Balancing sustainability performance dimensions: A system dynamics perspective

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Framing of the research.*During the last decades, the topic of sustainability has increasingly attracted the attention of management scholars and practitioners, such that pursuing a sustainability strategy and generating sustainability value has become a key concern for firms. As broadly argued by prior literature (e.g., Morioka et al., 2017), sustainability is based on three main pillars (the so-called "triple bottom line dimensions") as it concerns the simultaneous pursuit of economic, social, and environmental goals, for the benefit of current and future customers and society at large (Elkington, 1994, 1997). In this sense, sustainability draws its theoretical foundations in the stakeholders' theory (Freeman, 1984; Parmar et al., 2010), according to which the satisfaction of diverse stakeholders' expectations should represent the primary objective for firms (Upward & Jones, 2016).*

Being sustainability a multidimensional concept (Stubbs and Cocklin, 2008), it entails the alignment of interests of multiple stakeholders, and its achievement remains problematic for firms. Specifically, two main challenges impact the real possibility of adopting a sustainable behavior. On the one side, not necessarily the expectations and satisfaction of one stakeholder overlap with those of the others (Adams et al., 2016; Breuer et al., 2018; Schaltegger and Wagner, 2011). For instance, pursuing waste reduction may imply the adoption of green and automated processes that negatively affect the recruitment of the labor force. Similarly, the fight against economic and social inequality may imply the adoption of wage management practices that negatively affect the economic sustainability dimension for firms. In turn, the sustainability value generated by firms necessarily represents a balance among contrasting drivers associated with a broad plethora of diverse stakeholders (Jay and Gerard, 2015; Lüdeke-Freund and Dembek, 2017).

On the other hand, it seems unrealistic to believe that the set of stakeholder relationships that a firm establishes in a given period of time remains stable over time and valid in the long term. In this sense, sustainability has to be interpreted as a dynamic concept, where the objective of achieving a balance between the contrasting interests of stakeholders has to be revised every time a new stakeholder manifests its interests or existing stakeholders modify their own goals. Thus, while the long-term perspective of sustainable development for the firm and society at large remains valid (Evans et al., 2017; Morioka et al., 2017; Searcy, 2016), the sustainability value generated by the firm in the short term has to be constantly assessed. In the same sense, the analysis of the firm's business model for sustainability has to incorporate a dynamic perspective (Cosenz et al., 2020).

Purpose of the paper. *Against the background depicted in the previous section, this study aims at exploring the challenges that firms face when having to find a balance between the different components of sustainability. The problem is twofold. On the one side, due to the multiplicity of stakeholders, firms' sustainability performance can be thought of as a composite construct, which depends on several drivers. Therefore, by deciding which stakeholders (interests) to prioritize, firms could obtain different sustainability performance levels. However, such drivers may interact with each other, thus making the assessment of sustainability performance quite problematic. On the other side, the inner dynamic nature of sustainability requires a dynamic perspective and the need to assess sustainability performance over time. Therefore, firms should adopt adequate analytical methodologies that would take care of the temporal dimension of sustainability.*

In performing our analysis, we also aim to study the role that firms may play at the local level. Provided that some of the stakeholders the firm should respond to are embedded in the surrounding local context, the pursuit of sustainability strategies that pay more or less attention to local stakeholders may result in stronger or weaker social acceptance of the firm by the local community, thus affecting its reputation (Alcorn, 2003; Assefa and Frostell, 2007). Therefore, it is important to study whether and how the consideration of the local context for firms enters into the design of firms' sustainability strategies.

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Methodology. *In order to address the research question, we adopted a system dynamics perspective applied to the real case of a famous fast-food restaurant chain (here called ABC) located in the area of Rome (Italy). The choice of this company has been driven by the need to analyze a significant business case that generates social implications at the local level by providing employment opportunities for many residents of the city, especially those with limited education and skills. In fact, the analyzed fast-food chain owns 52 restaurants located in different neighborhoods in the area of Rome and has a significant impact on the social and economic landscape of the city. The company has also created jobs for immigrants, whose integration process into Italian society has been supported by the focal firm. Some restaurants belonging to ABC constitute specific micro-markets, where people consume food and spend their free time. Furthermore, ABC also has significant economic implications for the city of Rome. In fact, the company pays taxes, hires local workers, and contributes to the local supply chain, providing benefits to local businesses.*

The analysis has been conducted by employing both primary and secondary data. Specifically, the research has been conducted based on data collected through a structured questionnaire divided into four parts: (i) preliminary data about the company, (ii) economic-financial indicators, (iii) organization and employees, (iv) information about suppliers and the organization of the value chain.

The sections of the questionnaire allowed us to: (1) observe the investments made in the area where each restaurant is located, including the part related to the requalification of the areas surrounding the restaurant, such as parks, parking, and services; (2) clarify how the restaurants have effectively improved the area on which they are located - from differentiated waste collection to renewable energy, from rental costs to requalification costs of the area presided over; (3) investigate the organizational structure of the company, the employees, the diversity, and the restaurant's indirect social impact; (4) understand the extension of supply chain and its pervasiveness in the local area. The questions employed were adapted to the standards provided by the Global Reporting Initiative (2022) and data were collected for each individual restaurant over a time span of four years (2018, 2019, 2020, 2021).

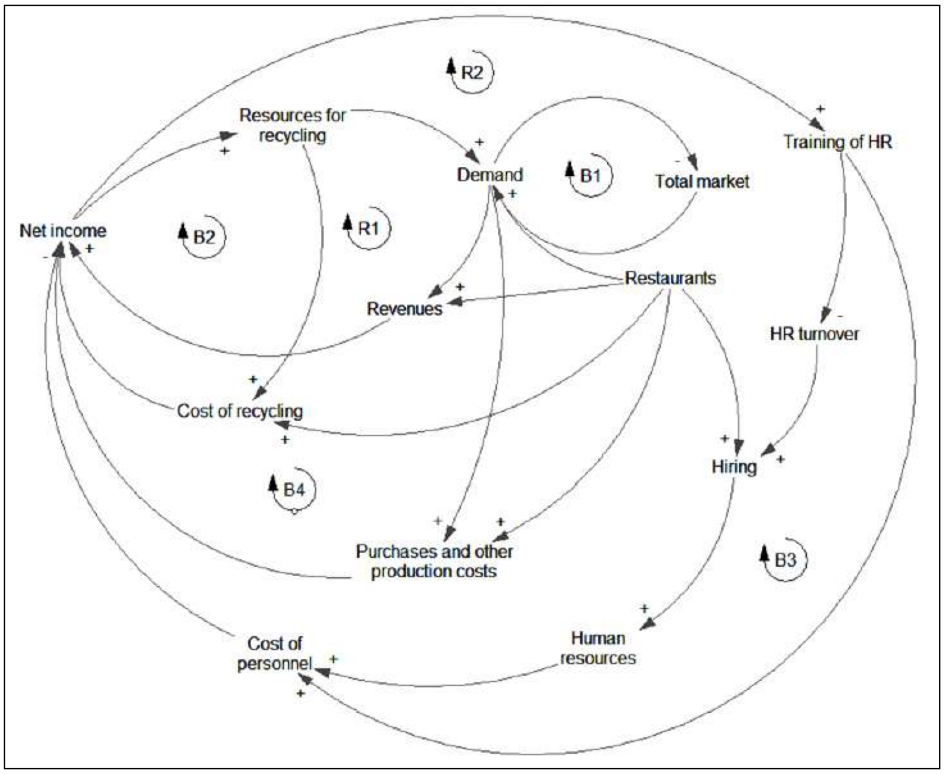
The research adopts System Dynamics (SD) modeling as the methodological approach to develop the ABC case study. SD is a simulation technique primarily conceptualized by Forrester (1958) for modeling and simulating complex physical and social systems and experimenting with the models to design strategies for management and change (Bianchi, 2016; Torres, Kunc, and O'Brien, 2017), also in the case of sustainable value creation processes (Videira et al., 2010; Cosenz et al., 2020). SD is a useful tool that can help understand the complex behaviors of systems over time, especially when such systems are characterized by a strong dynamic complexity and certain levels of instability. The underlying assumption of the SD approach is that these complex behaviors arise from the system's causal structure, which is considered a closed boundary incorporating all relevant variables related to the phenomenon of interest (Sterman, 2000). By adopting this perspective, analysts can construct closed chains of causal relationships, known as 'feedback loops', which are interconnected to explain and describe how and why the system behaves according to certain observed patterns. Therefore, organizational SD models consist of multiple feedback loops that contribute to understanding the reported trends of the organizational system. Feedback loops can be reinforcing - when variables are related to each other by direct (or positive) relationships or an even number of indirect (or negative) relationships exists - or balancing - i.e., an odd number of indirect (or negative) relationships exists. Reinforcing loops generate exponential growth behaviors; balancing loops generate exponential decay behaviors. The interplay and dominance of the different loops characterizing a complex system explain the overall system behavior (Sterman, 2000).

SD models are distinct from other simulation methods - such as agent-based modeling or discrete event simulation - in that they clearly show the structures that are responsible for producing specific behaviors within a system (Noto and Cosenz, 2021). This attribute is especially significant in the context of strategic management processes, as it enables a researcher to investigate the causal dynamics that underlie the creation and utilization of an organization's strategic resources (Morecroft, 2007; Warren, 2008; Bianchi, 2016; Cosenz and Noto, 2016).

To develop the SD model of ABC, we collected data through multiple meetings and through a questionnaire administered to the whole set of restaurants operating in the urban area. The resulting model was validated according to the SD literature's requirements (Barlas, 1996; Sterman, 2000; Homer, 2012) - i.e., structure validation tests, extreme condition tests, and partial modeling tests.

Results. *The structure of the ABC model is represented in a causal loop diagram (CLD) in Figure 1. CLD is a graphical syntax allowing the identification of the main feedback loops characterizing the analyzed system.*

Fig. 1: ABC's CLD



As one may notice, the ABC model is characterized by the presence of two reinforcing loops and three balancing loops.

The first reinforcing loop (R1) portrays the dynamic according to which the net income positively influences the amount of resources devoted to recycling and other environmental initiatives. We expect that these initiatives have a positive impact on the demand since the more the company invests in pollution reduction actions, the more the customers may be willing to purchase from the company restaurants. An increase in the demand for ABC products means an increase in revenues which are the positive components of the net income. Recycling and other environmental initiatives do represent in this case a first sustainability dimension for the company.

The second reinforcing loop (R2) shows that the greater the net income is, the greater the expenditure on human resource training, which, in turn, decreases the firm's turnover. Then, a lower turnover reduces the hiring processes, which are positively related to the number of human resources; moreover, lower employee turnover is also an antecedent to employee sentiment and improved customer satisfaction levels (Hurley & Estelami, 2007). Simultaneously, the number of human resources impacts the cost of personnel which represents one of the negative components of the firm's net income. The number of human resources, along with the investments in training and retention, represents a second relevant sustainability dimension for the company.

The first balancing loop (B1) shows that an increase in the demand for ABC products reduces the potential total markets - since it is not potential anymore but effective. Of course, the greater the total market is, the greater the demand for ABC products will be.

According to the second balancing loop (B2), the increase in the amount of resources devoted to recycling related to the net income (see R1) influences the cost of recycling which is a negative component of net income.

The third balancing loop (B3) assumes that a higher training activity, fostered by the net income (see R2), impacts the cost of personnel, which represents a negative component of the net income.

Last, the fourth balancing loop (B4) shows that the demand, connected to the investment in recycling and thus to the net income, is directly related to the purchases of raw materials. As such the level of demand influences the production costs which are a negative component of the net income.

Based on the model portrayed above, we computed three sustainability key performance indicators (KPIs):

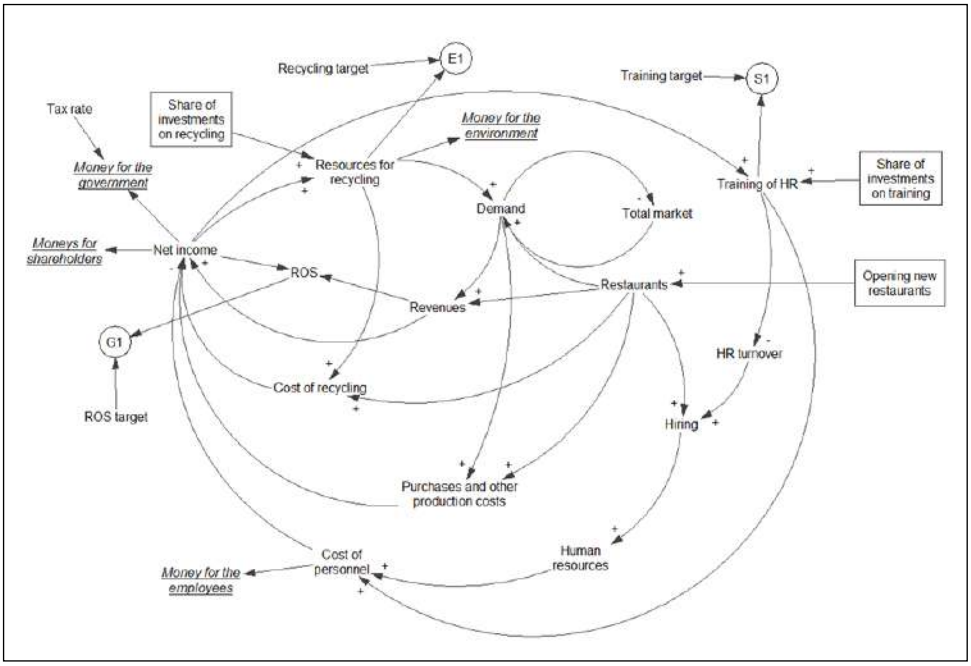
- *the first one assesses the environmental performance (E1) and puts the investment in recycling in relationship with a target value (the historical one).*
- *the second one aims at assessing the social performance (S1) and puts the overall number of human resources in relationship with the permanent employees - i.e., those with greater seniority. As such, the indicator evaluates the organizational climate.*
- *the third one, addressing governance performance (G1), benchmarks the effective return on sales (ROS) with a target value.*

These indicators allowed us to analyze the firm's overall sustainability performance based on different scenarios developed around a few key company strategies: i) the opening of new restaurants, ii) the decision on how much to

invest in recycling activities, and iii) the share of investments in HR training. These hypothetical strategies represent possible leverages that ABC may use to improve its sustainability performance overall.

Figure 2 shows the model structure identifying both performance indicators (circled variables) and strategic levers (squared variables). Moreover, in italics and underlined we highlighted the variables representing the accumulation of financial resources for different categories of stakeholders, i.e., the shareholders, the government (in terms of tax collected), the employees, and the community (in terms of financial resources devoted to the environment safeguard).

Fig. 2: KPIs and strategic levers



Based on the identification of the strategic levers and the related performance indicators, it has also been possible to experiment with the model in order to design strategies and assess the related expected performance in environmental, social, and governance (ESG) terms.

Table 1 summarizes some potential scenarios based on the combination of these three strategic levers. Clearly, the scenarios represented in Table 1 only represent a subset of all possible combinations that the company might choose from, some of them have been selected on purpose as "extreme" cases, and are shown here just for demonstrative purposes.

Tab. 1: Scenarios experimented

	Opening of new restaurants	***Share of investments in recycling***	***Share of investments in training***
Scenario 1	0 per semester	1% of net income	10% of net income
Scenario 2	12 per semester	10% of net income	50% of net income
Scenario 3	1 per semester	5% of net income	25% of net income

Figure 3 shows the KPIs dynamics under the different scenario conditions, while Figure 4 reports the accumulation dynamics of financial resources for the different stakeholders.

Scenario 1 replicated the current level of investments in the training and recycling of ABC. As such, it represents the benchmark for our scenario analysis. In this scenario, the KPIs report constant behaviors.

Scenario 2 hypothesizes a massive opening of new restaurants and important investments in recycling and training. As we may notice such a strategy report an initial improved performance in E1 and G1. However, this scenario resulted in being non-sustainable in the long run since the market does not support the demand for such an amount of new restaurants (which inevitably have fixed costs such as personnel and rents).

Scenario 3 reported the best performance overall since it accounts for a sustainable strategy of growth that allows the achievement of better results than the current scenario. This scenario also better contributes in terms of stakeholders' remuneration.

Fig. 3: KPIs scenario analysis

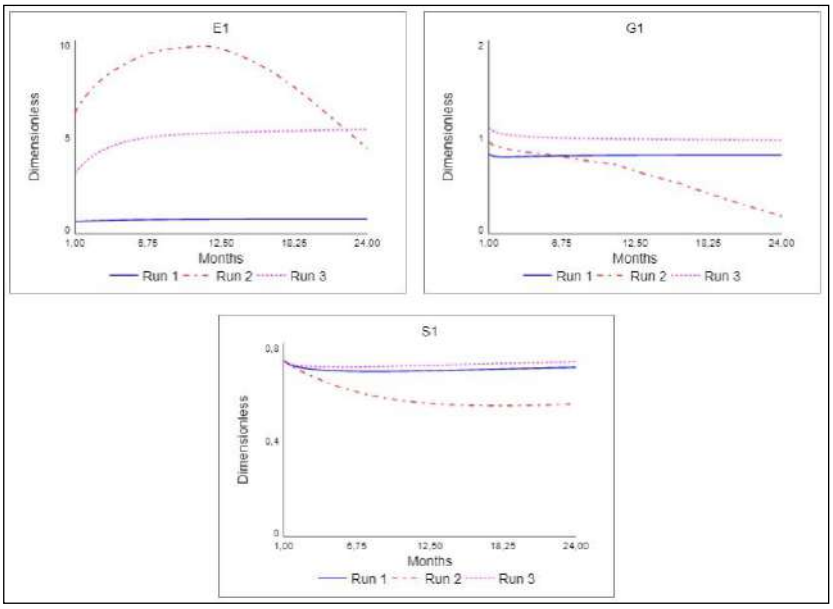
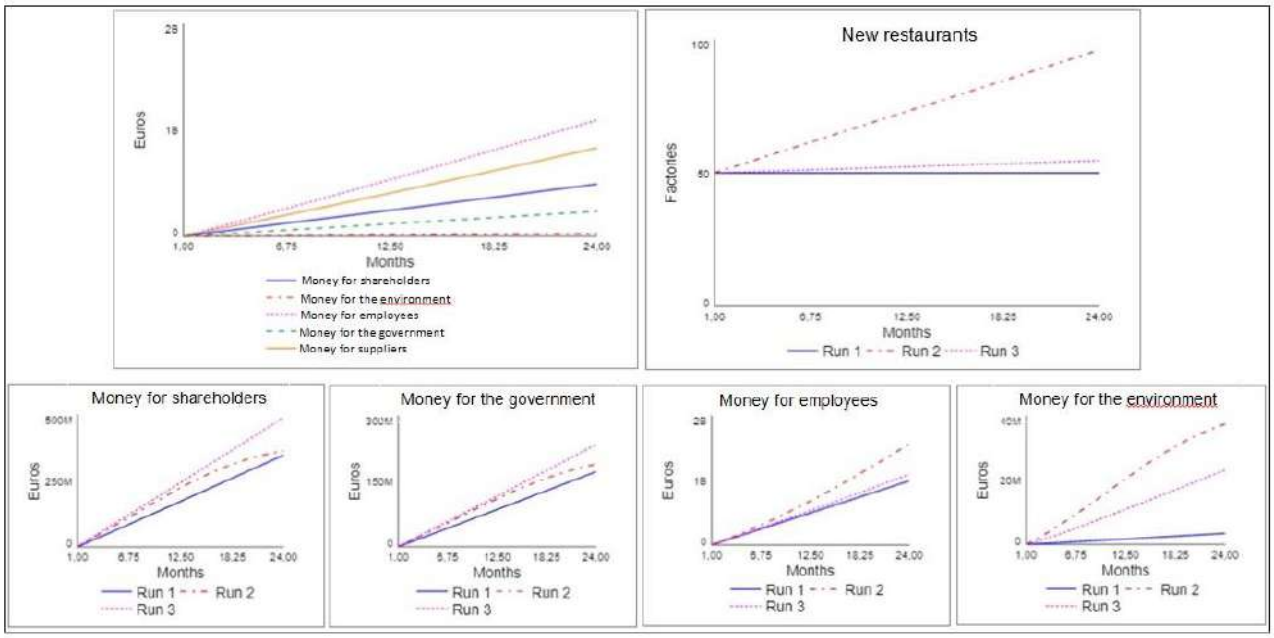


Fig. 4: Scenario analysis of financial resources generated for the stakeholders



Research limitations. *The findings of this study offer interesting opportunities for future research. The study was focused on a specific fast-food restaurant chain in the Greater Metropolitan Area of Rome. Future research could explore the effects of other chains, or replicate the analysis for the same company but in other cities. Moreover, other studies could extend such findings by observing and modeling how related perceptions of relevant stakeholders of the investigated area might affect the expected evolution of the results.*

Managerial implications. *The balance between the economic and social impact of companies is a topic of great interest to both academics and practitioners in the field of business and economics. While companies strive to achieve financial success and maximize profits, there is a growing recognition of the importance of social responsibility and the impact that businesses have on society. In this study, we have explored the relationship between economic and social impact and the challenges of balancing the two, in a stress-test case of a company operating in the fast food market, an industry sometimes associated with negative perceptions by groups of activists and stakeholders (Govindan, 2018). The balance between the economic and social impact of companies has important managerial implications for businesses. Managers might benefit from the proposed approach, by guiding their investments toward actions that generate a better engagement with multiple stakeholders, thus building trust and support. Company leaders should then identify and engage with stakeholders such as employees, customers, suppliers, and the community, and seek their input on social and environmental issues that are relevant to the business. Those inputs, consistent with our findings, might be of help*

to companies in order to develop business strategies that balance the social, environmental, and economic impact of their actions. We observed that the latter is functional for improving the former.

Also, managers should work to foster a culture that values social impact, and that empowers employees to make a positive impact on society and the environment. This can include providing training and education on social and environmental issues, and recognizing and rewarding employees who contribute to the company's social responsibility goals.

Finally, companies should measure and report their social and environmental impact to stakeholders, to demonstrate their commitment to sustainability and social responsibility, and the positive long-term effect on economic performance. Proper utilization of the proposed approach would then generate and balance environmental, social, and governance impact, enabling the company to develop clear engagement strategies with its stakeholders.

Originality of the paper. *The study offers two main contributions to the literature focused on sustainability. First, by accepting the view that sustainability is a multidimensional concept (Stubbs and Cocklin, 2008), we show that firms struggle to find a balance between diverse stakeholders' interests. The problem is accentuated by the existence of strict interrelations and interconnections among sustainability dimensions (Lüdeke-Freund and Dembek, 2017), such that the pursuit of one sustainability goal often affects - either positively or negatively - the pursuit of others. In order to navigate such a complexity, firms need adequate analytical tools that are able to disentangle the complex network of connections between sustainability dimensions, and the direct and indirect effects that originate from one to the others. The system dynamics approach adopted in this study may represent a viable solution in this respect.*

Second, this study also shows that the inner long-term perspective of sustainability (Evans et al., 2017; Morioka et al., 2017) can be fully explored only if dynamic effects are considered in the analytical process. Provided that the implementation of a comprehensive sustainability strategy may take years, intermediate (short-term) outcomes have to be fully assessed by firms, as they may differ from the final long-term goal. Some known real cases represent critical and anecdotal examples in this respect (Lai et al., 2019). Again, the methodological approach proposed in this study may help firms monitor the evolution of sustainability performance over time, thus providing useful insights in the design and planning of effective sustainability strategies.

Keywords: *Sustainability performance; Sustainability strategy; System dynamics; Food retail industry; Stakeholder theory*

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