Cultural and Technical Adaptation of *SafetyCard* to the Brazilian Legislative and Organizational Context

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Abstract Objective: This study aims at summarising the conclusions of the cultural and technical adaptation process of the *SafetyCard*—Performance Scorecard for Occupational Safety and Health Management Systems to the legislative and organisational context of Brazil. Background: Safety management systems should be imbued with a philosophy of improvement, enhanced by a capacity for performance evaluation, as prescribed by the good practices in the field and the ISO 45001 standard. Method: The methodological adaptation process consisted of two phases, the first focused on the cultural and technical adaptation of the parameters and instruments that integrate the *SafetyCard*, and the second on its application in an organizational context that could function as a basis for operational validation. Results: All the procedures carried out made it possible to successfully complete the adaptation process. The practical application in a company also demonstrated the tool's ability to maintain its configuration and how it integrates the main technical-scientific and normative-legal requirements and recommendations on occupational safety and health. Application: The adaptation increases the *SafetyCard* scope of use, as well provides Brazilian organisations and safety professionals with an approach that makes it easier for them to monitor system performance and comply with the ISO 45001 guidelines.

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1 Introduction

This article stems from a research developed with the aim of making a cultural and technical adaptation of the *SafetyCard*—Performance Scorecard for Occupational Safety and Health Management Systems to the legislative and organisational context of Brazil. The main objective is to summarise data and conclusions of this adaptation process, as well the experience of applying the *SafetyCard* in a waste collection and public hygiene company in northeastern Brazil.

The performance evaluation and review of a management system are essential pillars for the subsistence of any system, regardless of its nature (Neto 2012a). The performance evaluation of occupational safety and health (OSH) organisational systems based, solely or mainly, on accounting for the frequency and severity of work accidents, despite the importance of these procedures, is not in line with the current principles of continued improvement and development of organisations (Neto 2009, 2012a, b; Mohammadfam et al. 2016; Freitas et al. 2018). This is not least because, as Webb (2009) points out, the organisation's ability to control this type of performance indicators tends to be progressively limited. So much that ISO 45001: 2018 itself recommends that it is essential that the performance of safety management systems can be characterised by structured matrices of indicators. That matrices must reflect gains associated with this area and entrepreneurial attitudes in the search for the best working conditions.

The *SafetyCard* was developed by Neto (2012a) for application in the Portuguese context, but considers the main international technical-scientific and normative-legal OSH claims and recommendations, allowing the verification of an organisation's performance against a set of key factors of success in OSH (Neto 2009, 2012a). Its use allows to obtain a global and structured view of what is the reality of an organisation in terms of OSH, being able to be adapted to the context and legal/normative requirements in force in any country.

The fact that the original language of the tool is Portuguese facilitates its use in other Lusophone countries, particularly in a country like Brazil that already has a good legislative and normative framework on OSH. In this sense, adapting the *SafetyCard* culturally and technically to the normative and organisational context of Brazil is believed to be scientifically relevant, allowing the scope of its use to be extended, and making it available to Brazilian organisations and safety professionals. Although it is not a legal requirement, the voluntary use of the tool will facilitate the control and performance assessment of their safety management systems. Moreover, it also allows better compliance with the requirements of ISO 45001: 2018, namely in terms of requirements 9.1 and 9.3, concerning to the obligation to evaluate the performance of the OSH management system, incorporating proactive indicators and benchmarking exercises, and requirements 4.1, 4.2 and 5.4, to demonstrate the effort

that is being made to understand the organization and its context, to understand the needs and expectations of workers, and to consult and promote workers' participation, respectively.

2 Materials and Methods

The SafetyCard is supported by its own analytical structure and a set of instruments and procedures that enable the collection, processing and interpretation of data for its application. In this manuscript, it will not be possible to explain all the *SafetyCard* features, but some of its main aspects can be summarized. It is organized around seven analytical domains, which integrate different analytical segments, which, in turn, integrate a set of indicators (Neto 2012a, b). These indicators are, in essence, the analytical parameters that favour data collection and a detailed assessment of the company's OSH conditions and actions.

The model considers 110 indicators that can be mobilised in their entirety or partially, in the event that some parameters do not apply to the organisational reality under study. This it is possible because the *SafetyCard* has a modular character. It also considers a system of standardisation of performance results, so that all indicators can be transformed to the same numerical basis (Neto 2009, 2012a). The entire standardisation process was created to allow a transformation to a numerical binary base, where each indicator always assumes results between zero and one, either in a discrete or continuous manner (Neto 2009, 2012a). In addition, as not all analytical elements of the matrix have the same relevance for a safety management system, it also integrates a weighting system that allows the importance of each parameter to be graded, allowing also the achievement of delimited variation ranges and the construction of a rating scale for the partial and overall performance of the safety system under evaluation (see Neto 2012a).

The 110 indicators are divided into 20 different analytical segments, which integrate the seven analytical domains that form the conceptual basis of the analytical structure (Neto 2012a, b). These domains can be briefly characterised as follows (Neto 2012a, b): (1) Organizational Design—focuses on the structural and functional arrangement of the management of OSH activities; (2) Organizational Culture—focuses on the values, norms and standards of OSH behaviour in the organisation; (3) Occupational Health Structure—focuses on the strategy and organisational approach to occupational health; (4) Operational Structure for Hygiene and Safety at Work—focuses on the organisational capacity to act in the prevention and implementation of protective measures; (5) Internal Emergency Plan—focuses on the organisational capacity to respond to emergency situations; (6) Monitoring, Measurement and/or Verification Structure—focuses on the organisational capacity to assess, monitor and intervene on the work environment conditions; and (7) Safety of Work Equipment'—focuses on the organisational capacity to safeguard OSH integration in the acquisition, maintenance and use of work equipment.

The methodological adaptation process consisted of two major phases. The first was more focused on the cultural and technical adaptation of the parameters and instruments that integrate the *SafetyCard*, with the following main procedures being carried out: (i) setting-up and specification of the general legal and normative OSH requirements applicable to organisations that carry out their activity in Brazil; (ii) verification of the adequacy of the legal and technical requirements specified in the *SafetyCard* and its data collection instruments; and (iii) verification of the adequacy of the technical terms used in the data collection instruments to the grammatical lexicon used in Brazil.

After the specification and framing of the legal and regulatory requirements, the collaboration of two Brazilian OSH specialists was sought, who are also connected to the Portuguese technical and scientific community in the field, with their presence and collaboration being frequent in research and scientific events in Portugal. This situation facilitated the verification of the characteristics of the instruments utilised in data collection, as well their alignment with the legal and normative requirements and terminology used in Brazil. As a result of this analysis, small changes were made to these instruments, but there was no need to replace any indicator in the matrix, only to adjust the application / compliance criteria of some indicators that had a legal basis.

In the second phase, the focus was on the selection and application of the *SafetyCard* in an organisational context that could serve as a basis for the study and operational validation of the tool. In this stage, the following main procedures were carried out: (I) selection and establishment of a partnership with a company to have a practical context for the application of the *SafetyCard*; (ii) meeting with the OSH managers of the company to understand their operating logic and specificities, as well to finalize the work plan and data collection; (iii) visiting the organisation's facilities, participation in meetings with OSH technicians and analysing the documents made available by the company to understand the characteristics of the safety management system under study; (iv) application of the *SafetyCard* notation form to the organisation's OSH services, for carrying out the structural diagnosis of its management system; (v) applying a questionnaire to a sample of workers to record a pattern of shared attitudes, values and behaviours regarding OSH in the organisation. It was used the QTCCS—Questionnaire to Workers about Occupational Safety Culture and Climate, developed by Neto (2013) and adapted to Brazil by Neto et al. (2021).

As a case study, it was used a waste collection and sanitation company in the Northeastern of Brazil, which was willing to participate as part of its frequent collaborations with members of the research team. It is a large company with national implantation, but the study focused on the unit located in a city in the northeast of the country. The data were collected and processed in 2019 and 2020. The *SafetyCard* notation form was filled out by the company's OSH services. The notes collected during visits and meetings with technicians were used to understand and characterize the company's operation and management approach. The questionnaire responses were collected randomly over five working days at the company's facilities, seeking to cover both work shifts (morning and night) and different types of workers. The data

from the questionnaires helped to determine the company's safety climate, being one of the segments that enters into the assessment of the organizational culture domain.

In total, 200 questionnaires were validated. In sociodemographic terms, the majority of respondents were male (85%), and were married or of a similar status (54.5%). The youngest worker surveyed was 19 years old and the oldest 63, with an average of 38.8 years. Most had completed formal schooling (higher incidence of cases in middle school—2nd grade), and covered workers in both administrative or technical areas (e.g. personnel management, safety technicians, technical assistants) and operational areas (e.g. waste collection, street sweeping/washing, weeding and mowing, drivers, supervisors), with the majority of participants being integrated in the last work area mentioned. The length of service with the company ranged from a few months to 18 years. The average seniority was 5.2 years of service.

3 Results

The application of the *SafetyCard* in the company under study made it possible to obtain a scoring grid with the results for the 110 indicators. Given the size of that grid, it was decided to present a summary table in this article. Table 1 has these elements and allows an overall reading of the management system performance under evaluation. The global score determined was 0.745, which in the light of the classification grid of the *SafetyCard* global result (Neto 2012a), indicates good performance (applicable when the score is between 0.700 and 0.850). This reveals a performance effectiveness of 74.5%, with the remaining 25.5% being the performance improvement differential to be improved in the future. In a more disaggregated reading, it is possible to perceive which segments or domains in which the performance was better or worse. The occupational health domain reveals a perfect performance (100% effectiveness), with all the indicators being globally achieved. The Operational Structure for Hygiene and Safety at Work also reveals a positive result (88% efficiency), namely in terms of organisation and technical operability of the OSH services and focuses on prevention and protection. However, the work accidents component has an unfavourable performance, partly due to the increase in the number of accidents and the working days lost due to them, as well the maintenance of a high volume of hours not worked due to illness.

The domains where the company showed the lowest performance were related to safeguarding the safety of work equipment' (58% of effectiveness) and internal emergency management (59.3%). In the first case, the main problem was the lack of integrating OSH aspects in the specifications for the selection and acquisition of work equipment' and the provision of instructions and other safety guidelines. As for emergency planning, the main problem was the reduced assignment of roles and responsibilities in emergency response situations.

The two domains mentioned were the ones that showed the lowest performance effectiveness, and should be a priority for intervention. In any case, attention should also be drawn to the Monitoring, Measurement and/or Verification Structure, which

Table 1 Summary of results obtained with *SafetyCard*

Analytical domain	Analytical segment		Segment weighting		Domains weighting		
		PB	M	RD	M	RD	%
1. Organisational Design	Technical coverage	1.000	0.700	0.700	0.050	0.035	70.0
	Systemic approach	0.000	0.300	0.000			
2. Organisational Culture	Values	0.950	0.250	0.238	0.200	0.147	73.5
	Norms and basic standards of evaluation	0.800	0.300	0.240			
	Workers' basic assumptions	0.570	0.450	0.256			
3. Occupational Health Structure	Vigilance	1.000	0.750	0.750	0.100	0.100	100.0
	Promotion	1.000	0.250	0.250			
4. Operational Structure for Hygiene and Safety at Work	Organisation and operability	1.000	0.050	0.050	0.250	0.220	88.0
	Accidents loss ratio	0.424	0.150	0.064			
	Training	0.904	0.250	0.226			
	Prevention	0.975	0.400	0.390			
	Protection	1.000	0.150	0.150			
5. Internal Emergency Plan (PEI)	Planning	0.750	0.400	0.300	0.150	0.089	59.3
	Attributes and responsibilities	0.250	0.250	0.063			
	Devices	0.650	0.350	0.228			
6. Monitoring, Measurement and/or Verification Structure	Control of Environmental Conditions	0.500	0.550	0.275	0.200	0.126	63.0
	Monitoring, measuring and/or verification mechanisms	0.688	0.300	0.206			
	Corrective action	1.000	0.150	0.150			
7. Safety of Work Equipment's	Maintenance	1.000	0.500	0.500	0.050	0.029	58.0
	Safety prescriptions	0.160	0.500	0.080			
Total					1.0	0.745	74.5

Table 2 *SafetyCard* results with original weightings and company weightings

Analytical domain	*SafetyCard* results with original weightings			*SafetyCard* results with company weightings		
	Weightings (%)	Results	%	Weightings (%)	Results	%
1. Organisational design	5	0.035	70.0	15	0.105	70.0
2. Organisational culture	20	0.147	73.5	15	0.110	73.3
3. Occupational health structure	10	0.100	100.0	15	0.150	100.0
4. Operational structure for hygiene and safety at work	25	0.220	88.0	15	0.132	88.0
5. Internal emergency plan	15	0.089	59.3	10	0.059	59.0
6. Monitoring, measurement and/or verification structure	20	0.126	63.0	15	0.095	63.3
7. Safety of work equipment's	5	0.029	58.0	15	0.087	58.0
Total	100	0.745	74.5	100	0,738	73.8

only achieved 63% of performance effectiveness. To a large extent, this lower percentage was due to insufficient control of environmental working conditions. The assessment of the risk of exposure to various physical, chemical and biological agents was already somewhat old (more than 2 years), and there are still some parameters that have not been assessed (e.g. exposure to vibrations). Another opportunity that could be considered has to do with the implementation of safety management systems in accordance with ISO 45001. It could improve the systemic approach, as the company currently does not have certifications by any ISO standard.

Table 2 compares the results of the *SafetyCard* with the original weightings and the weights assigned by the company. The tool allows the company under study to assign its own weighting importance to each analytical domain under evaluation, in order to understand if there would be relevant differences in performance compared to what the original structure of the *SafetyCard* shows, and also to identify which areas the company values most in its safety management system.

Although the company weights the domains differently, the overall value of performance and effectiveness does not change significantly (74.5–73.8%). The classification remains at the same level (good performance). The company's OSH managers chose not to differentiate the relevance of the domains too much. The original *SafetyCard* structure established that difference, since safety system components are not all of the same importance. They don't contribute in the same way to achieve the success in the accident prevention and healthy workplace promotion (Neto 2012a, b, 2013).

4 Discussion and Conclusions

In the last two decades there has been a gradual increase in the interest of organisations in the implementation of management systems (Neto 2009, 2012a, 2013), including in the area of OSH itself. However, these systems presuppose continuous monitoring, favouring indicators that provide constant information and enable preventive action on hazards and risks in the occupational environment (Neto 2012a, 2013; Freitas et al. 2018; ISO 45001:2018), as well the assessment of workers' attitudes, values and safety behaviours (Neto 2012a, 2013).

Safety indicators play an important role in providing information to an organisation on its safety management system performance (Reiman and Pietikäinen 2012; Mohammadfam et al. 2016). The recognition and use thereof can be a motivating factor for the stakeholders (Reiman and Pietikäinen 2012), namely for the workers, and contribute to the enhancing organisation's OSH potential.

The *SafetyCard* meets all of these requirements, having already demonstrated its relevance in previous studies. Now with the successful completion of the cultural and technical adaptation to the legislative and organisational reality of Brazil, the tool's scope of use can be increased. The practical application in a Brazilian company demonstrated the tool's ability to maintain its configuration and be applied in different organizational contexts, regardless of the country, since it incorporates scientific, technical, legal and normative requirements essential to the OSH area.

The results of this case study are evidence in themselves of the success of the adaptation, but also indicate the type of analyses and conclusions that can be drawn therefrom. Although the data has been explored briefly, some of its potential is clear. The company under study showed a performance effectiveness of 74.5%, revealing a good OSH performance. These data are comparable with other studies published using the *SafetyCard* (e.g. Neto 2012a, 2013; Pereira and Neto 2020). Even if they are from different industries, some trends can be signalled. All of these organizations have a good or very good performance, largely because that they have a consolidated OSH system and structure. The safety climate proved to be positive, with workers showing a favourable level of safety internalisation and risk awareness, as well a strong recognition of the company's safety strategy and its ability to implement safety rules. However, in the case of this waste collection company, this positive pattern portrayed is also accompanied by the workers' negative assessment of the quality of safety communications in the organization. The same scenario was obtained by Moreira and Neto (2019), demonstrating that the communication component is one of the most challenging for the success of a safety management system (Moreira and Neto 2019; Pereira and Neto 2020).

With this adaptation process completed, new challenges arise. It is true that this article has some inherent limitations, in that it was not possible to fully develop the research results, and also only data from a practical application case were presented. However, the potential was portrayed and the main objective was duly achieved. The investigation can now progress to another phase, aiming to further disseminate the integration of the *SafetyCard* in the Brazilian organisational reality.

The use of the *SafetyCard* in more organisations will help to consolidate the adaptation/integration process. In addition, this increase in case studies will also open up the opportunity to work on other aspects, such as, for example, the possibility of creating a specific module with some exclusive indicators for the Brazilian context, increasing the tool's adjustment and the range of evaluation possibilities for OSH professionals in Brazil. This version can reinforce the ability to monitor performance and enhance the possibility of carrying out performance benchmarking exercises between organisations or between production units of the same economic group. The *SafetyCard* has great potential to favour performance benchmarking, another aspect that can be explored in that second phase of the research.

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