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Design, Development and Evaluation of an Environmental Diagnostic Approach for the Industry Companies in Morocco

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Abstract

The environmental analysis is to developing an inventory of the environmental situation of the company by identifying environmental impacts, to identify the most significant environmental requests. The objective of this scientific paper is to design and to develop of an environmental diagnostic approach for the dairy industry companies in Morocco. Based on an analysis of approaches implemented and evaluated by companies for environmental analysis, we were able to generate a reliable and correct methodological approach for the environmental analysis. Then we chose the tools Unified Modeling Language and Architecture of Integrated Information Systems to model the approach developed. The two processes of environmental analysis that we have developed: The diagnosis of environmental aspects and evaluation of environmental impacts were presented in a class, diagram and chart Chain event process. The model developed for the environmental analysis that is organized in a series of sequences, thus combining the practices, and generates results. Our scientific research has proposed a process of environmental analysis by well-structured and organized model, represented with the class diagram and the event process chain diagram. To ensure that the approach taken to be practical and operational we propose to operationalize it in a specially dedicated IT applications.

Keywords: ***Environmental management system; Environmental analysis; Environmental aspect; Environmental impact; Industry companies***

Introduction

Environmental science is an area where many would argue that the current level of knowledge pales into insignificance beside the capacity to enact rapid changes on an unprecedented scale, and therefore that it is not only beneficial but essential to understand more clearly the processes at work [1]. In this context, the environmental analysis is important to have alternatives that represent a clear choice regarding area, magnitude, intensity of impact and to identify the legal and other requirements that apply to industrial enterprises, e.g., The phenomenon of water pollution has been referred to in many texts-legal writing and rules not excluded- without an attempt being made to properly define the phenomenon [2].

Environmental analysis is a reliable source of valuable knowledge and information, it's a key element in the implementation of an environmental management program, it allows us to draw up an inventory, to refine the environmental policy and

propose environmental targets, so the Environmental impact analysis gives information on likely status of pollution [3]. In principle, the most used methods to ensure environmental analysis are basic and traditional methods, some of these methods can sometimes seem underdeveloped and often too theoretical and abstract. There is no standard method for the environmental analysis. The target of our scientific research is to design and develop a tool for achieving environmental analysis, based on two approaches: analysis of environmental aspects and evaluation of environmental impacts.

Materials and Methods

Study area

Since the introduction of ISO 14001, many companies have found a driver and a methodology for the implementation of the Environmental Management System thread [4].

The environmental impact is, remember, the effect and its cause is the environmental aspect of the business activity [5], and the setting up of environmental aspects in most Moroccans industrial enterprises is a result of the efforts made to ensure the minimization of environmental impacts at the production site by adopting the Environmental Management Program aimed at continuous improvement of its environmental performance by integrating environmental concerns at all process of the companies. The environmental evaluation has many tools [6].

Methodological approach

According to detailed diagnostic approaches applied by companies on the environmental analysis, we noticed:

- An inconsistency and divergence of environmental testing methods and input materials within the same industrial platform.
- Constraints and difficulties for some internal stakeholders to clearly formalize their technical environmental analysis.

Thus, there is no methodology or operational procedure to conduct an effective and efficient environmental analysis, the general panorama of these methods has identified a methodological approach for the environmental analysis.

The process the environmental analysis that we have designed and developed involves the formalization and monitoring methodology, pragmatic, operational and practical:

- The pragmatic aims to regulate the subjectivity of the actors in charge of the environmental analysis on different platform, aim that the latter is a realistic expression of the issues and impact on the industrial business environment.
- The operational permits ensure a dynamic and correct methodology and easy to implement by internal elements.
- Finally, the objective character, intended to ensure the consistency of measurements made by the various internal parts.

Modeling techniques

About modeling of our model, we decided to choose the Technical Architecture of Integrated Information Systems aims to diagnose and to detail the operation of the model, diagrams Unified Modeling Language (UML) completed the modeling because the Technical Architecture of Integrated Information Systems has no diagrams to model data and information.

Architecture of Integrated Information Systems is a business process modeling approach. It can diagnose processes and get a holistic view of process design, management, workflow, and application processing. The concepts supported by the Technical Architecture of Integrated Information Systems allow combine different aspects of business processes, assign them the methods, analyze commonalities and identify areas in detail.

Unified Modeling Language is a common graphic technique of object-oriented modeling, normalizes objects concepts. It allows us to express and develop object models, regardless of any approach and any platform and facilitate communication between the addictive parts of a project.

UML diagrams will capture the static and dynamic aspects while diagrams Technical Architecture of Integrated Information Systems (essentially using the channels of surplus value) will capture the multiple aspects and incremental process, why we will schematize each process model of environmental analysis proposed, with the chain of events diagram process "CPE" and the UML class diagram.

Results

The environmental analysis is to identify the environmental fields of business. This process contains two sub-processes that are:

- The environmental analysis in the sense of identifying environmental aspects of the business: it aims to determine the environmental and modernize enterprise perimeter through a practical analysis of the field by comparing the company's practices and interactions with the environment.
- The environmental analysis identifying significant environmental impacts: It is to diagnose the environmental aspects and impacts of the identified company.

As the environmental analysis progresses, it is important to have alternatives that represent a clear choice regarding area, magnitude and intensity of impact [7]. It is therefore essential to take action to remove even reduce the negative effects to do this, there are a number of environmental assessment [8].

Setting the analysis of environmental aspects model

The analysis of environmental aspects is usually based on the analysis of aggregate data of the organization (activities, the main activity "production or delivery"), internal operational procedures, applicable regulatory requirements and the different actions the company in environmental matters, These procedures shall include the documentation of information to monitor the performance of the applicable operational controls and compliance with environmental objectives and targets companies [9].

It is to identify, assess and enhance the impact and risks of the site activities on the environment (air, water, waste, noise, pollution, etc.) and draw up an initial inventory of the situation of the company.

The analysis of environmental aspects and is a recording regularly update that allows for the most exhaustive inventory possible environmental, real and potential, related activities, the organization of goods and services within the limits of the application of environmental program.

In the context of the analysis model designed and developed environmental aspects, it is not to define a standard methodology for criteria, thresholds and concepts, since by definition these must be representative of the reality of the relationship environment/business, and thus defined by each company.

The analysis model proposed environmental aspects of the company motto in different units and work cell, it is necessary to define in this representation of the business organization what are the levels on which processes should wear. It is essential to set in advance a common level with various entities for the realization of environmental diagnosis.

The tool is designed and developed to integrate all the methodologies of analysis of the environmental aspects of business by understanding each of them as a logical progression of linear type. It is essential however that each company to adopt a common methodology for all its entities. The process of analysis of the environmental aspects (FIG. 1) retained proposes to attach to the specific components of the entity a common variable. Based on an input data, such an activity, productive sub-process or a device type, a second step is linked chains and consists in connecting this first input data to one or more common vectors to all entities and processes, such as the environment and the affected area (e.g., air, water, waste, technological risk, etc.) and/or the subfamily dangers related (e.g., fire, explosion, chemical spill), and finally the observation of this aspect conditions (normal, damaged, or accidentally) (FIG. 2).

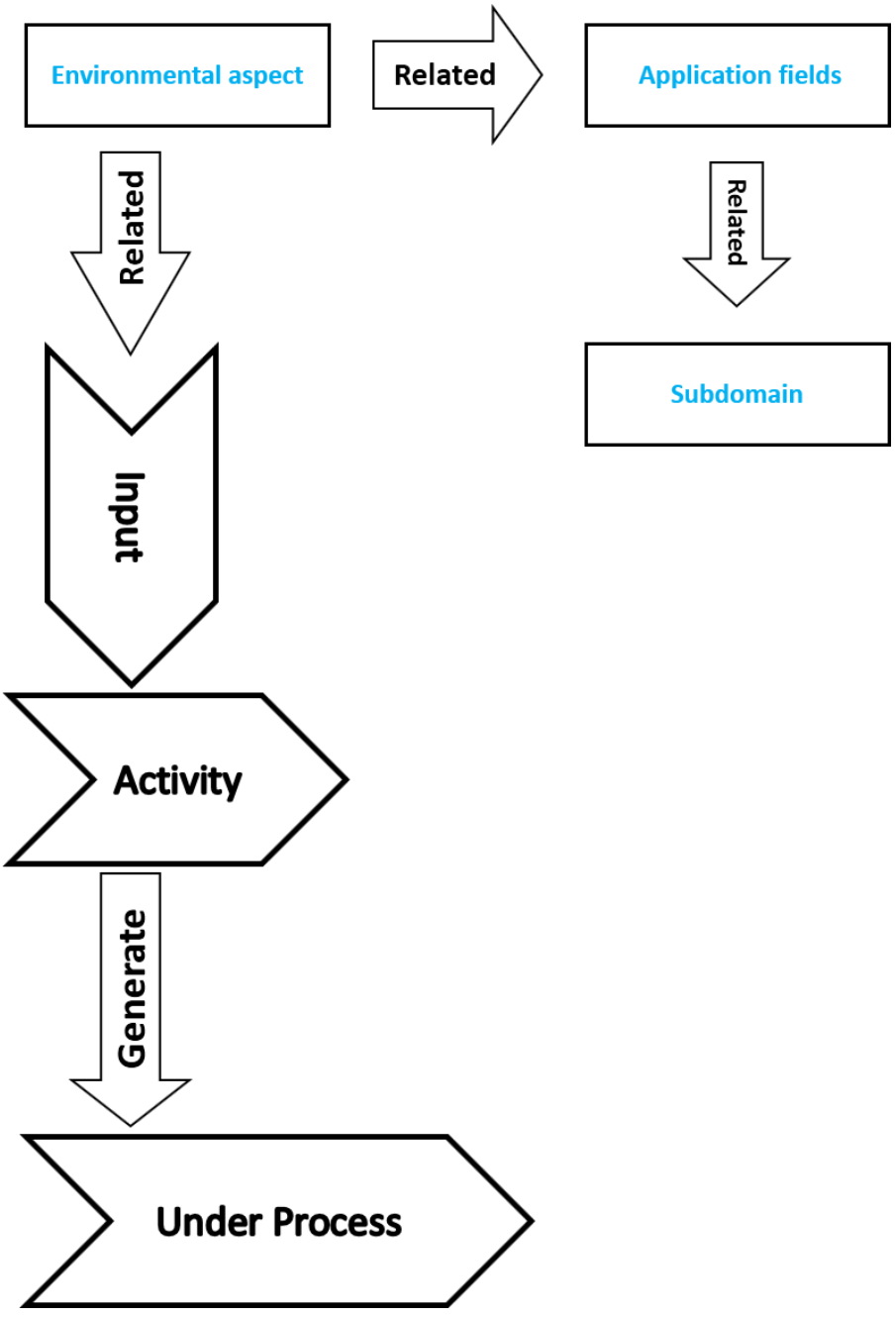

FIG. 1. **Class diagram of the process of analysis of the environmental aspects.**

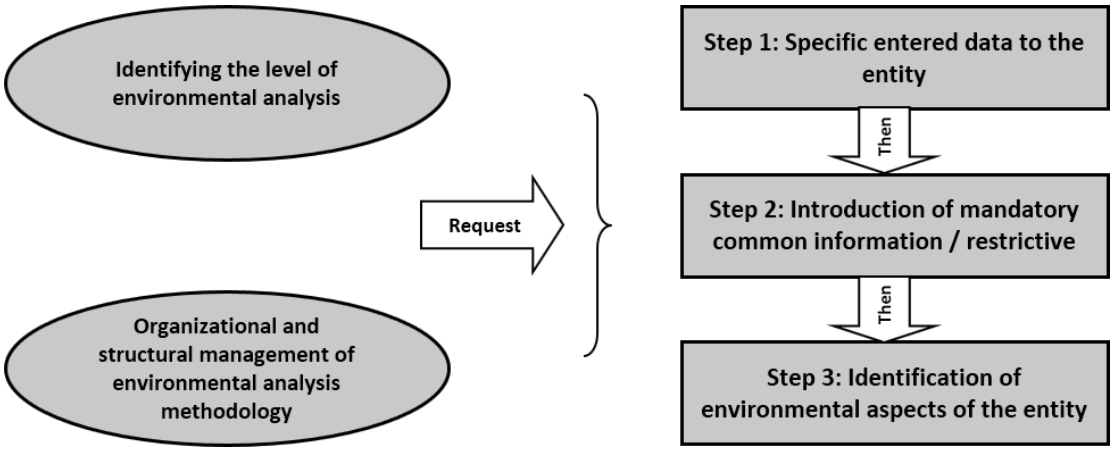

FIG. 2. **Process chain event diagram of the analysis of environmental aspects approach.**

Environmental impact assessment

Although the quality of an evaluation is often judged on the sole basis of the final report, it largely depends on the way in which the entire evaluation process was managed, from the commissioning of the evaluation to the conduct of the work, the drawing on conclusions, the formulation of recommendations and the communication of results [10].

In the same context, the environmental assessment is to diagnose the environmental aspects and impacts of the business previously identified in the process of analyzing the environmental aspects. Then each of these aspects is analyzed in terms of its significance to determine the Significant Environmental Impacts (SEI) (FIG. 3) as part of a well-organized and structured management of business operations and what are the risks significant likely to be present both in situations of normal operation in the presence of anomalies.

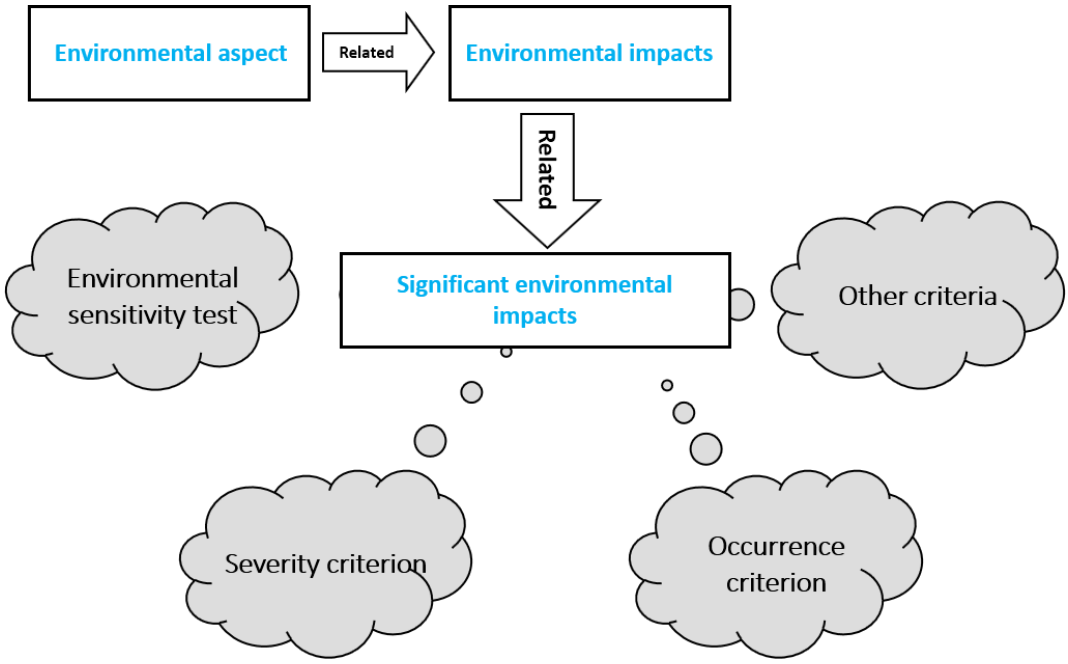

FIG. 3. **Class diagram of the evaluation process of the environmental impact.**

To define the significant environmental impacts of the company, designed and developed the tool includes:

- Incorporating common subjects (e.g., emissions to air and water, the generation, recovery and treatment of waste, etc.). Waste management is a set of activities including the following: collection, control and prevention of waste production [11].
- Observe normal operating situations of the company, but also in situations of accidental operation and degraded mode.
- Define evenly significant environmental aspects that the company has the means to control and those over which it has the means to influence.
- Evaluate prompted systematically significant environmental impacts.
- Identified for this evaluation of significant environmental impacts (FIG. 4), associated with levels of prioritization measurements such as frequency of impact, its severity, occurrence, or the sensitivity of the environment, but also the parameters of the weighting function impact a company's control threshold on these.

Discussion

Firstly, all enterprises must be set up a systematic measure to ensure environmental compliance; the purpose is the improvement of environmental performance, defined as measurable outcomes Environmental Management System in relation to the control by the organizations environmental aspects on the basis of its environmental policy, objectives and environmental targets [12].

Organizational management and structural environmental analysis through two processes: The analysis of environmental aspects and evaluation of environmental impacts, in linear mode (which allows him to simply understand step by step) and around individual and common parameters, allows objectifying the analysis of entities and cells, while keeping the individual items associated with the environmental reality of the entity.

In addition, this common frame of the different entities (and informed on the same organizational level) allows combine and cohere and practices and thus promotes data comparable and outputs can be consolidated within a single industrial platform.

The attachment of specific elements in these common data to formalizing real specific knowledge bases for analysis of environmental aspects of the platform in question shared by its different cells which are supplemented over the discounted analyzes. In addition to sharing the same methodology, internal stakeholders responsible for carrying out the analysis of environmental aspects and build a common language specific to entities of their company.

Based on the significant environmental impacts thus defined, the company then sets targets for mastering materials and reduction of significant impacts. These objectives organized into programs aim to identify targets in the short and medium term, for example: The waste reduction program has a goal of reducing industrial waste, but to ensure the realization of these objectives, the companies must respect a few number of points:

- Companies shall document this information and keep it up to date [13].
- Develop an assessment of the competence of personnel on the basis of predetermined skills matrix system defines the standard by which the company must comply [14].
- Reviewing the effectiveness of corrective actions and preventive actions implemented [15].
- Perform conduct reviews of Environmental Management System at least once a year [16].
- Besides these objectives directly related to the significant environmental impacts, other objectives may be established spontaneously as part of a proactive position, proactive enterprise (without being so associated with a significant

environmental impact), for example the improved management of the resource "paper", reducing paper consumption by promoting the use of recycled paper or from sustainable forests, etc.

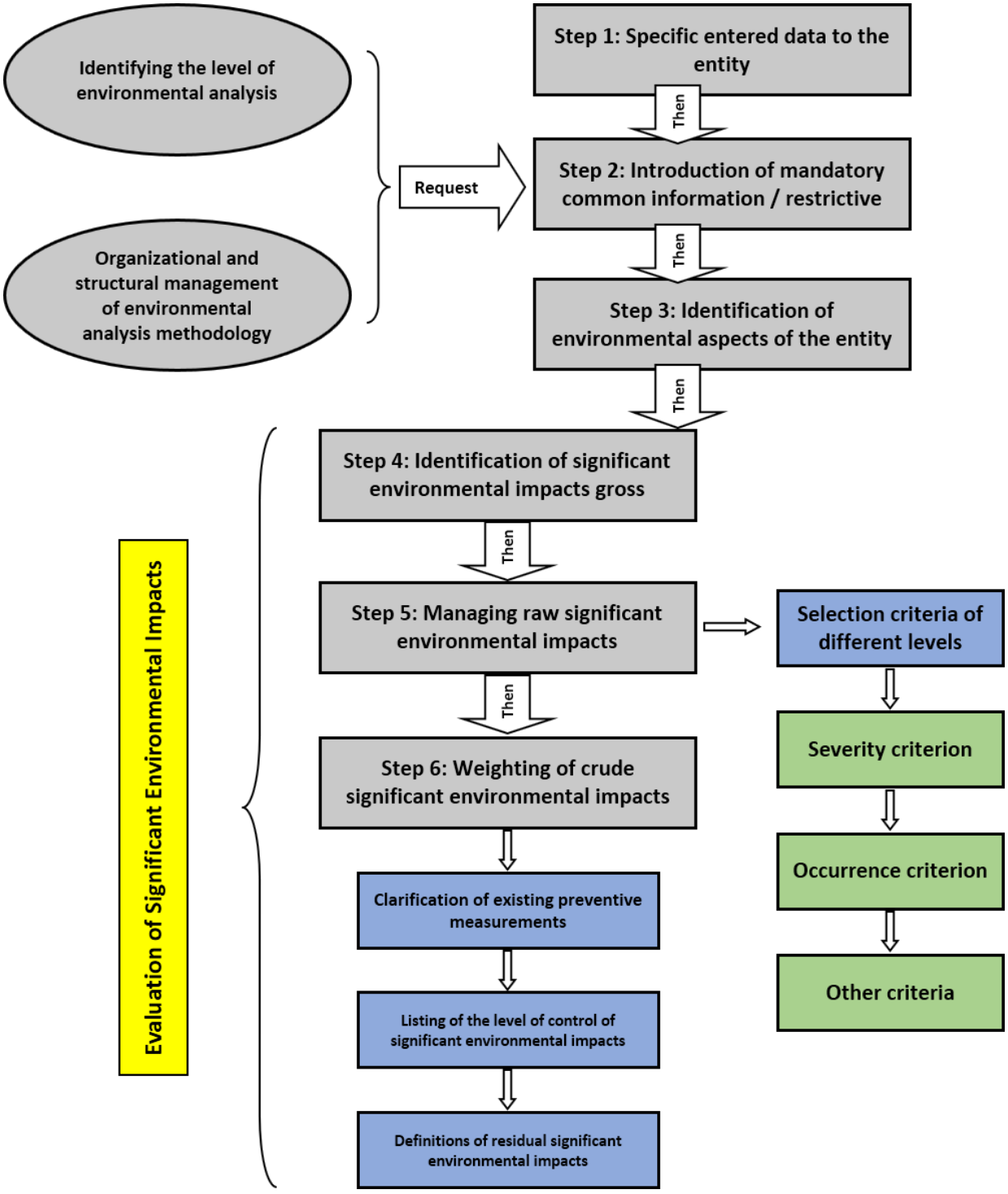

FIG. 4**. Process chain event diagram of the evaluation model of environmental impacts.**

Conclusion

In the context that, the EMS is a system and database which integrates procedures and processes for training of personnel, monitoring, summarizing, and reporting of specialized environmental performance information to internal and external

stakeholders of a firm [17]. Our scientific article has designed and developed an approach and assesses environmental analysis, based on two processes: The analysis of environmental aspects and evaluation of environmental impacts, structured in linear mode and about individual and common elements.

We conducted a performance of this tool of environmental analysis with the class diagram and the chain of events diagram process. To prevent the successful model remains merely theoretical and abstract, we suggest operationalizing it in an especially dedicated software.

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