Analytical Framework to Investigate Ethics, Social Responsibility and Sustainability in Engineering Project Management*

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Project management is part of the Engineering curricula worldwide. Frequently, project management courses are goal-centered in the pursue of a balance in the triple constrain formed by quality, cost and schedule. However, ethics, social responsibility and sustainability play a crucial role on the development of projects since their success relies on compliance with laws, regulations and local culture and values. This paper presents an in-depth analysis on the treatment of ethics, social responsibility and sustainability according to two widely-used project management standards, Project Management Book of Knowledge (PMBoK) and Individual Competence Baseline for Project, Program & Portfolio Management (ICB). We design an analytical framework to carry out a desk research to these two project management standards. Particularly, we count the number of times of appearance, present the definition, if any, determine the appearance in the different knowledge areas and process groups for PMBoK and in the different competences for ICB, and identify the proposed techniques or tools for ethics, social responsibility and sustainability management. The findings of the research demonstrate that ICB treats the three concepts more in deep than PMBoK. PMBoK refers more often to ethics and only proposes one tool for sustainability. ICB introduces the concepts throughout the standard, with repeated references to their significance. Nevertheless, the detail that standards provide can be further elaborated. As a result, we also suggest improvement proposals that could enhance the important role of these topics for students and practitioners involved in project management.

Keywords: project management; project management standards; ethics; social responsibility; sustainability

1. Introduction

Project management is taught in most Engineering Bachelor and Master degrees so students can gain knowledge and capabilities to organize and manage projects. The skills and knowledge required for project management are established in the shape of best practices guides covering the body of knowledge (BoK) released by project management organizations as well as in standards published by standardization agencies. The main BoKs and standards can be grouped regarding its focus either on projects or on people. Some of the most outstanding standards focused on projects are: Project Management Book of Knowledge (PMBoK) [1] promoted by the Project Management Institute (PMI), APM Body of Knowledge (APMBoK) [2] by the Association for Project Management, ISO 21500:2012 [3] by the International Organization of Standarization (ISO), and BS 6069:2019+C1:2019 [4] by the British Standard Institution. Whereas some of the most widespread standards focused on people are: Managing Successful Projects with PRINCE2 [5] by AXELOS, P2M - A guidebook of Program & Project Management for Enterprise Innovation [6] by the Project Management Association of Japan (PMAJ), and Individual Competence Baseline for Project, Program & Portfolio Management (ICB) [7] by the International Project Management Association (IPMA). These BoKs and standards are not static and are updated accordingly to the contributions to the field of knowledge, as well as, and not less important, to the influence of the environment in which projects are carried out.

Literature on project ethics, social responsibility and sustainability is fairly scarce and presents modest practical application by project practitioners [8, 9]. The general view about the ethics in project management is shared among the different institutions and emphasizes the ethics as a core competency of good project practitioners at the same time as condemning unethical behaviors and morally unsound decision making, which may profoundly impact the projects' success [8]. In recent years, technical Universities tend to include ethics, social responsibility and sustainability as transversal competences in their statutes and degrees. Therefore, the integration of ethical, socially responsible and sustainable principles in project management courses at engineering degrees comes as a natural outcome that should not be dismissed.

The aim of this work is to provide an in-depth analysis about the consideration of ethics, social responsibility and sustainability on two of the most widely used guides about project management. Specifically, we assess the recent editions of PMBoK [1], and ICB [7]. We chose PMBoK and ICB because they are frequently taught at Engineering studies in Europe, as evidenced by the number of studies from different countries presenting their impact on higher education [10–14]. The concepts to analyze, ethics, social responsibility and sustainability, affect directly to the people involved in a project, so it can be expected that they are further elaborated on a people-oriented standard, as ICB, than on a project-oriented standard, as PMBoK. Therefore, we are also interested in comparing the findings between a project and a people-oriented standard.

Nowadays, there is an increasing effort of project management organizations to take into account agility by extending the agile project management beyond software development [15]. The main focus is the flexibility, the acceptability of change, the continuous advancement and a strong interaction. The study of how ethics, social responsibility and sustainability are treated on them is catching researchers' attention [16, 17]. However, we do not analyze specific agile project management guides in this work since we focus on more general standards that include the consideration of agility in their frameworks.

2. Related Works

The main goal of integrating ethics, social responsibility and sustainability in project management is to ensure that decisions are made in order to guarantee the project success, and without harming society and the environment [18]. The academic literature on sustainable project management is still in its early stages, but scholars' interest is increasing. A new conceptual framework that connected five core aspects of sustainable project management was introduced: corporate policies and practices, resource management, life cycle orientation, stakeholder participation, and organizational learning [19]. In [18], three areas of impact of sustainability on project management were identified: scope management, the paradigm of project management, and a mind shift for the project manager. It seems clear that sustainability contributes to a modern, distinct, and developing school of project management thought. In [20], the potential benefits derived from the impact of sustainability on stakeholders' theory were presented as a tool for promoting corporate social responsibility and inclusive policies, generating mutual value and

technical progress, and as a key factor in a project's strategy and business management. In [21], authors conducted a systematic literature review on project management ethics, compliance, and governance, highlighting weaknesses and potential challenges. They found that the interconnected element for project management, enforcement, and ethics was governance.

In other lines of work, specific methodologies in order to achieve more sustainable projects are analyzed [22–24]. In [24], the authors discovered that only a small number of sustainability requirements were considered by project managers when making decisions based on the Q-sorts of 12 selected respondents. The triple restriction requirements were overrepresented in the top-10 statements in the ranking, while sustainability factors were overrepresented in the bottom-10 statements. In this way, the study presented in [22] was not able to determine which the expected relationship was between considering sustainability and completing the project on schedule and within budget. The work in [23] identified the factors that positively (Moral compass & Personal ability, Potential benefit, and Organizational fit) or negatively (Potential risk) influence the behavior of project managers with respect to sustainability.

Research presenting specific case studies about the treatment of ethics and sustainability in specific projects [25–27] has raised interest. 222 projects of 8 industries and 2 countries were studied in [27], and a lack of attention to the social and environmental aspects of the projects surveyed was found. They also proposed a structural model which yielded a significant and positive relationship between project sustainability management and project success. The work in [25] determined that companies, particularly those in the public sector, are concerned about project sustainability; however, there is a disconnection between perceptions of value and actual use in practice. In [26], a Construction Project Sustainability Assessing System (CPSAS) was proposed considering three basis of sustainability: environmental, social, and economic and its feasibility was analyzed in five different projects.

However, up to our knowledge, no recent work presents a comparison about how the main project management associations have addressed ethics, social responsibility and sustainability in their BoKs and standards [28].

3. Analyses of Selected Project Management Standards

With the purpose of determining how ethics, social responsibility and sustainability are considered in current project management practices as estab-

lished in project management standards, we use analytical aspects applied to two leading standards on the field of project management: the Project Management Body of Knowledge (PMBoK) [1], and the Individual Competence Baseline for Project, Program & Portfolio Management (ICB) [7].

We apply the analytical principles derived from the literature reviews on ethics and sustainability in project management practices proposed in the two chosen standards. The analytical framework is defined as follows. First, we identify and analyze the explicit considerations of ethics, social responsibility and sustainability principles along the two standards. In particular, we consider all the appearances of the root "ethic-" and "sustainab-", but only those appearances of the root "responsib-" that are related to social responsibility and not just to technical responsibility. Secondly, we identify and present the specific definitions to the given concepts. Thirdly, for the PMBoK, we identify and indicate the appearance of the concepts in the different knowledge areas and process groups, and for ICB, in the different competences. Finally, we identify the proposed techniques or tools for ethics, social responsibility and sustainability management. We apply the analytical framework to each standard and compare the findings across the standards.

4. Findings

In this section, we present the most relevant findings about ethics, social responsibility and sustainability discovered on PMBoK and ICB standards. Table 1 depicts the number of times of appearance of each term (considering the root of the term), the existence of a formal definition, the sections in which the term is explicitly mentioned, and the proposed techniques or tools to deal with these aspects.

4.1 PMBoK

PMBoK guide registers the three considered aspects with different levels of consideration. However, there is no definition of any of them, being accepted as terms that are well-known and non-specific of the field as to need a formal definition. In the following, the considerations about the root terms ethics, social responsibility and sustainability are described.

4.1.1 Ethics

With respect to ethics, PMI publishes the Code of Ethics and Professional Conduct [29] as stated in the introduction of the PMBoK. The goal is to disseminate trust in the project management profession and to assist individuals in making judicious decisions, especially when confronted with challenging circumstances in which they may be asked to compromise their integrity or values. Practitioners who do not follow the aspirational and mandatory standards included in the Code are claimed to be subject to disciplinary procedures before PMI's Ethics Review Committee.

Ethics is considered as an enterprise environmental factor internal and external to the organization. On the one hand, internal to the organization in relation to the organizational culture, structure and governance. On the other hand, external to the organization in terms of social and cultural influences and issues.

Amidst the qualities and skills of a leader, it is highlighted the need of being respectful in the sense of helping other to retain their autonomy, courteous, friendly, kind, honest, trustworthy, loyal and ethical. Ethics also constitute a principal factor for leadership styles as it forms part of the leader characteristics and the team member characteristics.

In the context of the Project Resource Management knowledge area, the project manager needs to be aware of and adhere to professional and ethical behavior, as well as guaranteeing that all team members do so as well.

An input to the Plan Communications Management, the Management Communications, the Monitor Communications, the Plan Stakeholder Engagement, the Manage Stakeholder Engagement, and the Monitor Stakeholder Engagement processes is the organizational process assets, which includes the organizational and corporate policies and procedures for social media, ethics, and security.

With regard to the Control Procurements process, proper procurement controls can be aided by the organization's code of ethics, its legal counsel, and external legal advice arrangements, as well as any existing anti-corruption programs. In this way, buying organization's code of ethics is considered as an enterprise environmental factor that can influence, as an input, the Control Procurements process.

4.1.2 Social Responsibility

Responsibility is considered many times for successfully achieving the project objectives, but it is scarce when referring to social responsibility. However, here we have only considered responsibility when it is in the context of covering a social need, that is regarded in the introduction and the role of the project manager.

The values that the global project management community defined as most important were responsibility, respect, fairness, and honesty, and so they are affirmed in the Code of Ethics and Professional Conduct published by the PMI as its foundation.

Table 1. Indication of the number of times of appearance, formal definition, explicit consideration and proposed techniques and tools for ethics, social responsibility and sustainability aspects by the two standards evaluated

PMBoK (PMI)

	Ethics	Social responsibility	Sustainability
Appearances	19	2	4
Definition	None	None	None
Explicit consideration	1.1.3 Code of ethics and professional conduct; 2.2.1 EFFs internal to the organization; 2.2.2 EFFs external to the organization; 3.4.4.2 Qualities and skills of a leader; 3.4.5.1 Leadership styles; 9 Project Resource Management; 10.1.1.5 Organizational process assets; 10.2.1.5 Organizational process assets; 10.3.1.5 Organizational process assets; 12.3 Control Procurements; 12.3.1.7 Enterprise environmental factors; 13.2.1.6 Organizational process assets; 13.3.1.4 Organizational process assets; 13.4.1.5 Organizational process assets	1.1.3 Code of Ethics and Professional Conduct; 3.4.4.3 Politics, power, and getting things done	3.3.4 The industry; 4.2.1.3 Enterprise environmental factors; 4.3.1.4 Enterprise environmental factors; 13.1.2.3 Data analysis
Techniques or tools	–	–	Data analysis – stakeholder analysis – (Identify Stakeholders process)

CBS (IPMA)

	Ethics	Social responsibility	Sustainability
Appearances	10	2	8
Definition	None	None	Yes
Explicit consideration	4.3.2.6 Align the project with human resource processes and functions; 4.3.3 Compliance, standards and regulations; 4.3.3.3 Identify and ensure that project complies with all relevant codes of conduct and professional regulation; 4.3.5 Culture and values; 4.3.5.2 Align the project with the formal culture and corporate values of the organization; 4.4.1.1 Identify and reflect on the ways in which own values and experiences affect the work; 4.4.2 Personal integrity and reliability; 4.4.2.1 Acknowledge and apply ethical values to all decisions and actions; 4.4.4.4 Show confidence and respect by encouraging others to share their opinions or concerns; 4.4.10 Results orientation	4.3.5. Culture and values; 4.3.5.2. Align the project with the formal culture and corporate values of the organization	4.3.1 Strategy; 4.3.3 Compliance, standards and regulations; 4.3.3.2 Identify and ensure that the project complies with all relevant health, safety, security and environmental regulations (HSSE); 4.3.3.4 Identify and ensure that the project complies with relevant sustainability principles and objectives; 4.3.5 Culture and values; 4.4.2 Personal integrity and reliability; 4.4.2.2 Promote the sustainability of outputs and outcomes; 4.5.9 Procurement
Techniques or tools	–	–	–

The project manager needs to have ability to deal with politics. Exercise of power, carried out in the context of leadership and management, also carries with it the responsibility of being sensitive to and respectful of other people.

4.1.3 Sustainability

In relation to sustainability, PMBoK gathers the following considerations that deal with the role of the project manager, the Develop Project Management Plan, the Direct and Manage Project Work and the Identify Stakeholders processes.

Process improvement and sustainability strategies are contemplated as a current industry trend that needs to be considered by the project manager in order to see how it may impact or apply to the current projects.

Sustainability is an enterprise environmental factors that can influence, as an input, the Develop Project Management Plan and the Direct and Manage Project Work processes.

Stakeholders' stakes, regarded as a stakeholder analysis result, can include moral rights, which may involve environmental sustainability. The stakeholder analysis is part of the data analysis technique for the Identify Stakeholders process.

Table 2 shows the relation among ethics and sustainability and the groups of processes in which they appear. We have indicated the processes, and the input, tool and technique or output item related

Table 2. Processes that include the terms ethics and sustainability and the process groups to which they belong to. In parenthesis, an indication of the input, tool and technique or output item related to the process in this context. The indication general information means that the aspect was referred to while describing the process

Process groups	Ethics	Sustainability
Initiating	–	Identify Stakeholders process (Tools and techniques: Data analysis – stakeholder analysis–)
Planning	Project Resource Management knowledge area (general information) Plan Communications Management process (Input: Organizational process assets) Plan Stakeholder Engagement (Input: Organizational process assets)	Develop Project Management Plan process (Input: Enterprise environmental factors)
Executing	Project Resource Management knowledge area (general information) Management Communications (Input: Organizational process assets) Manage Stakeholder Engagement (Input: Organizational process assets)	Direct and Manage Project Work process (Input: Enterprise environmental factors)
Monitoring and Controlling	Project Resource Management knowledge area (general information) Monitor Communications (Input: Organizational process assets) Control Procurements process (general information) Control Procurements process (Input: enterprise environmental factors) Monitor Stakeholder Engagement (Input: Organizational process assets)	–
Closing	–	–

to the processes according to the three aspects considered. Even though social responsibility is scarcely treated at the PMBoK guide, it is not done in relation with any process group – or knowledge area –, and thus it is not shown in the Table. Ethics are considered with respect to planning, executing and monitoring process groups, while sustainability deals with initiating, planning and executing process groups. Ethics are considered in four knowledge areas, which are Project Resource Management, Project Communications Management, Project Procurement Management and Project Stakeholder Management. Sustainability, on the other hand, covers two knowledge areas, which are Project Integration Management and Project Stakeholder Management.

4.2 ICB

The results shown are strictly those from the project management related chapters. Since IPMA ICB approaches not only project management but also program and portfolio management, considerations parallel to those highlighted here for project management are present in the ICB also in those other management areas.

ICB describes 29 competence elements (CE) across three competence areas: People, Practice and Perspective. The first competence area, *People*, establishes the personal and interpersonal competence elements required to succeed in projects, programs and portfolios, e.g., *Personal integrity and reliability*. The second one, *Practice*, comprises the competence elements related to technical aspects of managing projects, programs and portfolios, e.g., *Procurement*. The third one, *Perspective*, defines the competence elements that deal with the context, e.g., *Culture and values.*

ICB does not elaborate on specific techniques,

tools or concrete strategies for the individual to rely on. These are multiple and sometimes domain specific. It is for the individual to choose the preferred approach to implement the aspects described in the standard.

4.2.1 Ethics

ICB considers ethics in the following competence elements or indicators:

Align the project with human resource processes and functions ([7], Section 4.3.2.6): Ethics is explicitly mentioned as one of the support services which are provided by the human resource function.

Compliance, standards and regulations ([7], Section 4.3.3): 'Codes of ethics' appear in the list of topics defined in the knowledge requirements for this competence element.

Identify and ensure that project complies with all relevant codes of conduct and professional regulation ([7], Section 4.3.3.3): Ethical norms appear in the context of the different regulations the individual must identify.

Culture and values ([7], Section 4.3.5): Codes of ethics are highlighted as specific values in this competence. Here ICB describes how culture and values have to be included among the aspects considered in the management of a particular project for their impact on the individuals working or leading the project, the organization and society affected by the project.

Align the project with the formal culture and corporate values of the organization ([7], Section 4.3.5.2): Ethical norms are mentioned in the context of the corporate social responsibility as a lever to comply with them, alongside professional standards, and legal and non-governmental regulations.

Identify and reflect on the ways in which own values and experiences affect the work ([7], Section 4.4.1.1):

Ethical values are mentioned among those personal values and passions the individual has to identify and reflect in order to make consistent decisions and take consistent actions.

Personal integrity and reliability ([7], Section 4.4.2): 'Codes of ethics' and 'ethics' are mentioned in the knowledge requirements for this competence element. 'Ethical values' and principles are also mentioned in the context of a definition of personal integrity supported by the accordance of the actions of the individuals with their ethical values.

Acknowledge and apply ethical values to all decisions and actions ([7], Section 4.4.2.1): 'Ethical values' are described as key factors for consistent decisions and actions.

Show confidence and respect by encouraging others to share their opinions or concerns ([7], Section 4.4.4.4): ICB states that the individuals consider codes of conduct as guidelines for decisions and behavior.

Results orientation ([7], Section 4.4.10). In the context of maintaining the critical focus on obtaining the optimum outcomes for all interested parties, the individual must still maintain awareness of ethical issues that could have impact on the project.

4.2.2 Social Responsibility

Social responsibility only appears twice along the ICB standard, within the following competence elements or indicators:

Culture and values ([7], Section 4.3.5): Corporate social responsibility is mentioned in the knowledge area.

Align the project with the formal culture and corporate values of the organization ([7], Section 4.3.5.2): Corporate social responsibility is referred to as a lever of control to comply with ethical norms, standards and regulations.

4.2.3 Sustainability

In the following, the competence elements or indicators that treat sustainability in the ICB standard are presented:

Strategy ([7], Section 4.3.1): ICB mentions sustainability in the context of the strategies that are highly correlated with the mission and sustainability or the organizations. It also mentions 'sustainable thinking' in the skills and abilities area.

Compliance, standards and regulations ([7], Section 4.3.3): Sustainability is mentioned in the context of a benefit derived from increasing the organizations competence on different management domains.

*Identify and ensure that the project complies with all relevant health, safety, security and environmental regulations (*HSSE) ([7], Section 4.3.3.2): ICB men-

tions sustainability as a requirement for the project and its results.

Identify and ensure that the project complies with relevant sustainability principles and objectives ([7], Section 4.3.3.4): ICB mentions sustainability in the context of guidelines coming from the organization and wider society.

Culture and values ([7], Section 4.3.5): 'Sustainability of the outcomes' of the project is mentioned among the elements influenced by cultural aspects.

Personal integrity and reliability ([7], Section 4.4.2): 'Social equity and sustainability principles' is mentioned in the knowledge area of this competence element.

Promote the sustainability of outputs and outcomes ([7], Section 4.4.2.2): A definition of what promoting sustainability means is given. Moreover, a definition of sustainability is provided.

Procurement ([7], Section 4.5.9): Sustainability is mentioned as a strategic consideration to be taken.

5. Discussion

In this section, we discuss about how the observed findings can help to better understand the role of ethics, social responsibility and sustainability in project management.

5.1 PMBoK

The current project management practices at PMBoK represent mainly the management of some processes that deal with integration, scope, schedule, cost, quality, resources, risk, stakeholders, acquisitions and communication, while ethics, social responsibility and sustainability are considered in the background of some of the previous processes. In fact, social responsibility is not even considered in relation to any of the processes, although it can be considered as part of ethics. This means that project managers are focused on complying the project needs and goals without planning, monitoring and controlling the social ethics, responsibilities and sustainability required by the project. Therefore, we propose:

Proposal 1: The creation of a specific knowledge area about social ethics and responsibilities and another one about sustainability can contribute to a better understanding of the needs of a project manager to fulfill the codes of ethics and professional conduct, and to plan, execute and monitor and control specific processes for ensuring sustainable projects.

Proposal 2: Ethics, social responsibility and sustainability could be also considered on all knowledge areas and all process groups.

5.1.1 Ethics

Ethics is considered as an enterprise environmental factor internal and external to the organization: Ethics is shown here as something that matters both to internal and external stakeholders. Ethical aspects are acknowledged to be able to influence or constrain the project, therefore it can enhance or constrain project management options and have a positive or negative influence on the outcome of the project.

> *Proposal 3:* A statement about how ethics can influence or constrain the project and some tools and techniques to evaluate the risks, and manage the ethic influence, would provide clarity as to how this aspect can be under control.

Amidst the qualities and skills of a leader, it is highlighted the need of being ethical. Ethics also constitute a principal factor for leadership styles as it forms part of the leader characteristics and the team member characteristics. Ethics of the leader and of the team members must be considered to select the leadership style that the project management needs. However, no indication of how ethics should be considered in which styles of leadership is made.

> *Proposal 4:* Including an explanation about the most general leadership styles and how they can be influenced by ethics can arise certainty about the way in which ethics can be considered along the project.

In the context of the Project Resource Management knowledge area, the project manager needs to be aware of and adhere to professional and ethical behavior, as well as guaranteeing that all team members do as well: Nonetheless, there is no more information about the implications of this consideration.

> *Proposal 5:* A clear definition of ethical behavior should be provided. In this way, team members would exactly know to which kind of behaviors they should adhere.

An input to the Plan Communications Management, the Management Communications, the Monitor Communications, the Plan Stakeholder Engagement, the Manage Stakeholder Engagement, and the Monitor Stakeholder Engagement processes is the organizational process assets, which includes the organizational and corporate policies and procedures for social media, ethics, and security: Ethics are considered as an asset that can influence such processes but no tools or techniques specifically mention how they deal with ethics.

> *Proposal 6:* Tools and techniques should specify

how they interact with ethics as it is one aspect that can influence the processes. Also, an explanation about in which aspects the processes can get influenced by ethics would help to understand the importance of its consideration.

With regard to the Control Procurements process, proper procurement controls can be aided by the organization's code of ethics, its legal counsel, and external legal advice arrangements, as well as any existing anti-corruption programs: It is said that buying organization's code of ethics is considered as an enterprise environmental factor that can influence the Control Procurements process.

> *Proposal 7:* It might not be buying the organization's code of ethics but taking it into account when arranging the project procurement.

5.1.2 Social Responsibility

The values that the global project management community defined as most important were responsibility, respect, fairness, and honesty, and so they are affirmed in the Code of Ethics and Professional Conduct published by the PMI as its foundation.

> *Proposal 8:* Consider social responsibility as a factor that influences the project processes and needs to be taken care of.

The project manager needs to have ability to deal with politics. Exercise of power, carried out in the context of leadership and management, also carries with it the responsibility of being sensitive to and respectful of other people.

> *Proposal 9:* Techniques to a good dealt with politics should be presented.

5.1.3 Sustainability

Sustainability strategies are contemplated as a current industry trend that needs to be considered by the project manager: It is clear that the project manager cannot forget about the sustainability strategies that may impact the project and evaluate how they can apply to the project.

> *Proposal 10:* The sustainability strategies are limited to the external and existing industry; they could be included within the internal organization.

Sustainability is an enterprise environmental factors that can influence the Develop Project Management Plan process and the Direct and Manage Project Work processes: Sustainability is thus considered as an asset that can influence such processes but no tools or techniques specifically mention how to deal with it.

> *Proposal 11:* Tools and techniques should speci-

fically advert the manner in which sustainability is considered for the planification, execution and monitoring and controlling of the processes. Also, an explanation about in which aspects the processes can get influenced by sustainability would help to understand the importance of its consideration.

Stakeholders' stakes, regarded as a stakeholder analysis result, can include moral rights, which may involve environmental sustainability: It is notable the importance given to the stakeholder opinion about environmental sustainability, and of course, the legal regulations about it. Moral rights of the stakeholders are proposed to be considered in order to satisfy their expectations.

Proposal 12: Not only tools for analyzing the moral rights regarding environmental sustainability of the stakeholders should be presented, but also of the internal organization.

5.2 ICB

5.2.1 Ethics

Align the project with human resource processes and functions ([7], Section 4.3.2.6): ICB does not explicitly state the contents of training, but both ethical aspects and training appear in this competence indicator. That might suggest a correspondence between them.

Proposal 13: Training on ethics can be explicitly mentioned, endowing the human resource function with a prominent role in developing a common understanding of the ethics and values fostered by the organization.

Compliance, standards and regulations ([7], Section 4.3.3): Compliance with the 'codes of ethics' in place and its integration within the project is implicitly considered by transitive relation. The development of project management competence is stated as a duty of every individual. It is our claim that proficient project management relies on codes of ethics and that they must be integrated along with the rest of regulations and restrictions within the project.

Proposal 14: Codes of ethics can be explicitly mentioned, in the domain of project management, as a key factor to be integrated in the project.

Identify and ensure that project complies with all relevant codes of conduct and professional regulation ([7], Section 4.3.3.3): ICB mentions that codes of conduct and trading customs can be enforced by laws. Nevertheless, it is not explicitly mentioned that individuals can also play a proactive role in adopting the ethical norms

Proposal 15: A mention alluding the benefits of ensuring the adoption of ethical norms can provide clarity as to whether these norms are voluntary or mandatory.

Culture and values ([7], Section 4.3.5): ICB defines values as aspects on which individuals base their actions, and it considers ethics as specific values. This implies that ethics should be considered on the decision-making processes.

Proposal 16: Though it can be derived by transitive relation, a statement on the need of considering ethics on the decision-making processes can strengthen the point and clarify the need for individuals to consider ethics to base their actions.

Align the project with the formal culture and corporate values of the organization ([7], Section 4.3.5.2): ICB explicitly establishes a relationship among ethics, sustainability, and social responsibility. Ethics is mentioned as a topic that social responsibility can be a lever to comply with. This link is predated with a statement on sustainable development including social responsibility. This is an explicit link among these three topics.

Proposal 17: ICB can elaborate on the direct link between ethics and sustainability, without the intermediate action of corporate social responsibility.

Identify and reflect on the ways in which own values and experiences affect the work ([7], Section 4.4.1.1): ICB is clear on the role that ethical values play on the individual decisions and actions, and invites the individual to reflect on the influence of their opinions and values as a strategy to better understand other points of view and interpretations of the reality.

Personal integrity and reliability ([7], Section 4.4.2): ICB states that confidence is promoted by using ethical standards as a basis for making decisions and taking actions. Among other requirements, confidence and dependability are essential for team development, but this aspect is not mentioned in this section.

Proposal 18: Other areas, besides of decision making and action taking are influenced by the benefits of the use of ethical values and the associated confidence and reliability.

Acknowledge and apply ethical values to all decisions and actions ([7], Section 4.4.2.1): By communicating their principles and ethical values, individuals demonstrate what they stand for. On this premise, ICB describes ethical values as a powerful tool for consistency on decisions and actions, as well as for reliability.

Proposal 19: Ethical values can be considered in the individual's development of communication skills.

Show confidence and respect by encouraging others to share their opinions or concerns ([7], Section 4.4.4.4): By considering codes of conduct as guidelines for decisions and behavior, ICB implicitly acknowledges the need of ethical values as drivers of the decision-making processes.

Proposal 20: An explicit reference to ethical values can be made on this section.

Results orientation ([7], Section 4.4.10): Not being this section value-centric, ICB mentions the importance of maintaining awareness for ethical issues whilst optimizing the outcomes of the project for all interested parties.

Proposal 21: The reference to ethical issues can be made more apparent in this section of the standard by predating their occurrence to previous lines in the section.

5.2.2 Social responsibility

Culture and values ([7], Section 4.3.5). Even though corporate social responsibility is mentioned in the knowledge requirements, ICB does not explicitly predates the need of that knowledge by justifying why this knowledge is required.

Proposal 22: To clarify the need of corporate social responsibility in the context of Culture and values.

Align the project with the formal culture and corporate values of the organization ([7], Section 4.3.5.2): Due to the appearance of the three topics analyzed in this paper, this section has already been discussed in the context of ethics.

5.2.3 Sustainability

Strategy ([7], Section 4.3.1): ICBs' approaches strategies as elements to be understood and managed by projects. It also points out their correlation with sustainability. This point could easily be transformed into sustainability as a specific goal for the project to achieve, but the implications derived from that approach should be weighted by the organization sponsoring the project.

Proposal 23: ICB could highlight the difference between being correlated and being a specific goal.

Compliance, standards and regulations ([7], Section 4.3.3). By improving the competences related to project, program and portfolio management, the organization approaches sustainability. It could be argued that besides of complying with regulations and standards, sustainability compliance could become an objective by itself.

Proposal 24: Compliance with sustainability principles can be assessed once those are defined by the organization.

Identify and ensure that the project complies with all relevant health, safety, security and environmental regulations (HSSE) ([7], Section 4.3.3.2): By highlighting that the results of the projects should be sustainable, ICB accepts a much more rigorous approach to sustainability than by just approaching sustainability on the project.

Proposal 25: The impact of this approach can be remarked, e.g., by highlighting that the life cycle of the result of the project can last many decades, while the life cycle of the project a much smaller period.

Identify and ensure that the project complies with relevant sustainability principles and objectives ([7], Section 4.3.3.4). ICB acknowledges that sustainability aspects often vary in different countries and cultures. It does not approach the case of multicultural projects though.

Proposal 26: The case of sustainability in multicultural projects can be further elaborated.

Culture and values ([7], Section 4.3.5): ICB mentions that the individual may be called upon aligning the project with cultural values.

Proposal 27: A specific mention on aligning the project with sustainability principles can be highlighted.

Personal integrity and reliability ([7], Section 4.4.2) ICB mentions that integrity and reliability are built on consistency of values and other elements. Adding sustainability principles to the list of elements can show a clearer commitment with sustainability.

Proposal 28: Sustainability principles can be added to the list of elements that build integrity and reliability.

Promote the sustainability of outputs and outcomes ([7], Section 4.4.2.2) Sustainability is defined as the consideration of the long-term outcomes and effect of behavior.

Proposal 29: This competence indicator can be extended to provide more insights on sustainability.

Procurement ([7], Section 4.5.9) Sustainability is approached as a strategic consideration, without further elaboration.

Proposal 30: The role of sustainability in procurement can be described with higher detail.

5.3 Limitations and General Discussion

This study is limited to the analysis of BoKs and standards, so there is no certainty of how these guides and standards may extend and represent real-life practices [28]. Nonetheless, the BoKs and standards are developed by project management practitioners that agree on the most relevant current common practices. Moreover, they are followed to grant project manager certifications worldwide. Therefore, the findings should be relevant to evaluate the awareness of ethics, social responsibility and sustainability driven by the studied BoKs and standards.

It has been seen that these standards frequently mention the studied topics while elaborating on other areas, but there is a lack of depth in the specific consideration of these three aspects. PMBoK pays more attention to ethics than to social responsibility and sustainability aspects, as demonstrated by the difference in the number of appearances. Even though they appear as inputs to several processes, only one tool in a single occasion is described to specifically consider how to deal with sustainability. ICB introduces the studied terms widely spread along the standard with frequent allusions to their importance. Being an individual-centered standard, culture and values are not surprisingly common elements in the speech.

6. Conclusions

This work enriches the understanding of the important role of ethics, social responsibility and sustainability in project management and project management education by analyzing the treatment of these concepts as presented by two acknowledged standards, PMBoK and ICB. In summary, we proposed an analytical framework to analyze the treatment of ethics, social responsibility and sustainability on the two standards. The framework accounts for the number of times of appearance, identifies the definition, if any, determines the appearance in the different knowledge areas and process groups for PMBoK and in the different competences for ICB, and identifies the proposed techniques or tools on the three concepts. The research findings suggest that ethics, social responsibility and sustainability are treated superficially in PMBoK, whereas ICB plays a more relevant attempt to consider these aspects as part of the success of the project. Both PMBoK and ICB fail on providing an in-depth treatment of the specific impact of these aspects on projects and society. As a result, a collection of proposals for the improvement of the understanding and applicability of these aspects was provided. Future research may include empirical studies in which actual practices are analyzed in the context of decision making and action taking. Other lines of research would include the application of the proposed analytical framework to other project manager standards, including agile guides.

References

1. Project Management Institute, *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)*, 6th edn, Project Management Institute, 2017.
2. R. Murray-Webster and D. Dalcher, *APM Body of Knowledge*, 7th ed. Association for Project Management, 2019.
3. International Organization for Standardization, *ISO 21500:2012 – Guidance on project management*, International Organization for Standardization, 2012.
4. British Standard Institution, *BS 6079:2019 Project management – Principles and guidance for the management of projects*, British Standard Institution, United Kindong, 2019.
5. AXELOS, *Managing Successful Projects with PRINCE2*, 6th edn. The Stationery Office, 2017.
6. Project Management Association of Japan (PMAJ), *P2M. A guidebook of Program & Project Management for Enterprise Innovation*, 3th edn, Cyber Creative Institute Co. Ltd. Cyber Publishing Center, 2017.
7. International Project Management Association (IPMA), *Individual Competence Baseline for Project, Program & Portfolio Management*, 4th edn, IPMA Publications, 2015.
8. H. I. Jónasson and H. T. Ingason, *Project Ethics*, Routledge, 2013.
9. M. Á. Conde, F. J. Rodríguez-Sedano, C. Fernández, A. Gutiérrez-Fernández, L. Fernández-Robles and M. Castejón Limas, A Learning Analytics tool for the analysis of students' Telegram messages in the context of teamwork virtual activities, *ACM International Conference Proceeding Series*, Spain, 21–23 October 2020, pp. 719–724, 2020.
10. A. de Jong, Gaps between skills for successful project management and project management framework education, *Zeitschrift für Interdisziplinäre Ökonomische Forschung*, vol. 2196–4688, pp. 107–114, 2017.
11. A. Cerezo-Narváez, I. de los R. Carmenado, A. Pastor-Fernández, J. L. Y. Blanco and M. Otero-Mateo, Project Management Competences and Sustainable Development in Higher Education: Case Studies from Two Spanish Public Universities, *Preprints*, 2018.
12. R. Q. Goncalves, C. A. G. Von Wangenheim, J. C. R. Hauck and A. Zanella, An Instructional Feedback Technique for Teaching Project Management Tools Aligned with PMBOK, *IEEE Transactions on Education*, **61**(2), pp. 143–150, 2018.
13. A. A. Sherstobitova, L. V. Glukhova, E. V. Khozova and R. K. Krayneva, Integration of Agile Methodology and PMBOK Standards for Educational Activities at Higher School, *Smart Innovation, Systems and Technologies*, **188**, pp. 339–349, 2020.

14. S. Bayona, J. Bustamante, and N. Saboya, PMBOK as a Reference Model for Academic Research Management, *Advances in Intelligent Systems and Computing*, **745**, pp. 863–876, 2018.
15. D. Ciric, B. Lalic, D. Gracanin, N. Tasic, M. Delic and N. Medic, Agile vs. Traditional Approach in Project Management: Strategies, Challenges and Reasons to Introduce Agile, *Procedia Manufacturing*, **39**, pp. 1407–1414, 2019.
16. R. S. Malik, S. S. Ahmad and M. T. H. Hussain, A Review of Agile Methodology in IT Projects, *Proceedings of 2nd International Conference on Advanced Computing and Software Engineering (ICACSE)*, India, 8–9 February 2019, 2019.
17. A. López-Alcarria, A. Olivares-Vicente and F. Poza-Vilches, A Systematic Review of the Use of Agile Methodologies in Education to Foster Sustainability Competencies, *Sustainability 2019,* **11**(10), p. 2915, 2019.
18. A. J. G. Silvius and R. P. J. Schipper, Sustainability in project management: A literature review and impact analysis, *Social Business*, **4**(1), pp. 63–96, 2014.
19. S. Armenia, R. M. Dangelico, F. Nonino and A. Pompei, Sustainable Project Management: A Conceptualization-Oriented Review and a Framework Proposal for Future Studies, *Sustainability*, **11**(9), p. 2664, 2019.
20. D. Uribe, I. Ortiz-Marcos and Á. Uruburu, What Is Going on with Stakeholder Theory in Project Management Literature? A Symbiotic Relationship for Sustainability, *Sustainability*, **10**(4), p. 1300, 2018.
21. G. Galvão, L. Gamboa, L. Parizzotto, R. Souza Piao and M. Carvalho, Compliance and Ethics for Project Management Governance, *Proceedings of the 13th European Conference on Management, Leadership & Governance*, United Kingdom, 11–12 December 2017, p. 115, 2017.
22. A. J. Gilbert Silvius and R. Schipper, Exploring the relationship between sustainability and project success – conceptual model and expected relationships, *International Journal of Information Systems and Project Management*, **4**(3), pp. 5–22, 2016.
23. A. J. G. Silvius and M. de Graaf, Exploring the project manager's intention to address sustainability in the project board, *Journal of Cleaner Production*, **208**, pp. 1226–1240, 2019.
24. A. J. Gilbert Silvius, M. Kampinga, S. Paniagua and H. Mooi, Considering sustainability in project management decision making; An investigation using Q-methodology, *International Journal of Project Management*, **35**(6), pp. 1133–1150, 2017.
25. M. L. Martens and M. M. Carvalho, The challenge of introducing sustainability into project management function: Multiple-case studies, *Journal of Cleaner Production*, **117**, pp. 29–40, 2016.
26. W. Yu, S. Cheng, W. Ho and Y. Chang, Measuring the Sustainability of Construction Projects throughout Their Lifecycle: A Taiwan Lesson, *Sustainability*, **10**(5), p. 1523, 2018.
27. M. M. Carvalho and R. Rabechini, Can project sustainability management impact project success? An empirical study applying a contingent approach, *International Journal of Project Management*, **35**(6), pp. 1120–1132, 2017.
28. P. Eskerod and M. Huemann, Sustainable development and project stakeholder management: what standards say, *International Journal of Managing Projects in Business*, **6**(1), pp. 36–50, 2013.
29. Project Management Institute, *PMI Code of Ethics & Professional Conduct*, Project Management Institute.

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