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Should Costing: A Holistic Approach from the Product Design to Procurement

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Abstract. One of the most important driver for the development of competitive products is the cost. Despite most of the companies are focusing at the procurement stage (strategic sourcing) to reduce the cost of a product, around 80% of the final cost is determined at the design stage. Several software tools are currently available for Design to Cost. On the other side, "should cost" software tools allow to support the procurement phase. However, scienitific and industrial communities are missing an holistic "should costing" framework (method and tool) that accompany the product development process from design until procurement. To overcome this limitation, the paper presents a holistic "should costing" approach that integrates "should cost" and Design to Cost methodologies, covering design, engineering and procurement stages. Since dedicated software tools for "should costing" are required for the right implementation of this methodology, the paper describes stakeholders' requirements for a benchmarking of such tools. The proposed "should costing" frameworjk has been adopted by a couple of companies (product manufacturers), describing their background, deployment process and achieved results. The manuscript ends with a list of the most important benefits of this approach.

Keywords. Should Costing, Design to Cost, Procurement, Suppliers selection

Introduction and literature review

Cost is recognized as one of the most important driver for the development of competive products. Cost reduction can be achieved by: (i) improving process performance, (ii) increasing the competition among suppliers and/or, (iii) delocalising the production where labour cost is lower.

Most companies consider the cost only during the procurement or production phase (should cost). *Should cost* is defined as an approach that determines what the product or a system ought to cost, assuming applicable economic and physical attributes in line with the requirements [1]. However, cost reduction obtained by strategic sourcing is limited for high business volumes, while for low volumes and complex products, the way to achieve a cost reduction is difficult, since the procurement department does not know the cost models of its suppliers. In addition, the technical knowledge of operators involved at the procurement does not allow a technical negotiation considering the design features of the product/component.

Despite most of the companies are focusing at the procurement stage (strategic sourcing) for reducing the cost of a product, it is worth to notice that almost the 80% of

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the final cost of a product is determined at the design stage [2] - [3]. For this reason, designers are forced in adopting target design methodologies (Design for X) such as Design for Manufacturing, Design for Assembly and Design to Cost. In particular, *Design to Cost (DtC)* is defined as a systematic approach for controlling the costs of product development and manufacturing and it embraces cost reduction actions during the design stages [4]. DtC starts with cost estimation approaches, which can be broadly classified as: (i) intuitive methods, (ii) parametric techniques, (iii) variant-based models and, (iv) generative cost estimating models. The most accurate cost estimation is performed during the detailed design phase by using an iterative approach that is based on knowledge, features, operations, weight, material, physical relationships and similarity laws [5] - [6]. However, DtC shows a practical limitation due to the lack of knowledge on important aspects such as supplier capability, negotiation rules, special agreements with suppliers and so on which can be affect the final supplying cost.

Even if the level of detail and the numerical models used to quantify the cost are different between *Should cost* and *DtC,* the same cost items are considered: (i) raw materials, (ii) manufacturing, (iii) set-up, (iv) overhead, (v) labour cost and (vi) trasports.

From the design perspective, DtC represents the way to build up a cost estimation tool inside a manufacturing organization is to use the in-house knowledge. Commercial tools have been developed in the past years to help designers and practitioners in cost estimation and DtC activities. One of the most popular tool in this field is the *DFM Concurrent Costing* from BOOTHROYD DEWHURST, Inc. [7] - [8]. The tool is able to measure the complexity of assembly and manufacturing tasks with a quantitative result and it can produce cost estimates by defining manufacturing operations via manual input. For this reason, this tool is rather laborious and time-consuming [9]. *aPriori* is another tool for cost estimation from APRIORI and it permits to estimate a detailed cost of products and components, connecting all members of project team to relevant views of cost data – from sales to supplier, from concept to customer [10]. The tool takes into account Geometric Cost Drivers (GCDs) such as shape, tolerances, etc. and Non-Geometric Cost Drivers (NGCDs) such as materials, batch size, etc. [11]. *LeanCOST* is a cost simulation tool from HYPERLEAN and it is able to read any 3D CAD model to determine a complete and detailed quotation of the product under development [12]. The tool can automatically extract from 3D CAD model the product features and geometry, and it avoids manually measuring and entering geometric feature information to estimate costs [13]. These last two software tools enable manufacturers to access product cost data hosted in other enterprise applications to communicate product cost information between all functional organizations involved in product definition and delivery.

From the procurement perspective, *should cost* is a process whereby the cost of the part or product can be determined based on the raw materials used, manufacturing costs and overhead production costs [14]. The manufacturing cost can be achieved by analysing the engineering models to understand the raw material, defining the manufacturing processes required to deliver the required form features, and calculating the total costs using data related to material costs and processing costs [15]. Should cost can complement strategic sourcing or be used as a method for the supplier evaluation helping in the negotiation phase [16]. In addition, another goal of any should cost analysis initiative is to provide useful information to enable (depending on the stage) designers to modify raw material or enable suppliers to modify manufacturing processes with the aim to reduce costs [17] - [18]. In a large organization, the engineering department typically determines the "should cost" of a product by reverse engineering and cost estimation tools. Then, procurement/purchase department adds the additional costs (e.g. raw materials, manufacturing, labour cost, etc.) to that estimate. In the middle, several figures and departments play the role of cost reduction (supply chain department, cost reduction engineering department, manufacturing engineers, product engineers, value engineers, etc.) [19]. As for cost estimation and DtC tool, different "should cost" solutions are currently available on the market. *Should Cost Analysis (SCA)*, from REALINSIGHT, is a consulting tool for determining how much the electronic products (Printed Circuit Board Assemblies - PCBAs and/or Final Assembly - FA) 'should cost' to be manufactured [20]. *SEER-DFM Manufacturing tool* (Cost Management Software), from GALORATH Inc., can be used by manufacturing outsourcers to develop "should cost" guidelines, and by manufacturing subcontractors who need to reduce bid preparation time and error rates, and to quickly determine when not bidding at all is the best option [21]. *Costimator* (Cost Estimating Software for Manufacturers) is a quoting and process planning software from MTI Systems, Inc, developed for suppliers and manufacturers who manufacture or purchase parts [22].

In this context, the future challenge consists in combining the "should cost" methodology, commonly used at the procurement stage, with the "DtC", used at the design stage, for catching the best opportunities from the economic point of view. This integration should bring the development of an holistic approach covering the design, engineering and procurement phases of the product development process. The cost awareness should be shared among the involved players for integrating their contribution to the cost reduction. The paper presents a holistic "should costing" methodology that embraces the main stakeholders involved during the product development process. The authors presents a common development process integrating Design to Cost and Cost analysis activities. Dedicated software tools for "should cost" are required for the right implementation of such a methodology, so that the paper describes also the stakeholders' requirements in terms of should costing tools. In addition, a standard workflow is presented including the way enterprises are adopting such an approach.

1 Materials and Method

1.1 A holistic approach for should costing

The holistic approach for should costing, presented in Figure 1, encompasses the design, engineering and procurement departments of a manufacturing company. The structure, combinations and roles of these departments strongly depends by the enterprise itself. Figure 1 presents also the product manufacturing cost evolution throughout the product development process, from the design till the procurement stages. The costs definitions are:

- *Target cost*: manufacturing cost, defined by the marketing department or product leadership, the company must comply with for respecting products margin and be competitive in the market;
- *Estimated cost*: manufacturing cost estimated by designers once finished the design phase. This is the result of the first cost analysis carried out throughout the product development process. Mostly parametric or variant-based

estimating models are used at this stage. Generative cost approaches can be also employed according to product details level available (e.g. 3D CAD model with annotations);

- *Should cost*: manufacturing cost calculated by manufacturing engineers once finished the engineering phase. This is the baseline for supplier's selection and negotiation. Generative cost models are employed for this cost analysis because the product model contains all the information required for its manufacturing;
- *Procurement cost*: manufacturing cost, defined by the procurement department, which is the actual procurement cost of the product from the selected supplier.

A company should manage these cost values through a PLM (Product Life Cycle Management) system. For each component or product, four different fields will be allocated when a new design process starts. These fields will be populated during the product development process by the stakeholders responsible for each component/product.

The design department is the first team acting along the product development process. The main task is to design a product (or a functional group of it) respecting the design requirements (e.g. performance, weight, dimensions, etc.) including the cost. The design tools, such as the CAD system and the PLM, are the main tools used by designers during their work. Additional tools, such as CAE (Computer Aided Engineering) or Product Configurators can be used to improve the efficiency and the quality of the design activities. The design department need to evaluate the manufacturing cost to verify if it respects the "*target cost*" and to improve the product from the economic point of view. Designers are also responsible for a preliminary feasibility study, which implies minimum background on manufacturing technologies. To achieve a holistic approach, the "*estimated cost*" evaluated by designers should be stored within the PLM system of the company, which already contains the "*target cost*". If "*estimated cost*" exceeds the "*target cost*", the PLM systems will inform the involved stakeholders (e.g. designer, Chief Technical Officer, product leadership, etc.). Specific re-design workflows can start even before beginning the engineering phase. In this stage, for a better cost awareness (required for a re-design activity) it is important to know also the total cost breakdown (raw material, production, setup and investment). The cost analysis must be carried out using rules and parameters (cost models in general) approved by the engineering department. The accepted cost accuracy, depending on the industrial sector of the product, can be up to ± 20%. In general, mass-produced products require a higher accuracy.

Once the product has been designed, production engineers (engineering department) are responsible for its industrialization, by improving the product aspects that affect the manufacturing process. The cost analysis is carried out starting from the analysis previously realized by designers. At this stage, however, production engineers perform a more detailed analysis with the aim to define the "*should cost*". Indeed, he details the manufacturing processes to obtain the product and the relative parameters. The "*should cost*" is a consequence of such a data. If "*should cost*" exceeds the "*target cost*", a cost reduction process should start. Two solutions are available, i) revise the product (design) or ii) revise the processes (the manufacturing strategy or single parameters). In the first case, major revision, production engineers cooperate side-by-side with designers with the aim to revise the product project (shape, material, dimensions, tolerances, treatments and roughness) and to find the best product configuration that minimizes the production cost while meeting the requirements. This approach has the most important cost saving effect. Alternatively, minor revision, production engineers work from the manufacturing side, selecting the best scenario (e.g. suppliers, machine tool, cutting parameters, etc.) which minimizes the cost. The accuracy required in this stage is higher compared with the previous phase (generally not beyond ± 5%). As before, the "*should cost*" will be stored into the PLM system, which already contains the "*target cost*" and the "*estimated cost*" by the designer.

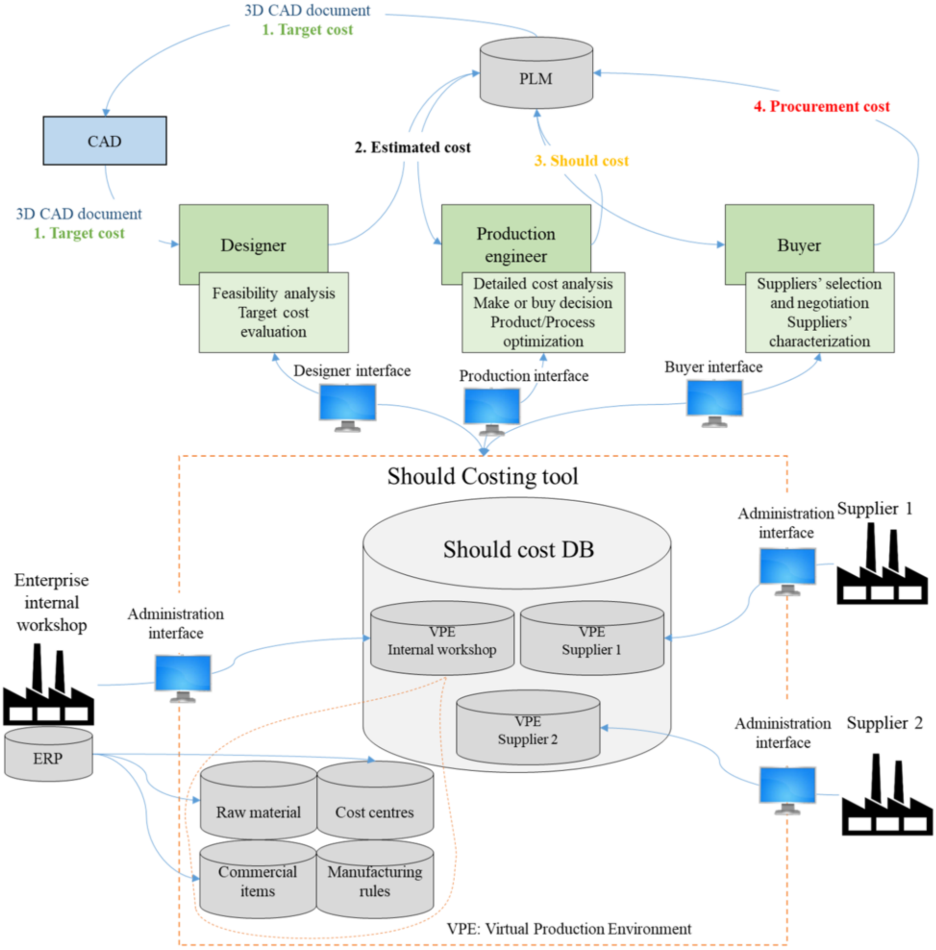

Figure 1. Should costing approach and software tool architecture.

At last, the buyer (procurement department) needs to know the "*should cost*" defined by the engineering department for the supplier's selection and relative negotiation phase. The "*should cost*" value, and the defined manufacturing processes, are the starting point for a negotiation process. The buyer needs to simulate alternative manufacturing scenarios to find the best one or to update the cost analysis according to the feedbacks received from suppliers. Once the supplier is chosen and the "*procurement cost*" is defined, this data are stored within the PLM for future data analyses or cost evaluations. Also at the procurement stage, if "*procurement cost*" exceeds the "*target cost*", the PLM system informs the involved stakeholders of this situation, so that recovering workflows can start (e.g. identify a different supplying strategy, start an improved product engineering phase, etc.).

The top part of the figure illustrates the "should costing" process that involves the design, engineering and procurement departments. It contains the software tools commonly used by these mentioned departments (CAD and PLM), the main cost-related activities they carry out, the cost evolution during the product development process and the interfaces of a holistic "should costing" tool used for the cost analyses. The bottom part of the figure is a focus on the general database architecture of a "should costing" tool. It consists of different Virtual Production Environments (i.e. one for each suppliers or internal workshops) managed through the administrative interface of such a tool. Each environment contains data relative to the raw material, commercial items, cost centres and manufacturing rules (i.e. cost models and cost routings).

The key enabling technologies for implementing a holistic "should costing" approach are linked to the adoption of a specific should costing tool. Indeed, even if the "should costing" activities can be carried out with traditional tools, the effort required for such cost analysis will not be compensated by the cost-reduction advantages. Moreover, it will not be possible to coordinate the work of the stakeholders and create a shared repository of knowledge. Appendix 1 summarizes, for each enterprise department, the software tools commonly used during their daily activities, the cost related activities that each department is currently perform or should carry out in the future and the requirements for a "should costing" tool (both common and specific).

1.2 The way for implementing a should costing approach

The implementation of a "should costing" approach is a multi-step project. The adoption of a "should costing" approach pass through a commercial software tool for the material and manufacturing cost estimation, currently available in the market. A company must select the best one according to their needs. *DFM: Concurrent costing* (by Boothroyd Dewhurst, Inc.) was the first software tool developed with this aim and it is a milestone in the landscape of this kind of systems. However, it lacks functions for automatically calculating a manufacturing process, and the relative cost, from a 3D geometry, which requires a user input. *aPriori* (by aPriori) overcomes these limitations, providing a tool which allows the automatic cost calculation even for complex 3D models, covering the most important manufacturing processes. *LeanCOST* (by Hyperlean) is a software platform made by different interfaces, one for each of the group of stakeholders described in the previous section. As for the *aPriori* solution, *LeanCOST* has recognition algorithms for the automatic cost estimation from 3D CAD models.

A company looking for a "should costing" tool has to firstly set a benchmark among this kind of technologies. The company has to create a working group made by the aforementioned stakeholders, including also one or more people of the IT department (even if it will not use the system, its contribution is required before taking a decision). The working group, headed by a Project Manager (generally a member of the engineering department), will be the responsible for the software selection and its development.

The next implementation step consists in starting a pilot project, which aims at setting up the system. During the pilot project, the enterprise defines a priority list of the manufacturing processes to be validated/customized. Generally, the pilot project concerns just one business unit of the company. In case of approval, the “should costing” project will be extended to all the other business units.

During this stage, the engineering department mainly works for customizing the knowledge included within the selected system and/or defining of additional costing rules. Indeed, it is important that the cost models reflect the background of the company or even the manufacturing strategies adopted by its production plants or suppliers. For managing possible differences among these scenarios, sometimes is necessary to model one Virtual Production Environment for each supplier of production plant. During the pilot project, the IT department works for a first connection with the enterprise software solutions (mainly the PLM and ERP: Enterprise Resource Planning). These systems contain data about raw materials, cost centres and commercial items, required for the cost analysis of a product. In this phase, the designers and buyers just give their impression about the tool and some feedbacks for improving the way to use it. For instance, for an automatic cost analysis process, designers can enrich the 3D CAD model with the Product Manufacturing Information or perhaps use markers (e.g. colours) to indicate the roughness of the product surfaces. During this project phase is important to draft the use scenarios of the selected “should costing” tool (how the engineers have to use such a tool), one for each department. This is important for the following business process re-engineering.

Once the engineering department approved the tool, the second stage starts. The procurement and design departments begin using the software tool while the IT department develops the integrations with the enterprise software solutions. During this step, the company continues modelling the Virtual Production Environments for new suppliers or for those business units not included in the first stage. Moreover, the engineering department continues improving the cost models, if required. During this stage, the company refines their internal processes for including the “should costing”. Once the second stage is completed, the “should costing” is considered fully implemented within an enterprise. It is worth to notice that the presented implementation depends by the organization and the structure of each enterprise. Indeed, some companies do not have an engineering department, so that the evaluation of such systems starts from the procurement or design departments.

2 Case studies and results discussion

This section presents how a couple of companies have adopted a “should costing” approach. They were selected for different dimensions, kind of products, background on “should costing”, medium-terms objectives, enabling strategies and departments involved. For each case study, the followings sub-sections describe how the “should costing” project have been deployed. It is worth to notice that section 1.1 presented a general approach, that can be customized for each enterprise.

2.1 Company 1 (middle enterprise)

Company 1 is an Italian enterprise designing and producing automatic systems for assembling and quality control, applied to several industrial sectors such as the automotive, aerospace, train, energy, environment and human care. It is a middle-size company (around 500 employees) where the products are designed by the internal design team (core products) and by external suppliers (non-core products). It has a small team for product engineering that also supports the procurement department in finding the suppliers. Certified suppliers produce the components constituting a product, whereas the internal laboratories are responsible for the product assembling and test. The medium-term objectives were i) reduce the manufacturing cost and ii) reduce the engineering and manufacturing time. The enabling strategies for achieving the previous aims were:

- Increase designer's awareness about costs and manufacturing aspects, for both the internal and external design teams. The manufacturing cost became a target;
- Avoid deep product redesign during the engineering phase;
- Continuously check the product cost evolution during the product design stages;
- Speed-up the negotiation with suppliers.

The company started a "should costing" project a couple of years ago by firstly involving the product engineering team. After the introduction of a "Should Costing" software tool (*LeanCOST* by Hyperlean), its technicians worked in cooperation with two strategic suppliers (high precision components and machined steel structures) customizing the database of the "should costing" tool with the aim to model the production plant of their suppliers. In this way, the cost information calculated by the tool can be compared with the suppliers' quotation. Once customized the tool and verified the accuracy of the results, the company started the training of the internal designers. The training addressed the cost theory and the usage of the software tool. After that, designers began using the tool by automatically computing the manufacturing cost of the products they were designing. The company identified two ways of using the tool at the design stage, in addition to its usage at engineering and procurement ones. First, use the tool for evaluating alternative design solutions for single complex components. Wrong design decision for these components may negatively affect the respect of the target cost of the whole product. In this manner, the company can reduce the effort for the following engineering phase. Second, use the tool for monitoring the manufacturing cost evolution of the whole product at the 25%, 50%, 75% and 100% of its maturity. In this second case, designers can anticipate as much as possible any corrective actions for respecting the target cost.

The company was able to respect the target cost for the products developed during the full use of the should cost approach, respecting the product lead time. For critical components (e.g. complex supports with bearing housing) with a cost around or greater than 1.000€, the manufacturing cost was also reduced up to 60% of the target cost. Indeed, with an accurate definition of the shape, designers were able to use semi-finished raw materials, which required less working time. Price negotiation with its customers, for manufacturing reasons, was no more required. The product delivery time was not affected by the "should costing" activity of the designers, because the effort for a "should cost" analysis during the design is largely compensated by the faster engineering process.

2.2 Company 2 (big enterprise)

Company 2 is a multinational enterprise designing turbo machinery solutions for the oil and gas sector. It is a large-size company made by several design teams, one for each functional group of the product (piping, inlet/ exhaust ducts, etc.). Its products, characterized by a high level of technology and high number of components, are realized with advanced and specific manufacturing processes. Certified suppliers are involved for the production of such components. The medium-term objectives of the enterprise were increase the economic competitiveness of its products and speed up the time for the new product introduction. The enabling strategies for achieving the previous aims were support designers and buyers with a should costing tool and deeply integrate the should costing tool with the system used at the product design.

The “should costing” project started three years ago, by firstly involving the design and procurement teams responsible for the product arrangement (piping in particular). This kind of functional group consists of thousands of parts, each one characterized by dozens of parameters and a complex production process. So that, once selected the “should costing” tool according to the company requirements (*LeanCOST* by Hyperlean), design, engineering and procurement teams worked together for modelling the manufacturing processes and relative costing rules within the system. Interviews to suppliers were necessary for this task. A standard virtual production environment has been modelled (it does not refer to a specific supplier). This phase engaged the software tool administrator and a process engineer for three months. The tool has been arranged to elaborate a manufacturing process and a related cost starting from a simplified 3D model enriched with product manufacturing information (e.g. pipe schedule, material, thickness, coating).

Once completed the introduction of the “should costing” tool, even included the training of the involved employees, the enterprise started using the tool. The designers were able to automatically get the production cost of a piping from a 3D CAD model (even simplified) for its comparison with the target cost. By analysing the Manufacturing Bill of Material, designers were also able to identify product improvement for reducing the cost, while preserving the performance. By using a detailed and customized report, the buyers were able to speed-up the cost negotiations with their suppliers thanks to the manufacturing process, with related information, available yet after the completion of the design phase. The product engineering department were only involved during the introduction of the software tool for cost estimation. Manufacturing engineers have not used the tool during the development process.

After one year since the “should costing” project start, it was applied to other products, in particular the inlet and exhaust ducts of a power generation plant. In that case, since the modularity of such a product, the “should costing” tool has been integrated with a product configurator and a design automation software tool. In this manner, designers were able to simplify and speed-up the design phase and should costing activity of complex products (thousands of parts).

2.3 Results discussion

The above presented should costing projects highlighted two different ways of implementing such a methodology. The most important advantages that such approach determines when implemented within a manufacturing company were:

- Standardization of the methods for determining the manufacturing cost. This was possible by defining a shared approach for the cost analysis and a shared

database of cost models. The "should cost" will no more depend by the background of each engineer;
- Improvement of the communications among the departments with an increased autonomy in their work. Since designers are more aware on cost related aspects, they can preliminarily evaluate the cost of a product without waiting a feedback from the engineering department.
- Reduction of the manufacturing cost, especially for critical parts. The use of analytic software tools helps designers in finding the cost-related hot spots (manufacturing criticalities) and solve them by changing the design.
- Reduction of the iterative loops between the design and engineering phases. This advantage implies also a reduction of the time for developing new products. The cost analysis and the application of the Design to Cost guidelines, yet during the design stage, lead designers toward the best solution reducing corrective actions during the product engineering phase.
- Improvement of the enterprise relationship with suppliers, with a faster cost negotiation. The product "should costing" activity elaborates economic data that can be easily compared with the cost analysis of the suppliers. The negotiation will be faster or even absent since the should cost will be calculated using manufacturing data shared by the suppliers.
- Fostering the collaboration among the company departments by exchanging "cost" knowledge and expertise at different level of the project development process.

3 Conclusions and future work

The paper presented a holistic "should costing" approach that integrates the "should cost" methodology, commonly used at the procurement stage, with the "Design to Cost", used at the design stage. It wants to overcome the current approaches available in literature, which lacks a holistic vision. The paper is mainly oriented to enterprises looking for an innovative approach for managing cost-related activities (Design to Cost and should cost) through the whole product development process. The research work argued the approach, describing the role of each stakeholder, and defining the process for its implementation within an industrial context. Since the application of the holistic approach pass through the deployment of a software tool, the paper briefly presents the most important aspects to consider for a benchmark analysis.

The great variety of the organizations of each enterprise led the authors to present a couple of case studies describing the process for implementing the "should costing" approach. The case studies will help the reader to figure-out how to adapt the proposed approach in different organizations. In addition, to the specific benefits achieved by the companies of the case studies, the papers present the overall theoretical benefits that can be achieved by adopting such an approach.

Future work will aim at defining a set of deployment processes, one for each group of enterprises with similar needs. It will help companies in effectively adopt "should costing" approach. Indeed, the adoption of a new holistic approach and the inexperience of the companies may result in unsuccessful projects in case of wrong management. Furthermore, authors want to setup KPIs for measuring the effectiveness the implemented "should costing" approach.

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Appendix 1. Enterprise departments and Should Costing

	Design	Engineering	Procurement
Software tools	CAD PLM CAE	3D Viewer / CAD PLM Excel	3D Viewer PLM
Cost related activities	Rough cost estimation to verify the respect of the target cost. Product Feasibility analysis of the manufacturing process. Cost breakdown analysis for identifying the economic hot spots.	Manufacturing process calculation. Process and/or product design optimization. Detailed cost estimation. Alternative manufacturing scenarios evaluation. Make or buy decision.	Suppliers' selection and negotiation. Simulation of different manufacturing scenarios of suppliers to find the most convenient solution. Suppliers' characterization (workshops and manufacturing processes).
Specific Should Costing tool requirements	Native integration with design tools (e.g. 3D CAD systems). Recognition of the Product Manufacturing Information available in the 3D CAD model. Design to Cost feedbacks directly on the 3D CAD model. Rapid evaluation of the design alternatives by the automatic recognition of the differences among revisions. Automatic selection of the best manufacturing scenario. Database of Design to Cost guidelines, which suggest designers on how reduce the manufacturing cost of a product.	Detailed visualization of the manufacturing process. It is required to access (view or modify) every data used for the cost calculation. Function to model the workshops (Virtual Production Environment) of their company or suppliers. Detailed export of the manufacturing process in Excel format. Cost calculation of the investment for go/no go decisions. Impact of the setup costs changing the production bath size. Detailed cost breakdown as a support for the process optimization.	Visualization of the manufacturing process and the overall manufacturing process. Cost simulation by changing the workshop or supplier. Detailed cost breakdown as a support for the suppliers' negotiation.
Common Should Costing tool requirements	Automatic cost analysis from the 3D CAD model. Shared database of cost models. Dedicated interfaces for each role (designers, production engineers, buyers and administrator). Both analytic and parametric cost analysis functionalities. The latter used for parametric products. Database of commercial items (e.g. pneumatic cylinder, valves, belts, etc.). Input of the batch size and relative (automatic) update of the manufacturing process. Management of single parts and assemblies. PDF Export of the overall cost, Bill of Material and manufacturing process. Evaluation of the investment cost. Continuous update of the costa available into the database.		