC interrelations, complementarities, and associations with environmental uncertainty, management attention and organizational learning. We also contribute to expand to public sector military organizations Widener's (2007) empirical analysis through Partial Least Squares Structural Equation Modelling (PLS-SEM), Hambrick & Mason's (1984) upper echelon approach to the moderation role of military managers personal characteristics, and Deschamps' (2019) management roles association to LOC use in large public organizations. The quantitative approach is adopted in a cross-sectional study, with data collection by questionnaire from military in management functions convenient sample in Portuguese Armed Forces Services Units and subunits. Data was collected by email, and the 281 validated answers, received between May and July of 2021, represent a response rate of 30,2%. PLS-SEM is used to test Simons' LOC relations, recurring for calculations to SmartPLS software version 3.3.9 (Ringle et al., 2015). The managers perception on MCS use in military organizations identification adds to the contingency approach studies, and contributes to fill the gap between practitioners, academics, and beneficiaries of the military sector (Chenhall, 2003; Gow & Wilson, 2014; Navarro-Galera et al., 2014; Chenhall & Moers, 2015; Anessi-Pessina et al., 2016; Banks et al., 2016; Otley, 2016).

This thesis is the first to study managers perceived MCS use in military organizational setting and answers a call to contribute to fill the literature gap (Catasus & Gronlund, 2005; Navarro-Galera et al., 2014; Godinho & Gonçalves, 2020; Soares et al., 2022). The research builds upon the contingency approach (Chenhall, 2003; Malmi & Brown, 2008; Navarro-Galera et al., 2014; Grabner & Moers, 2013; Chenhall & Moers, 2015; Otley, 2016), and extant research in public sector organizations based on Simons' LOC framework (Navarro-Galera et al., 2014; Martyn et al., 2016; van der Kolk, 2019), using empirical data from a survey of Portuguese military managers. Hence, its relevancy for researchers and military managers to understand and enhance the LOC interrelations and complementarities, its associations with uncertainty, management attention, organizational learning, and individual demographics impact on management practice to improve organizational decision-making, balance of control, and communication process (Simons, 1995; Almqvist et al., 2011; Banks et al., 2016).

This dissertation suggests answers to the research questions and provide directions for future research. Firstly, the question of how military managers use LOC is tested in the base model. We investigate the association between military managers beliefs systems' perceived importance on boundary, diagnostic control, or interactive control systems. Additionally, we study if military managers perceived importance on boundary systems has positive association with the diagnostic control systems, and if there is a positive relation between the perceived interactive control systems use on diagnostic control systems use. The findings suggest that military beliefs systems have positive and significant effects on all LOC use, and that interactive MCS use also predicts positive, significant, and relevant effects on diagnostic controls use. These findings support public sector literature and suggest that military managers are using LOC to identify emergent strategies to new contexts and produce MCS structural changes, namely at the diagnostic control systems level. The base model findings also reveal low LOC use level by the military managers sample, which suggest inappropriate MCS design. We test military manager's individual characteristics moderation effects on the associations between the LOC base model relations. Upper echelon theory supports our findings, regarding age and core training, but no significant difference was found in education level or military ranks, used as proxy to management roles. The results of the older military managers sample, with the statistical mean of the sample of 44 or more years old, suggest higher interactive MCS use influence on diagnostic controls. The economic or management core training military managers subgroup reveal positive and significant higher boundary effects emphasis by beliefs systems.

Secondly, the extended model investigates LOC use relationship with environmental uncertainty, organizational learning, and management attention. We test the positive association of the perceived environmental uncertainty level with each LOC use emphasis, and the positive effect of each LOC use emphasis on organizational learning or management attention. With surprise, the findings do not suggest significant environmental uncertainty effects on LOC use. Military managers reveal that organizational learning is influenced positively by beliefs and boundaries systems, but no significant results identify interactive or diagnostic effects, which suggests poor MCS design. On the other hand, management attention effects are positive and significantly predicted by beliefs, boundary, and diagnostic MCS use. Therefore, findings suggest that MCS design in Portuguese Armed Forces Services emphasize management attention efficiency. Regarding the military managers' characteristics moderation effects on the relationship between LOC use and organizational learning, our findings support that age is relevant and significantly affects negatively organizational learning by the older military managers subgroup.

The military managers sample reveals evidence of engagement with interactive and diagnostic MCS use, emphasized by the beliefs system with positive and significant total effects on organizational learning and management attention, which suggests management alignment with the intended strategy and innovative processes are used to identify and act upon emergent strategies. Although, the lower levels of LOC use perceived by the sample, compared to relevant literature findings, suggest that the institutional MCS design may not fully comply with the current strategic directives or Government reporting requirements.

The research findings contribute to expand Simons' LOC literature MCS use research to military organizations management, and upper echelon theory, with the study of how military managers demographics influence LOC use. Scholars may build on our findings to increase military organizations management research in management control systems, and policy makers may develop regulations or policies to mitigate threats and promote strengths which we identify in military organizations management control systems use.

The empirical results of LOC use associations in military organizational setting identify LOC inter-dependencies, complementarities, and older military managers perception of MCS use significant and relevant effects on LOC relations, organizational learning, and management attention efficiency. These findings contributes to the military public sector managers, professionals and administrative, respectively with operational and economic or management core training, effectively exploit MCS use predictive effects and emphasize the LOC use to execute the intended strategy and identify emergent strategies, and consequently increase LOC use levels, promoting processes (ways) may produce changes so structure (means) follows strategy, to achieve the expected outcomes (ends) (Simons, 1995; Navarro-Galera et al., 2014; Letens et al., 2017; NATO, 2020; Soares et al., 2022).

The investigation is organized by chapters. Chapter 2 identifies Simons' LOC, MCS use in public sector, and military Defense organizations management extant research literature review. Chapter 3 presents author's ontology, epistemology, theoretical framework, and hypotheses. Chapter 4 identifies the methodology adopted to collect data and analyze information to generate knowledge. Chapter 5 and 6 identify, respectively, the base and extended model results findings. The base model tests the associations between LOC use. The extended model tests the effects of environmental uncertainty on LOC use, and the LOC use effects on organizational learning and management attention. Chapter 7 an 8 identify research limitations and the main conclusions, respectively.

2. LITERATURE REVIEW

The present literature review addresses Simons' LOC framework in MCS use research, with the purpose of identifying the public sector organizations extant literature and the MCS use in military organizations research gap. We argue in the following paragraphs the theme relevancy, and in three sections it is identified Simon's LOC framework seminal work and MCS use extant literature, MCS use research in public sector organizations built on Simon's LOC framework, and the specific military context.

MCS research focus more on the private sector, than on the public sector, leading to knowledge gaps to the latter sector organizations, and between their and between scholars and practitioners (Chenhall, 2003; Navarro-Galera et al., 2014; Chenhall & Moers, 2015; Anessi-Pessina et al., 2016; Banks et al., 2016; Otley, 2016; van der Kolk, 2019). MCS relevancy, to manage private and public sector organizations (Chenhall, 2003), is dependent on more than one management control system and their interactions to achieve their strategic goals (Simons, 1995; Abernethy & Brownell, 1997).

Public Sector extant research on MCS use supports improvement of sustainable, efficient, effective, economic, and accountable decision-making processes. This chapter aims to identify relevant research and literature gaps in public sector MCS extant literature, with military organizations as the organizational unit (e.g. Units or subunits of the Navy, Army, Air Force).

Chenhall (2003) MCS conceptualization is adopted. MCS identifies a package of control systems with associated tools, capable to provide information to support the decision-making process (Norheim-Martinsen, 2016; Otley, 2016).

The MCS use research has been a study object through different perspectives, methods, and units of study (Martyn et al., 2016; Deschamps, 2019). The literature gap in public sector Defense organizations is identified by (Godinho & Gonçalves, 2020) EBSCO database survey of peer reviewed papers, published between 2000 and 2019. Those authors found that management research represents less than 1% of the 2768 papers, with the remaining focusing on economic questions at a country level, about economic variables association with military spending or expenditure determinants and military investment expenditures. Literature review papers associated to the military organizations are rare, and their findings reveal the economic research on military expenditure and growth (Alptekin & Levine, 2012; Awaworyi Churchill & Yew, 2018; Yesilyurt & Yesilyurt, 2019), and military spending and economic activity (Emmanouilidis & Karpetis, 2020).

The lack of studies of management in military organizations is identified (Catasus & Gronlund, 2005; Godinho & Gonçalves, 2020), particularly in MCS use and how the interaction between the management control packages may improve the organizational resilience, learning, and managers accountability and their attention towards innovative processes.

MCS use and design are referred in military organizations research, but only in generic terms, and at the country or executive Government level. Jones & McCaffery (2005) refers to the importance of Robert Anthony, a seminal management control advocate and researcher, and the development of the Planning, Programming, Budgeting System, and management control in the United States of America Department of Defense, but also the system design failure to interact with other management control packages. Chwastiak (2001) and Cunha et al. (2022) reveals, historical facts of United States of America and Portugal 1960's, MCS and accounting subordination to political and power relations to support a rational for higher military spending or public funds abuse, in opposition to promote efficiency. Other authors refer to MCS as a link to strategy and a generic identification of their importance to set targets (Sedysheva, 2011), a product of the new public management requirements for new measures and types of accountability (Hood, 1995), a measurement and accountability system to legitimate the military organization more than evaluate efficiency and effectiveness (Catasus & Gronlund, 2005), an instrument to questioning outputs and performance allowing to communicate to citizens and politicians the military organizational values and outcomes (Almqvist et al., 2011), promoting transparency.

2.1. Management Control Systems and Simons' Levers of Control

Management control was defined by Anthony (1988) has a political and leadership process to achieve strategy implementation, changing its early proposed definition as a management process to efficiently and effectively obtain and use resources to achieve the organization goals (Anthony, 1965).

Far from being a well-defined construct, authors have proposed their MCS definition: a set of input, process and output controls package, formal and informal, complementarity related that interact between them to support managers in accomplishing organizational objectives by being able to capture the controls within management accounting systems, either financial related and other external and non-financial information controls (Chenhall, 2003; Chenhall & Moers, 2015); a system of packages used by managers to oversee the actions and results of employees in comparison to the strategies and goals of the organisation, excluding the systems designed solely for decision-support purpose (Malmi & Brown, 2008).

MCS are approached in a package perspective (Simons, 1995; Malmi & Brown, 2008; Grabner & Moers, 2013; van der Kolk, 2019; Gerdin, 2020), relating differently across the organizational hierarchy by managers use (Malmi & Brown, 2008; Mundy, 2010) and its complementarity (Grabner & Moers, 2013; Chenhall & Moers, 2015; Gerdin, 2020).

Studies have focused on MCS design and use (Grabner & Moers, 2013; Martyn et al., 2016; Bedford et al., 2016). Deschamps (2019) concludes that MCS design may not have the intended purpose of constraining or enabling managers' behaviors, because managers can use MCS according to their relative interests. Our research will focus on MCS use in military organizations, using Simons' LOC framework. Simons' framework is comprehensive to MCS dimensions, instruments, and roles, relating them to context and organizational strategy (van der Kolk, 2019), and considered as a major attempt to construct an approach on a wider range of controls (Otley, 2016; Martyn et al., 2016).

In an attempt to promote more comparable studies, Tessier & Otley (2012) proposed a holistic approach to unify the pluralistic definition of concepts. Their revised Simons' LOC framework pursues the goal to clarify Simons original concept definitions with the focus on the managers intentions. Tessier & Otley (2012) defined three choice levels for managers in framework: type and objectives of controls are on the first and second level; being the last level related to the managers intentions of use and role of controls and consequences associated to controls. Tessier & Otley (2012) does not introduce any measurement instruments for the concepts, leaving such assignment to future empirical research. Their framework has been adopted in public sector organizations research (Lopez-Valeiras et al., 2018; Deschamps, 2019; Cuganesan & Free, 2021), but Simons' LOC have more peer reviewed studies.

MCS term is used in this study interchangeably with other terms present in the Simons' LOC framework literature such as Management Accounting, Management Accounting Systems, Performance Management Systems (PMS), Management Control, Organization Controls, Performance Measurement and Management. Although the terms have different constructions, they refer to the same purpose as Simons proposes at different levels of instruments or systems integration, being an example of the extended application of Simons' framework (Martyn et al., 2016). PMS is proposed by Ferreira & Otley (2009) to be the overarching term to encompass all aspects of control, including MCS and informal controls. Tessier & Otley (2012) the term used is MCS to refer to the extant literature that uses Simons' LOC framework, following Chenhall (2003). Another example is present in Pilonato & Monfardini (2020, p.2) when identifies the study perspective and assumes that "PMS affects MCS as a whole", following Tessier & Otley (2012).

Simons' LOC framework is relevant in MCS use research (van der Kolk, 2019). The LOC framework allows to study how formal controls are used to achieve organization goals through balancing tensions between the beliefs, boundary, diagnostic control, and interactive control systems levers (Simons, 1995), from structured questionnaire data collected in organizational units within an activity sector (Widener, 2007; Heinicke & Guenther, 2020).

This research follows Simons' LOC original framework and Simons MCS definition, being "*the formal, information-based routines and procedures managers use to maintain or alter patterns in organizational activities*" (Simons, 1995, p.5).

Simons' LOC framework acknowledges a dynamic relation among four levers, all policed by the internal controls, and three major tensions balance between unlimited opportunity and limited attention, intended and emergent strategy, self-interest and the desire to contribute (Simons, 1995). To Simons (1995), managers use MCS as means to accomplish the strategy end state, balancing the major tensions. Formal information-based systems, such as budgets, activity plans and monitoring systems, are means to managers' ends, through finding opportunities, communicating plans and objectives, monitoring performance, and to gather knowledge and sharing it with others (Simons, 1995).

The LOC framework allows to develop exploratory studies of how formal controls are used to achieve organization goals through balancing the beliefs, boundary, diagnostic control, and interactive control systems levers tensions (Simons, 1995), collecting data in several organizational units within an activity sector with a structured questionnaire design (Widener, 2007; Heinicke & Guenther, 2020).

Simons' LOC framework groups MCS as critical levers to understand the influence of employee's behaviour for strategy change or renewal, integrating different constructs as deliberate and emergent strategies, limited attention, single and double loop learning (Simons, 1995).

Simons (1995) identifies the Beliefs Systems (BLS) as the group of MCS used to communicate core values, inspiring and directing the search for new opportunities, through mission and vision statements or other formal communication instruments. The Boundary Systems (BDS) are, within MCS, those that allows to identify risks to be avoided, presented as constraints and restrictions, setting opportunity-seeking behaviour limits and law compliance, being more used in a context of low trust and high uncertainty (Simons, 1995). This LOC is related to sanctions when compliance is not met and categorized in two boundary types (Simons, 1995): strategic, because innovation is related to increased consumption of resources; or business conduct, such as acquisition and operational guidelines to achieve a credible reputation. The Diagnostic Control Systems (DCS) are used to keep the results on track to reach intended strategy goals, monitoring effectiveness and efficiency of performance variables, recurring to key performance indicators, activity plans and reports, with the purpose to motivate, reward accomplishment and enhance the capability to act upon deviations to standards, freeing management attention. The Interactive Control Systems (ICS) are the MCS used to formulate strategic changes, pursuing process validation through making the right questions, stimulating organizational learning and the emergence of new ideas and strategies to cope with weaknesses, threats, uncertainties, and risk (Simons, 1995). These systems provide an opportunity to the managers involvement in direct contact with subordinates and their daily decision-making process, through project management, human resources development, planning or intelligence activities (Simons, 1995).

Internal control systems are not considered as part of Simons' LOC, because, although critical to ensure data integrity and as structural, staff and systems safeguards, they do not control strategy (Simons, 1995).

The first two control systems set an action envelope where managers and the organization individuals may act in conformity with the organizational strategy and values, being able to act together to state the way forward of the organization while controlling actions avoiding the *not to do* organizational listing (Simons, 1995). These LOC are identified as part of the intended MCS design to control organizational strategy (Widener, 2007; Naranjo-Gil, 2016).

While, the DCS supports and provide feedback of the intended strategy implementation, the ICS promotes the identification of emergent strategies (Simons, 1995), but are managers' individual objectives dependent (Naranjo-Gil, 2016; Deschamps, 2019).

The BLS and the ICS are viewed has a positive and motivational force, by opposition to the BDS and DCS (Simons, 1995). Both latter ones have a negative and restrictive association, denying access to resource allocation or end paths to unauthorized behaviours (Simons, 1995).

The majority of Simons' LOC framework research relates to the organizational diagnostic and interactive uses of controls (Otley, 2016; Martyn et al., 2016; Teles et al., 2019).

All LOC interact and are complementary (Simons, 1995; Widener, 2007; Oyadomari et al., 2009; Martyn et al., 2016). Top managers, in a limited attention dynamics context, may be keener to use ICS more than other management levels, due to ICS relation to strategic uncertainties and emergent strategies (Simons, 1995).

Although, top management has also been identified to give DCS more attention to control processes, and operating managers ICS preference to organize their work and improve performance (Deschamps, 2019). Empirical research, using Simons' LOC framework, have confirmed that any MCS package have potential to be used either as diagnostic or interactive control systems (Bisbe & Malagueño, 2009; Deschamps, 2019), and also identifies interactive and diagnostic simultaneous use evidence (Widener, 2007). Therefore, the difference of diagnostic or interactive MCS use is more related to managers choice than MCS design (Naranjo-Gil, 2016; Deschamps, 2019). The ambiguity in these LOC findings may be explained by the research object definition, if it is focused on the MCS as a hole, one MCS component at a time, or the ICS construct is not rigorously identified (Bisbe et al., 2007; Bisbe & Malagueño, 2009).

Management Control literature as also investigated the relationship between MCS use and individual characteristics, expanding Hambrick & Mason's (1984) upper echelon theory (Hambrick, 2007; Abatecola & Cristofaro, 2018; Teles et al., 2019).

Extant literature addresses Simons' LOC framework problematic, identifying conceptual ambiguity related to construct definitions, different concept dimensions measurement, inclusion of informal systems and managers intentions (Bisbe et al., 2007; Ferreira & Otley, 2009; Tessier & Otley, 2012; Curtis et al., 2017). An example is the lack of consensus to what ICS comprises (Otley, 2016), leading to ambiguous findings, mainly due to its theoretical properties' subsets variation in studies.

2.2. Management Control Systems use in Public Administration

Public goods are distinct (Catasus & Gronlund, 2005). The public sector managers pursue different paths than those in the private sector, as well as stakeholder's communication strategies, achieving diverse financial and economical outcomes (Robinson, 2015; Iacovino et al., 2017).

New public management approach has been the main political argument to undertake reforms to assure that public management is economic, efficient, and effective (Hood, 1991, 1995; Detomasi, 2002; Verbeeten & Speklé, 2015; Hood & Dixon, 2016; Reiter & Klenk, 2018; Esposito et al., 2018). To reach high efficiency, effectiveness and economy standards in the public sector, organizations have undertaken a reform process, from a Weberian Public Administration to new public management model (Dunleavy & Hood, 1994; Byrkjeflot et al., 2018; Bezes, 2018), adopting private sector management tools (Andrews & van de Walle, 2013; Norheim-Martinsen, 2016; Andrews et al., 2019; Lapuente & van de Walle, 2020). New public management principles have had an impact how public sector organizations communicate to politicians and citizens in general, as well as they are managed (Norheim-Martinsen, 2016). New public management reform benefits, such as decentralization and dependence on regulations and procedures, has not been associated with positive performance (Verbeeten & Speklé, 2015). Although those reforms are imposed by public law stressing efficiency and client focused services, contingencies are more likely to predict the change than the legal pressures and informal processes to assure MCS functionality (Otley, 2016; George et al., 2019).

MCS are present across the public sector organizations, either to provide support to the management decision making, strategy implementation and organizational change, as in private sector organizations (Simons, 1995; Chenhall, 2003; Heinicke & Guenther, 2020; Bracci & Tallaki, 2021), or as a communication system with the political structure of Governments (Anthony, 1965; Felício et al., 2021). The MCS may also act as an organizational change enabler through its interactive use, contributing to generate and sustain resiliency capabilities in public sector organizations, by reduction of uncertainty, organizational learning and legitimize rational decision-making (van der Kolk et al., 2015; Bracci & Tallaki, 2021).

Simons' LOC framework is a relevant investigation path to research on managers use of MCS in public sector organizations (Martyn et al., 2016; Heinicke & Guenther, 2020). We present Simons' LOC extant research on public sector organizations categorized by organizational unit function, but none relates to military organizations: public health sector (Abernethy & Brownell, 1999; Nyland & Pettersen, 2004; Naranjo-Gil & Hartmann, 2006, 2007b, 2007a; Kober et al., 2007; Østergren, 2009; Kastberg & Siverbo, 2013; Naranjo-Gil, 2016; de Harlez & Malagueño, 2016; Matsuo et al., 2021); social sector (Kominis & Dudau, 2012; Bukh & Svanholt, 2020); local administrative government or municipalities (Kloot, 1997; Batac & Carassus, 2009; van der Kolk et al., 2015; Yetano et al., 2021); higher education sector (Pettersen & Solstad, 2007; Bobe & Kober, 2020a, 2020b; Heinicke & Guenther, 2020; Pilonato & Monfardini, 2020); central government (Adhi Nugroho & Hartanti, 2019); public sector organizations mix (Nuhu et al., 2017, 2019).

Investigation that studies managers use of all four LOC allows to learn about levers interaction, complementarity, and their emphasis on each lever (Simons, 1995; Widener, 2007; Naranjo-Gil, 2016; Adhi Nugroho & Hartanti, 2019; Heinicke & Guenther, 2020;

Bukh & Svanholt, 2020). In opposition, the majority of the public sector research focus on the Interactive or Diagnostic Control Systems LOC (Kloot, 1997; Abernethy & Brownell, 1999; Nyland & Pettersen, 2004; Naranjo-Gil & Hartmann, 2006; Pettersen & Solstad, 2007; Naranjo-Gil & Hartmann, 2007a, 2007b; Kober et al., 2007; Østergren, 2009; Batac & Carassus, 2009; Kominis & Dudau, 2012; Kastberg & Siverbo, 2013; de Harlez & Malagueño, 2016; Nuhu et al., 2017, 2019; Bobe & Kober, 2020a, 2020b; Yetano et al., 2021; Matsuo et al., 2021), or using case-study design approach (Kloot, 1997; Nyland & Pettersen, 2004; Pettersen & Solstad, 2007; Kober et al., 2007; Østergren, 2009; Batac & Carassus, 2009; Kominis & Dudau, 2012; Kastberg & Siverbo, 2013; Adhi Nugroho & Hartanti, 2019; Bukh & Svanholt, 2020).

Most of the literature follows Simons' LOC framework (Martyn et al., 2016; Adhi Nugroho & Hartanti, 2019; Heinicke & Guenther, 2020; Bobe & Kober, 2020a), but other authors argument the advantages to follow Tessier & Otley (2012) revised LOC framework, because it provides unambiguous interactive and diagnostic control systems definitions and add relevant dimensions of interest to Simons' LOC (Deschamps, 2019).

Surveys are used to explore MCS use in public sector (Abernethy & Brownell, 1999; Naranjo-Gil & Hartmann, 2006, 2007a, 2007b; Naranjo-Gil, 2016; de Harlez & Malagueño, 2016; Nuhu et al., 2017, 2019; Heinicke & Guenther, 2020; Bobe & Kober, 2020a; Matsuo et al., 2021; Yetano et al., 2021); Matsuo et al., 2021; Yetano et al., 2021), allowing to study complex management practices as MCS use in the field because they are effective in capturing participants perceptions (Speklé & Widener, 2018).

The research based on empirical data identifies relevant findings in public sector organizations, but it was not possible to establish causal relations nor generalize to other organizations or context due to their limitations. We identify the following major contributions from each quantitative and qualitative empirical studies, following (Martyn et al., 2016) categorization.

2.2.1. Research based on quantitative empirical studies

The public health sector organizations research found evidence of MCS interactive use by top management, removing information hierarchical and functional barriers, and that the diagnostic or interactive use depends on manager's context or interests (Abernethy & Brownell, 1999). Building on the previous authors, Naranjo-Gil &

Hartmann (2006) found that ICS use supports cost reduction strategy, while Naranjo-Gil & Hartmann (2006, 2007a, 2007b) studies confirm Simons claim that ICS use supports innovation strategy and found positive associations between top management teams composed with health sector professionals, by opposition to top management teams with an administrative background. Naranjo-Gil (2016) concludes that manager's DCS use benefits the control and implementation of planned strategy, and manager's ICS use promotes innovation and unrestricted communication across functional and hierarchical barriers, stimulating organizational flexibility and emergent strategies. ICS use is also found to have a positive effect in hospital performance, when partnership or governance strategic priorities are high, being more relevant for top management with a clinical background than with administrative background (de Harlez & Malagueño, 2016). Harlez & Malagueño (2016) study, additionally supports that the combination of ICS use and personal background may promote MCS use in hospitals. More recent research found evidence in the health sector that MCS interactive use by middle-managers is positively associated to individual performance, promoting proactive behaviours via psychological empowerment (Matsuo et al., 2021).

In public higher education sector research, following Simons' LOC framework, Bobe & Kober (2020a) identified a positive association between female gender and interactive MCS use. The same authors found that dean organizational tenure is positively associated with ICS use (Bobe & Kober, 2020b). Heinicke & Guenther (2020) found evidence that different managers, top administration and academic deans, have distinct perceptions of MCS use emphasis at their management levels, resulting in relevant positive associations perceived by top administration between BLS, BDS and standard processes (e.g. teaching performance), and by academic deans between DCS and innovation (e.g. research performance). The last identified finding is explained by the authors as DCS is useful to promote pragmatism and increase research performance through papers publishing metrics and incentive systems.

Nuhu et al. (2017) identifies, in a mixed public sector organizations setting, evidence of positive association between ICS and DCS use and the degree to which public sector organizations increase the likelihood of adopting new public management's management accounting practices. In the same setting, it was found that ICS use stimulates organizational change, employee empowerment and strategic flexibility, coherent with Simons propositions of ICS relation to emergent strategies (Nuhu et al., 2019).

2.2.2. Research based on qualitative empirical studies

Qualitative empirical studies research findings, based on case study design approach or interviews data collection, reveal MCS use associations in specific settings.

Nyland & Pettersen (2004) findings in the health sector associate ICS use to an increase demand for managers attention, because the interactions with the operational managers to manage reveals strategic uncertainties, leading to conciliation through face-to-face informal communication. Kober et al. (2007) present evidence that emergent strategies are promoted by ICS use of MCS, enabling strategy change. The same authors identify evidence to support the two-way relationship of strategy and MCS, because MCS mechanisms change to match the new strategy (Kober et al., 2007). Therefore, Kober et al. (2007) findings validate the contingency approach (Oyadomari et al., 2009).

Even organizations in the same sector, and country, may present different MCS use patterns, preferring more the ICS or DCS use. Østergren (2009) found in one of the two health regions organizations that the focus of managers on ICS use led to a deficient knowledge on strategy and top management interpretation indications ambiguously, while in the other health region organization, the managers focused on DCS forfeited to balance the organization budgets. In other health sector organizations, it was found that the leading use of MCS is interactive, but mainly by the workforce responsible for process orientation (Kastberg & Siverbo, 2013).

Public Social sector organizations case studies have provided two major contributions. Findings indicate that DCS and ICS balance is influenced by the perceived level of uncertainty, increasing ICS confidence in a predominant uncertain environment or increased organizations interaction when DCS where more commonly used (Kominis & Dudau, 2012). Secondly, middle managers LOC use was found to be influential to top management, adjusting budget and planning to context and to tighten vertical coupling with organizational goals via empowerment and its interactive use (Bukh & Svanholt, 2020).

In local administrative government or municipalities sector research, MCS associations with organisational learning were found, being ICS use an enabler of higher levels of learning, such as adaptive or generative learning (Kloot, 1997; Batac & Carassus, 2009). Although the political rationality may prevent strategy changes promoted by ICS and organizational learning (Batac & Carassus, 2009). In line with municipalities setting, it was found that there is a strong contribution of political logics to decision making process, even in times of austerity (van der Kolk et al., 2015). Van der Kolk et al. (2015) study also reveals that Simons' LOC "positive" and "negative" balanced approach can be critical in times of austerity, allowing to mitigate negative agent-like behaviour impacts of constraining MCS use at the departmental level, as BDS and DCS, with a level of stress on the use of facilitating MCS, as are BLS and ICS. Yetano et al. (2021) also found that complementary LOC uses, DCS and ICS, promotes a balanced MCS in local government departments, and that MCS use may increase performance if fitted to the organizational context.

In public higher education sector research, Pilonato & Monfardini (2020) found, in line with Heinicke & Guenther (2020) findings, that administrative and academic key actors perceive differently the interactive use of MCS.

Adhi Nugroho & Hartanti (2019) central government sector research studied research units and found that quality information from DCS use improves budget performance and urges improvements in ICS. This finding concurs to the complementary of all four LOC (Simons, 1995; Widener, 2007; Heinicke & Guenther, 2020; Bukh & Svanholt, 2020).

In summary, extant literature adds to the growing knowledge of MCS use, identifying how it is crucial to strategy management, individual and organizational performance. Since empirical research based upon Simons' LOC in public sector organizations is scarce, even more rare if the research design is a survey or questionnaire, and none in military organizations, we propose to study military organizations in an exploratory research military managers MCS use based on Simons' LOC framework and individual's moderating role (Hambrick & Mason, 1984; Hambrick, 2007; Tessier & Otley, 2012).

Due to the military organization unique settings within the public sector, the following section will elaborate on its unique context.

2.3. Military Defense Organizations Management

The public sector encompasses the general government and all organizations and institutions that it owns, controls and are non-market producers (Eurostat, 2013, 2019). Within this framework, the general government infolds central government organizations, where the military organizations are included, such as the Branches or Services of the Armed Forces (Portugal's Armed Forces Services are by precedence the Navy, the Army, and the Air Force), their commands, institutions and departments for military capabilities training, research and development, support, foreign aid, and operational activities.

This study adopts a restrictive military organization concept, considering only the public sector organizational units integrated in the Defense sector, in the direct administration of the political executive power, namely the Commands, Units, Directorates and other military units within the Armed Forces General Staff or Services of the Armed Forces as the Army, Navy or Air Force hierarchy. To encompass these organizational units in one term, we use interchangeably the designation of military organizations, military Unit or Subunit.

The military organizations are under direct administration of their respective government, who is directly responsible, have hierarchical power and limits autonomy to administrative acts. Just a few Portuguese military organizations, as Army's provider of geographic information *Centro de Informação Geoespacial do Exércit*o, and Navy's State laboratory for the sciences and techniques of the sea Hydrographic Institute, have an administrative and financial autonomy legal nature. In opposition, most Portuguese public institutes, public higher education, public healthcare organizations and local public administrations such as municipalities have administrative and financial autonomy (Felício et al., 2021).

The military organization provides an imperfect public good, exclusive from each country (Amara, 2008; Soeters et al., 2010). As Catasus & Gronlund (2005) identified, in the military organization there is a challenge to balance budget austerity and military missions' effectiveness capabilities, more than efficiency (Mol & Beeres, 2005). Not all military organizational components are similar to other organizations, and those that are, are not all the time, hence it must operate in non-conflict context, focusing on routine and training activities when there's no need to intervein, and be fully capable of operating in conflict or quasi-conflict theatres enforcing authority (Soeters et al., 2010).

The sovereign debt crisis of 2007, and the peace context that most of the developed countries develop their Defense policies, allowed to impose austerity budgets in specific public sector areas as the Defense (Letens et al., 2017; NATO, 2020; Soares et al., 2022). New public management principles are embedded in the public sector budgeting process legal framework and evaluated by the execution and control of the appropriated budget (Beeres & Bogers, 2012b). Extant literature identifies the contingencies as the determinant of public sector organizations management tools use to achieve more efficiency and a client focus, rather than the normative and legal compliance (George et al., 2019).

Austerity budgets, and other private management tools adoption, may constrain military mission performance, investment in current or future capabilities, either by acquisition or innovative research and development (Letens et al., 2017; NATO, 2020; Soares et al., 2022). Although the same factor may have positive results on expenditure efficiency and management control (Navarro-Galera et al., 2014).

Empirically, to improve the operational response, the Defense budgets should increase over time (Letens et al., 2017; NATO, 2020; Soares et al., 2022). Military career officials, even in a context of non-aggression, promote a continuous investment in Defense capacities and training (Allison & Halperin, 1972). Although the concept of peace time is relative to any given audience, most of the countries have been engaged fighting international terrorism, in peace enforcement or peace keeping operations, directly in the field or supporting allies. Because of it, NATO allies are fighting international terrorism and other threats, supporting allies and friendly nations as a measure of collective Defense (NATO, 2019b, 2022). Therefore, 2024 NATO's political goal of increasing each country's Defense budget, at least, up to 2% of the Gross Domestic Product is in its agenda (NATO, 2019b, 2019a, 2022).

Nevertheless, military organizations are increasingly being called to manage events in local or global scenarios with high levels of uncertainty and human or economic effects, as pandemics, terrorism, immigration crisis and armed conflicts (Osinga & Lindley-

French, 2010), being relevant the association of managers MCS use perceptions on the organizational practices (Steccolini, 2018).

Command and control are traditionally more associated to mechanistic and hierarchical based organizations (Otley, 1994; Simons, 1995). In the last years, military organizations have pursued reforms to become more agile organizations, based on networking, to achieve more flexibility and faster innovation through adaptation and learning processes, as the non-military organizations (Essens et al., 2007; Eisenberg et al., 2018). To be successful in battle, military managers and commanders constantly adjust their goals and models of actuation to the reality of their environment to achieve effectiveness and maximum performance with the resources available. The concepts of uncertainty and flexibility, used in private sector research (Chenhall, 2003), are also present in the military organizations.

Military organizations do not have competitors in the private sector (Beeres et al., 2021). Military and public social sector organizations are dependent on central government financing through the State budget. Military organizations respond to politicians, citizens, and its workforce for the creation of value by the service they deliver (Navarro-Galera et al., 2014; Letens et al., 2017). Military organizations managers may staff high level organizational strategic decisions, as investments in major equipment or recruitment, but the decisions are made at a political level by the executive Government. Military managers are trained according to the best knowledge in management, both theory and practice, allowing the balance between flexible management and compliance with constraints and restrictions imposed by public law in acquisitions and budgeting. The stakeholder accountability, public accounting standards regulation and new public management principles reform imposed by the legal framework have promoted the reduction of the management gap between military and civilian organizations (Norheim-Martinsen, 2016; Gomes, 2019).

Military organizations have responsibilities to plan, control and execute budgets, make an efficient use of resources, being authorized to make commitments, expenses, and revenues through their public managers at the different levels of each military organization, within their budget allocation approved by the political executive power

(OCDE, 2019), each one of them is similar to any other organization (Norheim-Martinsen, 2016).

The above approach does not remove the political dimension of the military managers role (Soeters, 2020a), although not elected officials, are morally and financially accountable for their actions and effects, as other public sector managers (Spicer, 2015).

The public sector governance model impacts decision-making process, including MCS designs and their reasons to use it (Eckerd & Eckerd, 2017; Eckerd & Snider, 2017; Iacovino et al., 2017). Military organizations, as part of public administration, have also adopted new public management practices and tools in line with the public sector reform (Andrews & van de Walle, 2013; Norheim-Martinsen, 2016), although these public organizations are very different from others since performance and effectiveness need to be evaluated in the Defense management context (Detomasi, 2002; Beeres et al., 2010; Soeters et al., 2010; Beeres & Bogers, 2012a; Letens et al., 2017). Portugal's military organization governance model follows new public management principles, but recent findings suggest that it is the old public administration model that mainly prevails (Moreno & Gonçalves, 2021).

Public sector organizations have organizational similarities (Felício et al., 2021). Defense Units and Subunits are public sector organizations. Therefore, they must comply with public sector legal, administrative, and financial requirements. Military organizations are complex due to the presence of different human resources training areas and degrees that must coordinate processes and tasks, and the technological innovation does not reduce financial needs, having ambidextrous objectives, as public interest and sovereign assignments, respectively.

Due to the specific setting of Defense, MCS use to manage performance is complex, because military organizations performance is complex to measure (Beeres & Bogers, 2012a; Letens et al., 2017; NATO, 2020; Soares et al., 2022). As an example, management accounting information, budgets, and performance indicators hardly reveal military organizations gains and opportunity costs offset (Mol & Beeres, 2005).

Findings identified in other public sector organizations allows to posit that managers MCS use differs from their context, interests or backgrounds (Abernethy & Brownell, 1999; Naranjo-Gil & Hartmann, 2006, 2007b; Bukh & Svanholt, 2020;

Pilonato & Monfardini, 2020; Heinicke & Guenther, 2020), management roles (Kastberg & Siverbo, 2013; Heinicke & Guenther, 2020; Matsuo et al., 2021), or sex (Bobe & Kober, 2020a, 2020b). These authors studied managers' demographic characteristics association with MCS use, innovation, and performance, which was identified by Hambrick & Mason (1984) upper echelon approach, where the organizational choices and results are interpreted as consequences of top managers characteristics, experience and personality moderated by context (Hambrick, 2007), psychological and cognitive processes (Abatecola & Cristofaro, 2018). Soeters (2020b) identifies that the upper echelon approach is relevant in military studies related to control, decision-making, and organizational learning. Military managers context and personal characteristics may have a moderating role in their MCS use.

The military organizations management requires a permanent attention to achieve goals with effectiveness, while pursuing process efficiencies, especially in peacetime scenarios, being the managers individual performance evaluated leading to increasing competing and political behaviours to ascend in their career, as they increase in their organizational tenure or responsibilities (Soeters, 2020a; Beeres et al., 2021; Heeren-Bogers, 2021).

Public organizations are object of management and accounting research to explore managers MCS use (Martyn et al., 2016; Deschamps, 2019; Felício et al., 2021), but the military organizations are not (Godinho & Gonçalves, 2020), although the extant literature considers it valid and relevant for public organizations. Hence, the novelty and relevancy of the present research, building upon Simons' LOC framework to study MCS use by military managers.

The following chapter presents the research framework and hypotheses adapted to explore MCS use in military organizations setting, guiding the criteria to the data collection, sample, analysis, and discussion of the results.

3. THEORETICAL FRAMEWORK AND HYPOTHESES

The contingency theory can be approached by the systems perspective, as this is critical to study interdependences, namely when management control packages form systems (Grabner & Moers, 2013). Chenhall (2003) argues the inexistence of a contingency theory, but contingency-based research founded in organizational theory. The same argument is supported by Otley (2016), stating that it must be considered in a broader sense to include the research to identify techniques that are most suitable for an organization in a given context.

Researchers since 1980 to 2000, based their studies on contingency-based studies identifying contextual variables which potentially explain MCS design or effectiveness, not being exempt from criticisms due to their contextual genesis (Chenhall, 2003). Nevertheless, contingency-based research is widely used to explain relations between behaviour, circumstances (Otley, 1978; Kenno et al., 2018) and to study the use of management tools in public administration, identifying the context and the adaptions of practices (George et al., 2019). Therefore, we adopt the contingency-based approach to the present research.

The MCS literature absence of a Simons' LOC framework study in military organizations, identified previously, enhances the novelty of this empirical study. This investigation can provide theoretical development to management control research literature in the public sector organizations.

We posit that MCS act both as a means and as an end to modernize management techniques or instruments, fostering personal and organizational achievements and recognition (Chenhall, 2003; Malmi & Brown, 2008; Navarro-Galera et al., 2014; Deschamps, 2019). As a means, because it relates to planning and control to communicate (Simons, 1995) with the political institutions at a national Defense level, and as an end, because it adds value to each military manager as a management system to enhance decision making (Widener, 2007), with the focus on how is MCS used and not how or why it was designed (Deschamps, 2019). We build on this conceptualization to identify an answer to how do military managers perceive MCS use, exploring LOC interdependencies and complementarities moderated by managers individual characteristics that may allow managers to manage or merely comply with bureaucracy procedures.

Simons' LOC framework identifies the managing of human behaviour, value, and strategy creation tensions within organizations as the strategy implementation heart (Simons, 1995). Knowing how different levels of public management and managers balance control is critical to manage the tension between efficiency and innovation (Simons, 1995; Abernethy & Brownell, 1999; Bobe & Kober, 2020a; Heinicke & Guenther, 2020; Pilonato & Monfardini, 2020; Yetano et al., 2021), through workforce empowerment and increase of organizational resilience (Naranjo-Gil & Hartmann, 2006, 2007b; van der Kolk et al., 2015; Naranjo-Gil, 2016; Nuhu et al., 2019; Bukh & Svanholt, 2020; Matsuo et al., 2021). In public sector organizations, as in other organizations, are necessary both processes of intended strategy implementation and emergent strategy adaption, independently of a dominant hierarchical structure, due to new public management reforms (Batac & Carassus, 2009; Norheim-Martinsen, 2016; van der Kolk et al., 2020). Military organizations are hierarchical organizations and have a top-down view of the strategy making (Simons, 1995; Essens et al., 2007; Eisenberg et al., 2018).

Felício et al. (2021) conclusions call for adaptation of private sector context MCS literature to the public sector, due to its specificities. Since extant literature does not identify the perceived LOC use in military organizations, we conduct an empirical exploratory study, building on Widener (2007), Kruis et al. (2016), Heinicke & Guenther (2020), and Bobe & Kober (2020a) public sector organizations Simons' LOC MCS use research.

Firstly, we focus on the four LOC, identified in Figure 1, adapting Widener (2007) theoretical model, through the exploratory study of the four LOC association as perceived by military managers, referring as the base model. The first part of the study design aims to explore MCS use in military organizations, their interdependencies, and moderating role of managers characteristics (Hambrick & Mason, 1984; Hambrick, 2007), to answer the questions how military managers perceive MCS use (research question #1), exploring Levers of Control interdependencies and complementarities, and how ~~moderated by~~ individual characteristics, of age and core training, moderate the LOC associations (research question #2) . We expect to find inter-dependencies and complementarities within the LOC framework through the military managers perceived MCS use (Widener, 2007).

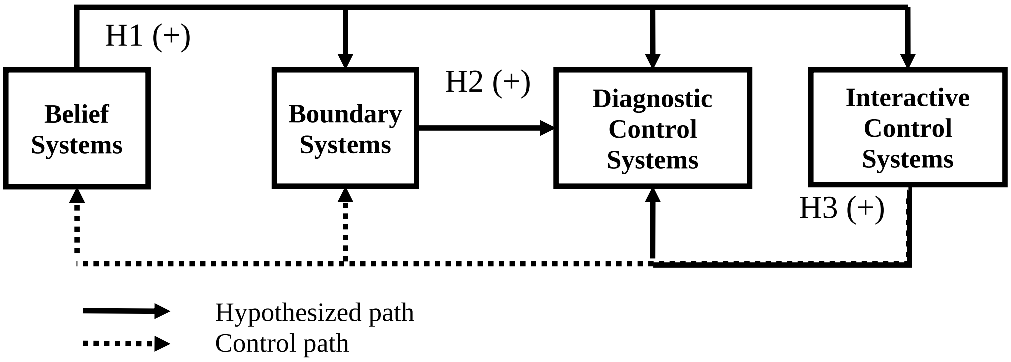


FIGURE 1- Levers of Control Base conceptual framework.

Lastly, we extend the LOC model to identify associations between environmental uncertainty and the Simons' LOC use (Kruis et al., 2016), and how the later predicts organizational learning and management attention, identified in Widener (2007), as presented in Figure 2. The extended study design has the objective to explore military managers MCS use relations with external environment to the Unit or Subunit, behavioural costs and benefits (i.e. organizational learning and management attention), and moderating role of managers characteristics (Hambrick & Mason, 1984; Hambrick, 2007). We develop three research questions to understand how environmental uncertainty impacts LOC use (research question #3), how LOC use predicts organizational learning and management attention (research question #4), and how military managers characteristics, of age and core training, moderate LOC use effects on organizational learning and management attention (research question #5). We expect to find positive significant relations between environmental uncertainty and Simons' LOC framework military managers perceived MCS use, and relevant and positive significant associations Simons' LOC use with organizational learning and management attention.

BLS in military organizations can be a keystone as in other organizations (Simons, 1995; Kruis et al., 2016; Heinicke et al., 2016), because mission and values statements provide motivation, core values and group focus on the military institutional and organizational goals. In military organizations context, the vision, mission, and core values are instrumental to lead and engage human resources, also known as soldiers or subordinates, in over and above activities, pursuing military goals to achieve national objectives of higher interest, even with sacrifice of life (Soeters, 2020a). Widener (2007) found that BLS use positively influences each of the other LOC. Other authors found similar results, identifying positive associations between the four LOC, with strong emphasis with the BLS use correlation (Heinicke et al., 2016), and a lever critical to make reforms tolerable (Pilonato & Monfardini, 2020). Therefore, we expect that the military organizations managers perceived importance on BLS have a positive association with the perceived importance they place on each LOC. The hypothesis formulated are:

H1a: The perceived importance of military managers on Beliefs System is positively associated with the perceived importance they place on the Boundary System.

H1b: The perceived importance of military managers on Beliefs System is positively associated with the perceived importance they place on the Diagnostic Control System.

H1c: The perceived importance of military managers on Beliefs System is positively associated with the perceived importance they place on the Interactive Control System.

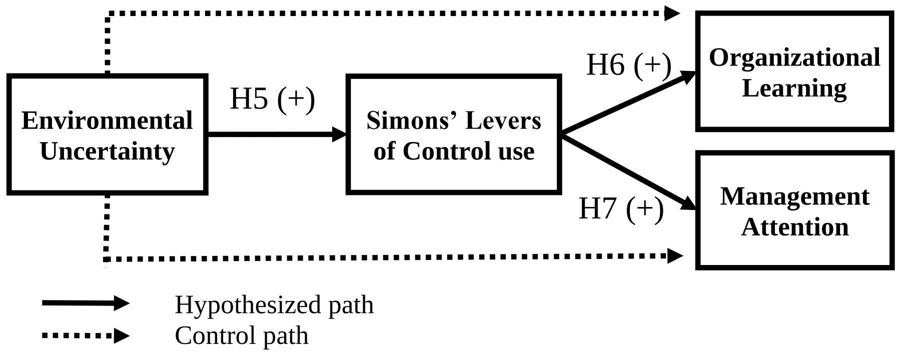


FIGURE 2 - Extended conceptual framework.

3.1. Levers of Control Base Model Hypotheses

Widener (2007) posits that a higher BDS use is positively associated with a higher DCS use, because both levers are identified by Simons (1995) to have a constraining role in the MCS. Military culture is identified to foster risk aversion and compliance with rules and procedures to their extent (Soeters et al., 2010; Koch-Bayram & Wernicke, 2018), in peace time conditions, similar to private sector managers (Amason & Mooney, 2008). It is also identified that military culture will emphasize the DCS use in order to have measures of compliance and act upon deviations (Heeren-Bogers, 2021). Hence, we hypothesize that:

H2: The perceived importance of military managers on Boundary System is positively associated with the perceived importance they place on the Diagnostic Control System.

Managers perception of emergent strategies is often associated with ICS use, being the means to organizational change of MCS, which in turn influences DCS use (Widener, 2007). The inter-dependency between ICS and DCS use of MCS, in public organization's MCS, is associated to emergent strategies identification (Kober et al., 2007; Nuhu et al., 2017; Adhi Nugroho & Hartanti, 2019), following Simons (1995) claim that it's an example of how structure follows strategy. Accordingly, we posit that the ICS use of MCS has a positive impact in DCS use of MCS, because the organizational adjustment to emergent strategies is followed with adaptations or modifications in DCS, leading to a use increase to have an effective control and communication of the new intended strategy. Thus, we hypothesize that:

H3: The perceived importance of military managers on Interactive Control System is positively associated with the perceived importance they place on the Diagnostic Control System.

MCS literature has developed on the groundwork of contingency theory presented by Otley (1980), identifying that the organizational context has impact in the MCS design and use (Chenhall, 2003; Otley, 2016). A research path for contingency-based studies is the identification of MCS use in organizations and how they impact decision-making process (Chenhall, 2003; Bisbe & Otley, 2004). The Contingency-based approach is adopted to study perceived MCS use in military organizations at an organizational level (Chenhall, 2003; Grabner & Moers, 2013; Otley, 2016).

The contextual variables organizational structure, culture, and size, identified by Chenhall (2003) are associated to influence the MCS design and outcomes, such as use or usefulness. We assume an equilibrium between context and MCS in military organizations, reinforced by the manager's institutional or political perspective (Soeters, 2020a) in their option for a given MCS use, hence its performance may be considered optimal for their context and is not studied as an independent variable (Chenhall, 2003).

We propose the absence of an effectiveness measure, as performance, because the similarities of the endogenous context between different military organizations and the unique Armed Forces organizational context, or *raison d'être*, remains unchanged when there is lack of effectiveness (Soeters et al., 2010).

Firstly, military organization's organizational structure is based on hierarchy and functional differentiation (Soeters, 2020b), which we posit that can lead to distinct perceptions due to the management level or functional perspective of the MCS use to realize the intended strategy or adapt to the emergent strategy (e.g. military ranks or core training). Military managers are aligned with the strategic objectives of their Service but operate within a level of autonomy, awarded to their Commanding Officer by the respective Service Chief of Staff, the highest military rank of the military Service, leading to an organizational unit that includes in their external environment all organizations that do not have a subordinate relation (Soeters et al., 2010; Soeters, 2020a). The need of flexibility and adaptation in a timely manner to act in changing contexts is satisfied by military organizations decentralization and a flexible culture (Soeters, 2020a).

Secondly, military managers perform in a unique context. We posit that their decision-making process and information requirements leads to identical LOC use than other activities sectors. Military managers may also moderate MCS use according to their context or characteristics (Chenhall, 2003), such as education level, professional core training, military rank group (proxy of management role), military Service (proxy of organizational culture), organizational size and age (proxy of organizational tenure). Hence, we postulate that the subunits, in their military unit, follow the private and public sector unit's management behaviour, supported by the argument that the military manager at a superior hierarchy has legitimacy to change the planned actions of its subordinates.

Portuguese military managers are trained for military operations or support military activities, and their career is influenced by their performance in each hierarchical position they assume, within an age or military core training subgroup, that can lead to influence their MCS use (Hambrick & Mason, 1984; Hambrick, 2007), as identified in public organizations (Naranjo-Gil & Hartmann, 2007b; Deschamps, 2019; Bobe & Kober, 2020b).

The upper echelon approach in MCS use research shows different results for different public settings. In public hospitals it was found a positive association between innovation and top management teams younger age, short tenure, and business educational background (Naranjo-Gil & Hartmann, 2007b), which supports that a higher tenure can be associated with higher inertia to change or lower innovation capability. On the other hand, in public higher education, Bobe & Kober (2020b) reveals that longer tenure is positively associated with dean's higher ICS use, but less motivated to change to new public management managerialism MCS use through higher DCS use. In military organization's setting, organizational tenure (mean = 24,7; standard deviation = 9,2) and age (mean = 44,5; standard deviation = 8,8) have a perfect correlation, as supported by the military managers sample results (0,933; $p < 0{,}001$). This may be explained because in Portuguese military context the contract with career military personnel is made at younger ages and there is no candidates admission with more than 27 years old.

Different MCS use perceptions may be present according to the manager characteristics within military organizations, as identified by Heinicke & Guenther (2020) and Deschamps (2019) in public sector organizations, and towards more organic or mechanistic controls with a more intense MCS use of ICS or DCS, respectively (Chenhall, 2003). MCS design to enable or constrain behaviours aims to align managers decisions with organizational strategy and goals, but managers are motivated to achieve their personal needs and objectives, therefore, depending on their management role, education, training, or age they can decide to use MCS in a different intent from its original design (Deschamps, 2019).

Manager's core training is related to Simons' LOC use, but there is no consensual result. Managers who are professionals, as medics in hospitals, are found to emphasize ICS use in opposition to DCS use, which is preferred by administrative managers, with business or management educational background (Naranjo-Gil & Hartmann, 2006, 2007b). We also find evidence of opposite conclusions regarding age and organizational tenure. The ICS use is positively associated either to older or more experienced managers (Bobe & Kober, 2020b), as is positively related to younger managers or with lower tenure (Naranjo-Gil & Hartmann, 2007b).

We posit the LOC use can be perceived differently by military managers, either due to their age or core training (Hambrick & Mason, 1984; Hambrick, 2007; Naranjo-Gil & Hartmann, 2006; Tessier & Otley, 2012; Heinicke & Guenther, 2020; Bobe & Kober, 2020a), which can moderate MCS use, as in Figure 3. We also test the model robustness with military manager's military ranks, as a proxy for management role, and education levels.

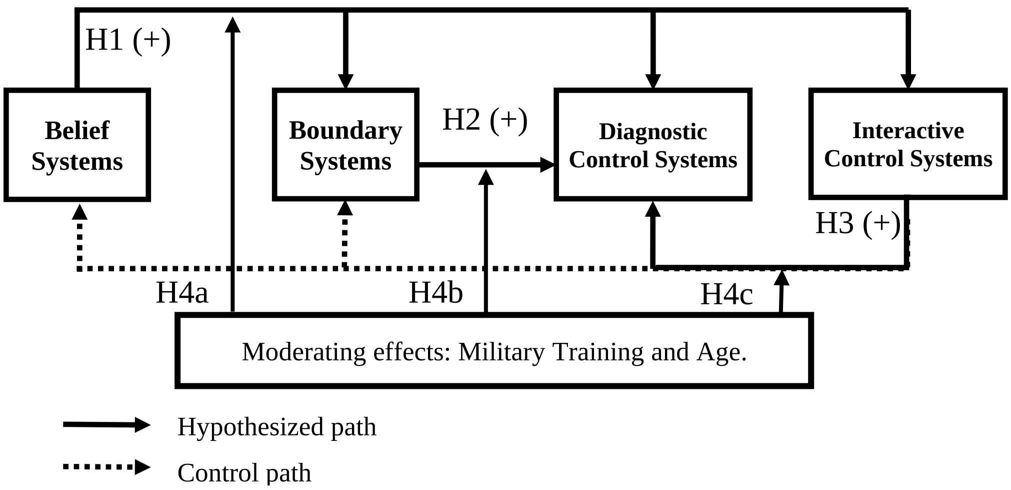


FIGURE 3 - Levers of Control conceptual framework with moderating effects.

We argue that the association between each LOC perceived use can be moderated by the military manager's characteristics. We identify four pairs of military manager's characteristics context groups eligible for comparison through multigroup analysis (MGA): operational training by opposition to those who have non-operational training; management training by opposition to those who have non-management training; operational training by opposition to those who have management training; military managers that are with 44 years old or more by opposition to those who have less than 44 years old.

We posit that managers with operational core training or older military may be more effectiveness oriented, thus favouring organic controls in ICS. And those with non-operational core training or younger can be more focused on efficiency, preferring mechanistic controls as DCS.

The identified arguments allow to hypothesize that:

H4a: The association between Beliefs Systems and the other LOC is moderated by the military manager's individual characteristics of age or military core training.

H4b: The association between Boundary Systems and Diagnostic Control Systems use is moderated by the military manager's individual characteristics of age or military core training.

H4c: The association between Interactive Control Systems and Diagnostic Control Systems use is moderated by the military manager's individual characteristics of age or military core training.

In resume, hypotheses #1, #2, and #3 will investigate answers to research question #1, and hypothesis #4 is related to study answers to research question #2.

3.2. Extended Model Hypotheses

Simons' LOC framework extant research support that organizational intended and emergent strategy can benefit from a balanced use of the MCS levers (Simons, 1995; Martyn et al., 2016; Heinicke & Guenther, 2020).

We follow Widener (2007) approach to study how military managers perceive environmental uncertainty contingency variable association to BLS, BDS, DCS, and ICS use, and those LOC use relationship with management attention efficiency and organizational learning in the military organization context. Environmental uncertainty association with the LOC use allows to analyze a contingency precursor to the necessity of control systems use in military organizations settings. Management attention and organizational learning association with the LOC use allows to investigate control systems use consequences, in terms of benefits (positive) and costs (negative) effects on organizational learning or management attention efficiency, respectively. The extended model theoretical framework is identified in Figure 4.

Military organizations operate in high uncertainty environments, even in peace time conditions, with necessity to permanently identify potential national Defense strategic geo-political risk and threat levels, as well as dual-use opportunities to employ their resources and skills in humanitarian aid missions (Osinga & Lindley-French, 2010; Soeters, 2020a). The contingency approach management studies support that MCS use emphasis are associated to the environmental uncertainty level (Chenhall, 2003). Military managers operate in complex organizational setting and scenarios, which may lead to a search for rational decision-making processes by commanders, chiefs, or directors, in particular when in wartime more than in peacetime, where the mission goals are more objective and unambiguous (Soeters, 2020b). Extant literature reveals that military managers have to conciliate elected politicians' politics with their behavioral dynamics and personal characteristics, which can have significant effects on decision-making (Hambrick & Mason, 1984; March & Weissinger-Baylon, 1986; March, 1994; Mintz, 2004; Vennesson & Huan, 2018; Soeters, 2020b).

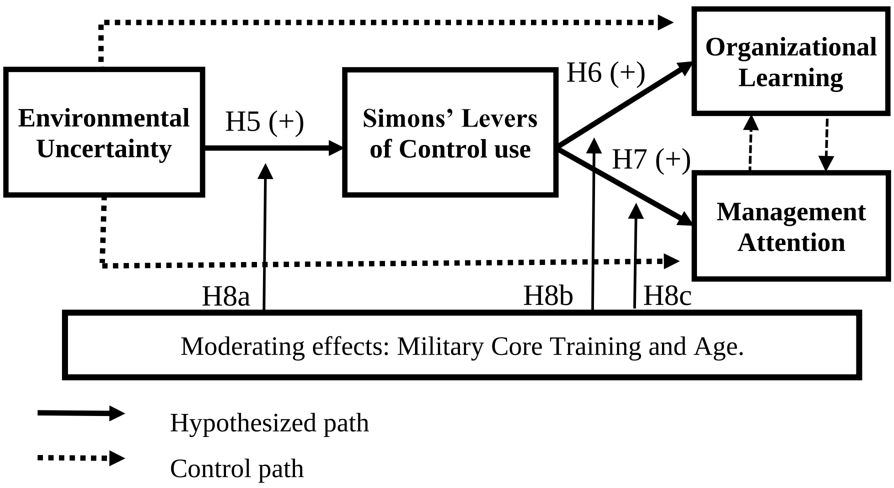


FIGURE 4 - Extended model conceptual framework with moderating effects.

The LOC framework is influenced by contingency variables and influences the organizations performance (Chenhall, 2003; Widener, 2007). Uncertainty is identified as an environmental variable (Simons, 1995). Uncertainty is positively related to the differences between managers' known and expected information (Galbraith, 1973). The uncertainty theme is a construct present in Simons (1995) analysis, identified as strategic uncertainties and controlled by the ICS, with the later promoting organizational learning. Strategic uncertainties are managers' mental construction of contingencies that may undermine intended strategy assumptions (Simons, 1995). Hence, the environmental uncertainty is the construct that capture Simons' conceptualization.

Widener (2007) argues that strategic uncertainty and risk are associated to MCS use and finds support to argue that it affects positively BLS and DCS use emphasis. Kominis & Dudau (2012) conclude that public organizations that operate in high environmental uncertainty context may emphasize ICS use.

We posit that environmental uncertainty in military organizations positively increases each of the LOC use emphasis to improve the vision, core values, and mission communication, employee's opportunity-seeking behaviour boundaries, management control through accurate diagnostic and interactive control use. Therefore, we hypothesize the following:

H5a: The environmental uncertainty perceived is positively associated with military managers Beliefs System use emphasis.

H5b: The environmental uncertainty perceived is positively associated with military managers Boundary System use emphasis.

H5c: The environmental uncertainty perceived is positively associated with military managers Diagnostic Control System use emphasis.

H5d: The environmental uncertainty perceived is positively associated with military managers Interactive Control System use emphasis.

Military organizational setting operates in dynamic contexts, either by change in national Defense risk and threat assessment, as previously presented, or by political or policies changes related to military funding, recruitment, or organic structures. The military organization may be an example of management controls importance in supporting change and generative organizational learning (Kloot, 1997).

We posit that military organizations have always been prone to promote actively a generative organizational learning culture, mainly through action review as in high reliable organizations, due to the specific context and setting that they operate to survive and adapt to constant context changes (Bijlsma et al., 2010; Hedlund et al., 2015; Benner et al., 2017; Soeters, 2020b). We identify (Kloot, 1997) double loop learning essential elements present within Portuguese Armed Forces management strategy (Diretiva Estratégica do Estado-Maior-General das Forças Armadas 2021-2023; Diretiva Estratégica da Marinha 2022; Diretiva Estratégica do Exército 2022-2023; Diretiva Estratégica da Força Aérea 2022-2025), namely: the available and appropriate accounting information with Portugal's Ministry of Defense SAP management integrated system; New Public Management measurement systems to control performance; reward systems either to military or civilian personnel; interactive decision-making processes with pluralistic and heterogeneity characteristics; continuous personnel training and development initiatives; strategic planning by the Ministry of Defense, with involvement of the Armed Forces General Staff and Service Staff structures; and the shared Portuguese

Armed Forces military vision and core values that induce high standards of effectiveness, quality, efficiency and economy throughout the organizational processes.

We identify differences between business and military strategy, operational and tactical management concepts. Both areas share strategy identical conceptualization, but they differ on the lower levels. While in business, the tactical level follows strategic level and overarches the operational level. In military doctrine, the operational level precedes tactical level (Osinga & Lindley-French, 2010; Soeters, 2020a). For Simons (1995), organizational learning is sandwiched between the tactical and strategic decision level, in business context.

Military organizations, as other organizations, need to adapt to the context and generate innovation to improve performance through organizational learning (Argyris, 1977, 1999, 2004; Simons, 1995; Bijlsma et al., 2010; Catino & Patriotta, 2013; Antal et al., 2017; Benner et al., 2017; Soeters, 2020a, 2020b). Control systems may stimulate adaptative and generative learning (Kloot, 1997). Within military organizations there is a learning culture that may differ from the remaining public sector, leading to use all information and knowledge in debrief sessions of missions, projects, or tasks to key participants with the aim to learn from the success, failures, incidents, or accidents that are identified (Bijlsma et al., 2010; Soeters, 2020b). The managerialist approach in military organizations management can influence the control systems impact on organizational learning, and its impact on processes or goal's changes, respectively through adaptive or generative learning. Although the balance between military organizations management and political decision-making rationales, may not emphasize organizational learning by MCS use due, as identified by Batac & Carassus (2009) within municipalities.

Management formal controls use emphases are positively associated with organizational learning (Simons, 1995; Kloot, 1997; Widener, 2007). Extant literature findings reveal different relations between organizational learning and Simons' LOC. ICS is identified to be a double loop or generative learning mechanism, where organizational learning emphasis is positively associated to ICS use (Argyris, 1977; Simons, 1995; Abernethy & Brownell, 1999; Henri, 2006; Batac & Carassus, 2009). Widener (2007) identifies a positive association between organizational learning with BLS and DCS, while Henri (2006) found a negative association with DCS use.

We posit that military managers emphasis on Simon's LOC are positively associated to Organizational Learning. Therefore, the discussion above supports the hypotheses below identified:

H6a: The military managers emphasis on Beliefs Systems use is positively associated with the military Organizational Learning level.

H6b: The military managers emphasis on Boundary Systems use is positively associated with the military Organizational Learning level.

H6c: The military managers emphasis on Diagnostic Control Systems use is positively associated with the military Organizational Learning level.

H6d: The military managers emphasis on Interactive Control Systems use is positively associated with the military Organizational Learning level.

Concerning management attention construct, it is considered a limited resource, by opposition to opportunities (Simons, 1995). Simons (1995) claim that this manager's capability should be used to focus on the interactive analysis of strategic uncertainties that may impact performance, in search of courses of action that capacitate the organization to maintain or increase competitive advantages.

Managers must choose how and when management attention is allocated. Interactive controls are management attention consumers (Simons, 1995; Widener, 2007), but are also attention enhancers, when their emphasis impact emphasize management focus on strategic areas where uncertainty is higher (Simons, 1995). On the other hand, diagnostic control contributes to free management attention, due to their ability to monitor results (Simons, 1995). Simons' LOC facilitates organizational tensions balance and managers empowerment, although the later should not result in less control, but in improved control of processes and outcomes (Simons, 1995). Military managers face the management dilemma, identical to other public sector or business managers, of balancing the cost of management attention use to transform control systems information in knowledge versus the time available to manage all situations (Widener, 2007; Soeters, 2020a, 2020b). Widener (2007) identifies that managers' BLS and DCS use are positively associated with management attention efficiency, and ICS use reveals to be a management attention consumer with negative association results.

We posit that the military managers emphasis on Simons' LOC impact positively management attention efficiency because military organizations promote decision-makers focus engagement on relevant threats or opportunities and respective action models, even with low information available and higher levels of uncertainty. Therefore, all control systems facilitate military managers focus and can have a positive effect on management attention efficiency, including interactive controls, supporting the following hypothesis:

H7a: The military managers emphasis on Beliefs Systems use is positively associated with management attention efficiency.

H7b: The military managers emphasis on Boundary Systems use is positively associated with management attention efficiency.

H7c: The military managers emphasis on Diagnostic Control Systems use is positively associated with management attention efficiency.

H7d: The military managers emphasis on Interactive Control Systems use is positively associated with management attention efficiency.

Lastly, regarding the environmental uncertainty effect on each LOC, and LOC effects on organizational learning and management attention constructs, we posit that they may be perceived differently by military manager's personal characteristics, either due to their age or core training (Hambrick & Mason, 1984; Hambrick, 2007; Naranjo-Gil & Hartmann, 2006; Tessier & Otley, 2012; Deschamps, 2019; Heinicke & Guenther, 2020; Bobe & Kober, 2020b). Identical to the base model assumptions, military core training and age are tested to analyse, through PLS-SEM multigroup analysis, their impact on the association between environmental uncertainty exogenous constructs and each Simons' LOC, and between the later and organizational learning and management attention endogenous constructs (Figure 4). Therefore, we hypothesize that:

H8a: The association between Environmental Uncertainty and each LOC is moderated by the military manager's individual characteristics of age or military core training.

H8b: The association between each LOC and Organizational Learning is moderated by the military manager's individual characteristics of age or military core training.

H8c: The association between each LOC and Management Attention is moderated by the military manager's individual characteristics of age or military core training.

The four pairs of military core training and age groups identified previously are compared through PLS-SEM multigroup analysis: operational training by opposition to those who have non-operational training; management training by opposition to those who have non-management training; operational training by opposition to those who have management training; military managers that are with 44 years old or more by opposition to those who are with 43 years old or less. Additionally, we analyse the model with PLS-SEM multigroup analysis to test model robustness with military manager's education levels and military rank groups, as a proxy for management role.

In resume, hypothesis #5 is formulated to pursue answers to research question #3, hypotheses #6 and #7 to research question #4, and hypothesis #8 is related to study answers to research question #5.

4. METHODOLOGY AND DATA

The researcher ontology assumption regarding the unit of analysis, the military organization, is that they are complex organizations and poor communicators by comparison to their stakeholders, namely the politicians and mass media influencers. The epistemological assumption is founded in the stakeholder's shared knowledge, which enhances the added value of individual's experience and environmental interpretation. It is the researcher assumption that the reality of the practice reveals more about the organization than the theory, as argued by Merchant & Otley (2020).

The contingency theory approach (Grabner & Moers, 2013; George et al., 2019) is adopted to study MCS use in military organizations.

The organizational unit of study is the military organization within Portugal's Ministry of Defense organic, their military Services or Branches as General Staff of the Armed Forces, Navy, Army, and Air Force. The military organization is defined as being the military Commands, Units or Services, including Directorates, General Secretariats, Institutes, or other military administrative entity, under the political responsibility of the respective Defense sector executive Government in which the manager has administrative authority over a set of tasks and processes of the unit to plan, control and execute expenses and revenues allocated by State or Federal Budget (Speklé & Verbeeten, 2014). The "*Commanders, Chiefs or Directors*" is a phrase generically used in the survey to refer to the person responsible for the operational and financial control management of a military Unit or Subunit, presented as "*(Sub)Unit*".

The objetive is to identify how MCS use is perceived by managers in military organizations setting, applying Simons' LOC framework, their relations and interdependencies, and association with environmental uncertaintanty, management attention and organizational learning.

The sample of 281 of 930 (30,2% response rate), with valid survey answers, was collected between May and July 2021, from Portuguese military organizations.

To test associations and relate survey results we identify relations between MCS and demographics (Ittner, 2018; Verbeeten & Speklé, 2015; Andrews et al., 2019). Table I and Table II presents the sample descriptive statistics.

TABLE I- Descriptive statistics for respondents (qualitative data).

	Respondents (%)
Portugal's MOD Service	279 (99,29)
Navy	66 (23,49)
Army	77 (27,40)
Air Force	124 (44,13)
General Staff of the Armed Forces	12 (4,27)
Military NATO Coded Ranks	281 (100,00)
General Officer, Senior or Field Grade Officer	123 (43,77)
Junior Officer	73 (25,98)
Non-Officer Personnel	85 (30,25)
Sex	281 (100,00)
Female	28 (9,96)
Male	249 (88,61)
Prefers not to answer	4 (1,42)
Education Level	281 (100,00)
Non-University level	66 (23,49)
University level - Bachelor or Degree	113 (40,21)
University level – Master or Doctorate (PhD)	102 (36,30)
Education Core Training	281 (100,00)
Operations	129 (45,91)
Economics, Management, Public Administration, Accounting or Finance	62 (22,06)
Engineering	53 (18,86)
Others	37 (13,17)

Early and late respondents' answers for all constructs were compared, based on the survey completion date, and there are no statistically significant differences. It is the researcher assumption that the sample is sufficiently similar to the target population (Speklé & Widener, 2018).

We tested all constructs for validity and reliability, and their relevancy according to extant literature. To test associations and relate survey results, we identify relations between MCS and demographics with robustness and rigor (Ittner, 2018; Verbeeten & Speklé, 2015; Andrews et al., 2019).

TABLE II - Descriptive statistics for respondents (quantitative data).

	Respondents (%)	Mean	Min.	Max.	Std. Dev.
Age	281 (100,00)	44,47	24	63	8,83
Less than 30 years old	17 (6,05)	26.65	24	29	1,66
From 30 to 39 years old	66 (23,49)	35,24	30	39	2,92
From 40 to 49 years old	100 (35,59)	44,48	40	49	2,77
More than 49 years old	98 (34,88)	53,78	50	63	3,16
MDO Tenure	279 (99,29)	24,66	1	42	9,23
Years in function	280 (99,64)	3,19	0	14	2,69
MDO Size (workforce number)	278 (98,93)	28,17	1	2345	153,22
Log MDO Size (workforce number)	278 (98,93)	0,67	0	3,37	0,64
Size (number of subordinates)	278 (98,93)	5,07	0	200	14,59
Log Size (number of subordinates)	278 (98,93)	1,12	0	5,3	1,03

4.1. Data and Sampling

The methodological choice follows an exploratory approach using an online survey, to collect cross-sectional data through a structured questionnaire (Dillan et al., 2014), targeting top, middle and operational military managers. The survey is considered a valid option to collect information on participants MCS perceptions and to provide data of current practices related to unstudied topics in complex organizational setting (Speklé & Widener, 2018), as is the military organizations. The survey instrument to collect data is used by MCS literature research to explore relations between Simons' LOC and other organizational elements (Martyn et al., 2016; Kruis et al., 2016; Naranjo-Gil, 2016; Nuhu et al., 2019; Heinicke & Guenther, 2020; Bobe & Kober, 2020a). We follow the extant literature which use an adapts Widener (2007) and Naranjo-Gil & Hartmann (2006, 2007b) survey instrument (Henri, 2006; Kruis et al., 2016; Naranjo-Gil, 2016; Adhi Nugroho & Hartanti, 2019; Heinicke & Guenther, 2020; Bobe & Kober, 2020a), allowing to compare results with different organizational settings.

The survey is divided in two parts: identification of the participant and MCS use. All questions related to MCS use are measured on a seven-point Likert scale. The participants identification section allows to aggregate respondents into professional categories and accordingly to their individual characteristics. The survey measures participants perceptions and opinions.

The MCS use analysis is based on Simons' LOC framework, collecting cross-sectional data, in Portugal's military organizations, directed at military managers, discarding civilians and non-officer ranks below OR-7 military equivalent NATO rank codes, to enhance the potential to compare results.

The convenience population of 930 Portuguese military managers are subordinate to the General Staff of the Armed Forces, Navy, Army, and Air Force. The 930 managers are eligible Portugal's Armed Forces Services cost centres workforce, responsible for contributing to organizational goals and budget planning, execution, control, and report to upper echelons, through the management of subordinate teams, activities, and budgets. The survey participants eligibility requirements are their rank, current management functions in a cost centre, in opposition to a deployed operational (sub)unit, with at least one hierarchical superior, and demonstrated their consent to participate in this study. The rank criteria includes all Officers ranks and the three higher non-Commissioned Officers ranks, who have management functions in military organizations, considering the military equivalent NATO all rank codes for Officers (OF) and rank codes from 7 to 9 for non-Commissioned Officers (OR), as coded: Officers, from OF-1 to OF-9 (General officer: OF-6 to OF-9; Senior officer: OF-3 to OF-5; Junior officer: OF-1 to OF-2); Non-Officers Personnel, from OR-7 to OR-9. The 281 respondents sample allows to test the theory (Speklé & Widener, 2018) of interdependency and complementarity of the LOC in military organizations setting, because the target population has management functions in Portuguese Armed Forces, distributed by different Services, Units levels, core training and military rank. It was considered sample prototypicality and relevancy (Landers & Behrend, 2015; Speklé & Widener, 2018), because military managers are the population that will more likely use MCS in their functions, in opposition to military operational personnel, and the manager sample is defined in the same way as membership in the population. We reason that the sample is at least revealing of contemporary MCS use in Portugal's military organizations.

The questions used are adapted from extant literature to measure managers perceived MCS use under Simons' LOC framework, considered relevant to study organizations that do not have monetary incentives (van der Kolk, 2019). The LOC questionnaire is based on BLS, BDS, DCS and ICS reflexive constructs, with extant literature validated items (Naranjo-Gil & Hartmann, 2006; Widener, 2007; Kruis et al., 2016; Heinicke & Guenther, 2020; Bobe & Kober, 2020a). The environmental uncertainty, organizational learning, and management attention are reflexive constructs. Environmental uncertainty is adapted from Kruis et al. (2016), and organizational learning and management attention are adapted from Widener (2007).

Because the items were originally in English, they were translated to Portuguese, from Portuguese to English, and English to Portuguese to validate translation of constructs and interpretation of questions, recurring to three independent researchers.

A survey pre-test was conducted in April and May 2021 with seven experts: four Portuguese military managers, with accounting or operational training, and three management scholars. The pre-test provided information to make minor wording adaptions for clarity, ambiguity, and face validity, without altering survey constructs or validity, and to improve constructs comprehension, adding examples previously to the questions. After revision, a request was sent to the Air Force Chief of Staff to obtain authorization to send an email with a cover letter and the questionnaire link to the Portuguese MOD managers target population.

The email was adopted as distribution method, being delivered through the Portuguese Armed Forces Services to the participants institutional email box. To increase response rates, we pledged to the participants an executive summary of the global results and sent one follow-up email, at the 30th day. All participants that completed the survey are relevant if internal validity is met. The mailing process provided a response rate of 30,2% (281 responses), starting with the first response on May 24th and ending on August 18th of 2021. Similar studies have presented response rates from 12,5% to 55.2% (Widener, 2007; Nuhu et al., 2019; Heinicke & Guenther, 2020; Bobe & Kober, 2020a; Matsuo et al., 2021).

Based on completion date, all survey constructs are compared between early and late respondents. We identify early respondents those who completed the survey before the follow-up reminder, and the remaining are identified as late respondents. Non-response bias analysis is based on the similarities of non-respondents and late respondents results (Armstrong & Overton, 1977). Table III compares distribution and means of the early and last responses for all items (Oppenheim, 1992). We found in Panel A of Table III that there are no significant differences (p > 0,05), using the Mann–Whitney U test, in demographic variables. Panel B of Table III reveals that constructs means differences of early respondents to late respondents are not statistically significant, supporting evidence of absence of significant bias between early respondents and late respondents (Armstrong & Overton, 1977) in five of seven constructs.

We find organizational learning (U = 3682; p = 0,022) and management attention (U = 3720; p = 0,017) constructs means distribution difference is statistically significant, in Panel B of Table III, which may indicate possible bias evidence between early and late respondents. We perform distribution robustness tests analysis, removing the 22 late observations from the 281 valid observations. We identify that the 259 subsample results reveal identical PLS-SEM path and R^2 values compared to the 281 sample findings. We find the non-response bias is not significant at 5% level. Therefore, the 281 observations sample are used to estimate PLS-SEM models, analyse, and discuss results.

Common method bias is evaluated by a Harman's one-factor test on the 18 survey questions used to form the Levers of Control constructs (eigenvalues > 1.0) and results show evidence the first component explains 44,5% of the variance, relative to the base model.

The extended model has 29 questions, with the additional 11 questions for the environmental uncertainty, organizational learning, and management attention constructs. We find through Harman's one-factor common method bias test (eigenvalues > 1.0), that the extended model results reveal that first component explains 35% of the variance, reducing the base model value.

Social desirability bias was considered in the survey pre-test and explanatory notes were added in the cover letter and before questions, reinforcing the anonymity and that there are no right or wrong answers. Halo effect was addressed with the identification of the convenience population and with preamble to the survey construct questions, finetuned after the survey pre-test. In line with (Speklé & Widener, 2018), we consider the results show evidence of a low risk of potential social desirability and halo bias.

TABLE III - Tests of Non-Response Bias.

Panel A: MDO managers variables comparison[(a)].

	Early respondents (N)	Late respondents (N)	Mann–Whitney U test
Rank category	2,65 (259)	2,38 (22)	Z = -0,890, *p* = 0,373
Age	44,68 (259)	42,09 (22)	Z = -1,492, *p* = 0,136
Education level	2,12 (259)	2,18 (22)	Z = -0,415, *p* = 0,678
MDO tenure	24,88 (257)	22,00 (22)	Z = -1,650, *p* = 0,099
Years in function	3,23 (259)	2,74 (22)	Z = -1,550, *p* = 0,121
MDO Size Workforce (Log)	0,67 (257)	0,67 (21)	Z = -0,189, *p* = 0,850
MDO Size Manager Subordinates (Log)	1,11 (257)	1,33 (21)	Z = -0,992, *p* = 0,321

Panel B: Constructs comparison[(b)].

	Early respondents (N=259)	Late respondents (N= 22)	Mann–Whitney U test
Beliefs Systems Controls	4,73	4,93	Z = -0,689, *p* = 0,491
Boundary Systems Controls	4,96	5,05	Z = -0,259, *p* = 0,795
Diagnostic Control Systems	4,21	4,63	Z = -1,234, *p* = 0,217
Interactive Control Systems	4,16	4,70	Z = -1,463, *p* = 0,144
Environmental Uncertainty	5,24	5,36	Z = -0,491, *p* = 0,623
Organizational Learning	5,42	6,01	**Z = -2,284, *p* = 0,022**
Management Attention	4,08	4,74	**Z = -2,384, *p* = 0,017**

[(a)] The table shows the managers characteristics variable means of the early and late respondents of our sample.
[(b)] The table shows the construct means of the early and late respondents of our sample.

We also consider the multitrait matrix, presented in Table IV and Table V, identifying correlation among constructs, being all under 0,9 can support that common method bias is not an issue in our survey results (Bagozzi et al., 1991; Tehseen et al., 2017). Hence, it supports absence of significant single-source bias (Podsakoff et al., 2003).

4.2. Variables Measures

The MCS use in the Simons' LOC framework perspective literature was exhaustively reviewed to specify the appropriate domains. We used questions validated by extant literature with minor adaptations to military organizations setting. The topic was discussed with accounting and management scholars and military managers to improve knowledge on the domain. The survey pre-test with scholars and military accounting and operational background managers allowed to review the questions for face validity. The abbreviated survey version is presented in Table VI and Table VII, respectively for base model LOC constructs and extended model additional constructs, and the complete questionnaire in English and Portuguese in appendix B.

TABLE IV - Multitrait Matrix for Model Constructs.

	1	2	3	4	5	6	7
Beliefs Systems (1)	0,857						
Boundary Systems (2)	**0,577*** **	0,753					
Diagnostic Control Systems (3)	**0,416*** **	**0,335*** **	0,850				
Interactive Control Systems (4)	**0,413*** **	**0,317*** **	**0,838*** **	0,850			
Environmental Uncertainty (5)	-0,105	-0,103	-0,079	-0,069	0,809		
Organizational Learning (6)	**0,490*** **	**0,370*** **	**0,318*** **	**0,359*** **	-0,029	0,840	
Management Attention (7)	**0,452*** **	**0,372*** **	**0,521*** **	**0,499*** **	-0,135	**0,334*** **	0,874

The diagonal of the matrix is the square root of average variance extracted for each variable, following the Fornell-Larcker criterion.
The remainder of the table reports the bivariate Pearson correlation coefficients.
*, **, *** significant at *p*<0,1, *p*<0,05 and *p*<0,001, respectively (two-tailed significance).

4.3. Levers of Control

We measure the extent military managers perceive each of the four Simons' LOC use. Simons' LOC framework BLS, BDS, DCS and ICS constructs are measured reflectively, following Naranjo-Gil & Hartmann (2006) and Widener (2007).

The BLS and BDS are measured using Widener (2007) four items construct respectively for each LOC, BLS_USE and BDS_USE, with minor wording adaption to the military organizations, validated by extant literature (Kruis et al., 2016; Heinicke & Guenther, 2020). Firm was replaced by military organization, organization by unit, top managers replaced by the commanders, chiefs or directors, and code of business conduct by internal regulation or regulation. The latter change follows (Heinicke & Guenther, 2020), and top managers expression replacement by commanders, chiefs or directors is more adjusted to military organizations context because they are the functions designators for the operational and financial control responsible of a military (Sub)Unit (e.g. Military Staff, Centres, Services, Directorates, Corps, Military Academies, Operational Base Units, or their subunits).

TABLE V - Multitrait matrix with PLS-SEM Control Variables.

	1	2	3	4	5	6	7	8	9	10
Constructs										
Beliefs Systems (1)	0,857									
Boundary Systems (2)	**0,577*** **	0,753								
Diagnostic Control Systems (3)	**0,416*** **	**0,335*** **	0,850							
Interactive Control Systems (4)	**0,413*** **	**0,317*** **	**0,838*** **	0,850						
Environmental Uncertainty (5)	-0,105	-0,103	-0,079	-0,069	0,809					
Organizational Learning (6)	**0,490*** **	**0,370*** **	**0,318*** **	**0,359*** **	-0,029	0,840				
Management Attention (7)	**0,452*** **	**0,372*** **	**0,521*** **	**0,499*** **	-0,135	**0,334*** **	0,874			
Control Variables										
Service Navy [a] (8)	0,085	0,038	0,016	0,053	-0,035	**0,120** **	0,025	n/a		
Service Army [b] (9)	-0,088	0,036	-0,101	**-0,170** **	0,030	**-0,218*** **	-0,071	**-0,344*** **	n/a	
Size (Log) [c] (10)	0,054	0,119*	**0,125** **	**0,158** **	0,121*	0,060	-0,088	-0,010	0,058	n/a

The diagonal of the matrix is the square root of average variance extracted for each variable, following the Fornell-Larcker criterion. The remainder of the tables reports the bivariate Pearson correlation coefficients.
[a] Service Navy is a dummy variable (i.e. 1 for Navy and 0 for others).
[b] Service Army is a dummy variable (i.e. 1 for Army and 0 for others).
[c] Size (LOG) is the log transformation variable of the variable SIZE.
*, **, *** significant at p<0,1, p<0,05 and p<0,001, respectively (two-tailed significance).

DCS and ICS are studied to assess the MCS use by Portugal's Armed Forces, instead of the use of performance systems, following (Heinicke & Guenther, 2020). Minor word adjustments changed the original DCS and ICS questions to fit military organizations and public sector settings after pre-test revision and literature review. We replaced management accounting system, present in (Naranjo-Gil & Hartmann, 2006), by MCS. We also replaced (Naranjo-Gil & Hartmann, 2006) reference to management accounting and control techniques by management and control tools. Other wording changes is in line with the BLS and BDS adjustments to military organizations setting identified previously: organization is replaced by the military Unit, where the respondent serves in their main active duty function; NATO ranks coded OF-1, OF-2, OR-9, OR-8, and OR-7 are considered operational managers due to their lower hierarchical level responsibilities and more operational functions assignments; top managers are replaced by the Commanders, Chiefs or Directors expression, being these functions responsible for the operational and financial control of a military Command, Unit or Service, which includes all Naval, Army, Air Force and Special Forces Services (e.g. Military Staff, Centres, Services, Directorates, Corps, Military Academies).

The measurement of DCS was made using four validated items by Naranjo-Gil & Hartmann (2006) (DCS_USE).

The properties of an ICS are defined by five dimensions (Bisbe et al., 2007): intensive use by top and operating managers; face-to-face challenges and discussions; focus on strategic uncertainties; and facilitating and inspirational involvement (Kruis et al., 2016; Heinicke & Guenther, 2020; Bobe & Kober, 2020a), with minor word adaption, building on Naranjo-Gil & Hartmann (2006), having present the conceptual and operationalisation issues in the literature (Bisbe et al., 2007; Tessier & Otley, 2012; Curtis et al., 2017). Following Bisbe et al. (2007) dimensions, we use six items to cover and to present the ICS construct (ICS_USE). Firstly, we measure management focus on strategic uncertainties and attention, asking to which extent military managers perceive how their (Sub)Unit management relies on MCS to signal opportunities and threats, negotiate targets and debate assumptions and actions plans, all instrumental to facilitate organizational interaction and empathy. Lastly, we measure MCS use by military managers to engage in face-to-face discussion with subordinates and to promote learning.

TABLE VI – Base Model Survey Items and Constructs.

Construct (*Code*)	Items	Source
Beliefs Systems (BLS_USE)	Please indicate to what extent the following statements describe your Unit (1 - Not descriptive at all, to 7 - Very descriptive): a. Our mission statement clearly communicates the Military Organization's core values to our workforce. b. Commanders, Chief or Directors communicate core values to our workforce. c. Our workforce is aware of the Military Organization's core values. d. Our mission statement inspires our workforce.	(Widener, 2007)
Boundary Systems (BDS_USE)	Please rate the extent to which you agree or disagree with the following statements (1 - Strongly disagree, to 7 - Strongly agree): a. Our Military Organization relies on regulation to define appropriate behaviour for our workforce. b. Our internal regulations informs our workforce about behaviours that are off-limits. c. Our Military Organization has a system that communicates to our workforce risks that should be avoided. d. Our workforce is aware of the Military Organization’s internal regulations.	(Widener, 2007)
Diagnostic Control Systems (DCS_USE)	Please indicate the extent to which you use Management Control Systems, considering it as the whole system of formal management and control tools to (1 - To a small extent, to 7 - To a large extent): a. Follow up significant exceptions and deviations b. Evaluate and control subordinates tightly c. Follow up pre-set plans and goals d. Align performance measures with strategic goals	(Naranjo-Gil & Hartmann, 2006)
Interactive Control Systems (ICS_USE)	Please indicate the extent to which you use Management Control Systems, considering it as the whole system of formal management and control tools to (1 - To a small extent, to 7 - To a large extent): a. Set and negotiate goals and targets b. Debate data assumptions and actions plans c. Signalling key strategic areas for improvement d. Challenge new ideas and ways for doing tasks e. Involvement in a permanent face-to-face discussion with subordinates f. Learning tool	(Naranjo-Gil & Hartmann, 2006)

TABLE VII – Extended Model Survey additional Items and Constructs.

Construct (*Code*)	Items	Source
Environmental Uncertainty (EU)	Please indicate the extent to which you agree or disagree with the following statements (1 - Strongly disagree, to 7 - Strongly agree): a. The (sub) Unit often needs to react to outside pressure. b. Making long-range plans for my (sub) Unit is hindered by the difficulty of predicting future events. How often do external factors substantially influence your (sub) Unit's performance? (1 - Not at all often, to 7 - Very often)	(Kruis et al., 2016)
Organizational Learning (OL)	Please indicate the extent to which the following statements describe your Unit (1 - Not descriptive, to 7 - Very descriptive): a. Learning is the key to improvement. b. Basic values include learning as a key to improvement. c. Once we quit learning, we endanger our future. d. Learning is viewed as an investment, not an expense.	(Widener, 2007)
Management Attention (MA)	Please indicate the extent to which the following statements describe your Unit (1 - Not descriptive, to 7 - Very descriptive): a. The control systems in place allows Commanders, Chief or Directors to focus attention on critical issues. b. The control systems in place allow Commanders, Chief or Directors to effectively leverage their time. c. The control systems in place reduce the need for Commanders, Chief or Directors to constantly monitor activities. d. Without our control systems the attention of Commanders, Chief or Directors would be spread more thinly.	(Widener, 2007)

4.4. Environmental Uncertainty, Organizational Learning, and Management Attention

The environmental uncertainty, organizational learning and management attention constructs are measured reflectively. The environmental uncertainty (EU) is used as proxy to measure the external environment (Chenhall, 2003), adapting the three items from Kruis et al. (2016) construct to military organizations. We ask Portuguese military managers to identify the extent to which the (sub)Unit reacts to external pressure, long-range plans are hindered, or external factors influences its performance.

Concerning management attention (MA) and organizational learning (OL), we measure them using Widener (2007) four items, with minor adaptions to military organizations context. Portuguese military managers were asked to identify the extent to which control systems facilitate managers to focus attention on critical issues, effectively balance their time, reduce the need to constantly monitor activities, and how it impacts managers attention. Regarding organizational learning, the items measure to which extent learning is perceived by military managers to be key to improvement, associated to military basic values, important to their future, and if is viewed as an investment by the military organization.

4.5. Control Variables

The control variables used to assess confounding effects are organizational size and military Services, the later as a proxy to organizational culture, validated from contingency approach (Chenhall, 2006; Otley, 2016).

The size of the manager's military organization, as proxy the organization size, reflects the dimension of its Unit or Subunit and may result in different managerial concerns (e.g. strategic or operational goals). The size of the military organization is measured by the number of its workforce (SIZE_Log), after a log transformation to mitigate distribution problems.

Organizational culture in military organizations is representative of national culture, because of the recruitment and training policies, being accepted to differ between Armed Forces Branches or Services (e.g. Army, Navy, or Air Force) (Soeters, 2020a, 2020b). The different military Services, Navy, Army, or Air Force, have distinct operational context and settings, doctrine, and hierarchical communication procedures, which can promote, at each of the Services level, micro changes to the national culture within the military managers, therefore different organizational cultures (i.e. Navy, Army, Air Force). We posit that the Armed Forces Service variable can be used as a proxy to organizational culture, in a contingency approach (Chenhall, 2006; Otley, 2016).

4.6. Multigroup Analysis Variables Groups

The multigroup analyses compares significant differences (Henseler et al., 2009; Sarstedt et al., 2011b; Hair et al., 2017a; Battisti & Siletti, 2019) in military managers MCS use constructs perceptions across groups in military core training and age variables.

We use the individual managers characteristics of military core training (TRAINING) and age (AGE) dummies as grouping variables. Military core training identifies two representative groups of military managers' operational or economic/management training, through dummy variables. The subgroups analysis of operational and non-operational military core training reflects the differences between core training for operational functions (e.g. military Service personnel first line conflict theatre or close support to military operations) and other support functions (e.g. economics, public administration, accounting or finance, engineering, health). Economics and management and non-economics/management core training subgroups analysis reflects the differences between military core training for economic, accounting, management, and other support functions (e.g. engineering, health), including operational functions. Age dummy variable is the result of the transformation of the continuous variable after the application of the split value of 44 years old, the statistical mean of the sample.

We use the manager's military ranks and education level demographic variables to conduct multigroup analysis robustness tests. The military ranks equivalent NATO codes are grouped in three categories associated with different management levels: top management is associated to superior and general Officers ranks, identified as top Officers, from OF-3 to OF-9 (RANK_TOFF); middle management to junior Officers ranks from OF-1 to OF-2 (RANK_JOFF); and operating management is associated to non-Officers, coded ranks from OR-7 to OR-9 (RANK_NOFF). Education level is grouped in university (e.g. bachelor, master, and doctorate levels) and non-university education level.

The aggregated sample is split in 11 subgroups. The age and military core training six subgroups support the variables, subgroups, and constructs inter-relations study: higher than 43 and non-higher than 43 in age variable; operational, economics/management, non-operational, and non-economics/management in military core training. The remaining five subgroups with military ranks and education level demographic variables support the robustness tests: top Officers, junior Officers, and non-Officers in military ranks; managers with university education level and non-university level, in education level variable.

4.7. Survey Data Analysis

We apply PLS-SEM to analyse the survey data and test the model in Figure 1. Firstly, because this research is exploratory, and this instrument provides the simultaneous evaluation of multiple exogenous and endogenous variables statistically significant associations to calculate the structure equation model, providing the larger picture of the model assessment (Naranjo-Gil & Hartmann, 2006, 2007b; Naranjo-Gil, 2016; Hair et al., 2017a, 2017b, 2019; Heinicke & Guenther, 2020; Sarstedt et al., 2020) Secondly, because it allows to work with small samples (Hair et al., 2017a, 2017b, 2019).

We follow the extant literature PLS-SEM two stages evaluation, assuring measurement and structural models' validity, consistency, and reliability (Hair et al., 2019). We use SmartPLS software, version 3.3.9, (Ringle et al., 2015) for PLS-SEM calculations.

The model's relevant path coefficients and bootstrapping PLS-SEM results analysis identify hypothesis support and are compared to the extant literature. The bootstrapping PLS-SEM, a non-parametric method, identifies the statistical significance path coefficients of the PLS-SEM results, through t-values, p-values, and confidence intervals analysis (Hair et al., 2017a). We perform the bootstrapping procedure with 5000 subsamples, randomly created from the original observations, with replacement, to estimate the PLS path model and to obtain standard errors for the PLS-SEM results (Hair et al., 2017a).

We analyse group effects by computing multigroup analysis through the above identified SmartPLS software (Ringle et al., 2015), to investigate differences in perception between the respondents' military core training, and age. Measurement of model invariance is a necessary condition to assure results validity. Therefore, we follow the measurement invariance of composite models (MICOM) procedure to conclude if comparison of the path coefficient estimates across the groups are valid (Henseler et al., 2016).

Primarily, we run the MICOM procedure on both base and extended models with size and Services control variables. We identify partial measurement invariance between the groups of age (44 years old or higher *versus* lower that 44 years old), and military core training subgroups (economics/management *versus* non-economics/management, economics/management *versus* operational, and operational *versus* non-operational military core training).

Additionally, we generate alternative models, with new paths or trimmed non-significant paths, and execute multigroup analysis with additional subgroups to perform robustness tests. We identify, through MICOM procedure, partial measurement invariance between the military ranks and education levels demographics variables subgroups to support both models multigroup analysis robustness tests. The specific difference between base and extended model relies on the MICOM military ranks groups results when compared, which reveal differences. The base model supports the two group pairs MGA comparison (i.e. top officers *versus* junior officers and junior officers *versus* non-officers), revealing partial measurement invariance through MICOM results. On the other hand, the extended model MICOM results only identify partial measurement invariance between top officers *versus* junior Officers military rank groups.

4.8. Measurement and Structural Models Reliability and Validity.

The LOC's variables are assessed through content and construct validity (Nunnally & H., 1994). We do empirical tests, Cronbach's alpha evaluation, convergent and discriminant validity, and internal consistency reliability analysis to argue validity of content and constructs (Nunnally & H., 1994; Hair et al., 2017a, 2019). The survey descriptive statistics are identified in Table VIII and Table IX, respectively for LOC base model and extended model. Construct validity is identified in Table X and Table XI, respectively for LOC base model and extended model. The constructs variables score is established by the average of the question answers.

We measured all constructs using a seven-point Likert-Scale. All survey questions results have a range from 1 to 7. The cross loadings analysis identifies all constructs are unidimensional with acceptable AVE above 0,56. All constructs present valid Cronbach's alphas between 0,736 and 0,922 (Nunnally & H., 1994), and composite reliability between 0,833 and 0,939.

Convergent validity and internal consistency analysis identifies that BLS_USE and BDS_USE, respectively with average variance extracted (AVE) of 0,735 and 0,567, and a Cronbach's alpha of 0,88 and 0,736. Widener's (2007) four items BDS measure are kept, although one item outer loading is 0,451 in our sample (Hair et al., 2019), because is above 0,400 and it's theoretically relevant to the construct validity (Hulland, 1999). The DCS construct has an AVE of 0,722, and a Cronbach's alpha of 0,871, and ICS construct has an AVE of 0,722, and a Cronbach's alpha of 0,922. Environmental uncertainty construct reveals an AVE of 0,654, and a Cronbach's alpha of 0,759. Lastly, we find management attention and organization learning constructs convergent validity and internal consistency values, respectively, are of 0,763 and 0,705 for AVE, and 0,896 and 0,858 for Cronbach's alpha.

TABLE VIII - Descriptive statistics for LOC construct items.

	Min. – Max.	Mean	Median	Std. Dev.
Beliefs Systems (BLS_USE)		4,75	5	1,26
Mission statement communicates values	1 – 7	4,99	5	1,52
Commanders, Chief or Directors communicate values	1 – 7	4,72	5	1,52
Workforce is aware of values	1 – 7	4,83	5	1,33
Mission statement inspires	1 – 7	4,47	5	1,51
Boundary Systems (BDS_USE)		4,96	5	1,18
Defines appropriate behaviour	1 – 7	5,20	6	1,55
Informs about off-limits behaviours	1 – 7	5,47	6	1,32
Communicates risks to be avoided	1 – 7	4,58	5	1,48
Workforce aware internal regulations	1 – 7	4,85	5	1,43
Diagnostic Control Systems (DCS_USE)		4,24	4	1,32
Follow up exceptions and deviations	1 – 7	4,21	4	1,56
Evaluate and control subordinates	1 – 7	3,87	4	1,60
Follow up plans and goals	1 – 7	4,55	5	1,52
Align performance measures with strategy	1 – 7	4,34	4	1,54
Interactive Control Systems (ICS_USE)		4,20	4	1,35
Negotiate goals and targets	1 – 7	4,30	5	1,55
Encourage new goals and priorities	1 – 7	4,28	5	1,51
Signal key strategic areas	1 – 7	4,28	5	1,55
Encourage new ideas and actions	1 – 7	4,31	5	1,60
Face-to-face involvement with subordinates	1 – 7	3,87	4	1,68
Learning tool	1 – 7	4,30	5	1,57

TABLE IX - Descriptive statistics for Extended Model construct items.

	Min. – Max.	Mean	Median	Std. Dev.
Environmental Uncertainty (EU)		5,24	5	1,32
Needs to react to outside pressure	1 – 7	5,35	6	1,65
Long-range plans are hindered by the difficulty of predicting future	1 – 7	4,98	5	1,71
External factors substantially influence performance	1 – 7	5,42	6	1,49
Organizational Learning (OL)		5,46	6	1,21
Learning is the key to improvement	1 – 7	5,61	6	1,32
Basic values include learning as a key to improvement	1 – 7	5,36	6	1,33
Future is endangered without learning	1 – 7	5,60	6	1,49
Learning is an investment	1 – 7	5,28	6	1,65
Management Attention (MA)		4,13	4	1,34
Commanders, Chief or Directors focus attention on critical issues	1 – 7	4,24	4	1,53
Commanders, Chief or Directors effectively leverage their time	1 – 7	4,05	4	1,56
Commanders, Chief or Directors reduce need to constantly monitor	1 – 7	3,96	4	1,47
The attention of Commanders, Chief or Directors would be spread more thinly without control systems	1 – 7	4,27	4	1,61

Bootstrapping procedure, with 5000 random subsamples, for a confidence interval of 95% was computed for all constructs Cronbach's alpha. ICS_USE confidence interval range between 0,903 and 0,938, and remaining constructs Cronbach's alpha confidence intervals range between 0,674 and 0,920.

The constructs internal consistency measured by the Cronbach's alpha and composite reliability scores suggests satisfactory reliability (Nunnally & H., 1994; Hair et al., 2017a, 2019). Convergent validity of each construct measure is adequate (Fornell & Larcker, 1981; Hair et al., 2019)Fornell & Larcker, 1981; Hair et al., 2019).

The cross-loading analysis of all items identify higher loadings on its respective construct. To assess correlation between the LOC constructs we calculated a multitrait matrix in Table IV. The multitrait matrix identifies four distinct constructs, their internal validity, by their consistency or reliability.

TABLE X – LOC Construct validity.

	Average Variance Extracted	Composite Reliability	Cronbach's Alpha	Outer Loadings
Beliefs Systems (BLS_USE)	0,735	0,917	0,880	
Mission statement communicates values				0,853
Commanders, Chief or Directors communicate values				0,883
Workforce is aware of values				0,850
Mission statement inspires				0,841
Boundary Systems (BDS_USE)	0,567	0,833	0,736	
Defines appropriate behaviour [a]				0,451
Informs about off-limits behaviours				0,803
Communicates risks to be avoided				0,866
Workforce aware internal regulations				0,817
Diagnostic Control Systems (DCS_USE)	0,722	0,912	0,871	
Follow up exceptions and deviations				0,835
Evaluate and control subordinates				0,770
Follow up plans and goals				0,894
Align performance measures with strategy				0,892
Interactive Control Systems (ICS_USE)	0,722	0,939	0,922	
Negotiate goals and targets				0,831
Encourage new goals and priorities				0,902
Signal key strategic areas				0,885
Encourage new ideas and actions				0,892
Face-to-face involvement with subordinates				0,729
Learning tool				0,847

This table reports the results of factor analyses by broad construct. We use SMART PLS 3.3.7 software (Ringle et al., 2015) to report the average variance extracted, composite reliability and Cronbach's Alpha for each factor analysis.
[a] Item loaded below 0,7 is kept, because it is identified as a valid measurement item for the Boundary Systems construct.

The diagonal presents the constructs square root of average variance extracted and the bivariate Pearson correlation coefficients, demonstrating that they have distinct dimensions, being the column correlation coefficients lower than the Alpha's coefficient

(Fornell & Larcker, 1981). The LOC correlation coefficients range between 0,317 to 0,838, and all construct's pairs are significantly correlated (*p* < 0,001). Environmental uncertainty is not significantly correlated with any of the constructs (*p* > 0,1). Organizational learning and management attention correlation coefficients are significant (*p* < 0,001), and range between 0,318 to 0,521. In Table V, we identify Service dummy variable and Size control variables correlations with constructs and between them. Navy military Service is positively correlated with organizational learning (0,120; *p* < 0,05). The Army military Service reveals a negative correlation with ICS (-0,170; *p* < 0,05) and organizational learning (-0,218; *p* < 0,001). Size is positively correlated with DCS (0,125; *p* < 0,05) and ICS (-0,158; *p* < 0,05).

TABLE XI – Extended Model Construct validity.

	Average Variance Extracted	Composite Reliability	Cronbach's Alpha	Outer Loadings
Environmental Uncertainty (EU)	0,654	0,848	0,759	
Needs to react to outside pressure				0,704
Long-range plans are hindered by the difficulty of predicting future				0,767
External factors substantially influence performance				0,937
Organizational Learning (OL)	0,705	0,904	0,858	
Learning is the key to improvement				0,902
Basic values include learning as a key to improvement				0,924
Future is endangered without learning				0,701
Learning is an investment				0,813
Management Attention (MA)	0,763	0,928	0,896	
Commanders, Chief or Directors focus attention on critical issues				0,907
Commanders, Chief or Directors effectively leverage their time				0,930
Commanders, Chief or Directors reduce need to constantly monitor				0,879
The attention of Commanders, Chief or Directors would be spread more thinly without control systems				0,770

This table reports the results of factor analyses by broad construct. We use SMART PLS 3.3.7 software (Ringle et al., 2015) to report the average variance extracted, composite reliability and Cronbach's Alpha for each factor analysis.

The results support that internal reliability is higher than the inter-construct reliability in accordance with the Fornell-Larcker criterion (Fornell & Larcker, 1981). We also analyse the Heterotrait-Monotrait ratio (HTMT) of the correlations and identify that all ratios, except one, range from 0,051 to 0,685 below the 0,85 threshold (Henseler et al., 2015).

Managers ICS and DCS use perceptions can be very similar (Bisbe et al., 2007; Bisbe & Malagueño, 2009), relating more to manager's choice (Naranjo-Gil, 2016; Deschamps, 2019), and to have the potential to be simultaneously used with the same level of extent (Widener, 2007) than the MCS conceptual design. Survey design of DCS and ICS constructs items are classified interchangeably due to exploratory factor analysis results, as identified when comparing Widener (2007) and Henri (2006). The ICS_USE and DCS_USE HTMT ratio is 0,925, which lead to perform bootstrapping procedure, with 5000 random subsamples, for a confidence interval of 95%. The HTMT bootstrapping procedure confidence intervals range between 0,053 to 0,959, with the value 1 outside of all interval's range. ICS_USE and DCS_USE HTMT ratio bootstrapping confidence interval range between 0,887 and 0,959, while remaining LOC HTMT ratios confidence intervals range between 0,053 and 0,791. We find support to suggest that all constructs are empirically distinct.

With the cross-loadings analysis, multitrait matrix, Fornell-Larcker and HTMT results presented, we can conclude that there is adequate empirical support for discriminant validity. All tests suggests that the measurement model reliability and validity is satisfactory.

The following chapter presents the results analysis in three steps. We start to identify the descriptive statistics, constructs, and control variables correlations. Then, using the aggregated base model, we discuss the measurement and structural models results, hypotheses and mediation level. Lastly, we discuss multigroup analysis base model and extended base model results, enabling the comparison between pairs of different groups of respondents (e.g. 44 years old or above/below 44 years old; Operational core training/Non-Operational core training). Robustness tests are performed for unobserved heterogeneity, alternative paths that are not hypothesized, rank and education level subgroups multigroup analysis.

5. Levers of Control Model Results and Discussion

This chapter details Simons' LOC significant and relevant results found in the sample observations. The descriptive, PLS-SEM and robustness tests refer to the base model, in the aggregated format, and its comparison with the Age and military Core Training variable subgroups. The chapter also includes the base model robustness tests, hypothesis assessment, and the discussion of how the findings impact military manager's management.

5.1. Descriptive Statistics

The participants demographic statistics are detailed in Table I and Table II. We tested all constructs for validity and reliability, and their relevancy accordingly to extant literature. To test associations and relate survey results we identified relations between MCS LOC and demographics with robustness and rigor (Ittner, 2018; Verbeeten & Speklé, 2015; Andrews et al., 2019).

We identify the largest group of respondents in the sample are from the Portuguese Army and Air Force, with 77 (27%) and 124 (44%) responses. Male respondents and Officer ranks account for the valid responses' majority of the sample, with 89% and 70%, respectively. The respondents age range between 24 and 63 years old (average of 44,5 years old, standard deviation of 8,8 years), with most of valid responses in the age groups above 40 years old (70%). Remaining demographic data identifies over 45% of respondents with Operational core training, overall average organizational tenure of 24,7 years (standard deviation of 9,2 years) and average current position years of 3,2 years (standard deviation of 2,7 years).

The variable military Core Training is split in four subgroups, comparing the operational, non-operational, economics and management, and non-economics and management participants, the Mann-Whitney U tests results presented in Panel B to D of Table XII shows no evidence significant differences ($p > 0,05$) of MCS use distribution between subgroups.

We find opposite results when comparing the same demographic data, construct means, and constructs distribution across age variable subgroups, in Table XIII. Age dummy variable threshold is set at its average integer of 44. A group of 160 military managers are 44 years old or older, and the remaining 121 have less than 44 years old. The constructs distributions have significant differences ($p < 0,05$) across the two Age categories, in all LOC constructs.

TABLE XII - Demographic data and construct means comparison, by Military Core Training subgroups.

Panel A: MDO managers variables comparison

	Military Core Training			
	Operational	Non-Operational	Economics / Management	Non-Economics / Management
Rank category	1,97	2,28	2,19	2,12
Age	44,91	44,11	42,48	45,04
Education Level	1,98	2,25	2,23	2,10
MDO tenure	25,83	23,66	22,24	25,35
Years in function	3,25	3,14	3,08	3,21
MDO Size Workforce (Log)	0,71	0,65	0,66	0,68
MDO Manager Subordinates (Log)	0,42	0,40	0,42	0,40
N (%)	129 (45,9%)	152 (54,1%)	62 (22,1%)	219 (77,9%)

Panel B: Constructs comparison, between Operational and non-Operational subgroups

	Operational (N=129)	Non-Operational (N= 152)	Mann–Whitney U test
Beliefs Systems	4,74	4,76	Z = -0,051; *p* = 0,959
Boundary Systems	4,96	4,96	Z = -0,364; *p* = 0,716
Diagnostic Control Systems	4,22	4,26	Z = -0,227; *p* = 0,821
Interactive Control Systems	4,17	4,24	Z = -0,266; *p* = 0,790
Environmental Uncertainty	5,29	5,21	Z = -0,519; *p* = 0,604
Organizational Learning	5,56	5,38	Z = -1,169; *p* = 0,242
Management Attention	4,09	4,16	Z = -0,131; *p* = 0,896

Panel C: Constructs comparison, between Operational and Economics / Management subgroups

	Operational (N=129)	Economics / Management (N= 62)	Mann–Whitney U test
Beliefs Systems	4,74	5,01	Z = -1,178; *p* = 0,239
Boundary Systems	4,96	5,04	Z = -0,252; *p* = 0,801
Diagnostic Control Systems	4,22	4,44	Z = -1,202; *p* = 0,229
Interactive Control Systems	4,17	4,45	Z = -1,509; *p* = 0,131
Environmental Uncertainty	5,29	5,16	Z = -0,802; *p* = 0,422
Organizational Learning	5,56	5,45	Z = -0,520; *p* = 0,603
Management Attention	4,09	4,35	Z = -0,948; *p* = 0,343

Panel D: Constructs comparison, between Economics / Management and non-Economics / Management subgroups

	Economics / Management (N= 62)	Non-Economics / Management (N= 219)	Mann–Whitney U test
Beliefs Systems	5,01	4,68	**Z = -1,690; *p* = 0,091**
Boundary Systems	5,04	4,94	Z = -0,561; *p* = 0,575
Diagnostic Control Systems	4,44	4,18	Z = -1,509; *p* = 0,131
Interactive Control Systems	4,45	4,14	**Z = -1,947; *p* = 0,052**
Environmental Uncertainty	5,16	5,27	Z = -0,801; *p* = 0,423
Organizational Learning	5,45	5,46	Z = -0,072; *p* = 0,943
Management Attention	4,35	4,07	Z = -1,243; *p* = 0,214

The table shows the construct and variable means of the variable Military Core Training subgroups of our sample for the managers characteristics and constructs.

Results, in Table XIII, reveal significant LOC use differences between age subgroups. The participants under 44 years old have a lower LOC use perception ($p < 0,05$) than participants with 44 or more years old. These results reveal a greater gap when compared with comparable measurements used in extant research LOC mean levels (Naranjo-Gil & Hartmann, 2006, 2007b; Widener, 2007; Naranjo-Gil, 2016; Kruis et al., 2016; Heinicke & Guenther, 2020; Matsuo et al., 2021).

Descriptive statistics for each construct item are identified in Table VIII and Table IX. Other studies that used similar constructs measurements identify each LOC mean, although they reveal higher values, compared to the results we find within the research sample. BLS mean between 4,57 to 5,23 and BDS mean between 5,03 to 5,58 (Widener, 2007; Naranjo-Gil, 2016; Kruis et al., 2016; Heinicke & Guenther, 2020)[2], respectively are above the sample means of 4,75 and 4,96. DCS mean is between 4,66 and 4,74 (Naranjo-Gil & Hartmann, 2006; Naranjo-Gil, 2016), above the research sample mean of 4,24. Lastly, military mangers' sample ICS mean of 4,20 are below the means identified between 4,51 and 5,01 by Naranjo-Gil & Hartmann (2006, 2007b), Naranjo-Gil (2016)[1] and Matsuo et al. (2021) [3].

[2] Original Naranjo-Gil (2016) values adapted by linear transformation from a 5-point score to a 7-point score Likert scale using the formula: $x_7 = (x_5 \times 1,5) - 0,5$.

[3] Original Matsuo et al. (2021) values adapted by linear transformation from a 5-point score to a 7-point score Likert scale using the formula: $x_7 = (x_5 \times 1,5) - 0,5$.

TABLE XIII - Demographic data and construct means comparison, by Age subgroups.

Panel A: MDO managers variables comparison

	Age	
	44 years old or older	Less than 44 years old
Rank category	2,05	2,25
Age	50,88	36,00
Education Level	1,83	2,52
MDO tenure	31,05	16,06
Years in function	3,69	2,53
MDO Size Workforce (Log)	0,72	0,61
MDO Manager Subordinates (Log)	0,41	0,40
N (%)	160 (56,9%)	121 (43,1%)

Panel B: Constructs comparison, between Age subgroups

	44 years old or older (N=160)	Less than 44 years old (N= 121)	Mann–Whitney U test
Beliefs Systems	4,94	4,50	**Z = -3,149; *p* = 0,002**
Boundary Systems	5,16	4,71	**Z = -3,071; *p* = 0,002**
Diagnostic Control Systems	4,45	3,96	**Z = -3,066; *p* = 0,002**
Interactive Control Systems	4,38	3,98	**Z = -2,296; *p* = 0,022**
Environmental Uncertainty	5,15	5,37	Z = -1,029; *p* = 0,304
Organizational Learning	5,66	5,20	**Z = -3,483; *p* < 0,001**
Management Attention	4,30	3,91	**Z = -2,567; *p* = 0,010**

The table shows the construct and variable means of the variable Age subgroups of our sample for the managers characteristics and constructs.

We find that there are more differences within Military Core Training subgroups than across them, because of the impact of the variable Age. This finding remains significant in the research sample through the multigroup analysis results, particularly when comparing military Ranks and Education Level variables subgroups, as we identify in the multigroup analysis robustness tests.

Constructs and control variables correlations are identified in Table IV and Table V. The LOC are positively correlated and statistically significant ($p < 0{,}001$) with all constructs. These findings reveal LOC’s association that suggest their complementarity and interdependence, in accordance with (Simons, 1995) and found in the extant literature (Widener, 2007; Naranjo-Gil, 2016; Heinicke & Guenther, 2020; Bukh & Svanholt, 2020). We find the strongest LOC´s correlation between the DCS and ICS constructs (0,838), and a moderated correlation between BLS and BDS (0,577), BLS and DCS (0,416), and BLS and ICS (0,413).

The correlation of control variables with the constructs, identified in Table V, reveal very weak correlations or no significant correlations. The LOC significant correlations are between Army and ICS (0,170; $p < 0{,}05$), relative to the Air Force, and Size (log) reveal positive correlations, at a 5% significance level, with DCS (0,125; $p < 0{,}05$), and ICS (0,158; $p < 0{,}05$).

In Table XIV and Table XV, we identify significant differences in levels of LOC use, with Mann-Whitney U tests, between control variables Service and Size subgroups. The Army participants reveal significant lower ICS use perception when compared with Navy (Z = -2,447; $p < 0{,}05$) and Air Force observations (Z = -2,798; $p < 0{,}01$). Concerning the Navy and Air Force subgroups comparison we find no significant differences ($p > 0{,}05$). Size (log) variable is split by the mean value into two subgroups. The participants serving in military (Sub)Units above Size (log) mean, reveal a significant difference in ICS use (Z = -2,313; $p < 0{,}05$), with ICS emphasis to a greater extent than the (Sub)Units with a lower workforce.

5.2. Partial Least Squares Structural Equation Modelling validation

The structural model assessment is a necessary condition to analyse the estimation of parameters, assuring that PLS-SEM maximizes the explained variance of the endogenous variables. Following a six-step procedure the model is evaluated to assess structural model (Hair et al., 2017a, 2019): collinearity (step 1); path coefficients significance and relevance (step 2); R^2 level (step 3); f^2 effect size (step 4); Q^2 predictive relevance (step 5) and q^2 effect size (step 6).

Complementary to the Harman's one-factor common method bias test, construct items construction and their correlation, we analyse the full collinearity test to assess the latent variables Variance Inflation Factors (VIF) in the model (Kock, 2015). Table XVI reveals VIFs not higher than 3,517, above the conservative VIF of 3,3, that can suggest common method bias model contamination, and below the less conservative VIF of 5 threshold (Kock, 2015; Hair et al., 2017a). We identify no significant support of common method bias issues either in the base model relations nor in the survey items, with the full collinearity test VIFs below 3,6. In the base model's latent variables relationships, presented in Table XVII, the higher VIF value identified is of 1,669, between BLS and DCS, hence no collinearity is present in the base model (step 1).

TABLE XIV - Demographic data and construct means comparison, by Military Service.

Panel A: MDO managers variables comparison

	Military Service		
	Navy	Army	Air Force
Rank category	2,30	2,26	1,95
Age	45,00	46,22	42,82
Education Level	2,26	2,23	1,99
MDO tenure	25,23	26,66	22,95
Years in function	2,69	3,31	3,34
MDO Size Workforce (Log)	0,66	0,74	0,66
MDO Manager Subordinates (Log)	0,41	0,40	0,42
N (%)	66 (23,5%)	77 (27,4%)	124 (44,1%)

Panel B: Constructs comparison, between Navy and Army subgroups

	Navy (N=66)	Army (N= 77)	Mann–Whitney U test
Beliefs Systems	4,94	4,57	Z = -1,724; *p* = 0,085
Boundary Systems	5,08	5,03	Z = -0,132; *p* = 0,895
Diagnostic Control Systems	4,27	4,02	Z = -1,057; *p* = 0,290
Interactive Control Systems	4,34	3,83	**Z = -2,447; *p* = 0,014**
Environmental Uncertainty	5,04	5,35	Z = -1,649; *p* = 0,099
Organizational Learning	5,72	5,05	**Z = -3,151; *p* = 0,002**
Management Attention	4,18	3,96	Z = -1,136; *p* = 0,256

Panel C: Constructs comparison, between Navy and Air Force subgroups

	Navy (N=66)	Air Force (N= 124)	Mann–Whitney U test
Beliefs Systems	4,94	4,74	Z = -1,226; *p* = 0,220
Boundary Systems	5,08	4,88	Z = -1,348; *p* = 0,178
Diagnostic Control Systems	4,27	4,32	Z = -0,595; *p* = 0,552
Interactive Control Systems	4,34	4,35	Z = -0,311; *p* = 0,756
Environmental Uncertainty	5,04	5,32	Z = -1,818; *p* = 0,069
Organizational Learning	5,72	5,55	Z = -1,067; *p* = 0,286
Management Attention	4,18	4,18	Z = -0,144; *p* = 0,885

Panel D: Constructs comparison, between Army and Air Force subgroups

	Army (N=77)	Air Force (N= 124)	Mann–Whitney U test
Beliefs Systems	4,57	4,74	Z = -1,226; *p* = 0,220
Boundary Systems	5,03	4,88	Z = -1,100; *p* = 0,271
Diagnostic Control Systems	4,02	4,32	Z = -1,621; *p* = 0,105
Interactive Control Systems	3,83	4,35	**Z = -2,798; *p* = 0,005**
Environmental Uncertainty	5,35	5,32	Z = -0,218; *p* = 0,828
Organizational Learning	5,05	5,55	**Z = -2,684; *p* = 0,007**
Management Attention	3,96	4,18	Z = -1,202; *p* = 0,229

The table shows the construct and variable means of the variable Service subgroups of our sample for the managers characteristics and constructs.

We identify in Table XVII, for the aggregated base model, that four out of five paths are significant ($p < 0,001$) and reveal relevant total effects between 0,394 to 0,807 (step 2), with exception of the BDS → DCS path that is not significant nor relevant (0,046; $p = 0,244$).

TABLE XV - Demographic data and construct means comparison, by Size and Size (Log) subgroups.

Panel A: MDO managers variables comparison

	Size	
	28 or more	Less than 28
Rank category	2,71	2,07
Age	46,65	44,16
Education Level	2,45	2,09
MDO tenure	27,26	24,28
Years in function	2,48	3,30
MDO Size Workforce (Log)	1,29	0,51
MDO Manager Subordinates (Log)	1,02	0,33
N (%)	31 (11,2%)	247 (88,8%)

Panel B: Constructs comparison, between Size subgroups

	28 or more (N=31)	Less than 28 (N= 247)	Mann–Whitney U test
Beliefs Systems	4,93	4,74	Z = -0,482; *p* = 0,630
Boundary Systems	5,35	4,93	**Z = -2,128; *p* = 0,033**
Diagnostic Control Systems	4,69	4,18	**Z = -2,101; *p* = 0,036**
Interactive Control Systems	4,74	4,15	**Z = -2,410; *p* = 0,016**
Environmental Uncertainty	5,40	5,23	Z = -0,307; *p* = 0,759
Organizational Learning	5,44	5,47	Z = -0,382; *p* = 0,703
Management Attention	4,03	4,14	Z = -0,588; *p* = 0,557

Panel C: MDO managers variables comparison

	Size (Log)	
	0,674 or more	Less than 0,674
Rank category	2,35	1,98
Age	45,44	43,65
Education Level	2,19	2,08
MDO tenure	26,18	23,35
Years in function	3,38	3,07
MDO Size Workforce (Log)	1,24	,23
MDO Manager Subordinates (Log)	0,79	,11
N (%)	123 (43,8%)	155 (55,2%)

Panel D: Constructs comparison, between Size (Log) subgroups

	0,674 or more (N=123)	Less than 0,674 (N= 155)	Mann–Whitney U test
Beliefs Systems	4,75	4,77	Z = -0,038; *p* = 0,970
Boundary Systems	4,97	4,97	Z = -0,244; *p* = 0,808
Diagnostic Control Systems	4,35	4,16	Z = -1,165; *p* = 0,244
Interactive Control Systems	4,42	4,05	**Z = -2,313; *p* = 0,021**
Environmental Uncertainty	5,49	5,06	**Z = -2,530; *p* = 0,011**
Organizational Learning	5,48	5,45	Z = -0,103; *p* = 0,918
Management Attention	3,94	4,29	**Z = -2,301; *p* = 0,021**

The table shows the construct and variable means of the variable Size and Size (Log) subgroups of our sample for the managers characteristics and constructs.

The aggregated base model coefficient of determination (R^2) measures the model's predictive power, identifying the amount of variance in the endogenous constructs explained by the exogenous constructs directly or indirectly associated with it (step 3).

TABLE XVI – Base model Full collinearity VIFs.

	1	2	3	4
Beliefs Systems (1)		1,241	1,657	1,641
Boundary Systems (2)	1,154		1,544	1,534
Diagnostic Control Systems (3)	3,456*	3,400*		1,256
Interactive Control Systems (4)	3,517*	3,487*	1,283	

* Values above 3,3 and below 5 can indicate possible collinearity and contamination by common method bias (Kock, 2015; Hair et al., 2019). A less conservative approach refers to valid VIFs between 0,2 and 5 (Hair et al., 2011, 2017a).

The endogenous constructs R^2, in Table XVIII, are significant ($p < 0,001$), and reveal DCS with the higher adjusted R^2 value ($R^2_{adj} = 0,705$), while BDS ($R^2_{adj} = 0,340$) and ICS ($R^2_{adj} = 0,199$) have lower values.

TABLE XVII - Aggregated base model path coefficients total effects, significancy and paths VIF.

Path	Total Path Coefficient	Standard Deviation	*t*-statistic	VIF
BLS → BDS	**0,580*** **	0,048	12,185	1,015
BLS → DCS	**0,406*** **	0,051	7,924	1,669
BLS → ICS	**0,394*** **	0,053	7,430	1,015
BDS → DCS	0,046	0,040	1,165	1,555
ICS → DCS	**0,807*** **	0,028	29,038	1,281

*** Significant at $p < 0,001$.

To measure the base model's out-of-sample predictive power we follow Shmueli et al. (2019) and execute the PLSpredict procedure. PLSpredict is an out-of-sample procedure prediction power indicator (Shmueli et al., 2019), incorporated in SmartPLS (Ringle et al., 2015), while R2 is an in-sample predictive power. Shmueli et al. (2019) guidelines compare the endogenous construct's items prediction errors between PLSpredict procedure PLS-SEM analysis results to the naïve benchmark produced, which identifies nine out of 14 construct's items in the PLS-SEM analysis with higher prediction errors compared to the naïve benchmark. Hence, the base model reveals a medium predictive power.

The effect size of latent constructs on endogenous constructs (step 4) is identified by the f^2 value (Cohen, 1988), in Table XIX. ICS effect size is strong on DCS (1,757; $p < 0,001$), as well as the effect size of BLS on BDS (0,510; $p < 0,001$). BLS reveals a medium effect size on ICS (0,194; $p < 0,05$). We also find that BLS (0,008; $p > 0,1$) and BDS (0,005; $p > 0,1$) have no effect in explaining DCS use.

TABLE XVIII – Base Model's predictive power - R^2 and adjusted R^2 coefficients.

Constructs	R^2	Adjusted R^2
Boundary Systems	**0,350*** **	**0,340*** **
Diagnostic Control Systems	**0,711*** **	**0,705*** **
Interactive Control Systems	**0,210*** **	**0,199*** **

*** Significant at $p < 0,001$.

Finally, the evaluation of Q^2 predictive relevance (step 5) and q^2 effect size (step 6), presented in Table XX, reveals that the model can predict all endogenous variable for the aggregated sample, with Q^2 above zero value, between 0,146 for ICS, 0184 for BDS and 0,504 for DCS.

TABLE XIX - Aggregated base model path coefficients, effect size (f^2).

Path	Path Coefficient	f^2 *t*-statistic	f^2	f^2 Effect size
BLS → BDS	**0,580*** **	3,957	**0,510*** **	**Large effect**
BLS → DCS	0,062	0,698	0,008	No effect
BLS → ICS	**0,394*** **	3,096	**0,194** **	**Medium effect**
BDS → DCS	0,046	0,492	0,005	No effect
ICS → DCS	**0,807*** **	6,038	1,757***	**Large effect**

, * Significant at $p < 0,05$, $p < 0,001$, respectively.

The predictive relevance effect size, measured by q^2 reveals small effect in the BLS-ICS relation (0,125), medium effect in the BLS-BDS relation (0,222), and a large effect of 0,732 in the relationship ICS-DCS (Cohen, 1988; Hair et al., 2019). BLS relationship with BDS and DCS do not support any effect with q^2 values below the 0,02 threshold (Cohen, 1988; Hair et al., 2019).

TABLE XX – Base model predictive relevance (Q^2) and effect size (q^2).

Path	Q^2	Q^2 excluded	q^2	*Predictive relevance size*
BLS → BDS	0,184	0,003	0,222	**Medium effect**
BLS → DCS	0,504	0,503	0,002	No effect
BLS → ICS	0,146	0,039	0,125	**Small effect**
BDS → DCS	0,504	0,504	0,000	No effect
ICS → DCS	0,504	0,141	0,732	**Large effect**

Through the six-step procedure results, we can conclude that the structural model presented is relevant and significant.

5.3. Robustness Tests

We assess unobserved heterogeneity following Sarstedt et al. (2017) guidelines for uncovering unobserved heterogeneity in PLS-SEM, using the finite mixture PLS (FIMIX-PLS), a latent class approach commonly used in PLS-SEM (Sarstedt et al., 2017). The FIMIX-PLS stop criterion (10^{-5}), maximum number of iterations (5000), and the number of repetitions (10) are the default settings. We assess the models with control variables and without control variables.

The minimum sample size to estimate each segment was computed assuming a 5% significance level, a minimum R^2 of 0,25, and a power level of 80%, identifying the maximum number of segments, respectively for the model with and without control variables, of 51 and 37 observations, and a maximum of 6 and 8 segments (Hair et al., 2017a). We rerun FIMIX-PLS for each segment up to the maximum segments in each model, with all settings constants.

The results of the fit indices for the number of segment solutions are ambiguous, in accordance to Sarstedt et al. (2011a) criteria analysis (Table XXI, Table XXII, Table XXIII, and Table XXIV). Neither Modified Akaike's Information Criterion (AIC) with Factor 3 and Consistent AIC identify the same number of segments, and Modified AIC with Factor 4 (AI4) and Bayesian Information Criteria (BIC) indicates a single segment. Additionally, Minimum Description Length with Factor 5 identifies one unique segment as AIC4 and BIC. Therefore, we can assume that unobserved heterogeneity is not at a critical level, which supports the results of the aggregated data analysis.

We examine alternative models and multigroup comparisons to validate the robustness of the results. We tested a model with added alternative paths, and models trimmed of paths not statistically significant in the base model. All the results found do not change statistical findings nor associations significancy or relevancy when compared to the base model. The validation of internal consistency, convergent and divergent validity are within the acceptable thresholds in all tested groups of all constructs, with exception of ICS construct. The ICS latent variable consistently reveals HTMT and Cronbach Alphas' values above 0,9, the later does not exceed 0,95. Bootstrapping procedure results, with 5000 random subsamples, for a confidence interval of 95% computation identifies values below 0,9 included in the range for HTMT.

TABLE XXI - Fit indices for Base Model without Control Variables Segment Solutions.

Criteria	Segment 1	Segment 2	Segment 3	Segment 4	Segment 5	Segment 6
AIC (Akaike's Information Criterion)	1893,30	1857,01	1842,86	1802,08	**1761,59**	1782,75
AIC3 (Modified AIC with Factor 3)	1913,30	1898,01	1904,86	1885,08	**1865,59**	1907,75
AIC4 (Modified AIC with Factor 4)	**1933,30**	1939,01	1966,86	1968,08	1969,59	2032,75
BIC (Bayesian Information Criteria)	**1966,07**	2006,18	2068,44	2104,06	2139,98	2237,55
CAIC (Consistent AIC)	**1986,07**	2047,18	2130,44	2187,06	2243,98	2362,55
HQ (Hannan Quinn Criterion)	1922,49	1916,83	1933,33	1923,19	1913,35	1965,15
MDL5 (Minimum Description Length with Factor 5)	**2417,14**	2930,87	3466,75	3976,00	4485,53	5056,73
LnL (LogLikelihood)	-926,65	-887,50	-859,43	-818,04	-776,80	-766,38
EN (Entropy Statistic (Normed))	-	0,78	0,58	0,80	0,86	0,81
NFI (Non-Fuzzy Index)	-	0,80	0,54	0,77	0,83	0,76
NEC (Normalized Entropy Criterion)	-	60,71	119,15	57,05	39,18	52,26

Note: Numbers in bold indicate the best outcome per segment retention criterion.

TABLE XXII - Fit indices for Base Model with Control Variables Segment Solutions.

Criteria	Segment 1	Segment 2	Segment 3	Segment 4	Segment 5	Segment 6	Segment 7	Segment 8
AIC (Akaike's Information Criterion)	1893,16	1878,90	1878,18	1877,56	1868,50	1879,81	**1862,51**	1868,26
AIC3 (Modified AIC with Factor 3)	1901,16	**1895,90**	1904,18	1912,56	1912,50	1932,81	1924,51	1939,26
AIC4 (Modified AIC with Factor 4)	**1909,16**	1912,90	1930,18	1947,56	1956,50	1985,81	1986,51	2010,26
BIC (Bayesian Information Criteria)	**1922,26**	1940,75	1972,77	2004,91	2028,58	2072,65	2088,08	2126,58
CAIC (Consistent AIC)	**1930,26**	1957,75	1998,77	2039,91	2072,58	2125,65	2150,08	2197,58
HQ (Hannan Quinn Criterion)	1904,83	1903,70	1916,11	1928,64	1932,70	1957,15	1952,98	1971,86
MDL5 (Minimum Description Length with Factor 5)	**2102,69**	2324,16	2559,16	2794,28	3020,93	3267,98	3486,40	3727,88
LnL (LogLikelihood)	-938,58	-922,45	-913,09	-903,78	-890,25	-886,91	-869,25	-863,13
EN (Entropy Statistic (Normed))	-	0,55	0,58	0,51	0,70	0,55	0,61	0,66
NFI (Non-Fuzzy Index)	-	0,58	0,56	0,46	0,62	0,44	0,47	0,53
NEC (Normalized Entropy Criterion)	-	127,69	119,24	138,45	84,44	127,14	109,89	96,73

Note: Numbers in bold indicate the best outcome per segment retention criterion.

TABLE XXIII - Relative Segment Sizes (N=281), for Base Model without control Variables.

Number of Segments	Segment 1	Segment 2	Segment 3	Segment 4	Segment 5	Segment 6	Segment 7	Segment 8
1	100,0%							
2	78,6%	21,4%						
3	71,3%	21,0%	7,7%					
4	57,1%	19,9%	19,6%	3,5%				
5	65,9%	17,0%	8,4%	4,8%	3,9%			
6	45,5%	17,5%	13,4%	11,7%	8,3%	3,7%		
7	32,9%	28,7%	22,6%	5,4%	4,7%	2,9%	2,8%	
8	45,7%	18,9%	8,6%	8,5%	6,1%	5,0%	4,8%	2,4%

Note: The table shows the relative segment sizes in declining order per solution per row. The SmartPLS 3 software uses the relative segment sizes in declining order when assigning the segment numbers to the final FIMIX-PLS segments.

TABLE XXIV - Relative Segment Sizes (N=281), for Base Model with control Variables.

Number of Segments	Segment 1	Segment 2	Segment 3	Segment 4	Segment 5	Segment 6
1	100,0%					
2	89,7%	10,3%				
3	65,8%	20,7%	13,5%			
4	65,7%	15,7%	10,5%	8,1%		
5	56,1%	17,2%	15,0%	6,7%	5,0%	
6	52,5%	18,2%	11,9%	6,6%	5,7%	5,1%

Note: The table shows the relative segment sizes in declining order per solution per row. The SmartPLS 3 software uses the relative segment sizes in declining order when assigning the segment numbers to the final FIMIX-PLS segments.

The alternative models created by adding paths between the LOC constructs, follows Simons' LOC framework theory (Simons, 1995). We evaluate the influence of ICS with an extra path to BDS and identify that it is not significant ($\beta = 0{,}093$, $p = 0{,}118$). We find that the path BDS to ICS is also not significant ($\beta = 0{,}117$, $p = 0{,}104$), and that BDS indirect effects results are not significant ($p > 0{,}1$). The model used to control ICS influence on the other LOC reveals that the results are identical, exception made to the values of ICS to BLS path, in replacement of the original BLS to ICS path, which reveals identical results ($R^2 = 0{,}171$, $\beta = 0{,}414$, $p < 0{,}001$) to the original path. This last result illustrates the BLS, and ICS positive relation is bidirectional and does not affect the remaining LOC results.

We test the model trimmed of the non-significant paths, following empirical findings (Widener, 2007), and the results are similar to the original model presented. Further simulations allow to observe changes in the alternative model, with all the paths except BDS to DCS, where BLS-DCS path is significant ($\beta = 0{,}084$, $p = 0{,}017$), but with no changes in total effects relative to the original model presented. This result reinforces the positive effect of BLS on DCS revealed in the original model, found in robustness analysis with path coefficient values not higher that 0,084 ($p = 0{,}017$) in direct effects, 0,416 ($p < 0{,}001$) in total effects, and 0,332 ($p < 0{,}001$) in specific indirect effects.

Military organizational structure is hierarchical (Soeters, 2020b), and management roles are highly correlated to military ranks. Military managers may moderate MCS use according to their characteristics, such as education level, military rank group (proxy of management role). We generate multigroup analysis robustness tests with military ranks and education level demographic variables subgroups validated through MICOM analysis.

Education Level variable is split in two subgroups to identify participants with university education degrees and those that have not concluded higher education levels. We find significant differences between subgroups with higher Management Attention emphasis ($Z = -2{,}399$; $p < 0{,}05$) by non-university level participants. The Portuguese military middle management ranks (i.e. OF-1 to OF-2) participants present significant perceived lower BLS ($Z = -3{,}325$; $p < 0{,}001$), BDS use ($Z = -2{,}629$; $p < 0{,}01$), and organizational learning ($Z = -1{,}984$; $p < 0{,}05$) emphasis than top management (i.e. OF-3 to OF-9). Furthermore, we identify that middle management ranks have significant lower DCS use (Z = -2,048; $p < 0{,}05$), and management attention (Z = -3,109; $p < 0{,}01$) emphasis than operational ranks.

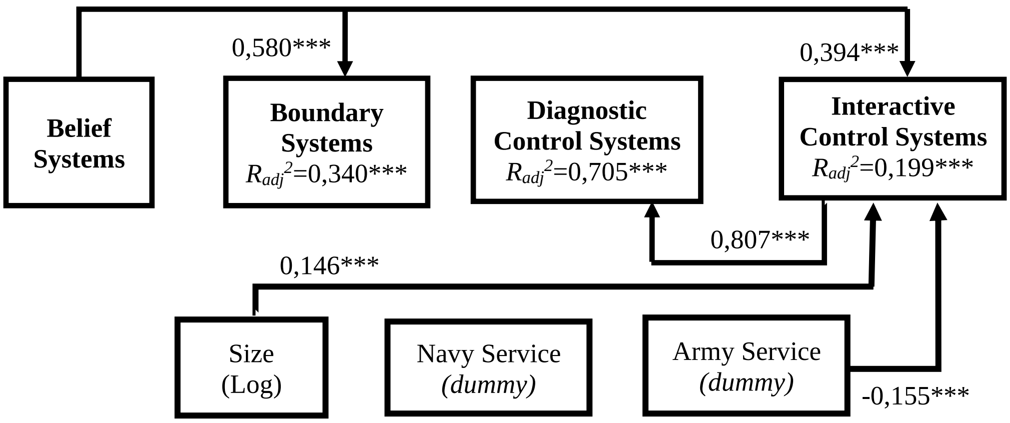
Base model's multigroup analysis robustness tests results for education level higher education and non-higher education subgroups reveals no significant differences in the path coefficients between LOC constructs in value and significancy. The R^2 and adjusted R^2 show similar aggregated base model values within higher education subgroup, but in non-higher education level subgroup ICS use construct reveal non-relevant and non-significant values ($R^2 = 0{,}144$; $p = 0{,}120$). Furthermore, we find that the positive path coefficient of the Service Navy control variable to ICS use results is significant in the non-higher education level participants subgroup (0,187; $p < 0{,}05$), relative to the Air Force, and differs significantly from the higher education subgroup in multigroup analysis test ($p < 0{,}05$). This finding reveals a unique result with significancy of a higher impact of Navy control variable on ICS use emphasis relative to Air Force participants, relative to the aggregated base model and complementary robustness tests, although it represents the answers of 10 participants. Service Army and Size control variables results reveal similar values and significancy. We find that the Education Level variable does not affect significantly nor add relevant explanatory arguments to the aggregated base model results in this sample.

Concerning base model's multigroup analysis robustness tests results for Rank, we tested the three subgroups comparing top Officers with junior Officers, and junior Officers with non-Officers. We did not identify subgroup significant differences between LOC path coefficients, nor in control variables path coefficients relative to the aggregated base model ($p > 0{,}05$). The R^2 and adjusted R^2 reveal no significant subgroups differences. The result that contrasts with the aggregated base model values is the non-significant junior Officer subgroup ICS R^2 (0,133; $p > 0{,}1$) and adjusted R^2 values (0,082; $p > 0{,}1$). We find that the Rank variable does not significantly affect the aggregated results but reveals lower contribution by junior Officers participants perceptions to BLS use ($R_{adj}^2 = 0{,}282$; $p < 0{,}05$) and ICS use ($R_{adj}^2 = 0{,}082$; $p > 0{,}1$) of MCS relative to the aggregated base model results in this sample.

Therefore, we can conclude that the base model's results are robust for the hypothesized associations and that the comparison with the alternative models do not reveal relevant and significant differences.

5.4. Base Model Results and Discussion

We test the hypotheses through PLS-SEM, using SmartPLS software (Ringle et al., 2015). The hypotheses H1 to H3 are tested with the aggregated base model results, and H4 paths through PLS-SEM multigroup analysis with Age and military Core Training subgroups. Additionally, the model includes size and military Navy and Army Service control dummy variables to identify confounding effects. The LOC base model significant estimated path coefficients are represented in Figure 5.



** and *** significant direct path coefficient at 0,05, and 0.01 levels, respectively (two-tailed).

FIGURE 5 – Base model PLS-SEM Levers of Control significant path.

5.4.1. Levers of Control Use Asssociation

We investigate the BLS use relationship with BDS, DCS and ICS use by the military managers sample to test H1a, H1b, and H1c, respectively. The direct path coefficients reflect positive effects of BLS exogenous construct on BDS, DCS and ICS endogenous constructs. The results in Table XXV reveals that BLS have positive and significant associations with BDS (0,580; $p < 0{,}001$; $f^2 = 0{,}510$) and ICS (0,394; $p < 0{,}001$; $f^2 = 0{,}194$), but a not significant association with DCS (0,062; $p > 0{,}1$; $f^2 = 0{,}008$). Hence, the direct effects results confirm H1a and H1c, and does not confirm H1b. The military managers perceived importance on BLS use is positive and directly associated with BDS and ICS use but not with the perceived importance they place on the DCS. Therefore, H1 is partially supported.

The results reveal model predictive relevance with medium effects of BLS on BDS (Q^2 = 0,184, q^2 = 0,222), and small effects on ICS (Q^2 = 0,146, q^2 = 0,125). On the other hand, total effects coefficient measures BLS influence on DCS, mediated by BDS and ICS. We find, in Table XIX and Table XX, that ICS is the most important construct to explain and predict DCS use perception (f^2 = 1,757; q^2 = 0,732). The strongest effect, identified in Table XVII and Table XIX, is the ICS on DCS (0,807; p < 0,001).

TABLE XXV – Aggregated base model Direct and Total effects coefficients.

Relationship	Hypotheses (expected sign)	Path direct coefficient (β)	*t*-statistic	Total effects coefficient (β)	*t*-statistic
BLS → BDS	H1a (+)	**0,580*** **	12,375	**0,580*** **	12,299
BLS → DCS	H1b (+)	0,062	1,507	**0,406*** **	7,879
BLS → ICS	H1c (+)	**0,394*** **	7,455	**0,394*** **	7,474
BDS → DCS	H2 (+)	0,046	1,143	0,046	1,153
ICS → DCS	H3 (+)	**0,807*** **	29,606	**0,807*** **	29,142

*, **, *** significant at p<0,1, p<0,05 and p<0,001.

The direct effects results, in Table XXV, do not provide evidence that BLS (0,062; p > 0,1) or BDS (0,046; p > 0,1) perceived importance are relevant or significant to influence DCS use when isolated.

Mediation analysis reveals, in Table XXV and Panel A of Table XXVI, that ICS full mediates BLS effects on DCS use, supporting a strong and significant BLS total effect on DCS (0,406; p < 0,001).

Therefore, by total effects analysis the aggregated base model military managers sample supports H1 with statistical significancy.

These results are similar to those in the public and private sector extant literature. The perceived BLS use by this sample of military managers identifies BLS to be a keystone in MCS use (Simons, 1995; Kruis et al., 2016; Heinicke et al., 2016), with significant direct effects on BDS and ICS, and total effects on DCS. The findings support the vision, mission, and core values importance to the military managers, as argued by Soeters (2020a). The results reveal that the military managers sample are engaged with organizational mission and values statements, committing them on higher LOC use emphasis to achieve compliance with the Unit's mission and strategic goals. The BLS use positive direct effects observed on BDS and ICS. These constructs correlation reveals the importance perceived by military organization managers to comply with the standards and procedures as well as providing feedback to adjust the assessment metrics to emergent strategies, motivated by their organizational beliefs, core values, and need of adaptation to the real-time constraints and possible solutions. The results support Widener (2007) and Heinicke et al. (2016) findings related to the positive correlation and influence of BLS on BDS, DCS and ICS levers.

Regarding H2, we find no statistical significancy in the path BDS to DCS value, to support that an emphasis on BDS use influences positively DCS use ($\beta = 0{,}046$; $p > 0{,}1$; $f^2 = 0{,}005$). Although both levers have a constraining role within MCS and are positively correlated (0,33; $p < 0{,}001$), we find that BDS use does not have any effect in DCS use. This finding is similar to private sector literature results (Widener, 2007; Heinicke et al., 2016), where DCS use is not explained by BDS use. The perception that BDS use does not influence DCS use can suggest that the military managers sample do not associate DCS to restrain behaviours or avoid risks, as identified by (Simons, 1995). The ICS full mediation of BLS influence on DCS contrasts with the irrelevant and not significant BDS mediation on BLS-DCS relation, or direct effect of BDS on DCS. These results confirm that the military managers sample emphasize DCS use as tool to achieve higher bureaucratic effectiveness levels more than a restraining lever, complying with the objectives and metrics identified by the superior echelon and act upon deviations (Heeren-Bogers, 2021), in observance of the existing rules and procedures while avoiding risk behaviours (Soeters et al., 2010; Koch-Bayram & Wernicke, 2018). We posit that DCS use may not be perceived as MCS to monitor military managers law compliance, and unapproved risk behaviours, since it is not emphasized by BDS use, although positive correlation exists between BDS and DCS. Instead, because of ICS full mediation of BLS on DCS use, the results suggests that the LOC is following emergent strategy, identified by Simons (1995) , as a lever to engage military managers to control organizational assets and produce management reports, fulfilling both personal and organizational objectives (Deschamps, 2019).

The disconnection between BDS and DCS use perception found in the military managers sample, may be supported with the perceived importance of the ICS use to explain and predict DCS use, either by mediation effect or direct effect as H1 and H3 tests results reveal. The DCS use by the military managers sample may be underestimated relative to Simons (1995) definition because it promotes less motivation and lower reward to management outcomes than in the private sector.

TABLE XXVI - Total, Direct, and Indirect effects of BLS on DCS.

Panel A: BLS on DCS and Age PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient (β)	Age: 44 or older β	Age: Under 44 β	PLS MGA Path differences
Total	**0,406*** **	**0,508*** **	**0,182*** **	***
Direct	0,062	0,058	0,013	n.s.
Total Indirect	**0,345*** **	**0,450*** **	**0,169*** **	***
Specific Indirect				
BLS → ICS → DCS	**0,318*** **	**0,392*** **	**0,161*** **	**
BLS → BDS → DCS	0,027	0,058	0,008	n.s.

Panel B: BLS on DCS and Military Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient (β)	Military Core Training: Operational β	Military Core Training: Non-Operational β	PLS MGA Path differences
Total	**0,406*** **	**0,293*** **	**0,499*** **	**
Direct	0,062	-0,019	0,138**	*
Total Indirect	**0,345*** **	**0,312*** **	**0,361*** **	n.s.
Specific Indirect				
BLS → ICS → DCS	**0,318*** **	**0,273*** **	**0,349*** **	n.s.
BLS → BDS → DCS	0,027	0,038	0,012	n.s.

Panel C: BLS on DCS and Military Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient (β)	Military Core Training: Operational β	Military Core Training: Economics / Management β	PLS MGA Path differences
Total	**0,406*** **	**0,293*** **	**0,507*** **	n.s.
Direct	0,062	-0,019	0,115	n.s.
Total Indirect	**0,345*** **	**0,312*** **	**0,392** **	n.s.
Specific Indirect				
BLS → ICS → DCS	**0,318*** **	**0,273*** **	**0,353*** **	n.s.
BLS → BDS → DCS	0,027	0,038	0,039	n.s.

Panel D: BLS on DCS and Military Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient (β)	Military Core Training: Economics / Management β	Military Core Training: Non- Economics / Management β	PLS MGA Path differences
Total	**0,406*** **	**0,507*** **	**0,377*** **	n.s.
Direct	0,062	0,115	0,061	n.s.
Total Indirect	**0,345*** **	**0,392** **	**0,316*** **	n.s.
Specific Indirect				
BLS → ICS → DCS	**0,318*** **	**0,353*** **	**0,302*** **	n.s.
BLS → BDS → DCS	0,027	0,039	0,014	n.s.

*, **, *** significant at $p<0,1$, $p<0,05$ and $p<0,001$. "n.s." – not significant.

The path ICS to DCS tests H3 and reveals to be significant and positively relevant (β = 0,807; p < 0,001; f^2 =1,757), which confirms H3. The military managers have a low ICS use mean value compared to the remaining LOC, but the impact of ICS use in DCS is the largest we identify on a LOC. The model predictive relevance of ICS-DCS path is strong (Q^2 = 0,504; q^2 = 0,732). The military managers sample perceive in real time the need to promote organizational change in face of emergent strategies to new contexts, or in opposition the need to lead a conservative command and the intended strategy maintenance. Similar to Widener (2007) results, we find that these military managers reveal that their ICS use can have a large influence in the DCS, although ICS use reveals the lowest mean in the sample results of all LOC. The extension to which ICS use is perceived by the military managers sample may reflect the need of improvement in control or communication within the (sub)Units to respond to emergent strategies, leading to the DCS use increase, as identified by Widener (2007), and adapting DCS to military organizations context. The strong correlation between ICS and DCS use (0,831; p < 0,001) also reveals their inter-dependency, which supports public organization's MCS extant research findings (Kober et al., 2007; Nuhu et al., 2017; Adhi Nugroho & Hartanti, 2019). We find that the military managers sample ICS -DCS use relation supports the previous authors findings, and Simons (1995) statement that this association provides an example of how structure follows strategy, in this context, how DCS use follows emergent strategies identified by ICS use. The military managers sample can promote the organizational adjustment to emergent strategies through adaptations or modifications on the DCS, which supports its use increase associated to ICS use, in support of effective control and communication of the new intended strategy by military managers. The DCS modifications in Portuguese military organizations may be consequence of ICS use and the interaction between the military managers and internal or external audits, which can result on technical directives or changes in the processes through the functional Directorates. Military managers interactive use of control systems responds to the need for better management of their activities and processes, promoting DCS use changes and integrating different management instruments, such as spreadsheets, database, project management software or new reporting layouts to assist management or to report information, in response to the Portuguese Ministry of Defense, Ministry of Finance's

Directorate General of Budget demands, or the Armed Forces General Staff organizations, which are responsible for the MCS design.

Additionally, Table XXVI reveals BDS and ICS mediation effects on DCS. ICS use specific indirect effect (β = 0,318; p < 0,001) is full mediating BLS positive effects on DCS, in aggregated sample analysis results. We find similar results of ICS use full mediation of Size control variable (0,117; p < 0,05) with positive effects on DCS. In opposition, we identify the ICS use full mediation negative effect of Army's Service control variable relative to the Air Force (-0,125; p < 0,05) on DCS. This strong positive impact of ICS use in DCS use perception supports Batac & Carassus (2009) that ICS complementarity can lead to generative learning and improvements in management. Portuguese military managers lead efforts to comply with new contingencies, either originated from external factors (e.g. significant changes in National Defence risk assessment, armed conflicts), or from new Governmental decisions resulting of Government election, budgetary instruments to constrain budget spending (e.g. available funds), or changes in Armed Forces mission or attributions (e.g. centralised command and management of Portugal's aerial firefighting capabilities) (Fernando & Pereira, 2020). Hence, the results can reveal a poor DCS design relative to the management needs.

5.4.2. Military Managers' Age Multigroup Analysis

We use PLS-SEM multigroup analysis to test subsamples differences between military managers, with 44 or more years old and less than 44 years old, operational and non-operational training, economic or management and non-economic or non-management training, and operational and economic or management training, in hypotheses H4a, H4b and H4c. The results for the multigroup analysis reveal the nonparametric significance test in each subgroup pair differences of the path model parameters estimation and are presented in Table XXVII and Table XXVIII.

Concerning the H4a, H4b and H4c age group tests, we find significant differences between older and younger military managers subgroups in the BLS and ICS use association (p < 0,01). Military managers with 44 or more years old have a significant greater BLS-ICS path coefficient value (β = 0,503; t = 7,522; p < 0,001) than those with less than 44 years old (β = 0,192; t = 2,165; p < 0,05).

Between LOC constructs, both subgroups path coefficients are significant at 5% level, except for the BLS and BDS associations to DCS that are non-significant at 10% level, similar to the aggregated sample results.

TABLE XXVII - Results of PLS-SEM for base model aggregated and age multigroup analysis.

Dependent Variable	Independent Variable	Hypotheses (expected sign) [PLS-MGA Hyp.]	Base Model Aggregated Sample Path Coefficient	Age ≥ 44 years old	Age < 44 years old	Coefficient [PLS-MGA]
LOC						
BDS	BLS	H1a (+) [H4a]	**0,580*** **	**0,664*** **	**0,472*** **	[*]
DCS	BLS	H1b (+) [H4a]	0,062	0,058	0,013	[n.s.]
ICS	BLS	H1c (+) [H4a]	**0,394*** **	**0,503*** **	**0,192** **	**[**]**
DCS	BDS	H2 (+) [H4b]	0,046	0,087	0,016	[n.s.]
DCS	ICS	H3 (+) [H4c]	**0,807*** **	**0,780*** **	**0,839*** **	[n.s.]
Controls						
BDS	Navy Service		0,021	-0,046	0,075	[n.s.]
DCS	Navy Service		-0,023	0,027	-0,079	[n.s.]
ICS	Navy Service		-0,032	-0,077	-0,006	[n.s.]
BDS	Army Service		0,089	0,048	0,116	[n.s.]
DCS	Army Service		0,034	0,045	0,015	[n.s.]
ICS	Army Service		**-0,155** **	-0,073	**-0,316** **	**[**]**
BDS	Size		0,084	0,055	0,097	[n.s.]
DCS	Size		-0,014	0,050	-0,115*	**[**]**
ICS	Size		**0,146** **	0,095	**0,163** **	[n.s.]
Adjusted R^2						
BDS			**0,340*** **	**0,436*** **	**0,189** **	**[**]**
DCS			**0,705*** **	**0,730*** **	**0,669*** **	[n.s.]
ICS			**0,199*** **	**0,253*** **	**0,155** **	[n.s.]

*, **, *** significant at $p<0,1$, $p<0,05$ and $p<0,001$, respectively (two-tailed significance).
n.s. – Not significant at 10% level.

Firstly, the different perceptions of older and younger military managers can be explained by the upper echelon approach (Hambrick & Mason, 1984; Hambrick, 2007). Both subgroups include participants with different characteristics that could influence their perceptions or decisions, as management levels (e.g. senior and junior Officers, and non-Officers), military core training (e.g. operational, economic/management, or others), and education levels (e.g. university or non-university level). The military managers with 44 years old or older, in their final years of service, are responsible for the effectiveness ratios of their (Sub)Unit, compliance with the mission assigned and perceive a greater independence status, relatively to lower tenure military (Soeters et al., 2010). Hence, older military managers can be more committed to the Armed Forces values, mission and to subordinates' duty of guardianship, whilst younger military managers reveal to be more

TABLE XXVIII - Results of PLS-SEM for base model aggregated and military core training multigroup analysis.

Dependent Variable	Independent Variable	Hypotheses (expected sign) [PLS-MGA Hyp.]	Base Model Aggregated Sample Path Coefficient	Military Core Training: Operational | Non-Operational Coefficient [PLS-MGA]			Operational | Econ./Manag. Coefficient [PLS-MGA]			Econ./Manag. | Non-Econ./Manag. Coefficient [PLS-MGA]		
LOC												
BDS	BLS	H1(+) [H4a]	**0,580*** **	**0,526*** **	**0,631*** **	[n.s.]	**0,526*** **	**0,740*** **	**[**]**	**0,740*** **	**0,536*** **	**[**]**
DCS	BLS	H1(+) [H4a]	0,062	-0,019	**0,138** **	[*]	-0,019	0,115	[n.s.]	0,115	0,061	[n.s.]
ICS	BLS	H1(+) [H4a]	**0,394*** **	**0,344*** **	**0,443*** **	[n.s.]	**0,344*** **	**0,435*** **	[n.s.]	**0,435*** **	**0,381** **	[n.s.]
DCS	BDS	H2(+) [H4b]	0,046	0,073	0,019	[n.s.]	0,073	0,053	[n.s.]	0,053	0,026	[n.s.]
DCS	ICS	H3(+) [H4c]	**0,807*** **	**0,793*** **	**0,788*** **	[n.s.]	**0,793*** **	**0,812*** **	[n.s.]	**0,812*** **	**0,792*** **	[n.s.]
Controls												
BDS	Navy Service		0,021	0,058	-0,025	[n.s.]	0,058	0,081	[n.s.]	0,081	-0,005	[n.s.]
DCS	Navy Service		-0,023	-0,102*	0,011	[n.s.]	-0,102*	0,067	[*]	0,067	-0,066	[*]
ICS	Navy Service		-0,032	-0,054	-0,021	[n.s.]	-0,054	0,053	[n.s.]	0,053	-0,065	[n.s.]
BDS	Army Service		0,089	0,136	0,023	[n.s.]	0,136	0,174*	[n.s.]	0,174*	0,067	[n.s.]
DCS	Army Service		0,034	-0,045	0,072	[*]	-0,045	0,103	[*]	0,103	0,006	[n.s.]
ICS	Army Service		**-0,155** **	**-0,242** **	-0,081	[n.s.]	**-0,242** **	-0,017	[n.s.]	-0,017	**-0,195** **	[n.s.]
BDS	Size		0,084	0,114	0,006	[n.s.]	0,114	-0,031	[n.s.]	-0,031	**0,130** **	[n.s.]
DCS	Size		-0,014	**0,111** **	**-0,105** **	**[**]**	**0,111** **	-0,043	[n.s.]	-0,043	0,018	[n.s.]
ICS	Size		**0,146** **	**0,229** **	0,079	[n.s.]	**0,229** **	0,093	[n.s.]	0,093	**0,178** **	[n.s.]
Adjusted R^2												
BDS			**0,340*** **	**0,304*** **	**0,376*** **	[n.s.]	**0,304*** **	**0,526*** **	[*]	**0,526*** **	**0,306*** **	**[**]**
DCS			**0,705*** **	**0,713*** **	**0,729*** **	[n.s.]	**0,713*** **	**0,772*** **	[n.s.]	**0,772*** **	**0,682*** **	[n.s.]
ICS			**0,199*** **	**0,208** **	**0,192** **	[n.s.]	**0,208** **	0,137	[n.s.]	0,137	**0,211*** **	[n.s.]

*, **, *** significant at $p<0,1$, $p<0,05$ and $p<0,001$, respectively (two-tailed significance).
n.s. – Not significant at 10% level.

focused to comply with legislation, directives, or rules to maximize effectiveness, efficiency and economy in their tasks or mission execution (Soeters et al., 2010; Soeters, 2020a, 2020b).

The older military managers reveal significant higher LOC's mean emphasis, as identified in Table XIII, and higher path coefficient with significant BLS-ICS association differences, identified in Table XXVII, than the younger participants. Thus, the results suggests that military managers with 44 years old or older are drivers for organizational change and innovation, independently of their education level, military rank, or core training. This finding finds support in Bobe & Kober (2020b), and opposes extant literature in other public settings that identify the older or higher tenure managers prefer DCS use, they are found to be more conservative, accommodated to their *status quo*, and organizational processes (Naranjo-Gil et al., 2009; Abatecola & Cristofaro, 2018). On the other hand, both military and public hospital organizations are professional organizations, driven by older or higher organizational tenure managers with higher reputation levels within their technical or organizational network. This context promotes advantages and organizational recognition to the older and higher tenure managers in support of innovation (Lega, 2009; Soeters et al., 2010; Soeters, 2020b), through BLS and ICS use emphasis as identified in these results and argued by Simons (1995) and Naranjo-Gil & Hartmann (2006, 2007b). We identify that the military managers sample years in current function are low for both age groups (44 years old or older: mean = 3,69; standard deviation = 2,96. 43 years old or less: mean = 2,53; standard deviation = 2,13), therefore, all have lower function tenures. Hence, we find that higher LOC use by older military managers and higher BLS-ICS path coefficient with significant differences in multigroup analysis results reveal that it supports Bobe & Kober (2020b) findings and suggest lack of motivation of older military managers to adopt changes related to new public management practices.

The descriptive results reveal medium emphasis on LOC by both Age subgroups, as we identify in Table XIII. These results are similar to Heinicke & Guenther (2020) findings in higher education organizations, which suggest that military managers, as deans, are minimizing LOC use because they perceive that MCS are useful mostly to comply with Government legislation and reporting.

We find H4a partially supported for Age subgroups. All Age subgroups results are similar to the aggregated sample results with BLS significant (p < 0,05) and positive association to BDS an ICS, but not to DCS use (p > 0,05). The military managers' sample PLS-SEM multigroup analysis reveal no significant differences to support H4b and H4c (p > 0,05).

Regarding control variables, in Table XXVII, we find that larger size military managers perceive positive and significant association of ICS use to a greater extent for the aggregated sample (β = 0,146; t = 2,720; p < 0,01) and younger Age subgroup (β = 0,163; t = 2,077; p < 0,05). This result may be due to increased younger human resources availability to perform mission, administrative tasks, and consequently more time available for new ideas discussion, debate on actions plans and use MCS as a learning tool, in particular regarding military managers under 44 years old. On the other hand, smaller military organizations, with less human resources, may allocate more proportion of working time to execute planned or emergent tasks and less on ICS use actions emphasis. Multigroup analysis show significant differences in Size relationship with DCS use path coefficient between Age subgroups (p < 0,05). Both subgroups path's coefficients are not significant at 5% level (44 years old or more: β = 0,050; t = 1,106; p > 0,1; under than 44 years old: β = -0,115; t = 1,943; p > 0,05).

Additionally, results show less ICS use emphasis from the Army Service military managers (β = -0,155; t = 2,652; p < 0,01), relative to the Air Force. These results may identify organizational culture differences, where Air Force Service can be associated to change and innovation due to its technological weapon systems, while the Army Service can be more committed with traditional modes of operation, as 'boots on the ground' strategy. Age subgroups multigroup analysis results reveal significant path coefficient differences within Army military managers, relative to Air Force, association to ICS use (p < 0,05). Both Army military managers Age subgroups reveal negative path coefficients, relative to Air Force. The younger managers results are relevant, significant, and with a lower value (β = -0,316; t = 3,274; p < 0,01) than the older subgroup (β = -0,073; t = 1,020; p > 0,1). Remaining Service control variables multigroup analysis paths coefficients do not reveal significant differences nor path coefficients. We find that younger Army military managers emphasize less ICS use than younger Air Force military managers, leading to significant value in the aggregated sample results and may be less oriented to organic controls, change and innovation.

5.4.3. Military Managers' Core Training Multigroup Analysis

Regarding the military core training H4a, H4b and H4c tests, Table XXVIII identifies PLS-SEM multigroup analysis results. We identify positive and significant BLS-BDS use association subgroups' differences, at 5% level, between operational and economic/management training, and between economic/management and non-economic/management. The subgroups sample reveal operational training ($\beta = 0{,}526$; $t = 6{,}601$; $p < 0{,}001$) and non-economic/management training subgroups ($\beta = 0{,}536$; $t = 9{,}366$; $p < 0{,}001$) with smaller BLS-BDS path coefficient value compared to the results of military managers' perception with economic/management training ($\beta = 0{,}740$; $t = 10{,}126$; $p < 0{,}001$). The remaining differences between military core training subgroups related to BLS association with DCS and ICS are not significant, thus these results support H4a partially. H4b and H4c are not supported by PLS-SEM multigroup analysis results between military core training subgroups, as we identify in Table XXVIII. When comparing core training PLS-SEM multigroup analysis results with extant literature, we find no rule of thumb to identify differences between military operational professionals, and economics or management related educational background and interactive MCS use perceptions, as evidenced for academic professionals in university or clinical professionals in hospital settings (Naranjo-Gil & Hartmann, 2006; de Harlez & Malagueño, 2016; Heinicke & Guenther, 2020; Bobe & Kober, 2020b).

Military managers with economic or management educational backgrounds reveal a relevant and significant higher positive BLS effect on BDS use than those with operational or other training. Furthermore, we find in the military managers' sample that economic or management related educational background are associated to higher LOC use levels when compared to different core training, although not significantly different, as Table XII reveals. These findings support extant literature claim that managers with economic or management related educational background reveal higher perception of LOC use than the respective sector professionals (Heinicke & Guenther, 2020), and suggest preference for constraining and mechanistic LOC than enabling or organic ICS use levers similar to Naranjo-Gil & Hartmann's (2006) findings.

Between LOC constructs, subgroups path coefficients significancy at 1% level only differ from the aggregated sample in the non-operations subgroup BLS-DCS path coefficient, as identified in Table XXVIII. The importance of BLS to BDS use and ICS use is relevant and significant in all core training subgroups. The predictive impact of BDS use in DCS use is not significant for all core training subgroups. On the other hand, BLS use impact on DCS use is only significant in the non-operational subgroup (β = 0,138; p < 0,05), but its result may be explained by the perceptions of non-operational and non-economic or management training subgroups more committed to comply with regulations and metrics, such as military managers with engineering or law core training. We find more similarities than differences between military managers educational background subgroups, in opposition to the health and higher education public sector findings, that may reveal the consequence of Portuguese common military initial training. The common military initial training has the objective to provide at an early stage shared beliefs values, leadership awareness, and tackle strategies to evaluate and solve problems or complex situations with information gaps, promoting military acculturation and a shared educational background.

Similar to age subgroups descriptive results, military core training subgroups also reveals medium emphasis on LOC, as identified in Table XII. Economic and management related education background show higher values, but they are not significant different. Therefore, it may support that MCS use is more intended to comply with Government legislation (Heinicke & Guenther, 2020) by military managers, than to manage the military organization.

Concerning control variables, in Table XXVIII, PLS-SEM multigroup analysis reveals significant differences in Size impact on DCS use path coefficient between operational and non-operational military managers subgroups (p < 0,05). Both subgroups path's coefficients Size-DCS are significant at 5% level, but with opposite signs (operations: β = 0,111; t = 2,082; p < 0,05; non-operations: β = -0,105; t = 2,084; p < 0,05). Military managers sample with operational training reveal significant and opposite DCS use perception when the (sub)Unit Size increases than those with non-operational training. The results suggest that Portuguese military managers with operational training positively associates DCS (β = 0,111; t = 2,082; p < 0,05) and ICS use (β = 0,229; t = 2,861; p < 0,01) to larger size military organizations to respond to higher management evidenced-based demands (Soeters, 2020b), and higher competition with their peers, in search of management performance improvements to ascend to higher ranks or to be eligible to high rewarding missions, similar to academics in higher education organizations (Heinicke & Guenther, 2020) and public sector managers (Nuhu et al., 2017, 2019). In opposition, non-operational military managers perceive DCS use as a barrier to improve performance in larger size (sub)Units, with increasing size having a negative effect on DCS use emphasis. Additionally, Army Service military managers results reveal a negative and significant association to ICS use perception, either those with operational training (β = -0,242; t = 2,689; p < 0,01) or with non-economics or management training (β = -0,195; t = 2,918; p < 0,01), relative to the Air Force. These results can support organizational culture differences between Army and Air Force Services, the latter being more prone to be considered an agile organization as previously identified in the age variable multigroup analysis, and aggregated sample. Remaining Service control variables multigroup analysis paths coefficients do not reveal significant differences nor path coefficients. Control variables do not influence significantly military managers with economics or management core training (p > 0,05).

5.4.4. Mediation Effects on Levers of Control

We study the existence of mediation effect between BLS use and DCS use in Table XXVI, Navy Service and DCS use in Table XXIX, Army Service and DCS use in Table XXX, and Size and DCS use in Table XXXI. The Navy Service dummy variable does not reveal significant results in the direct, indirect, and total effects relationship with DCS use, either for aggregated or subgroups samples, revealing no significant difference with Air Force Service.

For BLS use total, direct, and indirect effects on DCS use, we find that ICS is full mediating, except for the non-operational training subgroup sample result, were we find that a positive significant direct path coefficient (β = 0,138; t = 2,331; p < 0,05) supports ICS complementary partial mediation of BLS effect on DCS. It is also between operational and non-operational subgroups that PLS-SEM multigroup analysis identifies total effects significant difference at 5% level, mostly explained by the BLS use perceived by non-operational direct effects value.

TABLE XXIX - Total, Direct, and Indirect effects of Navy Service on DCS.

Panel A: Navy Service on DCS and Age PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient β	Age 44 or older β	Age Under 44 β	PLS MGA Path differences
Total	-0,048	-0,037	-0,082	n.s.
Direct	-0,023	0,027	-0,079	n.s.
Total Indirect	-0,025	-0,064	-0,003	n.s.
Specific Indirect				
Navy → ICS → DCS	-0,026	-0,060	-0,005	n.s.
Navy → BDS → DCS	0,001	-0,004	0,001	n.s.

Panel B: Navy Service on DCS and Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient β	Military Core Training Operational β	Military Core Training Non-Operational β	PLS MGA Path differences
Total	-0,048	-0,141	-0,006	n.s.
Direct	-0,023	-0,102	0,011	n.s.
Total Indirect	-0,025	-0,039	-0,017	n.s.
Specific Indirect				
Navy → ICS → DCS	-0,026	-0,043	-0,016	n.s.
Navy → BDS → DCS	0,001	0,004	0,000	n.s.

Panel C: Navy Service on DCS and Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient β	Military Core Training Operational β	Military Core Training Economics / Management β	PLS MGA Path differences
Total	-0,048	-0,141	0,115	*
Direct	-0,023	-0,102	0,067	*
Total Indirect	-0,025	-0,039	0,048	n.s.
Specific Indirect				
Navy → ICS → DCS	-0,026	-0,043	0,043	n.s.
Navy → BDS → DCS	0,001	0,004	0,004	n.s.

Panel D: Navy Service on DCS and Military Core PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient β	Military Core Training Economics / Management β	Military Core Training Non- Economics / Management β	PLS MGA Path differences
Total	-0,048	0,115	-0,005	*
Direct	-0,023	0,067	-0,066	*
Total Indirect	-0,025	0,048	-0,052	n.s.
Specific Indirect				
Navy → ICS → DCS	-0,026	0,043	-0,052	n.s.
Navy → BDS → DCS	0,001	0,004	0,000	n.s.

*, **, *** significant at p<0,1, p<0,05 and p<0,001. "n.s." – not significant.

TABLE XXX - Total, Direct, and Indirect effects of Army Service on DCS.

Panel A: Army Service on DCS and Age PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient β	Age: 44 or older β	Age: Under 44 β	PLS MGA Path differences
Total	-0,087	-0,007	**-0,248****	*
Direct	0,034	0,045	0,015	n.s.
Total Indirect	**-0,121*****	-0,053	**-0,264*****	**
Specific Indirect				
Army → ICS → DCS	**-0,125*****	-0,057	**-0,265*****	**
Army → BDS → DCS	0,004	0,004	0,002	n.s.

Panel B: Army Service on DCS and Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient β	Military Core Training: Operational β	Military Core Training: Non-Operational β	PLS MGA Path differences
Total	-0,087	**-0,227*****	0,008	*
Direct	0,034	-0,045	0,072	*
Total Indirect	**-0,121*****	**-0,182****	-0,063	n.s.
Specific Indirect				
Army → ICS → DCS	**-0,125*****	**-0,192*****	-0,064	n.s.
Army → BDS → DCS	0,004	0,010	0,000	n.s.

Panel C: Army Service on DCS and Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient β	Military Core Training: Operational β	Military Core Training: Economics / Management β	PLS MGA Path differences
Total	-0,087	**-0,227*****	0,098	**
Direct	0,034	-0,045	0,103	*
Total Indirect	**-0,121*****	**-0,182****	-0,005	n.s.
Specific Indirect				
Army → ICS → DCS	**-0,125*****	**-0,192*****	-0,014	n.s.
Army → BDS → DCS	0,004	0,010	0,009	n.s.

Panel D: Army Service on DCS and Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient β	Military Core Training: Economics / Management β	Military Core Training: Non- Economics / Management β	PLS MGA Path differences
Total	-0,087	0,098	**0,146****	n.s.
Direct	0,034	0,103	0,006	n.s.
Total Indirect	**-0,121*****	-0,005	**-0,152*****	n.s.
Specific Indirect				
Army → ICS → DCS	**-0,125*****	-0,014	**-0,154*****	n.s.
Army → BDS → DCS	0,004	0,009	0,002	n.s.

*, **, *** significant at p<0,1, p<0,05 and p<0,001. "n.s." – not significant.

TABLE XXXI - Total, Direct, and Indirect effects of Size on DCS.

Panel A: Size on DCS and Age PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient (β)	Age: 44 or older β	Age: Under 44 β	PLS MGA Path differences
Total	0,107*	0,128*	0,023	n.s.
Direct	-0,014	0,050	-0,115*	**
Total Indirect	**0,121*** **	0,079	**0,139** **	n.s.
Specific Indirect				
Size → ICS → DCS	**0,117*** **	0,074	**0,137** **	n.s.
Size → BDS → DCS	0,004	0,005	0,002	n.s.

Panel B: Size on DCS and Military Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient β	Military Core Training: Operational β	Military Core Training: Non-Operational β	PLS MGA Path differences
Total	0,107*	**0,301*** **	-0,042	***
Direct	-0,014	0,111**	**-0,105** **	***
Total Indirect	**0,121*** **	**0,190*** **	0,063	n.s.
Specific Indirect				
Size → ICS → DCS	**0,117*** **	**0,182*** **	0,063	n.s.
Size → BDS → DCS	0,004	0,008	0,000	n.s.

Panel C: Size on DCS and Military Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient β	Military Core Training: Operational β	Military Core Training: Economics / Management β	PLS MGA Path differences
Total	0,107*	**0,301*** **	0,031	*
Direct	-0,014	**0,111** **	-0,043	n.s.
Total Indirect	**0,121*** **	**0,190*** **	0,074	n.s.
Specific Indirect				
Size → ICS → DCS	**0,117*** **	**0,182*** **	0,076	n.s.
Size → BDS → DCS	0,004	0,008	-0,002	n.s.

Panel D: Size on DCS and Military Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient β	Military Core Training: Economics / Management β	Military Core Training: Non- Economics / Management β	PLS MGA Path differences
Total	0,107*	0,031	**0,162** **	n.s.
Direct	-0,014	-0,043	0,018	n.s.
Total Indirect	**0,121*** **	0,074	**0,144*** **	n.s.
Specific Indirect				
Size → ICS → DCS	**0,117*** **	0,076	**0,141*** **	n.s.
Size → BDS → DCS	0,004	-0,002	0,003	n.s.

*, **, *** significant at p<0,1, p<0,05 and p<0,001. "n.s." – not significant.

The age multigroup analysis reveals similar aggregated results, with significant differences found between age's subgroups for total and indirect effects. We find that the total and indirect effects of BLS on DCS are higher within the military managers with 44 and more years old and non-operational. It is also relevant that are the non-operational who reveal higher total effects on DCS use through BLS use emphasis.

The Army Service dummy variable indirect effects on DCS use, in the aggregated sample, reveal significant negative indirect effects path coefficients, relatively to the Air Force Service, supporting ICS use full mediation. Following the aggregated results, we find in PLS-SEM multigroup analysis significant differences between age subgroups in Army Service dummy variable indirect effects on DCS use, relatively to the Air Force Service, and between operational and economics/management core training subgroups total effects. In the age (core training) subgroups Army Service path coefficients reveal no ICS nor DCS use mediation for the older (economics/management's core training) military managers subgroup, and full ICS use mediation of Army Service effect on DCS use for younger (operational core training) military managers subgroup, relatively to the Air Force Service. The Army Service military managers that are younger with operational training reveal higher negative path coefficients of indirect and total effects on DCS use, with the lower ICS use explaining the significant differences relatively to the Air Force Service.

Size (log) control variable aggregated sample results support significant positive indirect path effect with ICS use full mediation on DCS use ($\beta = 0{,}117$; $p < 0{,}01$). We find in age subgroups PLS-SEM multigroup analysis significant differences in direct Size effects on DCS use, at 5% level. The older military managers subgroup sample do not reveal results with significancy, but in the younger sample subgroup results we identify, at 5% level, positive indirect Size impact on DCS use via ICS use ($\beta = 0{,}137$; $p < 0{,}05$). Between operational and non-operational core training multigroup analysis the total and direct effects reveal significant differences at 1% level, with higher positive values identified on the operational subgroup for total, direct, and indirect path coefficient Size to DCS use results. The indirect path coefficient of Size via ICS use on DCS use is significant for the operational ($\beta = 0{,}111$; $p < 0{,}05$) and non-operational sample ($\beta = -0{,}105$; $p < 0{,}05$), the later with negative value.

The aggregated sample results suggest that greater BLS use or Size may increase DCS use through ICS use significantly. Other finding is that BLS use effects on DCS use via ICS are consistent and similar to aggregated results through all age and core training subgroups. We find significant differences between older and younger subgroups BLS use indirect effects on DCS use path coefficients, with the older military managers revealing significant positive higher path coefficients, supporting higher ICS use by the older subgroup. Regarding military core training subgroups, we find that non-operational and economics or management are the subsamples which show that higher BLS use may increase higher DCS use via ICS use.

For the Army Service military managers' results, relatively to Air force, reveal a significant negative path coefficient between the Army Service dummy variable and DCS use via ICS use. These results are more relevant in Army's younger age and operational subgroups, with higher negative indirect effects relatively to Air Force military managers, at 5% level significancy. Therefore, within the research sample, Army's younger military managers with operational core training are less prone to DCS use via ICS use mediation, relative to Air Force military managers.

Lastly, we identify that Portuguese larger size military organization may increase military managers DCS use via ICS use, with higher emphasis among those with operational core training.

5.4.5. Base Model Main Findings

In resume, the base model results analysis provides three significant and relevant findings. Primarily, the LOC effects suggests that BLS use emphasis by military managers promotes higher LOC use to align managers decisions with intended strategy, or to identify emergent strategies, supporting H1 and extant literature findings (Simons, 1995; Widener, 2007; Heinicke et al., 2016; Pilonato & Monfardini, 2020). The ICS use effects on DCS are direct and by mediation of BLS effect, with strong predictive relevance, which supports H3 and Widener's (2007) and Batac & Carassus (2009) findings that ICS emphasis promotes organizational change and structure modification to follow new strategies (Kober et al., 2007; Nuhu et al., 2017; Adhi Nugroho & Hartanti, 2019). Hence, the results of perceived LOC use suggest that Portuguese Armed Forces MCS design may not comply with current strategy or new reporting requirements, in support of extant literature that identify new MCS framework for the Defence sector (Gomes, 2021; Soares et al., 2022).

Secondly, at the different management levels, military managers' characteristics reveal influence on MCS use, partially supporting H4a and Hambrick's upper echelon theory (Hambrick & Mason, 1984; Hambrick, 2007). The significant differences in LOC use perception and BLS effects on ICS emphasis between older and younger military managers suggest that older managers are keen to organizational change and innovation, independently of their education level, military rank, or core training, and to reveal less motivation to adopt new public management managerialism, as identified by Heinicke & Guenther (2020) and Bobe & Kober (2020b) in public higher education organizations. On the other hand, military managers with economic or management core training reveal significant differences in BLS use effect on BDS use relatively to the remaining core training also supports H4a. The economic or management core training military managers reveal the higher LOC use, as found in higher education setting by Heinicke & Guenther (2020), revealing their preference to comply with new public management directives.

And thirdly, we identify that military managers sample reveal that control variable size(log) significantly emphasizes positive ICS use, which suggests competition between peers, through innovation, as found on academics in higher education organizations (Heinicke & Guenther, 2020) and public sector managers (Nuhu et al., 2017, 2019). In opposition, we find that the Army relatively to the Air Force military managers perceive lower ICS use with significancy, which suggests organizational culture differences. Finally, size has a significant and opposite effect on operational and non-operational core trained military managers DCS use. The military managers with operational core training results suggest that size emphasize their adoption to evidenced-based management (Soeters, 2020b), while non-operational reveal negative size effect on DCS use. These findings support bigger military organizations emphasize complementary diagnostic and interactive MCS use by military managers with operational core training, also identified by Batac & Carassus (2009) and Harlez & Malagueño (2016).

The next chapter focus on environmental uncertainty effects on LOC use, and LOC use effects on organizational learning and management attention, with PLS-SEM path and multigroup analysis of military managers characteristics.

6. EXTENDED MODEL RESULTS AND DISCUSSION

The extended model results, analysis, and its discussion follow's the previous base model's chapter structure. This chapter focus primarily on the Environmental Uncertainty impact on the LOC use, and the LOC use impact on Organizational Learning and Management Attention. We identify specific results related to the constructs introduced in the extended model on the descriptive statistics section, hence all LOC results remains constant. The remaining sections reveal the PLS-SEM, hypothesis, and robustness tests results, followed by its discussion and how it may impact manager's management.

6.1. Descriptive Statistics

Table I and Table II identify participants demographic statistics. All constructs were tested for validity, reliability, and relevancy. The associations between Simon's LOC, demographics, and constructs are robust and rigorous.

The Mann-Whitney U tests do not reveal significant LOC use differences between the military Core Training variable subgroups ($p > 0{,}05$), in Table XII. We find, in Table XIII, evidence emphasis at a greater extent of military managers respondents with 44 or more years old on organizational learning and management attention than in the younger subgroup ($p < 0{,}05$). Environmental uncertainty construct Mann-Whitney U tests do not reveal significant differences ($Z = -1{,}029$; $p = 0{,}304$). We identify the most significant difference between age subgroups in organizational learning emphasis perception ($p < 0{,}001$) by the 44 years old or older subgroup. Similar to the results identified in the base model chapter, we find that military managers under 44 years old perceive a lower LOC use, and lower organizational learning and management attention emphasis in their military organization. These findings reveal MCS use, organizational learning, and management attention differences within age subgroups, which may impact knowledge transfer, organizational resiliency, and manager's management focus.

Table VIII and Table IX reveal that the organizational learning variable's mean of 5,46 in this research is higher than Widener (2007) 5,06 variable mean found for its private sector sample. In opposition, we find the management attention variable's mean of 4,13 lower than the 4,95 identified by Widener (2007).

Table IV and Table V reveals a weak to moderate correlation between organizational learning, management attention and the LOC's constructs use perception, all with statistical significancy ($p < 0,001$). Environmental uncertainty is not significantly correlated with any construct ($p > 0,05$). We identify moderate correlations between organizational learning and BLS (0,487), and between management attention and BLS (0,442), DCS (0,517) and ICS (0,498). Hence, the associations also may suggest complementarity and interdependence between these constructs.

Control variables correlations with constructs in Table V reveals that Size (log) is positively correlated with environmental uncertainty (0,119; $p < 0,05$). Concerning organizational learning, Navy's dummy control variable is positively correlated (0,122; $p < 0,05$), and Army's dummy control variable correlation is negative (-0,207; $p < 0,001$) relatively to the Air Force.

In Table XIV, organizational learning results reveal that Navy's (Z = -3,151; $p < 0,01$) and Air Force (Z = -2,684; $p < 0,01$) have significantly higher emphasis than Army's participants. Concerning constructs comparison between Navy and Air Force military Services we find no significant differences ($p > 0,05$). We find, in Table XV, that military managers sample serving in (Sub)Units with Size (log) variable equal mean value or above, show significant differences in environmental uncertainty (Z = -2,530; p < 0,05), and management attention (Z = -2,301; p < 0,05). Larger military (Sub)Units reveal higher environmental uncertainty emphasis than smaller size (Sub)Units. While management attention is emphasized to a greater extent in (Sub)Units with a smaller workforce.

6.2. Partial Least Squares Structural Equation Modelling validation

The extended model is evaluated, following the same six steps procedure than identified in the previous chapter, to assess structural model (Hair et al., 2017a, 2019) collinearity (step 1), path coefficients significance and relevance (step 2), R^2 level (step 3), f^2 effect size (step 4), Q^2 predictive relevance (step 5) and q^2 effect size (step 6).

Full collinearity test to assess the latent variables Variance Inflation Factors (VIF) in the model (Kock, 2015), in Table XXXII, reveals VIFs not higher than 3,568, above the conservative VIF of 3,3 and below the less conservative VIF of 5 threshold (Kock, 2015; Hair et al., 2017a), suggesting common method bias model contamination.

TABLE XXXII - Extended model Full collinearity VIFs.

	1	2	3	4	5	6	7
Beliefs Systems (1)		1,559	1,878	1,865	1,821	1,734	1,810
Boundary Systems (2)	1,287		1,550	1,540	1,547	1,533	1,529
Diagnostic Control Systems (3)	3,568*	3,509*		1,477	3,776*	3,556*	3,390*
Interactive Control Systems (4)	1,016	1,026	1,031		3,714*	1,022	1,015
Environmental Uncertainty (5)	3,507*	3,456*	1,460	1,025		3,436*	3,418*
Organizational Learning (6)	1,516	1,565	1,520	1,538	1,557		1,385
Management Attention (7)	1,278	1,376	1,399	1,377	1,369	1,569	

* Values above 3,3 and below 5 can indicate possible collinearity and contamination by common method bias (Kock, 2015; Hair et al., 2019). A less conservative approach refers to valid VIFs between 0,2 and 5 (Hair et al., 2011, 2017a).

We identify no significant support of common method bias issues either in the extended model relations nor in the survey items, with the full collinearity test VIFs below 3,6. In the extended model's latent variables relationships, presented in Table XXXIII, the higher VIF value identified is of 3,535, between ICS and organizational learning and management attention, hence we conclude that no collinearity is present in the extended model (step 1).

TABLE XXXIII - Aggregated extended model path coefficients total effects, significancy and paths VIF.

Path	Total Path Coefficient	Standard Deviation	*t*-statistic	VIF
BLS → BDS	**0,572*** **	0,047	12,189	1,011
BLS → DCS	**0,412*** **	0,051	8,062	1,646
BLS → ICS	**0,410*** **	0,052	7,870	1,011
BLS → OL	**0,472*** **	0,050	9,393	1,675
BLS → MA	**0,460*** **	0,058	7,909	1,675
BDS → DCS	0,048	0,041	1,171	1,519
BDS → OL	0,134*	0,068	1,959	1,558
BDS → MA	**0,143** **	0,063	2,278	1,558
DCS → OL	-0,027	0,100	0,266	3,464
DCS → MA	**0,260** **	0,087	2,985	3,464
ICS → DCS	**0,798*** **	0,025	31,289	1,220
ICS→ OL	**0,148** **	0,069	2,155	3,535
ICS→ MA	**0,394*** **	0,066	5,949	3,535
EU → BLS	-0,105	0,077	1,351	1,000
EU → BDS	-0,103	0,084	1,235	1,011
EU → DCS	-0,079	0,091	0,873	1,014
EU → ICS	-0,069	0,090	0,764	1,011
EU → OL	-0,059	0,044	1,340	-
EU → MA	-0,068	0,057	1,186	-

*, **, *** Significant at $p < 0,1$, $p < 0,05$ and $p < 0,001$, respectfully.

We also identify in the aggregated extended model 10 significant paths at 5% level, with seven of them at 1% level, as presented in Table XXXIII. These paths reveal relevant total effects between 0,143 to 0,798 (step 2). The BDS → OL path direct and total effects are 0,135 with a *p-value* = 0,047, and 0,134 with *p-value* = 0,050, respectively. Furthermore, environmental uncertainty has no significant total effect on any endogenous construct ($p > 0,1$).

The R^2 of boundary, diagnostic, interactive, organizational learning, and management attention endogenous constructs are significant ($p < 0,001$), as presented in Table XXXIV, with exception of BLS ($R^2 = 0,011$; $p = 0,477$). DCS continues to reveal the higher adjusted R^2 value ($R^2_{adj} = 0,705$), while BDS ($R^2_{adj} = 0,329$) and ICS ($R^2_{adj} = 0,165$) have lower values when compared to the base model adjusted R^2 values.

TABLE XXXIV - Extended Model's predictive power - R2 and adjusted R2 coefficients.

Constructs	R^2	Adjusted R^2
Beliefs Systems	0,011	0,007
Boundary Systems	**0,334*** **	**0,329*** **
Diagnostic Control Systems	**0,709*** **	**0,705*** **
Interactive Control Systems	**0,171*** **	**0,165*** **
Organizational Learning	**0,383*** **	**0,367*** **
Management Attention	**0,305*** **	**0,288*** **

*** Significant at $p < 0,001$.

We follow Shmueli et al. (2019) and execute the PLSpredict procedure to measure the extended model's out-of-sample predictive power, as calculated in the base model. PLSpredict procedure results identifies 18 out of 26 construct's items in the PLS-SEM analysis with higher prediction errors compared to the naïve benchmark. Hence, the base model reveals a medium predictive power.

The effect size of latent constructs on endogenous constructs (step 4) is identified by the f^2 value (Cohen, 1988), in Table XXXV, and reveal similar results to the base model. ICS effect size is strong on DCS ($f^2 = 1,794$; $p < 0,001$), as well as the effect size of BLS on BDS ($f^2 = 0,486$; $p < 0,001$). BLS reveals a medium effect size on ICS ($f^2 = 0,200$; $p < 0,01$). We find that BLS ($f^2 = 0,007$; $p > 0,1$) and BDS ($f^2 = 0,005$; $p > 0,1$) have no effect in explaining DCS use. Environmental uncertainty reveals no effect in explaining any of the four levers of control. BDS and ICS also are identified with no effects in explaining organizational learning and management attention. On the other hand, BLS effect size is small in explaining organizational learning ($f^2 = 0,098$; $p < 0,05$). All remaining relations reveal results with no significancy, with *p-value* above 10% level.

TABLE XXXV - Aggregated extended model path coefficients, effect size (f^2).

Path	Path Coefficient	f^2 *t*-statistic	f^2	f^2 Effect size
BLS → BDS	**0,572*** **	4,015	**0,486*** **	**Large effect**
BLS → DCS	0,058	0,650	0,007	No effect
BLS → ICS	**0,410*** **	3,193	**0,200** **	**Medium effect**
BLS → OL	**0,337*** **	1,997	**0,098** **	**Small effect**
BLS → MA	**0,202** **	1,367	0,040	**Small effect**
BDS → DCS	0,048	0,488	0,005	No effect
BDS → OL	**0,135** **	0,895	0,017	No effect
BDS → MA	**0,130** **	0,942	0,018	No effect
DCS → OL	-0,027	0,047	0,000	No effect
DCS → MA	**0,260** **	1,356	0,032	**Small effect**
ICS → DCS	**0,798*** **	5,982	**1,794*** **	**Large effect**
ICS → OL	0,169*	0,762	0,012	No effect
ICS → MA	0,186*	0,869	0,016	No effect
EU → BLS	-0,105	0,680	0,011	No effect
EU → BDS	-0,043	0,264	0,003	No effect
EU → DCS	-0,013	0,081	0,001	No effect
EU → ICS	-0,026	0,070	0,001	No effect

*, **, *** Significant at $p < 0,1$, $p < 0,05$, $p < 0,001$, respectively.

Lastly, we identify through the evaluation of Q^2 predictive relevance (step 5) and q^2 effect size (step 6), in Table XXXVI, that the extended model can predict all endogenous variable for the aggregated sample, with Q^2 above zero value, and between 0,006 for BLS and 0,503 for DCS. The predictive relevance effect size, measured by q^2 reveals a small effect in the BLS relation with ICS ($q^2 = 0,132$), Organizational Learning ($q^2 = 0,059$) and Management Attention ($q^2 = 0,022$), a medium effect in the BLS-BDS relation ($q^2 = 0,211$), and a large effect of 0,753 in the relationship ICS-DCS (Cohen, 1988; Hair et al., 2019). All remaining relationships do not support any effect with q^2 values below the 0,02 threshold (Cohen, 1988; Hair et al., 2019).

The six-step procedure results presented sustain the conclusion that the extended model is relevant and significant.

TABLE XXXVI - Extended model predictive relevance (Q^2) and effect size (q^2).

Path	Q^2	Q^2 excluded	q^2	*Predictive relevance size*
BLS → BDS	0,179	0,006	0,211	**Medium**
BLS → DCS	0,503	0,503	0,000	Null
BLS → ICS	0,119	0,003	0,132	**Weak**
BLS → OL	0,207	0,160	0,059	**Weak**
BLS → MA	0,278	0,262	0,022	**Weak**
BDS → DCS	0,503	0,503	0,000	Null
BDS → OL	0,207	0,200	0,008	Null
BDS → MA	0,278	0,270	0,011	Null
DCS → OL	0,207	0,207	0,000	Null
DCS → MA	0,278	0,265	0,018	Null
ICS → DCS	0,503	0,129	0,753	**Strong**
ICS → OL	0,207	0,202	0,006	Null
ICS → MA	0,278	0,271	0,010	Null
EU → BLS	0,006	0,000	0,006	Null
EU → BDS	0,179	0,178	0,001	Null
EU → DCS	0,503	0,504	-0,002	Null
EU → ICS	0,119	0,119	0,000	Null

6.3. Robustness Tests

We follow Sarstedt et al. (2017) guidelines to uncover unobserved heterogeneity in the extended PLS-SEM, with the same parameters used to assess the base model in chapter 5 through FIMIX-PLS computing process in SmartPLS 3 (Ringle et al., 2015). The minimum sample size to estimate each segment was computed assuming a 5% significance level, a minimum R^2 of 0,25, and a power level of 80%, identifying four as the maximum number of segments, and a minimum of 80 observations (Hair et al., 2017a).

We find ambiguous fit indices for the number of segment solutions (Sarstedt et al., 2011a), in Table XXXVII and Table XXXVIII. Hence, we can assume that unobserved heterogeneity is not present at a critical level and proceed with results analysis of the aggregated data.

TABLE XXXVII - Fit indices for Extended Model without Control Variables Segment Solutions.

Criteria	Segment 1	Segment 2	Segment 3	Segment 4
AIC (Akaike's Information Criterion)	4087,24	4052,62	**4003,05**	4004,03
AIC3 (Modified AIC with Factor 3)	4116,24	4111,62	**4092,05**	4123,03
AIC4 (Modified AIC with Factor 4)	**4145,24**	4170,62	4181,05	4242,03
BIC (Bayesian Information Criteria)	**4192,75**	4267,28	4326,87	4436,99
CAIC (Consistent AIC)	**4221,75**	4326,28	4415,87	4555,99
HQ (Hannan Quinn Criterion)	4129,55	4138,71	4132,92	4177,67
MDL5 (Minimum Description Length with Factor 5)	**4846,80**	5597,93	6334,12	7120,85
LnL (LogLikelihood)	-2014,62	-1967,31	-1912,53	-1883,01
EN (Entropy Statistic (Normed))		0,62	0,71	0,74
NFI (Non-Fuzzy Index)		0,66	0,71	0,71
NEC (Normalized Entropy Criterion)		108,05	80,93	74,03

Note: Numbers in bold indicate the best outcome per segment retention criterion.

TABLE XXXVIII - Relative Segment Sizes (N=281), for Extended Model with control Variables.

Number of Segments	Segment 1	Segment 2	Segment 3	Segment 4
1	100,0%			
2	69,4%	30,6%		
3	65,4%	26,7%	7,8%	
4	52,7%	26,7%	15,5%	5,1%

Note: The table shows the relative segment sizes in declining order per solution per row. The SmartPLS 3 software uses the relative segment sizes in declining order when assigning the segment numbers to the final FIMIX-PLS segments.

The validation of internal consistency, convergent and divergent validity are within the acceptable thresholds in all tested groups of all constructs, with exception of ICS construct as referred on previous chapter. The ICS latent variable consistently reveals HTMT and Cronbach Alphas' values above 0,9, the later does not exceed 0,93. Bootstrapping procedure results, with 5000 random subsamples, for a confidence interval of 95% computation identifies ICS effects on DCS values in the range for HTMT acceptance, between 0,887 and 0,959.

We analyse alternative models' paths and multigroup comparisons of educational level and military rank subgroups to validate the robustness of the results.

Firstly, we link new environmental uncertainty direct paths to organizational learning and management attention, and results reveal no statistical significancy nor relevant changes in total effects compared to the extended model results. Secondly, we remove the control variables and identify that BDS effects on organizational learning (β = 0,114; p = 0,104) and management attention (β = 0,111; p = 0,080) are nor significantly different but reveal non-significant values at 5% level. Lastly, we tested one model trimmed from non-statistically significant paths relative to the extended model results and find that ICS effect on organizational learning is significant at 5% level (β = 0,149; p = 0,033), due to the trimmed DCS → OL path that is partially mediating the ICS effects in the extended model. The results found in alternative models when compared to the extended model do not reveal relevant associations.

Following the theoretical framework and methodology in the previous chapter, we test model's robustness by adding new multigroup analysis with military ranks and education level demographic variables subgroups validated through MICOM analysis for the extended model.

PLS-SEM multigroup analysis robustness tests results for education level higher education and non-higher education subgroups reveals significant differences in the BDS use effects on management attention (p = 0,003), due to the results of the non-higher education subgroup in value and statistical significancy (β = 0,430; p < 0,001), compared to the higher education subgroup (β = 0,041; p > 0,1). These results may be partially explained by the relevant values in the economics/management core training (β = 0,399; p < 0,05) and non-officer's rank (β = 0,371; p < 0,001) subgroups for the same path. The higher education multigroup analysis also reveal additional significant differences in total effects of BDS (p = 0,003) and ICS (p = 0,003) on management attention. We identify relevant and positive effects of ICS on management attention by the higher education subgroup (β = *0*,490; p < 0,001), and of BDS on management attention by the non-higher education subgroup (β = *0*,453; p < 0,001). The adjusted R^2 reveal similar aggregated extended model values within higher education subgroup, but in non-higher education level subgroup ICS use construct reveal non-significant values (R_{adj}^2 = 0,139; p = 0,170), as it is identified in the base model. These findings suggest more research to analyse education level differences within the military organization managers.

Concerning extended model's multigroup analysis robustness tests results for Rank, we tested the two subgroups comparing top Officers with junior Officers, validated by MICOM analysis. We did not identify subgroup significant differences between LOC direct effects, nor in control variables path coefficients relative to the aggregated base model. We find significant differences in ICS total effects on organizational learning (β = *0*,400; p < 0,05), but no significant values to conclude existence of mediation or direct effects. We identify in both subgroups non-significant effects at 5% level of control variables on organizational learning and management attention. The adjusted R^2 reveal no significant subgroups differences, but the junior Officer subgroup ICS adjusted R^2 value (R_{adj}^2 = 0,063; p > 0,1) is the non-significant, similar to findings in the younger age, economics/management core training, and non-higher education subgroups.

We find that the rank variable does not significantly affect the aggregated results but reveals significant negative association by top Officers participants of environmental uncertainty effects on BLS use (β = -0,217; p < 0,05). This result is not identified in any other environmental uncertainty association with statistical significancy.

Therefore, we can conclude that the extended model's results are robust for the hypothesized associations and that the comparison with the alternative models do not reveal relevant and significant differences.

6.4. Results and Discussion

To test the hypotheses H5, H6 and H7 we perform bootstrapping tests with the aggregated extended model through PLS-SEM, using SmartPLS software (Ringle et al., 2015). Hypothesis H8 is tested by PLS-SEM multigroup analysis with age and military core training subgroups. Additionally, the model includes size and military Navy and Army Service control dummy variables to identify confounding effects. The aggregated extended model estimated path coefficients, statistically significant at 5%, are represented in Figure 6.

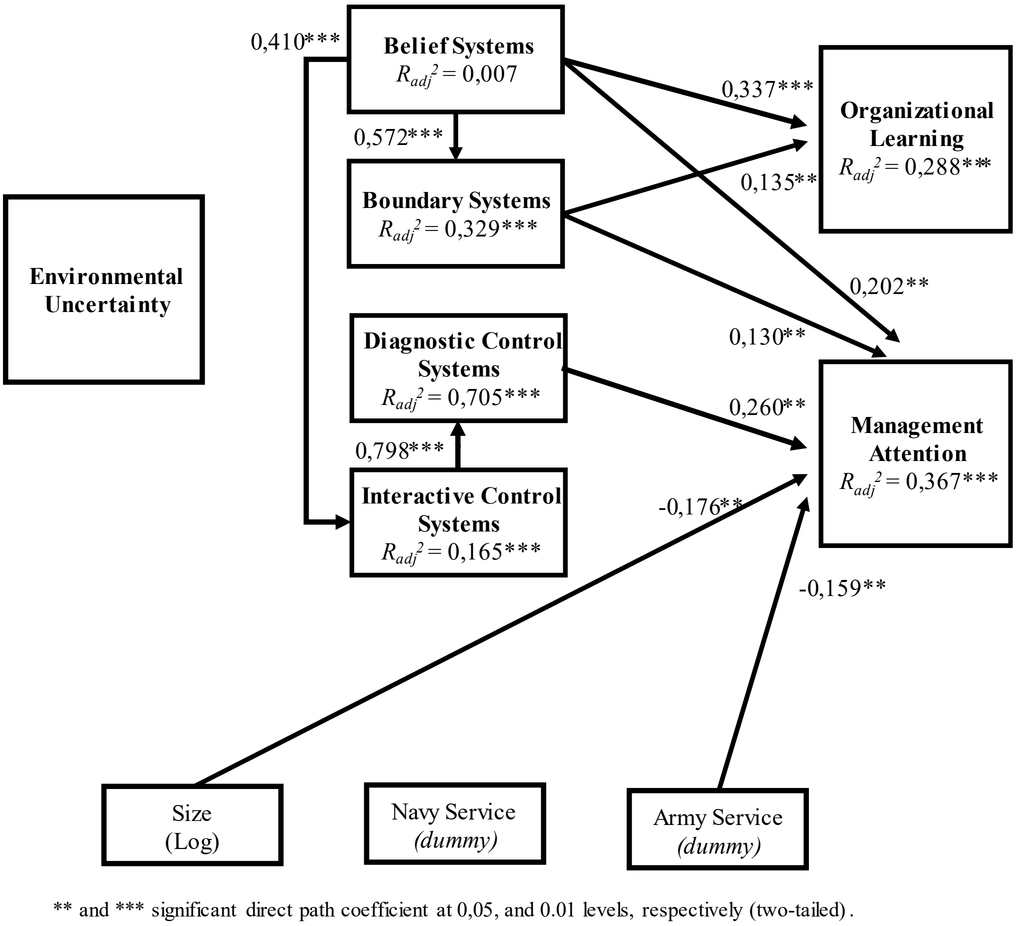


FIGURE 6 - Extended model PLS-SEM significant path.

6.4.1. Environmental Uncertainty Association with Levers of Control Use

We test environmental uncertainty effect on BLS, BDS, DCS and ICS use by the Portuguese military managers sample through H5a, H5b, H5c and H5d, respectively. All paths reveal no statistical significancy ($p > 0,1$) of environmental uncertainty effect values on the LOC (Table XXXIX). Hence, H5 is not supported by the Portuguese military managers sample results. This finding is of particular interest. We expected to find significant results of environmental uncertainty effects on MCS use by the military manager's sample because extant literature supports the existence of high levels of environmental uncertainty in the Defense sector (Osinga & Lindley-French, 2010;

Soeters, 2020a, 2020b). This absence of significant results opposes extant literature (Kominis & Dudau, 2012).

6.4.2. Organizational Learning Association with Levers of Control Use

We test H6a, H6b, H6c, and H6d to investigate the Portuguese military managers sample results perception of each LOC use constructs relation with organizational learning. The aggregated results significant path values, in Table XXXIX, reveal positive BLS (β = 0,337; p < 0,001; f^2 = 0,098) and BDS use (β = 0,135; p < 0,05; f^2 = 0,017) direct effects on organizational learning. On the other hand, total effects reveal change in results significancy related to direct effects on organizational learning of ICS use (β = 0,148; p < 0,05) and BDS use (β = 0,134; p < 0,1). We find support to confirm H6a and H6b with the direct effects results, but not H6c and H6d.

TABLE XXXIX - Aggregated extended model Direct and Total effects coefficients.

Relationship	Hypotheses (expected sign)	Path direct coefficient (β)	*t*-statistic	Total effects coefficient (β)	*t*-statistic
EU → BLS	H5a (+)	-0,105	1,351	-0,105	1,358
EU → BDS	H5b (+)	-0,043	0,672	-0,103	1,252
EU → DCS	H5c (+)	-0,013	0,356	-0,079	0,880
EU → ICS	H5d (+)	-0,026	0,318	-0,069	0,774
BLS → OL	H6a (+)	**0,337*** **	4,568	**0,472*** **	9,393
BDS → OL	H6b (+)	**0,135** **	1,983	0,134*	1,959
DCS → OL	H6c (+)	-0,027	0,266	-0,027	0,266
ICS → OL	H6d (+)	0,169*	1,730	**0,148** **	2,155
BLS → MA	H7a (+)	**0,202** **	2,949	**0,460*** **	7,909
BDS → MA	H7b (+)	**0,130** **	2,069	**0,143** **	2,315
DCS → MA	H7c (+)	**0,260** **	2,985	**0,260** **	2,985
ICS → MA	H7d (+)	0,186*	1,813	**0,394*** **	5,949

*, **, *** significant at p < 0,1, p < 0,05 and p < 0,001.

The extended model predictive relevance results reveal weak effects of BLS on organizational learning (Q^2 = 0,207; q^2 = 0,059), while the remaining LOC reveal no relevant impact on organizational learning.

In Table XXXIX, we identify an increase between direct path coefficient values and total effects of BLS on organizational learning, from 0,337 to 0,472, and a decrease in ICS effects on organizational learning, from 0,169 to 0,148.

Aggregated extended model mediation analysis reveals partial mediation of BLS effects on organizational learning, explained by BDS (β = 0,077; p < 0,1) and ICS (β = 0,069; p < 0,1) as identified in Table XL, and no mediation in ICS use effects on organizational learning (Table XLI).

We find that the sample results support Widener (2007) conclusions related to the positive effect of BLS use emphasis on organizational learning but, in opposition, the findings reveal, at 5% significancy level, positive BDS use direct effects and no significant DCS use relationship. Results reveal no support to ICS use direct effect on organizational learning, within a 5% significancy level, as identified by Widener (2007), in opposition to Henri (2006) and Batac & Carassus (2009). The ICS use reveals in extended model aggregated results significant positive total effects (β = 0,148; p < 0,05), in alternative models when we trim all non-significant paths significant positive direct effects (β = 0,149; p < 0,05), and when we exclude the control variables significant positive direct effects (β = 0,219; p < 0,05). The aggregated results of the extended model without control variables identifies that the BDS use emphasis does not have significant effect on organizational learning (β = 0,114; p > 0,1). Hence, H6 is partially supported.

6.4.3. Manangement Attention Association with Levers of Control Use

We test H7 in the extended model to investigate the LOC effects on management attention. We identify, in Table XXXIX, that emphasis on BLS (β = 0,202; p < 0,05; f^2 = 0,040), BDS (β = 0,130, p < 0,05, f^2 = 0,018), and DCS use (β = 0,260; p < 0,05; f^2 = 0,032) predicts higher management attention efficiency, at a 5% significancy level these results confirm H7a, H7b, and H7c, respectively.

Additionally, we find all total effects relationships positive and significant at 5% level (Table XXXIX). The extended model LOC predictive relevance on management attention results only reveal weak effects of BLS use (Q^2 = 0,278; q^2 = 0,022) and Size (log) (Q^2 = 0,278; q^2 = 0,032) control variable. The mediation analysis results identify BLS partial mediation (Table XLII), and ICS use total effect on management attention is under the 5% significancy level (β = 0,394; p < 0,001), with full mediation by DCS use (Table XLIII).

TABLE XL - Total, Direct, and Indirect effects of BLS on OL.

Panel A: BLS on OL and Age PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient (β)	Age 44 or older β	Under 44 β	PLS MGA Path differences
Total	**0,472*** **	**0,527*** **	**0,352*** **	n.s.
Direct	**0,337*** **	**0,397*** **	**0,267** **	n.s.
Total Indirect	**0,136** **	0,130	0,084	n.s.
Specific Indirect				
BLS→BDS→DCS→OL	-0,001	-0,021	0,000	n.s.
BLS→BDS→OL	0,077*	**0,136** **	0,029	n.s.
BLS→DCS→OL	-0,002	-0,023	0,006	n.s.
BLS→ICS→DCS→OL	-0,009	**-0,133** **	0,040	**
BLS→ICS→OL	0,069*	**0,171** **	0,009	**

Panel B: BLS on OL and Military Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient (β)	Military Core Training Operational β	Non-Operational β	PLS MGA Path differences
Total	**0,472*** **	**0,482*** **	**0,462*** **	n.s.
Direct	**0,337*** **	**0,394*** **	0,229	n.s.
Total Indirect	**0,136** **	0,088	**0,233** **	n.s.
Specific Indirect				
BLS→BDS→DCS→OL	-0,001	-0,003	0,000	n.s.
BLS→BDS→OL	0,077*	0,045	**0,148** **	n.s.
BLS→DCS→OL	-0,002	0,001	0,004	n.s.
BLS→ICS→DCS→OL	-0,009	-0,025	0,009	n.s.
BLS→ICS→OL	0,069*	0,069	0,073	n.s.

Panel C: BLS on OL and Military Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient (β)	Military Core Training Operational β	Economics / Management β	PLS MGA Path differences
Total	**0,472*** **	**0,482*** **	**0,453*** **	n.s.
Direct	**0,337*** **	**0,394*** **	0,122	n.s.
Total Indirect	**0,136** **	0,088	**0,331** **	n.s.
Specific Indirect				
BLS→BDS→DCS→OL	-0,001	-0,003	-0,018	n.s.
BLS→BDS→OL	0,077*	0,045	**0,286** **	*
BLS→DCS→OL	-0,002	0,001	-0,018	n.s.
BLS→ICS→DCS→OL	-0,009	-0,025	-0,078	n.s.
BLS→ICS→OL	0,069*	0,069	0,159	n.s.

Panel D: BLS on OL and Military Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient (β)	Military Core Training Economics / Management β	Military Core Training Non- Economics / Management β	PLS MGA Path differences
Total	**0,472*** **	**0,453*** **	**0,475*** **	n.s.
Direct	**0,337*** **	0,122	**0,381*** **	n.s.
Total Indirect	**0,136** **	**0,331** **	0,094*	n.s.
Specific Indirect				
BLS→BDS→DCS→OL	-0,001	-0,018	0,000	n.s.
BLS→BDS→OL	0,077*	**0,286** **	0,041	*
BLS→DCS→OL	-0,002	-0,018	-0,001	n.s.
BLS→ICS→DCS→OL	-0,009	-0,078	-0,003	n.s.
BLS→ICS→OL	0,069*	0,159	0,057	n.s.

*, **, *** significant at *p*<0,1, *p*<0,05 and *p*<0,001. “n.s.” – not significant.

Therefore, we find support to confirm H7, with all LOC emphasis positively impacts management attention efficiency. These findings differ from Widener (2007) because the sample results reveal BDS direct effects and ICS use total effects positive effects on management attention with significancy and relevancy. The results also support the Widener (2007) conclusions for BLS and DCS use association on management attention emphasis. The ICS use total effect on management attention is significant and reveals full mediation by DCS use.

Our findings suggest that the military managers emphasis on LOC use enables positively their focus and engagement on critical issues, increasing an efficient use of their limited management attention.

6.4.4. Military Managers’ Age and Core Training Multigroup Analysis

We test hypotheses H8a, H8b and H8c with the PLS-SEM multigroup analysis of subsamples differences between the age and military core training groups, also studied in the previous chapter. The results for the multigroup analysis reveal the nonparametric significance of the path model parameters estimation differences in each subgroup pair (Table XLIV and Table XLV).

TABLE XLI - Total, Direct, and Indirect effects of ICS on OL.

Panel A: ICS on OL and Age PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient (β)	Age: 44 or older β	Age: Under 44 β	PLS MGA Path differences
Total	**0,148****	0,076	0,208*****	n.s.
Direct	**0,169****	**0,340****	0,038	n.s.
Total Indirect	-0,021	**-0,264****	0,170	**
Specific Indirect				
ICS→DCS→OL	-0,021	**-0,264****	0,170	**

Panel B: ICS on OL and Military Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient (β)	Military Core Training: Operational β	Military Core Training: Non-Operational β	PLS MGA Path differences
Total	**0,148****	0,117	0,181*****	n.s.
Direct	**0,169****	0,182	0,162	n.s.
Total Indirect	-0,021	-0,065	0,020	n.s.
Specific Indirect				
ICS→DCS→OL	-0,021	-0,065	0,020	n.s.

Panel C: ICS on OL and Military Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient (β)	Military Core Training: Operational β	Military Core Training: Economics / Management β	PLS MGA Path differences
Total	**0,148****	0,117	0,184	n.s.
Direct	**0,169****	0,182	0,360	n.s.
Total Indirect	-0,021	-0,065	-0,176	n.s.
Specific Indirect				
ICS→DCS→OL	-0,021	-0,065	-0,176	n.s.

Panel D: ICS on OL and Military Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient (β)	Military Core Training: Economics / Management β	Military Core Training: Non- Economics / Management β	PLS MGA Path differences
Total	**0,148****	0,184	0,134*****	n.s.
Direct	**0,169****	0,360	0,143	n.s.
Total Indirect	-0,021	-0,176	-0,008	n.s.
Specific Indirect				
ICS→DCS→OL	-0,021	-0,176	-0,008	n.s.

*, **, *** significant at p<0,1, p<0,05 and p<0,001. “n.s.” – not significant.

TABLE XLII - Total, Direct, and Indirect effects of BLS on MA.

Panel A: BLS on MA and Age PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient (β)	Age 44 or older β	Under 44 β	PLS MGA Path differences
Total	**0,460*****	**0,537*****	**0,238****	n.s.
Direct	**0,202****	**0,212****	0,166	n.s.
Total Indirect	**0,258*****	**0,326*****	**0,145****	*
Specific Indirect				
BLS→BDS→DCS→MA	0,007	0,015	0,000	n.s.
BLS→BDS→MA	**0,075****	0,085	0,048	n.s.
BLS→DCS→MA	0,015	0,016	0,008	n.s.
BLS→ICS→DCS→MA	**0,085****	0,096*	0,055	n.s.
BLS→ICS→MA	0,076*	0,112*	0,034	n.s.

Panel B: BLS on MA and Military Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient (β)	Military Core Training Operational β	Non-Operational β	PLS MGA Path differences
Total	**0,460*****	**0,493*****	**0,446*****	n.s.
Direct	**0,202****	**0,275****	0,145	n.s.
Total Indirect	**0,258*****	**0,218****	**0,301*****	n.s.
Specific Indirect				
BLS→BDS→DCS→MA	0,007	0,013	0,002	n.s.
BLS→BDS→MA	**0,075****	0,049	0,102*	n.s.
BLS→DCS→MA	0,015	-0,007	0,028	n.s.
BLS→ICS→DCS→MA	**0,085****	**0,114****	0,070	n.s.
BLS→ICS→MA	0,076*	0,049	0,099*	n.s.

Panel C: BLS on MA and Military Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient (β)	Military Core Training Operational β	Economics / Management β	PLS MGA Path differences
Total	**0,460*****	**0,493*****	**0,442*****	n.s.
Direct	**0,202****	**0,275****	0,058	n.s.
Total Indirect	**0,258*****	**0,218****	**0,385****	n.s.
Specific Indirect				
BLS→BDS→DCS→MA	0,007	0,013	0,002	n.s.
BLS→BDS→MA	**0,075****	0,049	**0,279****	*
BLS→DCS→MA	0,015	-0,007	0,002	n.s.
BLS→ICS→DCS→MA	**0,085****	**0,114****	0,007	n.s.
BLS→ICS→MA	0,076*	0,049	0,095	n.s.

Panel D: BLS on MA and Military Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient (β)	Military Core Training Economics / Management β	Military Core Training Non- Economics / Management β	PLS MGA Path differences
Total	**0,460*****	**0,442*****	**0,447*****	n.s.
Direct	0,202**	0,058	**0,197****	n.s.
Total Indirect	**0,258*****	**0,385****	**0,250*****	n.s.
Specific Indirect				
BLS→BDS→DCS→MA	0,007	0,002	0,005	n.s.
BLS→BDS→MA	**0,075****	**0,279****	0,043	*
BLS→DCS→MA	0,015	0,002	0,018	n.s.
BLS→ICS→DCS→MA	**0,085****	0,007	**0,103****	n.s.
BLS→ICS→MA	0,076*	0,095	0,082*	n.s.

*, **, *** significant at p<0,1, p<0,05 and p<0,001. "n.s." – not significant.

PLS-SEM multigroup analysis for age groups, between older and younger subgroups, reveal significant differences in BLS effects on BDS and ICS use, and in the effect of DCS use on organizational learning emphasis. The LOC relationships identified in the extended model (Table XLIV) replicate the findings of the base model results (Table XVII), either with or without statistical significancy.

Regarding differences between age subgroups with environmental uncertainty, organizational learning, and management attention, we find that the only significant difference is the DCS use effect on organizational learning ($p < 0,01$), which partially supports H8b. The military managers sample with 44 years old or more reveal a relevant and significant negative DCS effect on organizational learning path coefficient value (β = -0,339; t = 2,702; $p < 0,01$), in opposition to those with less than 44 years old which reveal a positive non-significant result (β = 0,211; t = 1,364; $p > 0,1$). Although not significantly different between age subgroups, we find that military managers interactive controls emphasis promotes high levels of perceived organizational learning (β = 0,340; t = 2,688; $p < 0,01$).

We investigate the mediation effects in each age subgroup. In Panel A of Table XLI, we find that the older military managers subgroup total indirect effects results reveal ICS use on organizational learning significant values and significant differences between age subgroups ($p < 0,01$). Between older and younger subgroups, the specific indirect effects also reveal significant differences ($p < 0,01$), where we identify in all older subgroup paths that include ICS use significant results, and negative values if DCS use is present.

TABLE XLIII - Total, Direct, and Indirect effects of ICS on MA.

Panel A: ICS on MA and Age PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient β	Age: 44 or older β	Age: Under 44 β	PLS MGA Path differences
Total	**0,394*** **	**0,414*** **	**0,373** **	n.s.
Direct	0,186*	0,223*	0,142	*
Total Indirect	**0,208** **	0,191*	**0,231** **	n.s.
Specific Indirect				
ICS→DCS→MA	**0,208** **	0,191*	**0,231** **	n.s.

Panel B: ICS on MA and Military Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient β	Military Core Training: Operational β	Military Core Training: Non-Operational β	PLS MGA Path differences
Total	**0,394*** **	**0,434*** **	**0,375*** **	n.s.
Direct	0,186*	0,131	0,220*	n.s.
Total Indirect	**0,208** **	**0,303** **	0,155*	n.s.
Specific Indirect				
ICS→DCS→MA	**0,208** **	**0,303** **	0,155*	n.s.

Panel C: ICS on MA and Military Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient β	Military Core Training: Operational β	Military Core Training: Economics / Management β	PLS MGA Path differences
Total	**0,394*** **	**0,434*** **	0,232	n.s.
Direct	0,186*	0,131	0,216	n.s.
Total Indirect	**0,208** **	**0,303** **	0,016	n.s.
Specific Indirect				
ICS→DCS→MA	**0,208** **	**0,303** **	0,016	n.s.

Panel D: ICS on MA and Military Core Training PLS-SEM multigroup analysis.

Effects	Aggregated Path coefficient β	Military Core Training: Economics / Management β	Military Core Training: Non- Economics / Management β	PLS MGA Path differences
Total	**0,394*** **	0,232	**0,461*** **	n.s.
Direct	0,186*	0,216	0,204*	n.s.
Total Indirect	**0,208** **	0,016	**0,257** **	n.s.
Specific Indirect				
ICS→DCS→MA	**0,208** **	0,016	**0,257** **	n.s.

*, **, *** significant at *p*<0,1, *p*<0,05 and *p*<0,001. "n.s." – not significant.

We identify in the older subgroup that DCS use competes with ICS use effects, partially mediating the total effects on organizational learning, with significant negative specific indirect effects (β = -0,264; t = 2,644; p < 0,01) and positive direct effects (β = 0,340; t = 2,688; p < 0,01). The indirect effects of BLS use on organizational learning, for the age subgroups are non-significant at 5% level, and results suggest this is influenced by DCS use competitive mediation.

Regarding the LOC effects on management attention by the age subgroups, we find no significant differences (Table XLIV). Additionally, combining the mediation and age multigroup analysis we identify that LOC effects on management attention reveals BLS use partial mediation for the military managers older subgroup sample (Panel A of Table XLII), while there no significant mediation by ICS use effect (Panel A of Table XLIII). On the younger subgroup, we identify full mediation of BLS and ICS use effect on management attention, the later mediated by DCS, in Panel A's of Table XLII and Table XLIII, respectively.

PLS-SEM multigroup analysis for age and military core training subgroups results reveal that all remaining relations effects of environmental uncertainty on each LOC, and LOC effects on organizational learning or management attention analysis have no significant differences at 5% level, as we identify in Tables XLIV and XLV. Therefore, results do not support H8a nor H8c.

Although there are no significant differences between military core training subgroups, PLS-SEM identify significant effects of LOC on organizational learning and management attention. We find, in Table XLV, that military managers sample with economic/management core training their DCS use effect on management attention (β = 0,020; p > 0,1), and their BLS use effect on organizational learning (β = 0,122; p > 0,1), are non-significant and non-relevant, in opposition to the operational core training subgroup results on DCS use effect on management attention (β = 0,370; p < 0,05) and BLS use effect on organizational learning (β = 0,394; p < 0,05). On the other hand, the economics/management core training subgroup reveal the most relevant value with significancy in the BDS use effects on organizational learning (β = 0,408; p < 0,05) and on management attention (β = 0,399; p < 0,05).

TABLE XLIV - Extended model PLS-SEM aggregated and age multigroup analysis results.

Dependent Variable	Independent Variable	Hypotheses (expected sign) [PLS-MGA Hyp.]	Ext. Model Aggregated Sample Path Coefficient	Age ≥ 44 years old | < 44 years old Coefficient [PLS-MGA]		
LOC						
BLS	EU	H5a (+) [H8a]	-0,105	-0,160	-0,099	[n.s.]
BDS	EU	H5b (+) [H8a]	-0,043	-0,046	-0,031	[n.s.]
DCS	EU	H5c (+) [H8a]	-0,013	0,049	-0,057	[n.s.]
ICS	EU	H5d (+) [H8a]	-0,026	-0,009	-0,107	[n.s.]
BDS	BLS		**0,572*** **	**0,649*** **	**0,434*** **	**[**]**
DCS	BLS		0,058	0,067	0,028	[n.s.]
ICS	BLS		**0,410*** **	**0,503*** **	**0,238** **	**[**]**
OL	BLS	H6a (+) [H8b]	**0,337*** **	**0,397*** **	**0,267** **	[n.s.]
MA	BLS	H7a (+) [H8c]	**0,202** **	**0,212** **	0,166	[n.s.]
DCS	BDS		0,048	0,096	0,001	[n.s.]
OL	BDS	H6b (+) [H8b]	**0,135** **	**0,209** **	0,067	[n.s.]
MA	BDS	H7b (+) [H8c]	**0,130** **	0,132	0,112	[n.s.]
OL	DCS	H6c (+) [H8b]	-0,027	**-0,339** **	0,211	**[**]**
MA	DCS	H7c (+) [H8c]	**0,260** **	**0,245* **	**0,288** **	[n.s.]
DCS	ICS		**0,798*** **	**0,781*** **	**0,802*** **	[n.s.]
OL	ICS	H6d (+) [H8b]	0,169*	**0,340** **	0,038	[n.s.]
MA	ICS	H7d (+) [H8c]	0,186*	**0,223* **	0,142	[n.s.]
Controls						
OL	Navy Service		0,023	-0,033	0,119	[n.s.]
MA	Navy Service		-0,011	-0,047	0,026	[n.s.]
OL	Army Service		**-0,159** **	**-0,196** **	-0,119	[n.s.]
MA	Army Service		0,006	-0,068	0,082	[n.s.]
OL	Size		0,012	0,091	-0,084	[n.s.]
MA	Size		**-0,176*** **	**-0,201** **	**-0,148* **	[n.s.]
Adjusted R^2						
BLS			0,007	0,020	0,002	[n.s.]
BDS			**0,329*** **	**0,425*** **	**0,178** **	**[**]**
DCS			**0,705*** **	**0,729*** **	**0,660*** **	[n.s.]
ICS			**0,165*** **	**0,245*** **	0,057	**[**]**
OL			**0,288*** **	**0,363*** **	**0,220** **	[n.s.]
MA			**0,367*** **	**0,423*** **	**0,230** **	[*]

*, **, *** significant at $p<0,1$, $p<0,05$ and $p<0,001$, respectively (two-tailed significance).
n.s. – Not significant at 10% level.

Our findings suggest that older military managers DCS use emphasis have negative and significant effect on organizational learning, either directly and indirectly, which contrasts to the positive and significant DCS use effect on management attention. These results influence ICS use total effects negatively on organizational learning, and positively on management attention.

6.4.5. Control Variables Effects on Organizational Learning and Manangement Attention

Control variables in the aggregated sample results, Table XLIV reveals Army Service (β = -0,159; p < 0,01; f^2 = 0,031) and size (β = -0,176; p < 0,001; f^2 = 0,048) significant negative effects on organizational learning and management attention, respectively. The Army Service dummy variable, relatively to the Air Force Service, results are replicated in the age and military core training subgroups, in Table XLIV and Table XLV, of older (β = -0,196; p < 0,05), non-operations (β = -0,189; p < 0,05), and non-economics/management (β = -0,204; p < 0,01) subgroups. This result suggests that organizational culture may influence organizational learning.

Furthermore, in Tables XLIV and XLV, we find no significant difference between the military managers age and core training in the PLS-SEM multigroup analysis of the control variables effects on organizational learning and management attention. The military core training subgroups reveal significant results for control variables impact on organizational learning and management attention. We find that larger size military organizations have significant negative impact on operational (β = -0,249; p < 0,05), economics/management (β = -0,251; p < 0,05), and non-economics/management (β = -0,173; p < 0,05) core training managers management attention efficiency (Table XLV).

Hence, our findings suggest that bigger military organizations reduce military managers management attention efficiency, which results in a lower capacity to balance their time, focus on critical issues and on environmental uncertainties.

6.4.6. Extended Model Main Findings

The extended model PLS-SEM analysis reveals different hypothesis tests results.

The aggregated results do not support H5, because there is no significant evidence that external environment, measured by environmental uncertainty, influences military managers MCS use. These results differ from Widener (2007) and Kominis & Dudau (2012) findings that MCS use is positively associated with managers' perceived risk or uncertainties, which suggests a call to research in the Defence public sector to understand how military managers perceive environmental uncertainty, its relation to military

TABLE XLV - Results of PLS-SEM for extended model aggregated and military core training multigroup analysis.

			Ext. Model Aggregated Sample	Military Core Training								
		Hypotheses (expected sign)		Operational | Non-Operational			Operational | Econ./Manag.			Econ./Manag. | Non-Econ./Manag.		
Dependent Variable	Independent Variable	[PLS-MGA Hyp.]	Path Coefficient	Coefficient [PLS-MGA]			Coefficient [PLS-MGA]			Coefficient [PLS-MGA]		
LOC												
BLS	EU	H5a (+) [H8a]	-0,105	-0,035	**-0,196***	[n.s.]	-0,035	-0,157	[n.s.]	-0,157	-0,093	[n.s.]
BDS	EU	H5b (+) [H8a]	-0,043	-0,079	-0,026	[n.s.]	-0,079	-0,169	[n.s.]	-0,169	-0,012	[n.s.]
DCS	EU	H5c (+) [H8a]	-0,013	-0,010	-0,010	[n.s.]	-0,010	0,066	[n.s.]	0,066	-0,033	[n.s.]
ICS	EU	H5d (+) [H8a]	-0,026	-0,129	0,009	[n.s.]	-0,129	0,080	[n.s.]	0,080	-0,062	[n.s.]
BDS	BLS		**0,572*****	**0,530*****	**0,622*****	[n.s.]	**0,530*****	**0,700*****	**[*]**	**0,700*****	**0,539*****	**[*]**
DCS	BLS		0,058	-0,019	**0,139****	**[**]**	-0,019	0,080	[n.s.]	0,080	0,054	[n.s.]
ICS	BLS		**0,410*****	**0,376*****	**0,451*****	[n.s.]	**0,376*****	**0,441*****	[n.s.]	**0,441*****	**0,402****	[n.s.]
OL	BLS	H6a (+) [H8b]	**0,337*****	**0,394*****	**0,229****	[n.s.]	**0,394*****	0,122	[n.s.]	0,122	**0,381*****	[n.s.]
MA	BLS	H7a (+) [H8c]	**0,202****	**0,275****	0,145	[n.s.]	**0,275****	0,058	[n.s.]	0,058	**0,197****	[n.s.]
DCS	BDS		0,048	0,069	0,018	[n.s.]	0,069	0,116	[n.s.]	0,116	0,029	[n.s.]
OL	BDS	H6b (+) [H8b]	**0,135****	0,085	**0,237****	[n.s.]	0,085	**0,408****	[n.s.]	**0,408****	0,077	**[*]**
MA	BDS	H7b (+) [H8c]	**0,130****	0,092	**0,164***	[n.s.]	0,092	**0,399****	[n.s.]	**0,399****	0,079	**[*]**
OL	DCS	H6c (+) [H8b]	-0,027	-0,080	0,025	[n.s.]	-0,080	-0,219	[n.s.]	-0,219	-0,011	[n.s.]
MA	DCS	H7c (+) [H8c]	**0,260****	**0,370****	**0,200***	[n.s.]	**0,370****	0,020	[n.s.]	0,020	**0,326****	[n.s.]
DCS	ICS		**0,798*****	**0,819*****	**0,772*****	[n.s.]	**0,819*****	**0,804*****	[n.s.]	**0,804*****	**0,790*****	[n.s.]
OL	ICS	H6d (+) [H8b]	0,169*	0,182	0,162	[n.s.]	0,182	0,360	[n.s.]	0,360	0,143	[n.s.]
MA	ICS	H7d (+) [H8c]	0,186*	0,131	**0,220***	[n.s.]	0,131	0,216	[n.s.]	0,216	**0,204***	[n.s.]

*, **, *** significant at $p<0,1$, $p<0,05$ and $p<0,001$, respectively (two-tailed significance).
n.s. – Not significant at 10% level.

(cont.)

(cont.)

			Ext. Model Aggregated Sample	Military Core Training								
		Hypotheses		Operational | Non-Operational			Operational | Econ./Manag.			Econ./Manag. | Non-Econ./Manag.		
Dependent Variable	Independent Variable	(expected sign) [PLS-MGA Hyp.]	Path Coefficient	Coefficient [PLS-MGA]			Coefficient [PLS-MGA]			Coefficient [PLS-MGA]		
Controls												
OL	Navy Service		0,023	0,081	-0,006	[n.s.]	0,081	0,125	[n.s.]	0,125	-0,019	[n.s.]
MA	Navy Service		-0,011	-0,021	0,018	[n.s.]	-0,021	-0,024	[n.s.]	-0,024	0,001	[n.s.]
OL	Army Service		**-0,159****	**-0,140***	**-0,189****	[n.s.]	**-0,140***	-0,047	[n.s.]	-0,047	**-0,204****	[n.s.]
MA	Army Service		0,006	0,015	0,029	[n.s.]	0,015	-0,154	[n.s.]	-0,154	0,057	[n.s.]
OL	Size		0,012	0,054	-0,020	[n.s.]	0,054	-0,099	[n.s.]	-0,099	0,055	[n.s.]
MA	Size		**-0,176****	**-0,249****	**-0,116***	[n.s.]	**-0,249****	**-0,251****	[n.s.]	**-0,251****	**-0,173****	[n.s.]
Adjusted R^2												
BLS			0,007	-0,007	0,032	[n.s.]	-0,007	0,008	[n.s.]	0,008	0,004	[n.s.]
BDS			**0,329*****	**0,279****	**0,386*****	[n.s.]	**0,279****	**0,540*****	**[**]**	**0,540*****	**0,285*****	**[**]**
DCS			**0,705*****	**0,697*****	**0,719*****	[n.s.]	**0,697*****	**0,772*****	[n.s.]	**0,772*****	**0,681*****	[n.s.]
ICS			**0,165*****	**0,148****	**0,191****	[n.s.]	**0,148****	**0,162***	[n.s.]	**0,162***	**0,162****	[n.s.]
OL			**0,288*****	**0,280*****	**0,300*****	[n.s.]	**0,280*****	**0,311****	[n.s.]	**0,311****	**0,293*****	[n.s.]
MA			**0,367*****	**0,402*****	**0,322*****	[n.s.]	**0,402*****	**0,372*****	[n.s.]	**0,372*****	**0,384*****	[n.s.]

*, **, *** significant at $p<0,1$, $p<0,05$ and $p<0,001$, respectively (two-tailed significance).
n.s. – Not significant at 10% level.

managers known and expected management information gap (Galbraith, 1973), and MCS use (Simons, 1995).

Regarding organizational learning hypothesis, the military managers sample reveal that their emphasis on BLS and BDS have positive direct impact, hence, we find H6 is partially confirmed. Our findings support the beliefs systems significant and relevant importance to stimulate organizational learning by military managers, as boundaries and interactive MCS use at a lower level. These findings support the lower mean scores for DCS and ICS use relative to BLS and BDS use (Table VIII), which raises future research questions related to the adequacy level of MCS design in the Portuguese Armed Forces, in support of Gomes (2021) and Soares et al. (2022).

Management attention H7 hypothesis are confirmed. We find that BLS, BDS, and DCS use reveal positive direct effects and ICS use reveal positive total effects on military managers attention efficiency, in support of Simons' (1995) LOC framework. Our results confirm that the LOC use emphasize managers' management focus on the prosecution of the intended strategy. All Simon's LOC are perceived by the military managers sample as attention enhancers, opposite to Widener (2007) findings, where the interactive MCS use is identified as an attention consumer. which suggests benefits from common military specific training and education (Soeters et al., 2010; Soeters, 2020b; NATO, 2020; Soares et al., 2022).

The PLS-SEM multigroup analysis tests H8 hypothesis, with one result revealing significant differences. We find that H8b partially supported with the significant difference between age subgroups in diagnostic MCS use on organizational learning, which we identify a negative relevant effect value in the older military managers subgroup of diagnostic controls on organizational learning emphasis, with significancy at 5% level. The military managers older age subgroup results also reveal a positive, relevant, and significant interactive controls use effects on organizational learning, although not significantly different from the younger subgroup. The DCS use effects by older military managers reveals to be a keystone to balance the levers effects on the exogenous variables (Simons, 1995). Therefore, the age multigroup analysis suggests that age can be a significant and relevant determinant of outcomes, independently of their education level, military rank, or core training, as we identify in the base model chapter, supporting

Hambrick & Mason's (1984) upper echelon theory. The older military managers subgroup are a mixture of top management Officers and front-line management non-Officers, and our findings suggest that the latter may have mimetic behaviors relative to the firsts. Additionally, we find that the ICS use emphasis by older military managers identified in the base model chapter do not impact positively organizational learning but rather management attention efficiency.

Regarding military core training, we identify that the boundary controls emphasize the efficient use of management attention by military managers' economics or management core training subgroup, allowing them to balance their time, focus on the critical issues and environmental uncertainties, which support Heinicke & Guenther (2020) findings that identify the emphasis of administrators on BDS use and professionals on DCS use.

Lastly, we find, within multigroup analysis in Tables XL, XLI, XLII, and XLIII that mediation of BLS and ICS use effects on organizational learning and management attention reveals the interdependence and complementarity between LOC, in support of extant literature (Simons, 1995; Widener, 2007; Naranjo-Gil, 2016; Heinicke & Guenther, 2020; Bukh & Svanholt, 2020).

7. CONCLUSION

This research posits that the military organizational setting is rich and complex, where the stakeholder's knowledge is enriched by individual's organizational and Defense context experience and interpretation. The research framework design choice, within a contingency-based approach (Chenhall, 2003; Otley, 2016; George et al., 2019), and hypothesis arguments builds on Widener (2007), Kruis et al. (2016), Heinicke & Guenther (2020), and Bobe & Kober (2020a), expanding Hambrick & Mason's (1984) upper echelon theory to military organizations managers (Soeters, 2020b).

In military organizations, pluralism is found within each specific military professional groups of actors (e.g. naval engineers, army cavalry, or air force pilots), but these organizations are also pluralistic, where multiple actors engage in ambidextrous objectives to achieve the Nation's best interest – the Nations deterrence and defence of foreign threats or attacks, and provide contingency humanitarian aid support to their citizens (Soeters et al., 2010; Soeters, 2020b, 2020a). With ambiguous performance measures, high level of professionalism, and highly dependent on political decision-making, either for strategy or administrative issues, military are complex organizations, sharing management dilemmas and organizational problems as health, higher education or local government public sector organizations (Naranjo-Gil & Hartmann, 2006, 2007a, 2007b; Kober et al., 2007; Naranjo-Gil et al., 2009; Nuhu et al., 2017, 2019; Deschamps, 2019; Bobe & Kober, 2020b; Heinicke & Guenther, 2020; Soeters, 2020b; NATO, 2020; Heeren-Bogers, 2021; Beeres et al., 2021; Soares et al., 2022). Concomitant research is scarce or inexistent to evaluate Management Control Systems use in military organizations to allow military managers, and the military organizations stakeholders to take appropriate action to pursue the strategic objectives with effectiveness, efficiently, and with economy of their time, effort, and the public funding (Godinho & Gonçalves, 2020). Private and public sector organizations are studied to improve knowledge and provide management focus to correct deviations or to promote changes (Martyn et al., 2016).

We identify evidence of extant research literature gaps in public sector literature on Management Control Systems use, supported by Soares et al. (2022), specifically using MCS Simons' LOC framework, and the unique context and setting of Defense Armed

Forces Branches Units and Subunits organizational level. Although a relevant number of public sector Simons' Levers of Control framework Management Control Systems use studies are available, there is a pertinent research gap with military organizations as their organizational unit of research (Godinho & Gonçalves, 2020). The literature survey results reveals that most of the research analyses economical determinants and impacts of military expenditure, supported in case-studies approach. This investigation is the first to suggest how military managers use Management Control Systems in military organizations, employing Simons' Levers of Control framework framework, and identify management effects. The military organization studies have provided evidence from qualitative and case study research. The survey instrument provides large amount of data and a wider range of participants to research Management Control Systems use perceptions.

This investigation expands the management control literature and Simons' Levers of Control framework analysis, with a sample of 281 participants from the Portuguese Armed Forces Services, adding to the accounting scholar's discussion by exploring the Management Control Systems use perceptions of different actors and three management levels (i.e. top, middle and operational management) within military organizations (Naranjo-Gil & Hartmann, 2006, 2007b, 2007a; de Harlez & Malagueño, 2016; Deschamps, 2019; Heinicke & Guenther, 2020; Soares et al., 2022).

The research is based on the military organization level empirical study of the military managers perception of interdependence and complementarity of Simons' Levers of Control framework, and how it is influenced by environmental uncertainty and how it effects organizational learning and management attention. The study is divided in four areas. The first two, through the base model, are dedicated to answer how Portuguese military managers perceive the use of beliefs, boundary, diagnostic, and interactive control systems, and how their personal characteristics impact their perception, namely their age and military core training. Following the method and structure of the base model we identify the extended model to investigate how military managers Levers of Control framework use is affected by environmental uncertainties, and how their Levers of Control framework use impacts organizational learning and management attention. Lastly, we research how age and military core training moderate military managers

Levers of Control framework use effects on organizational learning and management attention, in the extended model.

Our main and specific objectives are achieved with significant and relevant associations identification of management control systems use by the Portuguese military managers sample, through Simons' Levers of Control use framework, with interdependency and complementarity, predictive effects on organizational learning and management attention, and moderated by age and core training personal characteristics.

The base model results analysis reveals significant and relevant Levers of Control framework interaction, complementarities, and individual's characteristics effect on Levers of Control framework use findings, which provides answers to research questions #1 and #2. Beliefs systems use emphasis by military managers promotes higher Levers of Control framework use and suggests that managers decisions are aligned with intended strategy, and encourage emergent strategies identification, supporting the positive association between military managers beliefs systems' perceived importance on boundary, diagnostic control, or interactive control systems, and extant literature findings (Simons, 1995; Widener, 2007; Heinicke et al., 2016; Pilonato & Monfardini, 2020). We find support for a positive effect of the perceived interactive control systems use on diagnostic control systems use, and Widener's (2007) and Batac & Carassus (2009) findings, that interactive Management Control Systems use emphasize organizational change and structure modification to follow new strategies (Kober et al., 2007; Nuhu et al., 2017; Adhi Nugroho & Hartanti, 2019). Hence, the results of low perceived Levers of Control framework use level and their associations suggest that Portuguese Armed Forces Management Control Systems design do not reveal full compliance with current Armed Forces strategic directives or new Government reporting requirements.

Secondly, military managers' age and core training characteristics influence Management Control Systems use at different management levels, which supports Hambrick's upper echelon theory (Hambrick & Mason, 1984; Hambrick, 2007) and partially supports base model hypothesis that military manager's individual characteristics moderates the associations between beliefs systems and the remaining Levers of Control framework. The significant differences in each Levers of Control framework use perception, and beliefs effects on interactive Management Control

Systems use emphasis between military managers age groups are independent of education level, military rank, or core training. These findings suggest that older managers are more prone to organizational change and innovation and less motivated to adopt new public management managerialism, as identified by Heinicke & Guenther (2020) and Bobe & Kober (2020b). The economic or management core training military managers reveal the higher Levers of Control framework use, as found in higher education setting by Heinicke & Guenther (2020), and results suggest constraining and mechanistic Levers of Control framework use preference, as identified by Naranjo-Gil & Hartmann (2006).

Last of all, we identify that military managers perceive higher interactive Management Control Systems use in larger organizations, which suggests intra-organizational competition through innovation to achieve promotion, as found by Heinicke & Guenther (2020) and Nuhu et al. (2017, 2019). We also find results that suggests different organizational culture effects on interactive Management Control Systems use between Armed Forces Services. The military managers with operational core training results suggest that larger size organizations significantly emphasize evidenced-based management adoption, in comparison with non-operational subgroup, and the diagnostic and interactive Management Control Systems use is complementary, in support of Batac & Carassus (2009) and Harlez & Malagueño (2016) findings.

We also find in the extended model results analysis significant and relevant findings. Environmental uncertainty effects on Levers of Control framework use do not reveal significant results. Organizational learning positive effect by each Levers of Control framework use emphasis hypothesis are partially supported because the military managers perceive that Beliefs Systems and Boundary Systems use emphasis significantly enables a learning culture. These findings support Portuguese military managers Management Control Systems use to emphasize organizational learning, through enabler and constraint levers, as argued by Salvada (2018) and Gomes (2021) relatively to continuous improvement process motivated by austerity contextual settings and supported by extant public and private sector literature (Argyris, 1977; Simons, 1995; Kloot, 1997; Widener, 2007; Soeters et al., 2010; Benner et al., 2017; Soeters, 2020a, 2020b).

Management attention positive effect by each Levers of Control framework use emphasis hypothesis is confirmed, suggests higher management attention efficiency, and supports Simons' (1995) Levers of Control framework arguments. These findings suggest that Portuguese Armed Forces Services would benefit from promoting the Levers of Control framework use emphasis to enhance management attention efficiency, translating into more available time to focus management attention on critical issues and creative solutions to develop and consolidate organization's strategic objectives execution, balancing the execution of intended strategy and identification of emergent strategies (Simons, 1995). Consequently, it suggests that common military specific training and education may capacitate military managers to be more efficient under conditions of lack of information and higher levels of uncertainty (Soeters et al., 2010; Soeters, 2020b; NATO, 2020; Soares et al., 2022). PLS-SEM multigroup analysis partial supports military managers' characteristics moderation effects on the relationship between Levers of Control framework use and organizational learning hypothesis. We find that diagnostic Management Control Systems use effects on organizational learning emphasis reveal statistically significant differences between age subgroups. The older military managers subgroup significant and relevant negative effect suggests the perception that diagnostic Management Control Systems use weakens organizational learning. This finding suggests that the older military managers sample are more engaged on increasing their management focus to manage critical issues on the short term than on identifying lessons or implementing lessons learned, which does not support extant research in Portuguese Defence sector innovation and organizational change (Salvada, 2018; Gomes, 2019; Soares et al., 2022), similar to aggregated and younger subgroup results. On the other hand, we find that that the age has significant and relevant effects in both management attention and organizational learning outcomes, independently of the remaining personal characteristics, as we identify in the base model chapter, in support of Hambrick & Mason's (1984) upper echelon theory and Deschamps (2019). We also find that our results suggest mimetic behaviors between the older military managers, which include the upper Officers and non-Officers.

Service control variable reveal, in the extended model, effects on organizational learning emphasis. These findings suggests that military managers organizational culture differs by Service in aggregated results, older age, non-operations, and non-economics/management military core training subgroups *per se*, although no significant differences are identified in subgroup's multigroup analysis.

On the other hand, the size control variable reveals that the larger size military organizations are less management attention efficient, with all results revealing negative values with significancy at the 1% level. Hence, higher number of human resources in the military organization suggests that less military managers can stock management attention.

We also identify significant and relevant boundary controls effects on management attention of military managers with economics/management core training, and non-higher education. These findings contrast with operational core training and higher educated military managers, that reveal relevant and significant Beliefs Systems and Diagnostic Control Systems use effects on management attention. Hence, the findings suggest support to Heinicke & Guenther's (2020) findings that identify the emphasis of administrators on Boundary Systems use and professionals on Diagnostic Control Systems use, to promote higher attention efficiency, through the balance of their time, focus on the critical issues and environmental uncertainties.

Additionally,-we find support to the interdependence and complementarity between Levers of Control framework use, through mediation analysis within multigroup analysis, of Beliefs Systems and Interactive Control Systems use effects on organizational learning and management attention (Simons, 1995; Widener, 2007; Naranjo-Gil, 2016; Heinicke & Guenther, 2020; Bukh & Svanholt, 2020).

Lastly, we find support that military organizations managers Management Control Systems use pattern differs from other public sectors, and reveal the uniqueness of the public Defense sector, as previously discussed and highlighted in the following paragraphs. The military managers sample mean values for each Levers of Control are lower than those found in public sector extant research (Naranjo-Gil & Hartmann, 2006, 2007; Naranjo-Gil, 2016; Matsuo et al., 2021; Heinicke & Guenther, 2020). This identifies anomalies in Management Control Systems design to support military managers to manage military organizations. The older military managers reveal significant and relevant associations with higher interactive Management Control Systems use, distinct from the public health sector (Naranjo-Gil et al., 2009), although similar to public higher education sector findings (Bobe & Kober, 2020b). On the other hand, older military managers results identify significant and relevant differences of Beliefs Systems effects on Interactive Control Systems use, which is associated to smaller motivation to follow managerialism practices, while the economic or management core training military managers reveal the higher Levers of Control use, as found in public higher education sector. Our base model findings identify relevant and significant association of BLS with BDS use and ICS use in all core training subgroups. We conclude that Portuguese common military initial training may explain the similarities found between military managers educational background subgroups, in opposition to the health and higher education public sector findings. The extended model findings are not comparable to public sector research because our study is the first to investigate Levers of Control use associations to organizational learning and management attention in public sector organizations.

Therefore, we conclude that our findings identify relevant differences of management control systems use, with Simons' Levers of control framework, in military organizations when compared to other public sector entities research, namely supported by age, and not by tenure, and military core training, and not by professionals versus administrative or management background managers.

Our conclusions on military managers Management Control Systems use are a way to promote new means to better outcomes and contribute to scholars and practitioners. This study allows a new scientific support, with relevancy and significancy, of the Management Control Systems use by each Portuguese military managers subgroups characteristics at disposal of scholars for future research and military leadership, at the different management levels, to enhance their followers Levers of Control use, organizational learning, and management attention outcomes in accordance with the respective context.

7.1. Contributions to Literature and Practitioners

We contribute to Management Control Systems use concomitant research literature in public sector, and in particular to promote military organizations academic independent and scientific evaluation, and to allow military managers increase management focus and improve their communication with military organizations stakeholders.

This dissertation contributes to public management scholars and military organizations managers. The investigation contributes to expand Simons' (1995) Levers of Control framework, Hambrick & Mason's (1984) upper echelon theory research by exploring military organizations Levers of Control framework use and the perceptions of managers with different personal characteristics, and responds to more research on management control systems use by different manager's levels (Deschamps, 2019).

Our findings have implications for the political and military strategic management, operational and frontline managers of military organizations. The moderating effects of individual's characteristics and military Services suggests that they are relevant to emphasize Management Control Systems use. The results reveal evidence that Management Control Systems use can be increased if its design is appropriate to the organization's core function and mission, enhancing organizational learning and conserving management attention to critical issues and emergent strategies.

The emphasis on interactive Management Control Systems use, while presenting essential diagnostic information to manage military organizations complexity, promotes organizational learning and management attention efficiency. The findings in this research sample suggest that Management Control Systems design issues in military organizations may not enable military managers to increase Levers of Control framework use levels found. Contrary to Naranjo-Gil et al. (2009) findings in public hospitals, the older military managers sample perceive to have higher Levers of Control framework use. The results suggest that there are more differences between younger and older military managers than between the core training, education level or rank characteristics. These findings identify that younger military managers should be encouraged to increase the Levers of Control framework use, reducing the gap between age subgroups, identified in Table XIII, to improve communication and accountability (Simons, 1995). The positive reinforcement of Diagnostic Control Systems and Interactive Control Systems use in military organizations, in all age groups, can promote management success, as found in extant public sector literature (Nuhu et al., 2017, 2019).

Overall, we find that the Levers of Control framework use emphasis results suggest that military managers are focused to be mission effective (e.g. executing planned training hours, augmenting recruitment numbers and diminishing attrition in the initial years, increasing troops moral and welfare, providing better support to operations, and fulfilling real mission objectives) rather than to emphasize the use of current Management Control Systems, as deans in higher education organizations (Heinicke & Guenther, 2020). The lower Levers of Control framework use level perceived by the military managers sample in the Portuguese Armed Forces Services suggest that Management Control Systems are mostly useful to meet administrative, budgetary, and legal reporting requirements devoid of the specific *raison d'être* of the military institution (White, 2018).

Our research findings suggest that the cross-sectional results may also identify organizational weaknesses, namely the poor Management Control Systems design, military managers Management Control Systems use training deficiencies, structure not appropriate to the strategy, or insufficient resources to manage the organization in achieving the strategic objectives. Hence, this dissertation calls for more research so that the military organization may understand and engage sustainable actions to adequate the use of management tools to manage, promote innovation, and support structure changes to follow the organizational strategy (Simons, 1995; Gomes, 2021; Soares et al., 2022).

Military managers face the same issues that other public sector managers do. They are compelled to use management control systems to manage the balance between different strategic, political, economic, and financial objectives. Simultaneously, the stakeholders reveal different priorities, such as higher efficiency or higher resiliency, lower costs or lower foreign dependency. We expand public management literature with an increase in knowledge of how military managers use management control systems to emphasize the Simons' levers of control, organizational learning, and management attention. We consider relevant our contribution with the practical finding that suggests that the use of management control systems as levers to achieve strategic goals by all levels of management differs, and age and core training acts as moderators. How military managers use the levers of control reveals levers' emphasis and personal characteristics moderation effects, that act as enablers or constraints, allowing to open a new research avenue to better understand and promote an effective and efficient alignment between strategy and management in public organizations.

7.2. Limitations

The research limitations are similar to all survey studies and cross-sectional data that focus on one type of organization (Speklé & Widener, 2018, 2020). The data results of a single-moment, single-sector and single-country sample limits generalization but allows indirect control of potential confounding effects of Portugal's military organizations organizational and sector factors. The 281 participants were mainly from Portuguese Air Force Service, which limits the generalizability of the findings to the Portuguese Armed Forces. Although, we assure data reliability by thoroughly pretested the survey instrument and performed content and construct validity tests. In result, we found no evidence of significative expected biases. The military management function is present at different stages of the military career, at each management level. The participants represent the three levels of management, from top to frontline managers. To assure data reliability, we collected a full sample, pretested the survey instrument, and tested for content and construct validity. All tests indicated no inappropriate bias risk. The option for PLS-SEM technique and survey data, supported by extant theory and literature, does not enable to reveal causal relationships, but allows to identify effect's associations. The specific characteristics of Portuguese Armed Forces sample may reveal results different from other sample, public sector organizations or Nation's Armed Forces.

7.3. Future Research

This dissertation thesis promotes questions that could not be investigated related to the levers of control use effect on management outcomes in public organizational setting, and managers moderator's characteristics. In our investigation, we find that the management control systems use by military managers is influenced by age and core training and did not find significant effects of environmental uncertainty emphasis on the use of levers of control.

Future research can build on these findings to investigate if military managers management use Beliefs Systems as a resilience lever to tolerate and manage reforms (Pilonato & Monfardini, 2020). It would be interesting to scholars and practitioners' community to use other data and methods to investigate causality, in the military setting, between Management Control Systems use, uncertainty, organizational learning, management attention, and performance in a longitudinal study (Kruis et al., 2016).

Additionally, research should explore Boundary Systems and Diagnostic Control Systems use determinants (Kruis et al., 2016) in military organizations, as military education level or organizational culture, and management control packages, respectively. Another research path of interest resides in the study replication in other countries' military organizations, to compare military managers Levers of Control framework use of different national cultures and national settings (Norheim-Martinsen, 2016). Our findings also call for research related to the adequacy level of Management Control Systems design in the Portuguese Armed Forces Services, in support of recent Defense specific Management Control Systems frameworks identified by Gomes (2021) and Soares et al. (2022).

Lastly, because professionals in military organizations are the major actors, the base and extended model framework can be used to compare Levers of Control framework use in public sector settings with professional organizations context, as law enforcement forces, health, or higher education.

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APPENDICES

Appendix A – Godinho & Gonçalves (2020) authorized paper reuse and reprint.

Defense Organizations Budgeting and Management Control Systems in Restrictive Budgets Context—Literature Gaps

Luis M. Godinho and Tiago Gonçalves

Abstract There is an increasing need to adopt private sector management processes and performance metrics by the public sector, as New Public Management is more present in the executive government actions plans. The Defense Organizations, such as the Armed Forces are not exempt of this movement. Concepts as accountability and sustainability are more common. Through budgeting and management control, it is possible to improve performance and communication, in a restrictive budget context (Letens et al. in Strategic Performance Measurement for Defense Organizations: a preliminary framework, 2017 [1]; Navarro-Galera et al. in Defence Peace Econ, 25:577–604, 2014 [2]; Cain et al. in Inter J Public Adm 27:557–576, 2004 [3]; Dougherty et al. in Public Adm Rev 63:484–497, 2003 [4]). This study aims to provide evidence of gaps in the literature relative to the association of management control systems and budgeting in Defense Organizations, as the branches of the military. A literature survey is presented for the papers published from 2000 to 2019. Although more than 2500 research papers were found, there is none that provides neither a systematic literature review nor meta-data analysis for the management and business knowledge area. Preliminary results show evidence that most of the research has been done to assess economical determinants of the military expenditure, and that this research has had focus on implementation of accounting or control instruments in case studies approach. This paper provides evidence of the gap in management planning and control research, applied at the organizational level of Armed Forces branches, namely in the context of restrictive budgets.

Keywords Defense · Armed Forces · Budget · Budgeting · Management control systems

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1 Introduction

The Defense Organizations (DO), as public institutions, have to comply with the respective legal, administrative and financial requirements, such as having to prepare and execute a budget approved by the political executive. Particularly, since the crisis of 2007, restrictive budgets are more common in the public sector, as in the defense [1]. This has put a stress on DO to better justify to politicians, citizens and its workforce the added value delivered [1, 2]. Foremost, in the potential value embedded in the budgeting process, and ultimately by the execution and control of the appropriated budget [3–5].

Restrictive budgets for DO may compromise the performance of missions, research and development initiatives and current or future capabilities [1]. On the other hand, other authors state that restrictive budgets in DO impacts expenditure efficiency and management control [2].

Additionally, cumulative pressures to these organizations, identified in the literature about New Public Management (NPM), emerge from normative adoption of management tools by public organizations, including DO. Findings suggest that it is the contingencies that promote their use to achieve more efficiency and a client focus [6].

The purpose of this paper is to identify gaps in the literature relative to organizational unit of Defense Organizations (DO) studies, such as the Armed Forces, regarding the interaction between management control systems (MCS) and the budgeting process, in restrictive budgets context [2, 7–9]. The objective is to provide directions for future research to answer the challenge of building bridges between the academic and the practitioners within the scope of the present study [9–11].

A search for peer-reviewed papers in the EBSCO database was conducted for the period between 2000 and 2019. The results were filtered to fit within the scope of this study, and 2772 papers identified as valid. The preliminary findings corroborate the gap in research related to DO, the branches of the Armed Forces, as organizational units and the interaction between budget, budgeting and MCS.

The paper is organized as follows: It starts with the sections regarding the methodological choices for constructs and the literature search; the literature analysis chapter presents a table to resume the preliminary findings and a brief discussion on the main issues; finally, the conclusion of the paper enhances the academic knowledge produced and gaps for future research agenda.

2 Methodology

We adopt a methodology based on a systematic search of a bibliographical database (EBSCO) and a content analysis of the published research for the time window 2000–2019. In order to do so, we define the construct of interest and limit our search to a set of keywords that represent and define the scope of the construct under analysis.

Although the preliminary findings have evidence to be presented, the data analysis is ongoing to create the knowledge map with the above mentioned techniques.

Initially, we argue that DO in each country, as well as the branches of the Armed Forces, do not significantly depart from any other organization [12]. Their management complies with most of the same principles as in the private sector. Although the investment in major equipment and recruitment decisions are mostly political, the current management is flexible, even if subjected to constraints and restrictions imposed by public law and budgeting.

Consequently, the construct of interest adopted is the one that identifies the MCS as a package of control systems with associated adopted instruments, as well as subsidiary and related, of all organizational activity providing information to support decision making [8, 12, 13].

From the previous literature, we identified the main keywords that reflect our research goal (management control; budget; budgeting; expenditure; spending) and cross them to find research specifically related to DO and military forces (Keywords: military; Defense; Armed Forces).

Our final query ran the following criteria:

- Keywords on subject terms with Boolean search phrase: (Management Control OR Budget OR Budgeting OR expenditure OR spending) AND (Military OR Defense OR Armed Forces);
- Online EBSCO host databases;
- Related to military sciences, business and academic;
- English language only;
- Published between the years of 2000 and 2019;
- Peer reviewed only.

We also extended the search to equivalent subjects.

The first round of search with the criteria above returned 2802 papers.

In order to analyze their validity to the present study, a search within the first part of the Boolean search phrase was made, restricting the results to those who contained "management" or "control," eliminating seven out of ten results.

Consecutive searches, within the initial framing, was made for "budget," "budgeting," "expenditure" and "spending." The results returned the following number of papers, where we cross-identified research relating to our organizations under analysis (military, defense and Armed Forces) with the aforementioned keywords: management control—2 papers; budget—1055 papers; budgeting—30 papers; expenditure—594 papers and spending—1528 papers.

Finally, we conducted a brief content analysis of the papers obtained with our search criteria.

3 Literature Review: Preliminary Results

The first round of search resulted in 2802 papers found. Overall, the papers that met all constructs identified, ("OR" operator), within the scope of this study sum up to 2768 papers, as shown in Table 1.

Based on the final database, we analyzed the scope of the papers. Most of the papers found addresses a macro-organizational unit, such as the Ministry of Defense or equivalent, the military spending of the country or the country's military investment expenditures, as shown in Table 1. None of the research studies the budget execution of the Armed Forces as an organizational unit per se.

We followed our analysis by examining the scope of information and management control under analysis on the papers on our search. Two out of ten papers, with reference to management or control, are related with management control and DO, but none of them with budget or budgeting subjects. All 30 papers with reference to budgeting keywording relate either to the strategic planning or to planning or control instruments but do not commit to establish an empirical relation between budgeting and the MCS.

Specifically, and as an example, Letens et al. [1] refer to the importance of budgets, but do not identify how the MCS interact with any of the categories within the framework "means > ways > end." This is common to all other studies, because they focus on military spending determinants, expenditure factors or economic variables.

When we analyze the cross-importance of MCS and the intention of its use in budgeting-related keywords, none of the papers identifies MCS with any other of the keywords. The focus is mostly on spending with 55% of hits related to that, as presented in Table 1.

When drilling the results for geography and geopolitical clusters by refining the search, it is possible to find large focus on specific countries/geopolitical unions. The

Table 1 List of papers hits by keyword searched

Keyword	Number of hits
MCS	2
Budgeting	21
Budget	691
Expenditure	459
Spending	1158
Budgeting and budget	6
Budgeting and spending	2
Budgeting and expenditure	1
Budget and expenditure	61
Budget and spending	297
Expenditure and spending	70
Total	2768

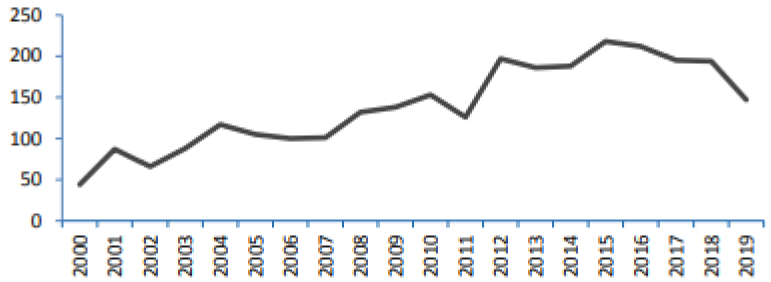

Fig. 1 Number of papers published per year (2000–2019)

recurrent subjects are the United States of America (USA) with 1133 papers, North Atlantic Treaty Organization (NATO) alliance present in 150 research papers, China with 153 and the European Union (EU) with 113 papers.

When we specifically addressed availability of the systematic literature surveys, such as we propose to conduct in this paper, 17 hits returned after a refined search within the first round for the Boolean phrase "review of literature OR literature review OR meta-analysis OR systematic review." After an analysis of their abstract, four papers were validated as belonging to the scope of this study. A brief analysis of their research setting, found evidence that the authors developed their research after 2012 [14–17], which may be related with the strong increment of research papers related with these constructs from 2012 onwards, as shown in Fig. 1.

Methodologically, these literature survey papers are based on meta-analysis of the relationship between economic growth of the country and the military expenditures and spending [14–17]. This finding may indicate an association of the keywords expenditure, spending more toward economical than management perspectives.

Finally and foremost, the results show evidence of a gap in studies with its focus and scope on management themes, meta-data analysis or systematic literature review related to MCS and budgets, when compared with the (macro) economic focused area.

4 Conclusion

The NPM, the managerialism stress on the public sector and the request to increase public funds management transparency has impacted the DO, not only at the political national and international wide level but also at the individual Armed Forces. The daily empirical observation reveals signs of an increase in complexity in the DO, probably as result of higher levels of education and technology. On the other hand, we must provide the military and civil citizens information regarding the issues of efficiency and sustainability, while providing evidence for more and better communication in behalf of the DO, either internal or external.

In a context of restrictive budgets, asymmetric conflicts and more educated personnel in the ranks, and widely in societies, the DO have to be able to effectively communicate its strategic intentions and budget requirements while providing the public good of defense efficiently, without diminishing the capabilities approved by their executive government.

Consequently, we focus this literature survey in the constructs related to DO and their use of MCS and budgeting tools throughout the period from 2000 to 2019.

Our results show that in 20 years, the number of studies has tripled its yearly publications, from 44 to 147, in 2019.

In terms of scope, many of the researches have focused on the determinants or expenditures factors for the military spending. Consequently, we show evidence that the management perspective is lacking, providing potential interest for more studies with this scope. An example is the lack of studies associating the planning and the control functions of management in DO, and how their interaction may improve the overall performance and accountability.

We stress, in our preliminary results of the literature survey in this paper, evidence of the need to further develop more research in management and business areas with the organizational unit being the DO. Although every case will be unique, the business model, restrictions, control and planning tools may provide some common grounds.

More specifically, we argue for future research focused on studies that develop their scope within budget planning and management control, at the organizational level of the Armed Forces, by opposition to economical perspectives, in order to meet politically imposed restrictions, such as budgetary constraints, but also efficient and effective use of military spending, within transparent reporting, required by increasing educated citizenship.

4.1 Limitations and Conflict of Interests

The military organizations, namely their higher education institutions and research centers libraries, were not screened to identify unpublished research papers or other research work formats, leading to a limitation of the results presented in the literature survey, for which we focused on published papers indexed on EBSCO.

The findings presented are part of ongoing research; therefore, the authors considered this as preliminary results. A detailed data analysis recurring to content analysis of the papers is in process to present a systematic literature review, as part of a methodology, to map the knowledge gap of budget planning and management control research, at the organizational level of the DO.

Regarding potential conflict of interests, one author is a Portuguese Air Force commissioned Officer and receives funding for its present doctoral program from the same institution.

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Appendix B – Questionnaire in english and portuguese languages.

Management Control Systems use in Military Defense Organizations

Início do bloco: Bloco de questões por defeito

The questionnaire is integrated in my Doctoral thesis in Management, under the guidance of Professor Tiago Gonçalves, at ISEG - Lisbon School of Economics & Management, supported by the Portuguese Military University Institute and Air Force Academy, with the objective of identify how North Atlantic Treaty Organization Military Organizations Units managers perceive Management Control Systems use.

Answering the questionnaire will take about 10 minutes.

Your individual answers and information will be kept confidential. The results will be presented in an aggregated format assuring its anonymity.
When you proceed to the questionnaire you are authorizing the use of the data provided by your answers to be used for academic purpose and scientific papers submission.

Thank you for your great support for this research project.
Please use the contacts below for any comments or additional information request.

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Quebra de página

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Fim do bloco: Bloco de questões por defeito

Inicio do bloco: Bloco 1

Please answer all questions.
There are no right or wrong answers. Only your personal assessment is relevant for us.

Military Organization structure

1. Military Defence Organization Country

- Belgium
- Canada
- Denmark
- France
- Greece
- Italy
- Netherlands
- Norway
- Poland
- Portugal
- Spain
- Turkey
- United States of America

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2. Military Defence Organization Service

- ◯ General Staff of the Armed Forces
- ◯ Army
- ◯ Navy
- ◯ Air Force
- ◯ Other (Which one?) ____

Quebra de página

The Military Organization adopted definition considers only the public sector organizational units integrated in the Defense sector, in the direct administration of the political executive power, namely the Commands, Units, Directorates and other military units within the Armed Forces General Staff or Services of the Armed Forces as the Army, Navy or Air Force hierarchy.

To encompass these organizational units its used the designation of military Unit, which have an approved legal organic and are lead, generically, by Commanders, Chiefs or Directors, who have hierarchical authority over its Sub-Units.

The participant must be a Unit or Sub-Unit hierarchical responsible, with management functions over a set of tasks and processes to plan, control or execute expenses allocated by State or Federal Budget.

Your responsabilities in the Military Organization (Sub)Unit.

3. Please indicate the type of work primarily done by your (Sub)Unit:

○ Staff

○ Operations

○ Administration, Finance or Accounting (e.g. Budget planning, execution, control or reporting; Program managers)

○ Humans Resource / Personnel Management

○ Logistics

○ Maintenance

○ Aquisitions/Procurement

○ Health

○ Security

○ Education or Training

○ Research and Development

○ Information Technologies

○ Administrative / Secretary

○ Other (Which one?) ______________________________

○ Choose one option

---

*

4. How many subordinates are under your hierarchical dependency?

____

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*

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5. **How many of your subordinates have you has their direct hierarchical superior?**

____

Quebra de página

Fim do bloco: Bloco 1

Início do bloco: Bloco 2

Please answer all questions.
There are no right or wrong answers. Only your personal perception is relevant for us.

The following items follows Simons (1995) Management Control Systems (MCS) definition and Levers of Control framework.
- ***Management Control Systems are*** *"the formal, information-based routines and procedures managers use to maintain or alter patterns in organizational activities"* (Simons, 1995).
- Managers must lead the workforce and resources of their organizational units to contribute for accomplishment of strategic goals, managing the tensions between unlimited opportunity and limited attention, intended and emergent strategy, workforce self-interest and their desire to contribute.

The Commanders, Chiefs or Directors are generic terms used to refer to the responsible person for the operational, administrative and financial control of a military Unit.

Management Control Systems use

6. Please indicate to what extent the following statements describe your Unit:

	1 - Not descriptive at all	2	3	4	5	6	7 - Very descriptive
Our mission statement clearly communicates the Military Organization's core values to our workforce.	○	○	○	○	○	○	○
Commanders, Chief or Directors communicate core values to our workforce.	○	○	○	○	○	○	○
Our workforce is aware of the Military Organization's core values.	○	○	○	○	○	○	○
Our mission statement inspires our workforce.	○	○	○	○	○	○	○

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7. Please rate the extent to which you agree or disagree with the following statements:

	1 - Strongly disagree	2	3	4	5	6	7 - Strongly agree
Our Military Organization relies on regulation to define appropriate behaviour for our workforce.	○	○	○	○	○	○	○
Our internal regulations informs our workforce about behaviors that are off-limits.	○	○	○	○	○	○	○
Our Military Organization has a system that communicates to our workforce risks that should be avoided.	○	○	○	○	○	○	○
Our workforce is aware of the Military Organization's internal regulations.	○	○	○	○	○	○	○

Quebra de página

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Please answer all questions.
There are no right or wrong answers. Only your personal perception is relevant for us.

Management Control Systems (MCS) includes all planning, monitoring and reporting systems based on formal information use (e.g., operational, maintenance or financial Key Performance Indicators, balanced scorecards, budgeting, performance evaluations, EMAS environmental evaluations and benchmarking).

The Commanders, Chiefs or Directors are generic terms used to refer to the responsible person for the operational, administrative and financial control of a military Unit.

Management Control Systems (MCS) use

8. Please rate the extent to which your Unit's top management actions (including your direct superior) currently relies on Management Control Systems (MCS) to:

	1 - To a small extent	2	3	4	5	6	7 - To a large extent
Track progress towards goals.	○	○	○	○	○	○	○
Monitor results.	○	○	○	○	○	○	○
Compare outcomes to expectations.	○	○	○	○	○	○	○
Evaluate performance on key measures (KPIs).	○	○	○	○	○	○	○
Enable discussion between superiors, subordinates and peers.	○	○	○	○	○	○	○
Signal key strategic areas for improvement.	○	○	○	○	○	○	○
Signal new strategic challenges we need to face.	○	○	○	○	○	○	○
Discuss the impact of potential changes in our surrounding environment.	○	○	○	○	○	○	○
Provide a shared view of the Unit.	○	○	○	○	○	○	○

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Tie the Unit together.	○	○	○	○	○	○	○
Enable the Unit to focus on common issues.	○	○	○	○	○	○	○
Develop a common vocabulary in the Unit.	○	○	○	○	○	○	○

Operating managers are considered the person responsible for the lowest hierachical Subunits in the military Unit. Operating managers respond to middle managers, and these to strategic management (e.g. Units Commanders, Chief or Directors).

9. Please indicate the extent to which you agree or disagree with the following statements:

	1 - Strongly disagree	2	3	4	5	6	7 - Strongly agree
Operating managers are involved infrequently and on an exception basis with the MCS.	○	○	○	○	○	○	○
Commanders, Chief or Directors pays little day-to-day attention on the MCS.	○	○	○	○	○	○	○
Commanders, Chief or Directors relies heavily on staff specialists in preparing and interpreting information from the MCS.	○	○	○	○	○	○	○
Operating managers are frequently involved with the MCS.	○	○	○	○	○	○	○

Quebra de página

10. Please indicate the extent to which you use Management Control Systems, considering it as the whole system of formal management and control tools to:

	1 - To a small extent	2	3	4	5	6	7 - To a large extent
Follow up significant exceptions and deviations	○	○	○	○	○	○	○
Evaluate and control subordinates tightly	○	○	○	○	○	○	○
Follow up preset plans and goals	○	○	○	○	○	○	○
Align performance measures with strategic goals	○	○	○	○	○	○	○
Set and negotiate goals and targets	○	○	○	○	○	○	○
Debate data assumptions and actions plans	○	○	○	○	○	○	○
Signalling key strategic areas for improvement	○	○	○	○	○	○	○
Challenge new ideas and ways for doing tasks	○	○	○	○	○	○	○
Involvement in a permanent face-to-face discussion	○	○	○	○	○	○	○

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with subordinates							
Learning tool	○	○	○	○	○	○	○

Fim do bloco: Bloco 2

Inicio do bloco: Bloco 4

Please answer all questions.
There are no right or wrong answers. Only your personal perception is relevant for us.

Environmental uncertainty

11. Please indicate the extent to which you agree or disagree with the following statements:

	1 - Strongly disagree	2	3	4	5	6	7 - Strongly agree
My (Sub)Unit often needs to react to outside pressure.	○	○	○	○	○	○	○
Making long-range plans for my (Sub)Unit is hindered by the difficulty of predicting future events.	○	○	○	○	○	○	○

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12. How often do external factors substantially influence your (Sub)Unit's performance?

- ◯ 1 - Not at all often
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7 - Very often

Please answer all questions.
There are no right or wrong answers. Only your personal assessment is relevant for us.

<u>Organizational learning</u>

13. **Please indicate the extent to which the following statements describe your Unit:**

	1 - Not descriptive	2	3	4	5	6	7 - Very descriptive
Learning is the key to improvement.	◯	◯	◯	◯	◯	◯	◯
Basic values include learning as a key to improvement.	◯	◯	◯	◯	◯	◯	◯
Once we quit learning we endanger our future.	◯	◯	◯	◯	◯	◯	◯
Learning is viewed as an investment, not an expense.	◯	◯	◯	◯	◯	◯	◯

Please answer all questions.
There are no right or wrong answers. Only your personal assessment is relevant for us.

Management attention

The Commanders, Chiefs or Directors are generic terms used to refer to the person responsible for the operational, administrative and financial control of a military Unit.

14. Please indicate the extent to which the following statements describe your Unit:

	1 - Not descriptive	2	3	4	5	6	7 - Very descriptive
The control systems in place allows Commanders, Chief or Directors to focus attention on critical issues.	○	○	○	○	○	○	○
The control systems in place allow Commanders, Chief or Directors to effectively leverage their time.	○	○	○	○	○	○	○
The control systems in place reduce the need for Commanders, Chief or Directors to constantly monitor Unit activities.	○	○	○	○	○	○	○
Without our control systems the attention of Commanders, Chief or Directors would be	○	○	○	○	○	○	○

spread more thinly.

Fim do bloco: Bloco 4

Início do bloco: Bloco 5

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Please answer all questions.
Data is treated anonymously and responses are confidential. The information will be processed and presented in an aggregated format assuring anonymity.

Personal information

15. What is your...

- **15.1. Age?** ____
- **15.2. Work years in the Military Organization?** ____
- **15.3. Years in current position?** ____

16. What is your sex?

- Female
- Male
- Prefers to not answer

17. What is your rank grade (NATO codes equivalent)?

- ◯ General Officer (from OF-6 to OF-9)
- ◯ Senior or Field Grade Officer (from OF-3 to OF-5)
- ◯ Junior Officer (from OF-1 to OF-2)
- ◯ Non-Officer Personnel (from OR-7 to OR-9)
- ◯ Other Non-Officer rank
- ◯ Civilian

18. What is your educational major or area of specialization:

- ◯ Administration, Management, Economy, Financial or Accounting
- ◯ Operational
- ◯ Engineering
- ◯ Health
- ◯ Other (Which one?) ______________________________

19. What is your highest level of education completed?

- ◯ Non-University level
- ◯ University level - Bachelor or Degree
- ◯ University level - Master
- ◯ University level - Doctorate (PhD)

Quebra de

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página

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Please provide your email address if you are interested in receiving the aggregated results of the research. (Your answer will be treated separate from the questionnaire in order to assure anonymity)

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Fim do bloco: Bloco 5

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Uso de Sistemas de Controlo de Gestão nas Organizações Militares

Início do bloco: Bloco de questões por defeito

O questionário insere-se no âmbito do Programa de Doutoramento em Gestão, sob orientação do Professor Tiago Gonçalves, no Instituto Superior de Economia e Gestão, com o apoio do Instituto Universitário Militar e da Academia da Força Aérea, com o objetivo de identificar como os gestores das Organizações Militares da Organização do Tratado do Atlântico Norte, ao nível das suas Unidades e Subunidades, percecionam o uso dos Sistemas de Controlo de Gestão.

Responder ao questionário demorará cerca de 10 minutos.

As suas respostas e informações pessoais serão mantidas confidenciais. Os resultados serão apresentados em formato agregado a fim de assegurar o seu anonimato.
Ao prosseguir para o preenchimento do questionário está a autorizar o uso dos dados fornecidos pelas suas respostas para fins académicos e publicação de artigos científicos.

Agradeço o seu enorme apoio a este projeto de investigação.
Por favor use os contatos abaixo para enviar comentários ou solicitar esclarecimentos.

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Quebra de página

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Fim do bloco: Bloco de questões por defeito

Início do bloco: Bloco 1

Por favor, responda a todas as perguntas.
Não há respostas certas ou erradas. Apenas sua perceção é relevante para nós.

Estrutura da Organização Militar

1. País da Organização Militar

- Bélgica
- Canadá
- Dinamarca
- França
- Grécia
- Itália
- Holanda
- Noruega
- Polónia
- Portugal
- Espanha
- Turquia
- Estados Unidos da América

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2. Serviço da Organização Militar

- ◯ Estado-Maior-General das Forças Armadas
- ◯ Exército
- ◯ Marinha
- ◯ Força Aérea
- ◯ Outro (Indique qual?) ____

Quebra de página

A definição adotada de Organização Militar considera as unidades orgânicas do sector público integradas no sector da Defesa, na administração direta do poder político executivo, nomeadamente os Comandos, Unidades, Direções e outros Órgãos militares do Estado-Maior-General das Forças Armadas ou Serviços das Forças Armadas como as existentes na hierarquia do Exército, Marinha ou Força Aérea.

Para englobar essas unidades organizacionais é utilizada a designação de Unidade, que tendo uma orgânica legal aprovada é liderada, genericamente, por Comandantes, Chefes ou Diretores, que tem autoridade hierárquica sobre as respetivas Subunidades.

O participante deve ser o responsável da Unidade ou Subunidade, com funções de gestão atribuídas sobre um conjunto de tarefas e processos para planear, controlar ou executar despesas alocadas pelo Orçamento do Estado.

Caraterização das suas responsabilidades na (Sub)Unidade Militar.

3. Indique o tipo de atividade primariamente desempenhado pela sua (Sub)Unidade:

- ◯ Estado-Maior / Staff
- ◯ Área de Operações
- ◯ Administração, Finanças ou Contabilidade (e.g. planeamento, execução, controle ou relatórios orçamental; gestor de projeto / programa)
- ◯ Gestão de Recursos Humanos / Área de Pessoal
- ◯ Logística
- ◯ Manutenção
- ◯ Área de Aquisições
- ◯ Saúde
- ◯ Segurança
- ◯ Educação ou Formação
- ◯ Área de Investigação e Desenvolvimento
- ◯ Tecnologias de Informação
- ◯ Apoio Administrativo
- ◯ Outro ____
- ◯ Escolha uma opção

*

4. Quantos subordinados estão na sua dependência hierárquica?

____

*

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5. **Dos subordinados na sua dependência, quantos estão na sua dependência direta (i.e. tem uma relação hierárquica direta ou é o primeiro avaliador)?**

____

Quebra de página

Fim do bloco: Bloco 1

Início do bloco: Bloco 2

Por favor, responda a todas as questões.
Não há respostas certas ou erradas. Apenas sua perceção é relevante para nós.

As seguintes questões adotam os conceitos de Sistemas de Controlo de Gestão (SCG) e de Alavancas de Controlo enunciados por Simons (1995):
- **Os Sistemas de Controlo de Gestão são "**as rotinas e procedimentos formais baseados em informação que os gestores usam para manter ou alterar padrões nas atividades organizacionais**"** (Simons, 1995).
- Os gestores devem liderar a força de trabalho e os recursos de suas unidades organizacionais para contribuir para a realização dos objetivos estratégicos, gerindo as tensões entre oportunidades ilimitadas e atenção limitada, estratégia planeada e emergente, interesse próprio da força de trabalho e seu desejo de contribuir.

Os Comandantes, Chefes ou Diretores são termos genéricos para referência ao responsável pelo controlo operacional, administrativo e financeiro da Unidade militar.

Uso do Sistemas de Controlo de Gestão (SCG)

6. Por favor, indique até que ponto os seguintes itens descrevem a sua Unidade:

	1 - Não descreve de todo	2	3	4	5	6	7 - Descreve muito bem
A nossa declaração de Missão comunica claramente os valores centrais da Organização Militar para os nossos efetivos.	○	○	○	○	○	○	○
Comandantes, Chefes ou Diretores comunicam os valores fundamentais aos nossos efetivos.	○	○	○	○	○	○	○
Os nossos efetivos estão cientes dos valores fundamentais da Organização Militar.	○	○	○	○	○	○	○
A nossa declaração de Missão inspira os nossos efetivos.	○	○	○	○	○	○	○

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7. Indique o seu grau de concordância com cada afirmação:

	1 - Discordo totalmente	2	3	4	5	6	7 - Concordo totalmente
A nossa Organização Militar depende de regulamentação para definir o comportamento apropriado dos seus efetivos.	○	○	○	○	○	○	○
Os nossos regulamentos internos informam os efetivos sobre quais os comportamentos que não são permitidos.	○	○	○	○	○	○	○
A nossa Organização Militar possui um sistema para comunicar aos seus efetivos os riscos que devem ser evitados.	○	○	○	○	○	○	○
Os nossos efetivos estão cientes dos regulamentos internos da Organização Militar.	○	○	○	○	○	○	○

Quebra de página

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Por favor, responda a todas as questões.
Não há respostas certas ou erradas. Apenas sua perceção **é relevante para nós.**

Os Sistemas de Controlo de Gestão (SCG) incluem todos os sistemas de planeamento, monitorização e relatórios baseados no uso formal de informações (e.g. *Key Performance Indicators* das áreas de operações, manutenção ou financeira, *balanced scorecards*, orçamento, indicadores de desempenho, avaliações ambientais EMAS ou *benchmarking*).

Os Comandantes, Chefes ou Diretores são termos genéricos para referência ao responsável pelo controlo operacional, administrativo e financeiro da Unidade militar.

Uso dos Sistemas de Controlo de Gestão (SCG)

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8. Avalie em que medida as ações de gestão de topo da sua Unidade (incluindo o seu superior direto) atualmente dependem dos Sistemas de Controlo de Gestão (SCG) para:

	1 - Em pequena medida	2	3	4	5	6	7 - Em grande medida
Acompanhar o progresso rumo à realização dos objetivos.	○	○	○	○	○	○	○
Monitorizar os resultados.	○	○	○	○	○	○	○
Comparar os resultados com as expectativas.	○	○	○	○	○	○	○
Avaliar o desempenho em medidas-chave (KPIs).	○	○	○	○	○	○	○
Permitir a discussão entre superiores, subordinados e pares.	○	○	○	○	○	○	○
Sinalizar as principais áreas estratégicas chave para melhoria.	○	○	○	○	○	○	○
Sinalizar os novos desafios estratégicos que precisamos enfrentar.	○	○	○	○	○	○	○
Discutir o impacto de mudanças potenciais no	○	○	○	○	○	○	○

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ambiente envolvente.							
Prover uma visão comum da Unidade.	○	○	○	○	○	○	○
Criar espírito de missão no efetivo da Unidade.	○	○	○	○	○	○	○
Permitir que a Unidade se concentre em questões comuns.	○	○	○	○	○	○	○
Desenvolver um vocabulário comum na Unidade.	○	○	○	○	○	○	○

Gestores operacionais são considerados como sendo todas as pessoas responsáveis pela Subunidade com o mais baixo nível hierárquico na Unidade.
Os gestores operacionais respondem aos gestores intermédios, e estes à gestão estratégica (e.g. Comandantes, Chefes ou Diretores da Unidade).

9. Indique o seu grau de concordância com cada afirmação:

	1 - Discordo totalmente	2	3	4	5	6	7 - Concordo totalmente
Os gestores operacionais raramente e de forma excecional se envolvem com o SCG.	○	○	○	○	○	○	○
Comandantes, Chefes ou Diretores prestam pouca atenção no dia-a-dia ao SCG.	○	○	○	○	○	○	○
Os Comandantes, Chefes ou Diretores dependem fortemente de especialistas para preparar e interpretar as informações do SCG.	○	○	○	○	○	○	○
Os gestores operacionais estão frequentemente envolvidos com o SCG.	○	○	○	○	○	○	○

Quebra de página

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10. Indique em que medida usa os Sistemas de Controlo de Gestão, considerando o sistema de gestão formal e ferramentas de controlo como um todo para:

	1 - Em pequena medida	2	3	4	5	6	7 - Em grande medida
Acompanhar exceções e desvios significativos	○	○	○	○	○	○	○
Avaliar e controlar com rigor os subordinados	○	○	○	○	○	○	○
Acompanhar planos e objetivos predefinidos	○	○	○	○	○	○	○
Alinhar as medidas de desempenho com os objetivos estratégicos	○	○	○	○	○	○	○
Definir e negociar objetivos e metas	○	○	○	○	○	○	○
Discutir pressupostos e planos de ação	○	○	○	○	○	○	○
Sinalizar as principais áreas estratégicas chave para melhoria	○	○	○	○	○	○	○
Discutir novas ideias e maneiras de realizar tarefas	○	○	○	○	○	○	○
Envolver os subordinados em discussões frente-a-frente permanentemente	○	○	○	○	○	○	○
Promover a aprendizagem organizacional	○	○	○	○	○	○	○

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Fim do bloco: Bloco 2

Início do bloco: Bloco 4

Por favor, responda a todas as questões.
Não há respostas certas ou erradas. Apenas sua perceção **é relevante para nós.**

Incerteza Ambiental

11. Indique o seu grau de concordância com cada afirmação:

	1 - Discordo totalmente	2	3	4	5	6	7 - Concordo totalmente
Minha (Sub)Unidade frequentemente tem necessidade de reagir a pressões externas.	○	○	○	○	○	○	○
A criação de planos de longo prazo para a minha (Sub)Unidade é prejudicada pela dificuldade de prever eventos futuros.	○	○	○	○	○	○	○

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12. Com que frequência os fatores externos influenciam substancialmente o desempenho da sua (Sub)Unidade?

- ○ 1 - Não é frequentemente de todo
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6
- ○ 7 - Muito frequentemente

Quebra de página

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Por favor, responda a todas as questões.
Não há respostas certas ou erradas. Apenas sua perceção é relevante para nós.

Aprendizagem Organizacional

13. Por favor, indique em que medida as seguintes afirmações descrevem a sua Unidade:

	1 - Não descreve de todo	2	3	4	5	6	7 - Descreve muito bem
Aprender é a chave para a melhoria.	○	○	○	○	○	○	○
Os valores básicos incluem a aprendizagem como um fator crítico para a melhoria.	○	○	○	○	○	○	○
Quando paramos de aprender, colocamos nosso futuro em risco.	○	○	○	○	○	○	○
A aprendizagem é vista como um investimento, e não como uma despesa.	○	○	○	○	○	○	○

Quebra de página

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Por favor, responda a todas as questões.
Não há respostas certas ou erradas. Apenas sua perceção é relevante para nós.

Atenção da Gestão

Os Comandantes, Chefes ou Diretores são termos genéricos para referência ao responsável pelo controlo operacional, administrativo e financeiro da Unidade militar.

14. Por favor, indique em que medida as seguintes afirmações descrevem a sua Unidade:

	1 - Não descreve de todo	2	3	4	5	6	7 - Descreve muito bem
Os sistemas de controlo existentes permitem que os Comandantes, Chefes ou Diretores concentrem a sua atenção nos assuntos críticos.	○	○	○	○	○	○	○
Os sistemas de controlo existentes permitem que Comandantes, Chefes ou Diretores alavanquem de forma efetiva o seu tempo.	○	○	○	○	○	○	○
Os sistemas de controlo existentes reduzem a necessidade de	○	○	○	○	○	○	○

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monitorização constante das atividades da (Sub)Unidade pelos Comandantes, Chefes ou Diretores.							
Sem os nossos sistemas de controlo existentes a atenção dos Comandantes, Chefes ou Diretores estaria demasiado dispersa.	○	○	○	○	○	○	○

Fim do bloco: Bloco 4

Início do bloco: Bloco 5

*

Por favor, responda a todas as questões.
Os dados são tratados de forma anónima e as respostas são confidenciais. A informação será processada e apresentada em formato agregado a fim de assegurar o anonimato.

Informações pessoais

15. Quantos anos tem de...

○ **15.1. Idade?** ________________________________

○ **15.2. Trabalho na Organização Militar?** ________________________________

○ **15.3. Permanência na função atual?** ________________________________

16. Qual é o seu sexo?

- ◯ Feminino
- ◯ Masculino
- ◯ Prefiro não responder

17. A que grupo pertence o seu posto militar ou categoria (códigos OTAN/NATO)?

Apresentar esta opção:
If Structure = Portugal

- ◯ Oficial General (de OF-6 a OF-9)

Apresentar esta opção:
If Structure = Portugal

- ◯ Oficial Superior (de OF-3 a OF-5)

Apresentar esta opção:
If Structure = Portugal

- ◯ Oficial Capitão e Oficial Subalterno (de OF-1 a OF-2)

Apresentar esta opção:
If Structure = Portugal

- ◯ Sargento-Mor, Sargento-Chefe ou Sargento-Ajudante (de OR-7 a OR-9)

Apresentar esta opção:
If Structure = Portugal

- ◯ Outro posto militar

Apresentar esta opção:
If Structure = Portugal

- ◯ Civil

18. Qual é a sua área de formação académica ou especialização:

◯ Administração, Gestão, Economia, Financeira ou Contabilidade

◯ Operacional

◯ Engenharia

◯ Saúde

◯ Outro (qual?) ____

---

19. Qual é o nível **de escolaridade** mais elevado **que completou?**

◯ Nível não universitário

◯ Nível universitário - Bacharelado ou Licenciatura

◯ Nível universitário - Mestrado

◯ Nível universitário - Doutorado (PhD)

Quebra de página

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Caso esteja interessado em receber os resultados agregados da investigação, pedimos que indique o seu endereço de correio eletrónico (A sua resposta será tratada separadamente do questionário a fim de assegurar o anonimato).

____

Fim do bloco: Bloco 5

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