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# A Value-Oriented Metamodel for Small and Medium Enterprises' Decision Making

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***Abstract*—**To be competitive and sustainable, any company has to maximize its value. However, unlike listed companies that can assess their values based on market shares, most Small and Medium Enterprises (SMEs) which are non-listed cannot have direct and live access to this critical information. Traditional accounting reports only give limited insights to SME decision-makers about the real impact of their day-to-day decisions on the company's performance and value. Most of the time, an SME's financial valuation is made one time a year as the associated process is time and resource-consuming, requiring several months and external expertise to be completed. To solve this issue, we propose in this paper a value-oriented metamodel that enables real-time and dynamic assessment of the SME's value based on the large definition of their assets. These assets cover a wider scope of resources of the company and better account for immaterial assets. The proposal, which is illustrated in a case study, discusses the benefits of incorporating assets in the SME valuation.

***Keywords*—**SME, metamodel, decision support system, financial valuation.

## I. Introduction

KNOWING in real time the value of a company is of prime importance. It is required to propose a price when the company enters on a listed market, or when the company owners decide to sell their shares. The value can also be communicated to shareholders as part of a business negotiation (e.g., with clients, suppliers, or investors). It is generally agreed upon that strategic decision making should rely on the implementation of decisions to produce results that match with the company's objectives and that improve the company's value. In [1], strategy is defined as "a detailed plan for achieving success in situations such as war, politics, business, industry, or sport, or the skill of planning for such situations". In contrast, operational decisions are more granular and derive from strategy implementation. By estimating financial performance, it is possible to provide meaningful decision variables to support operational and strategic decisions to reach objectives. As a consequence, we can assume that having a clear vision of the company's value is critical for strategic and operational decision making.

Unfortunately, assessing such a value is not obvious, particularly for SMEs. Existing methods are generally based on financial statements that are produced after the financial operations have occurred, have been recorded, organized and presented in compliance with reporting standards. This process is time- and resource-consuming and generally only provides an ex-post evaluation of the company. Most of the time, particularly for SMEs, the value is calculated only one time a year with an a posteriori point of view. And it is only based on a financial criterion and a business process perspective [2] as business processes are considered as the means that companies operate to achieve their objectives. Unfortunately, this approach presents numerous limitations as most of a company value is also related to other features such as the human capital or customers. In addition, most of the existing valuation methods do not consider uncertainties as a component of their assessment. As mentioned by [3], considering the current Volatility, Uncertainty, Complexity and Ambiguity (VUCA) world this assumption is no longer valid.

The problem statement of this research work is finally to know how to better and faster assess the value of any non-listed company and particularly SMEs. To answer this question, we aim at modeling a company with convenient data to estimate its results and its financial statements in order to enable a faster, ex-ante, and uncertainty sensitive SMEs' value assessment.

In Section II, we will present an analysis of the background associated to the key concepts of our problem statement. In Section III, we will develop our proposal through the design of a value-oriented metamodel able to represent any non-listed company and that would be able to support any valuation process. In Sections IV and V, we will illustrate the usability through specific instances of the proposal. We will particularly discuss the potential of this metamodel to enrich conventional financial reporting and management accounting methods regarding the problem statement defined. We will provide conclusions and avenues for future work in Section VI.

## II. Literature Review

In this section, we consider the main concepts required to complete an enterprise model that starts with strategy as the top level of decision making and leads to a financial valuation of the company. The model must be able to account for the impacts of uncertainty on a company's performance and thus, on its value.

Value as the key concept of this article is addressed first, before a more precise definition of Strategy. We then present Business Process as the mean to achieve a company's goals. Next, we discuss a wider definition of resources employed in business processes in the Asset concept. Finally, Uncertainty background for the metamodel is detailed in the last sub-section.

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### A. Value

Assessing a company's value is a crucial process in business as it enables the company's owners to make the most important decisions for their company: sell, acquire, invest, etc. [4]. Current methods are grouped in three categories: (i) assets- and flows-based methods [5], (ii) comparative methods [6], (iii) mixed methods [4]. The first category analyzes a company's value as dependent on the company's assets' values and on the financial income of the company. The second category does company's valuation dependent on the company's sector and on its competitors. The third category of methods is combinations of the first two categories. Each of these methods gathers data in financial statements that include uncertainty with simply at most one pessimistic, one nominal and one optimistic scenario. These methods also rely on a limited range of assets and do not account for all of existing assets such as Human Capital or Reputation.

Among the first category, the literature provides different methods for assets valuation [4]. They converge towards methods that consider each asset independently in its contribution to a company's performance. Recently, more and more articles [7]-[10] tend to analyze combinations of assets in this purpose, and deal with immaterial assets such as Knowledge, Human Capital, Data, Business Process, that are not necessarily accounted for in financial statements.

One of the first articles on IT assets valuation [11] provides an estimative method that warns decision makers about the criticality of IT immaterial resources and proposes to account for IT material assets and multiply by 10 their value to assess immaterial value.

A method commonly used for financial asset management and widely used in investment project decisions is the method of Discounted Cashflows [12]. This method proposed in the 1930's enables companies to incorporate, in estimated calculations, the impact of time on the net present value of future cash flows. This method is then admitted for the whole company valuation based on the balance sheet and income statement forecasts.

Portfolio Analysis is proposed as a method to compare and aggregate valuation of a set of assets [6]. It is based on the integration of different trends thanks to different measures that can impact assets' financial value. For example, a group of assets can be assessed based on their exposure to sectorial risk. Moreover, financial assets such as shares or options benefit from a large variety of valuation methods such as Capital Asset Pricing Model (CAPM) [13].

The Real Options method applies a stochastic process on financial future value of an asset [14], [15]. It is both convenient on the options market (options are a specific type of financial assets whose value can be calculated by the Real Options Method) or for the whole company valuation, considering that its equity represents the value at the statement date and that income can increase or decrease in accordance with the stochastic model. Even if these methods incorporate different factors that can impact assets' value, they all consider assets as independent inductors of company performance and value.

Assets Portfolio Analysis [6], [16]-[19] represents an important trend in literature when dealing with a set of assets. Portfolio Analysis considers that each asset contributes to the global performance for the assets owner or manager, when ISO 55000 introduces the concept of "system of assets". In this point of view, assets in the company are connected by potential and effective interrelations that dynamically lead to the organization's performance but not value. Thus, we can observe assets are specified by capabilities. Indeed, assets are able to serve processes by their capacities and abilities.

As presented in the next paragraphs, we consider that the first category of financial evaluation methods is adapted to companies' valuation but too restrictive to complete the assessment of companies. In addition, these methods do not embed strategic nor operational decision-making on the company-system. Finally, the process design can integrate a wider range of assets than usually considered in accounting and in industrial engineering.

### B. Strategy as the Point of Entry

Balanced Scorecard [20] aims at supporting strategic management or at "translating strategy into actions" [21] and reminds that the Financial performance is the achievement of strategies that consider Clients, Internal processes, and Learning. According to Mintzberg [22], anyone being asked about a definition of strategy would say that strategy is a plan: "By this definition, strategies have two essential characteristics: they are made in advance of the actions to which they apply and they are developed consciously and purposefully." From his dictionary, Mintzberg [22] gives another definition of strategy that is "a plan, a method, or a series of maneuvers or stratagems for obtaining a specific goal or result". In [23], strategy is the efficient implementation of "simple, consistent and long term goals", "profound understanding of the competitive environment", and "objective appraisal of resources". Enterprise modeling that aims at valuing company, requires to embed the company's strategy through the decision makers' ability to define its objectives.

### C. Business Process Management

Grant's [23] first block for an effective implementation of strategy consists in defining "simple, consistent, and long-term goals". A specification of processes invokes a partial compliance with Grant's definition of strategy in ISO/IEC 33020:2019 "Information technology — Process assessment" where: "Process capability is a process quality characteristic related to the ability of a process to consistently meet current or projected business goals". According to this definition, processes are used in companies in order to complete decided objectives.

In [24], capabilities are defined as "a set of specific and identifiable processes such as product development, strategic decision making, and alliancing". Strategic role of capabilities is discussed in [24] as they give the company its strategic advantage and allows it to create value.

There are two potential locations of the capabilities that provide competitive advantage for the company. The first definition considers capabilities as an attribute of a process, when the second definition considers capabilities as the process itself. Thus, it is important for enterprise modeling to include the top level of decision making, because strategic goals are achieved by the execution of the processes. Current valuation methods are based on a static analysis of financial results compared to a limited account of assets. Modeling assets interactions as processes that lead to produce the different results could achieve a more complete value assessment of companies.

### *D. Assets as a System*

In Business Process Modeling Notation (BPMN) version 2.0 [25], resources are specified to be an opened concept that defines any resource used to achieve a process: "The Resource class is used to specify resources that can be referenced by Activities. These Resources can be Human Resources as well as any other resource assigned to Activities during Process execution time." This concept is generic enough to support any of the category of Assets proposed in this article. But BPMN standard specifies also that "the definition of a Resource is "'abstract'" because it only defines the Resource, without detailing how for instance actual user IDs are associated at runtime." This is a limitation, especially if we consider capacities and abilities as attributes of the assets.

Assets can fit within a wider definition than commonly admitted resources in industrial process design. This literature allows to find a large variety of assets:

- Information Technology (IT): In an article about information systems valuation [11], authors distinguish between tangible assets (material resources such as computers) and intangible assets (security, infrastructure, etc.). More recent articles, consider data [26] as an asset, and some other propose data related to processing, such as Business Intelligence [10] as other assets.
- Human Capital: Some articles identify Intellectual Capital [27] or Human Capital [28], Entrepreneur him/herself [29], Competencies or Knowledge [10] that are all human-related assets.
- Process: Business processes as well as Decision-Making (Corporate Social Responsibility [16]) processes and more generally, the companies' procedures are considered by authors as assets.
- Material Resources: we find different kind of plants studied as assets. Product platforms [18], energy plants [30] are two examples. More generally, we can consider material resources that are located inside these facilities [9]. Machines that compose the plants are the first of these assets.
- Circulating Assets [8]: They are assets that are temporary using financial resources on a short or midterm horizon. Even if not in the body of text, we consider Treasury that is an obvious asset, and generally the first one that the company has. Material stocks of raw material or assembled products are another component of Circulating Assets.
- Customers [31] is another immaterial asset considering that the company has to manage this asset to maximize its value.

Based on the scientific literature and accounting standards, we consider two other assets. An asset whose reporting rules are very specific and limited: Brand and Reputation [32], and a cutting-edge proposition from researchers [33]: Suppliers as assets. Brand and Reputation is the immaterial asset that the company uses to meet its customers, or its employees. Suppliers can be considered as an asset since a supply network is a critical resource for sustainable performance and to avoid supply shortage or to grant a quality of service.

This typology of assets is robust to the Resource Based View [34] that deals with strategic resources that provide a competitive advantage thanks to their abilities. Depending on the company and its business, some of these assets can have a different criticality, but their value for the company depends on how the company employs them. This leads to new perspectives in companies' valuation.

### *E. Uncertainty*

One of the main limitations in current methods for companies' valuations lies in their deterministic approach, although the environment is rapidly changing [35]. They are mainly based on historical performance of the company. Comparative methods include the sector's risk by comparing the evaluated company to competitors or other companies with the same activities [4]. Nevertheless, assets- and flows-based methods do not include company specific risks.

For uncertainty definition, we refer to the Physics Of Decision Framework (POD) [36]. The POD framework enables to set uncertainty with "potentials" that impact the represented systems. These potentials include the system characteristics, the interactions between the elements of the system, the financial aspects, and the system's ability to innovate. It also considers decision-making as the function that reduces the differences between "the current state of the system and its objectives".

## III. Proposal

In this section, we propose a metamodel (Fig. 1) that organizes a basis of knowledge necessary to represent a company from its objectives to its value. We develop this metamodel for the goal to enable company valuation, similarly to Gruber's views [37] that a metamodel should be goal oriented. This metamodel goes beyond the limits identified in the background: (i) start performance assessment from the strategy origin, (ii) enlarge the conception of resources, (iii) include uncertainty in company valuation. We choose this type of model because it aims at defining a generic representation of a variety of existing cases : "A metamodel is a description of the abstract syntax of a language, capturing its concepts and relationships, using modelling infrastructure" [38].

### *A. Metamodel Description*

Strategic decision making relies on the implementation of Objectives by the company to produce Results that match with its Objectives.

As mentioned in the background, a company executes its Processes to perform its Objectives. To run these Processes, we incorporate two concepts: Assets and Contracts.

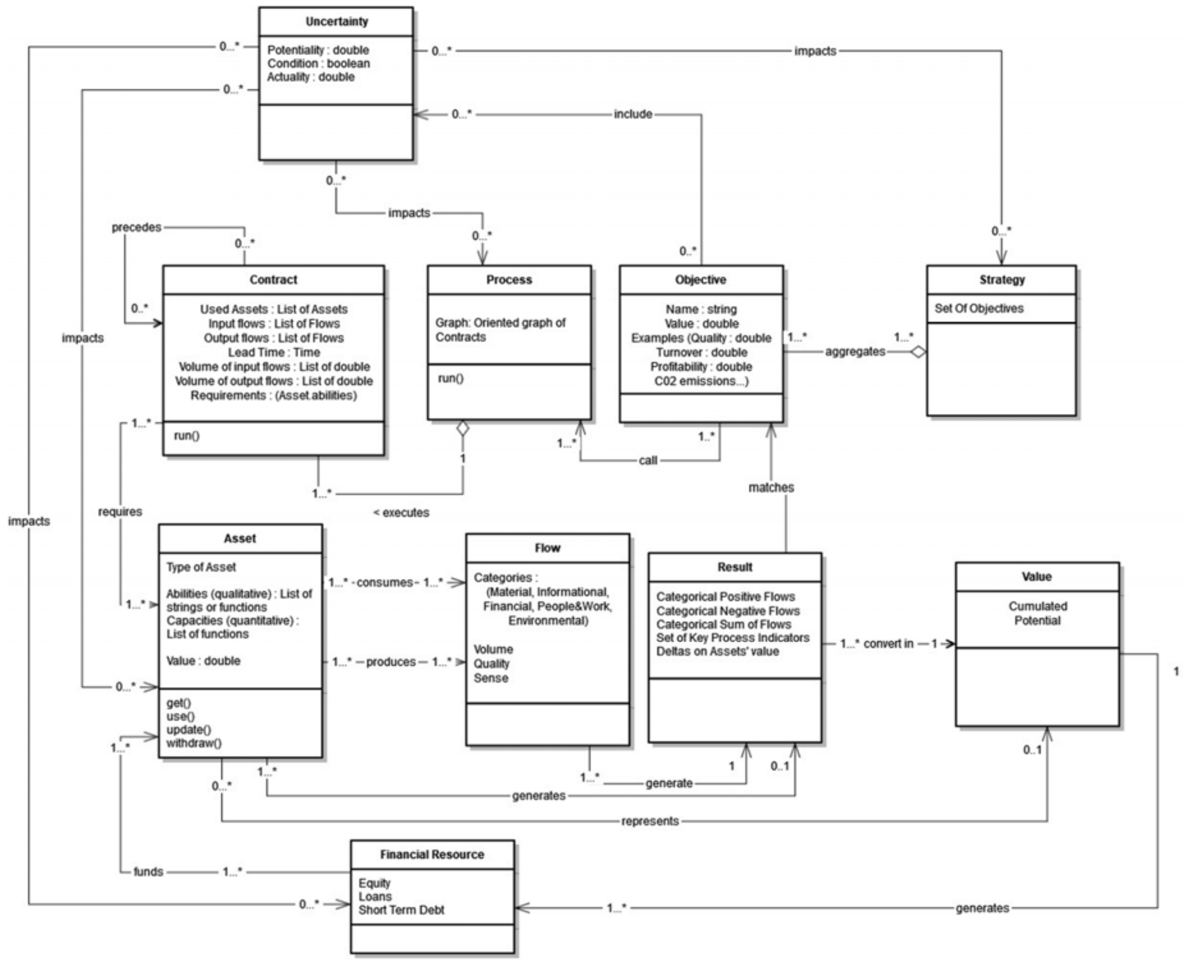


Fig. 1 Value-Oriented Metamodel

Contracts represent the standard of work. Each Contract is an elementary step of a Process. Processes are defined as an organized set of Contracts that are ran with respect to their antecedence relationships. A Process aggregates the required Contracts in oriented graphs that enables to run the business Process. We tend to aggregate any step invoked to run a Process. External Contracts (involving stakeholders) like sales Contract and internal Contracts (only involving internal resources) like manufacturing range are included in this definition as a description of steps to carry out a Process.

Assets are the material and immaterial resources used by the company to perform a contract. Assets consume and produce flows of five possible types: *Material, Information, Financial, Work,* or *Environmental.* For example, production of goods relies on material Flows consumption and production. Data or Information is required in many processes. Sales or purchases induce financial flows. And most of companies' activities can produce greenhouse gases. Operational decision on asset can be to Use, Get, Update, or to Withdraw it. These decisions are considered as the operational decisions that enable company to implement its Strategy.

Financial reporting is mandatory reporting for almost every company and provide a financial information on companies' Value, from the statements themselves, or from financial analysis of these statements. Thanks to merging engineering and accounting, we can define balance sheet and income statement as aggregated information about financial Flows in a company. On the other hand, non-financial reporting is becoming more and more widespread. Carbon footprint is a statement based on aggregated flows of $CO_2$ accounted by the company.

### *B. Metamodel Ability to Asses Companies' Value*

Considering reporting as information about flows enables to account for and report information on classes connected to the class Flow. Flows are consumed or produced by Assets, directly connected to Flows. It is possible to account for Assets' contribution in flows statements. Contracts represent the company's standard "how-to" use assets. Finally, an organized set of contracts is called a Process that can serve the company's objectives, and we can assess process performance thanks to its indirect connection to Flows. One possible outcome of this connection is to implement conventional activities cost accounting thanks to the proposed metamodel. This part of the model can be used to define asset's value as mentioned in IFRS® (International Financial Reporting Standards) accounting standards. In IFRS [38], an asset "is a present economic resource controlled by the entity as a result of past events" and "an economic resource is a right that has the potential to produce economic benefits". However, company performance also depends of the behavior of two of these three intermediate classes that can generate their own outputs. Assets' value can fluctuate based on their market value for example. Process performance can trigger outputs, key process indicators, that are specific to the process such as time of shutdown, accidents, breakdowns, independently from the output flows. All this different information (assets value, assets' value variation and key process indicators) is stated in the Results class and enable to present different performance statements. These Results determine the Value of the company.

## IV. Model Instantiation

In this section, we develop an illustrative case that represents a fictional industrial company. This company is composed of different assets and contracts, that produce flows aggregated in result statements.

The three experiments consist in a partial instantiation of our metamodel with the Contracts, Assets, Flows and Result classes. They also provide financial information presented as balance sheet and income statement that can be processed to compute the company's value. The experiments provide a method that can be used: (i) to assess the company value at time with past information, or (ii) to assess company future value with available data at the time.

Experiment 1 simply runs the instance in a nominal configuration to produce results. This part highlights how the metamodel classes and their properties can be converted in objects from an existing simulation software and can compute results.

Experiment 2 repeats Experiment 1 by removing one asset. This work enables to compare the company's financial statements with and without this asset (Reputation) and thus to assess this specific asset's financial value.

Experiment 3 is a parameter variation to include uncertainty in results processing. It enables to represent the impact of class Uncertainty on the class Asset from the metamodel.

These methods of accounting for assets should provide financial statements as entry points to assess the company's value based on the value-oriented metamodel.

### *Common Values for the Experiments*

We consider a company that is composed at the beginning of 5 employees, and 1 machine. Products and Raw Material stocks are empty. Company supplies 100 clients. The quantity produced is triggered by the demand and a surplus of product is stored each month. The production requires 2 units of Raw Material for 1 unit of Product. Machines, Human Resources and Raw material costs are computed each month and their sum represents the total cost of the company since start time until end of run time. Same information is provided for Turnover. We also consider Cashflow generation, which is the difference between amounts paid by clients (1 month of delay after sale) and costs until last month (1 month of delay for the company to pay its providers).

An illustrative example of a company is represented in Anylogic © thanks to Agent-Based and System Dynamic tools. The instance includes the different Assets presented in Table I and connects them with Contracts converted in arrows.

On experiment 1 and experiment 2, arbitrary and fixed values are set to the three parameters: (cost_unit_RM = 5), (Price = 30), (Basket size = 100) for the simulations.

Running the model enables to estimate variation of different assets and sufficient financial data to produce a balance sheet and an income statement as final presentation of Results as expected in the metamodel.

TABLE I
Initial Set up of the System

| Category | Label | Initial Value | Ability label | Capacity label | Capacity |
|---|---|---|---|---|---|
| Human Resources | HR | 5 | work | | Sales capacity /5000 |
| Machine | Machine | 1 | produce | | Sales capacity |
| Information System | IT | 1 | assist_hr;assist_machine | rate_ahr; rate_am | 0,001; 0,001 |
| Raw Material Stock | MP | 0 | provides | | Stocks capacity |
| Products Stocks | Stocks | 0 | sales | basket size | 100 product/client |
| Clients | Clients | 100 | pays | sale price | 30 |
| Reputation | Reputation | 0 | favors | | 1E-12 |
| Cashflow | Cashflow | 0 | #Sum of flows | | #Turnover - Costs |

### *Estimating Asset's Value by Comparison*

Running an instance composed of assets whose ability are estimated in physical or financial units can perform a financial estimation of different financial indicators such as Cashflow or Net Income. By removing an asset and its abilities in the system, it is possible to compare the company's performance in the absence of this asset. By comparison between the financial performance (Net Income) of these two configurations, we can assess this asset's value. For this purpose, we will compute two simulations: one with a Reputation whose ability is a low multiplicator coefficient that increases the number of clients after each sale, and a second one where this asset and its ability is removed.

### *Assessing Uncertainty in Experiment 3*

We use the same instantiation process to assess the impact of uncertainty on three properties of three other assets:

- "Sale Price" is an attribute of the asset Products Stocks representing the sale price of a unit of Product,
- "Basket size" is an attribute of the asset Clients representing the average number of products bought by a Client,
- "cost_unit_RM" is an attribute of the asset Raw Material

Stocks representing the purchase cost of a unit of Raw Material.

In order to assess the impact of uncertainty, we simulate stochastic values for these assets' properties, instead of the fixed values set on the two previous experiment 1 and experiment 2.

Uncertainty does not have any dedicated object in Anylogic© software. This is the reason why we use the available functionality to develop a stochastic simulation, using parameters as input with agent-based and system dynamic tools.

The experiment will use the Parameter Variation method to simulate stochastic values for the different sources for uncertainty.

Ranges of values will be computed for Basket size (Clients capacity), Price (Products capacity), and Cost_unit_RM (Raw Material value) ranges of values. This leads to 252 possible combinations, all simulated. Running this third simulation as experiment should enable to assess uncertainty impact on the system performance. We choose to focus on the assessment of the impact on the company's cashflows.

TABLE II
PARAMETER VARIATION

| Parameter | Type | Min | Max | Step |
|---|---|---|---|---|
| Basket Size | Range | 60 | 120 | 10 |
| Price | Range | 25 | 35 | 2 |
| Cost_unit_RM | Range | 2,5 | 10 | 1,5 |

## V. RESULTS

### A. Comparison between Experiment 1 and Experiment 2

Experiment 1 runs the simulations with fixed values and includes the asset "Reputation" and its ability to increase the number of clients after each sale. Financial Results are presented in Table III that displays this information in respect with accounting standards. Required information to process the financial statements (Tables III-V), especially Table III for this first experimentation, is sourced in Fig. 2 that displays information on each asset after six iterations.

In this first of financial statement, we maintain the conventional historical cost method to assess assets. In this balance sheet, reputation's ability has increased number of clients and thus income but is not assessed as asset itself, because of restrictions from accounting standards [31].

Experiment 2, run the simulation after removing the asset "Reputation" is processed with the same method to establish the Income Statement in Table IV.

The difference between net income in the two configurations provides information on how this asset impacts or not company's performance. Thus, we can assess its value by estimating this impact: The value of Reputation is estimated to 1,830,109 – 1,194,237 = 635,872 which leads to re-estimated balance sheet in Table V.

Once the financial statements that include the value of re-estimated assets are established (Table V), it is possible to reassess the company's value with conventional methods improved by a better account for its assets with the proposed metamodel. This valuation method relies on systemic view of the assets in the company and can support operational decision-making such as decision to get a certain number or volume of assets to implement the company's strategy.

TABLE III
FINANCIAL STATEMENTS AFTER EXPERIMENT 1

| Income statement after simulation | | | | |
|---|---|---|---|---|
| | Income Statement | | | |
| | Turnover | 2 466 192 | | |
| | Expenditures | 636 083 | | |
| | - cost_RM | 822 064 | | |
| | - var stock RM | - 173 335 | | |
| | - var_stock_prod | - 154 044 | | |
| | - cost_machine | 92 124 | | |
| | - cost_HR | 49 274 | | |
| | Net Income | 1 830 109 | | |
| **Balance sheet after simulation** | | | | |
| Assets | Volume | Cost or Value | Resources | Cost or value |
| Machine | 9,2 units | not estimated | Equity | 0 |
| Human Resources | 16 peo. | not estimated | Income | 1 830 109 |
| IT | 0.9 units | not estimated | Assets Re-evaluation | |
| Reputation | 8.22E-08 | not estimated | | |
| Clients | 182 peo. | 520 153 | | |
| Row Material | 34 667 | 173 335 | Current liabilities (Supplier) | 201 098 |
| Stock Products | 16 441 | 154 044 | | |
| Cashflow | 1 183 675 | 1 183 675 | | |

TABLE IV
INCOME STATEMENT BY REMOVING REPUTATION

| | |
|---|---|
| Turnover | 1 800 000 |
| Expenditures | 605 763 |
| - cost_RM | 600 000 |
| - var stock RM | - 100 000 |
| - var_stock_prod | - 141 |
| - cost_machine | 69 940 |
| - cost_HR | 35 964 |
| Net Income | 1 194 237 |

TABLE V
RE-ESTIMATED BALANCE SHEET

| Balance sheet after simulation | | | |
|---|---|---|---|
| Assets | Cost or Value | Resources | Cost or Value |
| Machine | 92 124 | Equity | 0 |
| Human Resources | 49 274 | Income | 1 830 109 |
| IT | | Assets Re-evaluation | 777 270 |
| Reputation | 635 872 | | |
| Clients | 520 153 | | |
| Row Material | 173 335 | Current liabilities | 201 098 |
| Stock Products | 154 044 | | |
| Cashflow | 1 183 675 | | |

### B. Experiment 3 Results

Experiment 3 consists in a parameter variation to assess uncertainty impact on the company's performance. Running this third simulation provides 252 rows of data that we analyze in order to assess uncertainty.

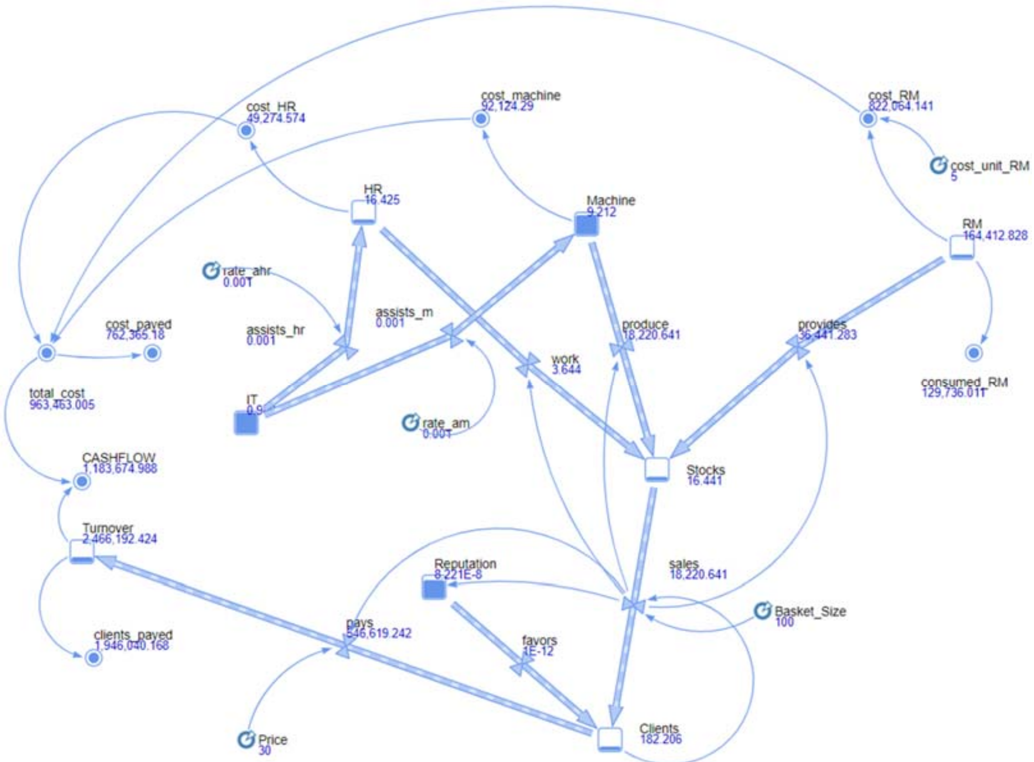


Fig. 2 Outputs from Anylogic © for Experiment 1

As we defined three parameters that take different values in the experiment, we decide to present tables as heatmaps where one of the two parameters is fixed, and all the range of the values of the two other parameters are displayed in row and columns headers.

Fig. 3 contains the Cashflows generated after six iterations of company run for a fixed cost of raw material (cost_unit_RM) at 7€/unit. Amount of Cashflow generated by the simulation varies between 441k€ and 1.906k€ depending on the combination of minimal and maximal values of "Basket size" and of "Sale Price".

| CASHFLOW (fixed cost_MP 7€/u) | | | | | | |
|---|---|---|---|---|---|---|
| Panier / Price | 25 €/u. | 27 €/u. | 29 €/u. | 31 €/u. | 33 €/u. | 35 €/u. |
| 60 u. | 441 526 | 511 495 | 581 464 | 651 434 | 721 403 | 791 372 |
| 70 u. | 533 615 | 617 425 | 701 235 | 785 045 | 868 855 | 952 665 |
| 80 u. | 631 271 | 729 631 | 827 991 | 926 351 | 1 024 711 | 1 123 071 |
| 90 u. | 734 813 | 848 469 | 962 125 | 1 075 781 | 1 189 437 | 1 303 093 |
| 100 u. | 844 579 | 974 315 | 1 104 051 | 1 233 787 | 1 363 523 | 1 493 259 |
| 110 u. | 960 925 | 1 107 565 | 1 254 205 | 1 400 846 | 1 547 486 | 1 694 126 |
| 120 u. | 1 084 228 | 1 248 639 | 1 413 049 | 1 577 460 | 1 741 871 | 1 906 281 |

Fig. 3 Cashflows depending on basket size and sale price

Fig. 4 contains the Cashflows generated after six iterations of company run for a fixed "Basket size" at 90 units of product/ client. Amount of Cashflow generated by the simulation varies between 478k€ and 1.693k€ depending on the combination of minimal and maximal values of "cost of a unit of Raw Material" and of "Sales Price".

| CASHFLOW (fixed Panier 90u./cli) | | | | | | |
|---|---|---|---|---|---|---|
| RM Price | 25 €/u. | 27 €/u. | 29 €/u. | 31 €/u. | 33 €/u. | 35 €/u. |
| 2,5€ | 1 124 788 | 1 238 444 | 1 352 100 | 1 465 757 | 1 579 413 | 1 693 069 |
| 4,0€ | 994 796 | 1 108 452 | 1 222 109 | 1 335 765 | 1 449 421 | 1 563 077 |
| 5,5€ | 864 805 | 978 461 | 1 092 117 | 1 205 773 | 1 319 429 | 1 433 085 |
| 7,0€ | 734 813 | 848 469 | 962 125 | 1 075 781 | 1 189 437 | 1 303 093 |
| 8,5€ | 604 821 | 718 477 | 832 133 | 945 789 | 1 059 445 | 1 173 101 |
| 10€ | 474 829 | 588 485 | 702 141 | 815 797 | 929 453 | 1 043 109 |

Fig. 4 Cashflows depending on cost of raw material and sale price

Thanks to the range of possible cashflows (i.e. Figs. 3 and 4), it is possible to reassess company's value by a better accounting of uncertainty. Thus, we can consider that the discussed metamodel enables to assess stochastic inputs with the chosen experiment as Parameter Variation. Even if we had to convert the metamodel classes in standard Agent-Based and System Dynamics entities, the results show that the metamodel can fit with these techniques and with a standard software for business simulations. It makes possible to include in company's valuation methods a more precise assessment of uncertainty.

## VI. Conclusion and Perspectives

The accounting value of a company is currently too limited by a restricted account of assets and does not allow to value accurately SMEs that are not listed on stock markets. We show that the integration of assets at the heart of the company's value allows us to value an SME with a better account for its assets, that reduces the gap with the stock market valuation. From the assumption that the goal of a company is to increase its value, in order to help strategic decision making, this ability to estimate the value of the company at any time is key.

The first step of a strategic decision tool must therefore be to formalize the value of a company: for this we propose a metamodel that governs the logic and semantics of the different concepts that allow the notion of value to be expressed in a company. A simulation allows us to project a value at a given moment, over n months: this allows us to illustrate concretely the use of this metamodel in time, making the hypothesis of a limited open world with very few uncertainties.

Several perspectives are open with this metamodel. One first perspective is to review in depth the notion of value of a company, and no longer positioning processes but rather assets at the heart of this value. A second perspective is to support and design an information system by formalizing the important data for strategic decision support. At present, most reporting solutions for support decisions making are focused on the past and not the future. Tools are either ERPs or solitary business tools (marketing, accounting, etc.) and therefore are not able either to represent the value of the company as a complete system or to propose a vision of value that extracts from the processes and takes the assets as an opportunity for value. Another perspective is to take the first step towards a strategic decision support tool which, on the basis of endogenous and exogenous data, will make it possible to predict the value of a company according to future threats and opportunities.

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