

Financial Components Operations Reference Model: a SCOR-based financial model

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Abstract. In this paper we present an SCOR-based model, the FCOR model. Such a model allows to define metrics for each strategic objective and in this way obtain a vision of the operations' metrics at different levels. Our proposed model describes a number of steps that allows to find, in a structured way, the components that influence the most on the financial results, the level of influence that the firm has to change the result of such components and the impact that they will have in the final result in order to improve such metrics. We also present a case study of how the FCOR model was used in a manufacturing company, having a positive impact measured by a decrease by 5.3% on spending for waste materials, which was reflected in the reduction of variable expenses by 4.6%. This in turn contributed to the total production costs being reduced by 1.7% even though the deliveries increased by 4.5%.

Keywords: Knowledge management; Supply chain; SCOR model

1. Introduction

Measuring the performance is the first step that managers take in order to improve any process of decision making in a company, see [1]. Without a deep understanding of the actual performance, there is no baseline that can be used to establish an improvement plan, i.e., a company is flying blind, see [2], [3]. For each one of the processes of decision making in a company, management must consider the following three fundamental questions: (a) What are the company's goals? (b) What is the company's situation? (c) What are the obstacles preventing the company reaching its objectives? The answer to the question (a) should be the company's strategy, vision, mission and values that guide all companies towards a common goal. All companies thrive to satisfy a need based on the delivery of products and services that comply with customer's demand; such an effort gives way to the company's profitability and with this, the resilience and continuance of the firm, if and only if the company is capable of adjustment to changes and threats in a more competitive and demanding environment, see [4].

In order to answer questions (b) and (c), it is required that managers define metrics which should be monitored through data collection and analysis to understand the behaviour in time, see . Metrics should be developed based on the priorities of the firm's strategy and offer managers all information needed so they can make the best decision. In the industry, there has been a development of models that aid to define strategies and projects that the company should focus on in order to have a continuing improvement or to face a crisis but, in most occasions, metrics that are selected to measure effectiveness of the activities proposed, do not reflect the company's reality in terms of its financial aspects, which at the end is an indicator of the health or entropy of an organization, see [8]. However, it is not sufficient to have metric, but to have the correct ones; given that there are many different processes and activities that can be measured, how does know which are the correct ones to focus on? The answer may be in connecting the processes to the total firm's performance, see [9].

Amongst diverse management models and approaches, such as management by objectives, operations research, balance scorecards, etc., a model that presents one of the best structures to define and analyze adequate metrics is the Supply Chain Operations Reference (SCOR) model (see [10]–[12]), since it is a tool that is useful to represent, analyze, configure, evaluate and compare activities and development through all the supply chain. Such a model is used to manage a series of common

problems in businesses using a clear language and standardized metrics, promoting common business practices that allow for a better firm's performance.

In this paper we present the FCOR model, which is based on the SCOR model. Such a model allows to define metrics for each strategic objective and in this way obtain a vision of the operations' metrics at different levels. Our proposed model describes a number of steps that allows to find, in a structured way, the components that influence the most on the financial results, the level of influence that the firm has to change the result of such components and the impact that they will have in the final result in order to improve such metrics. We also present a case study of how the FCOR model was used in a manufacturing company, having a positive impact measured by a decrease by 5.3% in spending for waste materials, which was reflected in the reduction of variable expenses by 4.6%. This in turn contributed to the total production costs being reduced by 1.7% even though the deliveries increased by 4.5%.

The document is structured as follows: in section 2 we briefly review the SCOR model; section 3 presents the FCOR models, section 4 presents the case study and section 5 concludes.

2. The SCOR Model

The SCOR model contains standard descriptions for the management of processes, a frame of reference for relationships between standard processes, the standard measures for changing processes, management practices that lead to improvements and alignment of different functions. The SCOR model is very complete and as a language to communicate with all the actors in the supply chain. The decomposition process in such a model is developed to define a specific configuration of the elements of the processes that are part of it.

In Fig. 1 we show the different levels of the SCOR model, characterized by the elements and processes that identify each one of them, as well as the content of each level and the areas that are involved.

The SCOR model aims to describing all the firm's activities, operations and corresponding tasks at all possible levels, in order to satisfy customer's demand. Besides the knowledge of process' re-engineering and good practices, SCOR defines a series of metrics that can be used to evaluate the processes at each level of hierarchy. Attributes of performance and metrics are measures in five categories: flexibility of the supply chain, reliability, capacity of answer, costs and asset's management.

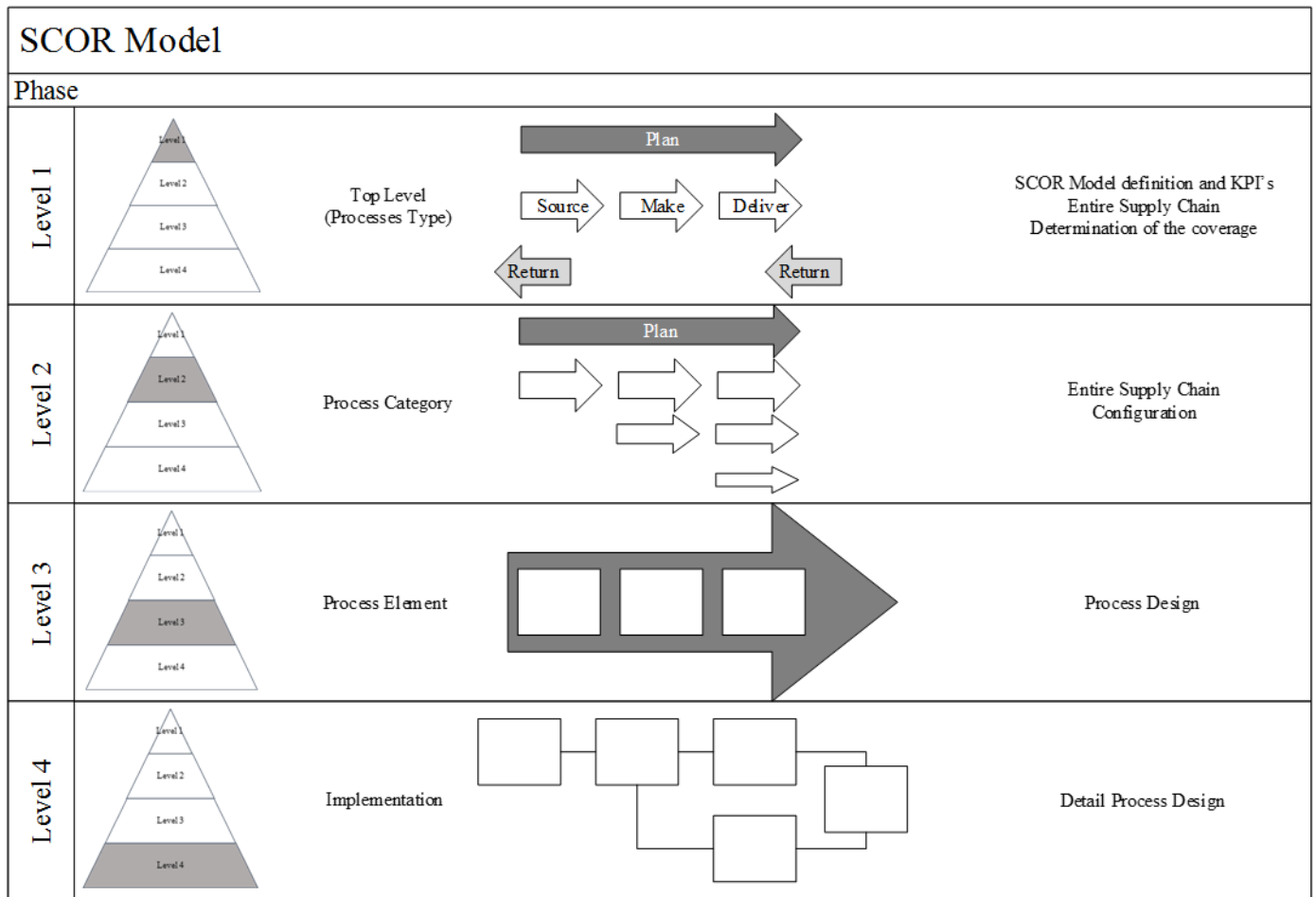


Fig. 1. SCOR model description

3. The FCOR Model

There are different models that can be constructed taking the SCOR model as a point of reference, see [13]–[15]. Such models allow to define metrics for each strategic objective and in this way obtain a vision of the operations' metrics at different levels. Profit is one of the keystones for the resilience and continuance of a firm and one of the main objectives of the owners; therefore, it is important that all decisions and actions taken, have such an objective in sight. Thus, we center on such strategic finance objective, in particular in the profit of operations of the firm. In this way, in this section we present the Financial Components Operations Reference (FCOR) model, which is based on the SCOR model. Such a model describes a number of steps that allows to find, in a structured way, the components that influence the most on the financial results, the level of influence that the firm has to change the result of such components and the impact that they will have in the final result in order to improve such metrics. In Fig. 2 we present the different levels of the FCOR model.

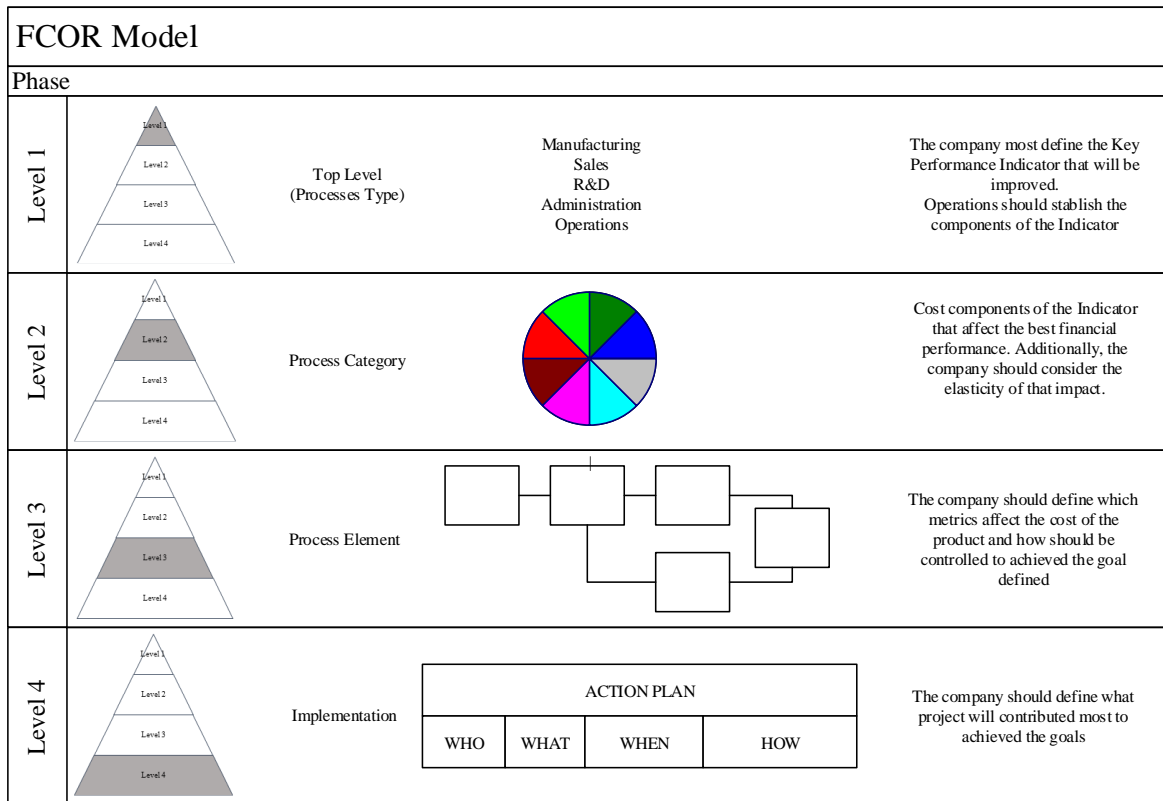


Fig. 2. FCOR model description. Source: [16]

3.1. Superior level: strategic financial objective selection

The reach and content of the FCOR model are defined at this level. The area where the analysis is performed is defined and the reach is established so the metrics are well defined. We consider the following FCOR processes:

- Sales expenses
- Research and development (R&D) expenses
- Sold services or product costs
- Management expenses
- Financial expenses

3.2. Configuration level and selection of main metrics

Once the strategic financial objective is chosen, the elements that compose such an objective should be numbered, e.g., the components of sold services or products costs might be visualized in Table 1.

Table 1. Sales goods production cost

1.3 Sales goods production cost	
	Initial Inventory of Raw Materials
+	1.3.1 Raw Materials Purchasing
+	1.3.2 Ordering costs
=	Available Raw Materials
-	1.3.3 Final Inventory of Raw Materials
=	Work In Process
+	1.3.4 Direct Labor
+	1.3.5 Manufacturing Variable Cost
+	1.3.6 Fixed Costs
=	Value of Total Production in Process

Having identified such elements, a proper weight for each cost component should be defined, by determining the relative statistical frequency of each component to obtain the percentage of each element, i.e.,

$$f_i = n_i / \sum_{i=1}^N n_i \quad (1)$$

Where f_i is the relative frequency, n_i is the value of each cost component i . In such a way, we are able to visualize which component has a larger weight. Using this information, we will be able to determine which cost components have the greatest importance in the total distribution of cost.

After identifying the components that have the largest impact on total cost, we should verify how much influence we have in order to affect them, given that there are factors that do not depend on our decisions. In order to make simpler and graphical the acceptance criterion of the components in which the team efforts should be focused, we create an impact-effort matrix, so we can better appreciate the degree of influence that we have, as can be seen in Fig. 3.

	Easy to improve	Hard to improve	Out of control
High impact outcomes	A	B Variable costs	E Materials
Low impact outcomes	C Labor costs	D Fixed Costs	F

Fig. 3. Example of an impact-effort matrix

Fig. 3 is based on the experience of the persons in charge of evaluating the alternatives and therefore it is important to have a consensus regarding the importance of each aspect of the different areas of the company. In this way, we make sure that all different departments are willing to work together to reach for the results desired and that all activities take place. To make sure that the efforts and resources are well invested, it is necessary to quantify the variation experienced by a variable when replaced by other. This can be determined using an elasticity computation that refers to the variation in percentage of a dependent variable in relation with an independent variable. If such variation of the dependent variable, y , is larger than the independent variable, x , the relationship is inelastic; if the variation is the opposite, then the relationship is elastic, as can be seen in the following equation:

$$E_c = \frac{\Delta C_t / C_t}{\Delta V_c / V_c} \quad (2)$$

where E_c is the elasticity of the component, C_t is total cost, V_c value of the component and Δ denotes and increase in the variables.

Equation (2) allows to detect if the variables that we want to modify will have an impact in the elements already defined as important, such that decisions about the activities can be made and better results in less time are achieved. If this process is repeated for a few times, it will help to control all elements that affect the results.

Table 2. Elasticity example for the components of production cost

	Component Value				Production cost				Elasticity
	Value 1	Value 2	Δ	%	Value 1	Value 2	Δ	%	E_c
Labor	20	15	-5	-25	50	45	-5	-10	40%
Materials	16	12	-4	-25	50	46	-4	-8	32%
Fixed Expenses	9	6.75	-2.25	-25	50	47.75	-2.25	-5	18%
Variable Expenses	5	3.75	-1.25	-25	50	48.75	-1.25	-3	10%

3.3. Elements of the process level

In this level the metrics are broken down into the factors that affect them, and a table is created to determine which are the factors that impact the most, so corrective specific actions are generated. All elements have variables that affect them and the fundamental part of the FCOR proposed model is to break down all these variables and elements so it is known where to focus the efforts. As one progresses a deeper level in the analysis is reached and the steps in levels 2 and 3 should be repeated, so we can define how many and which variables to focus on, as can be seen in Fig. 4.

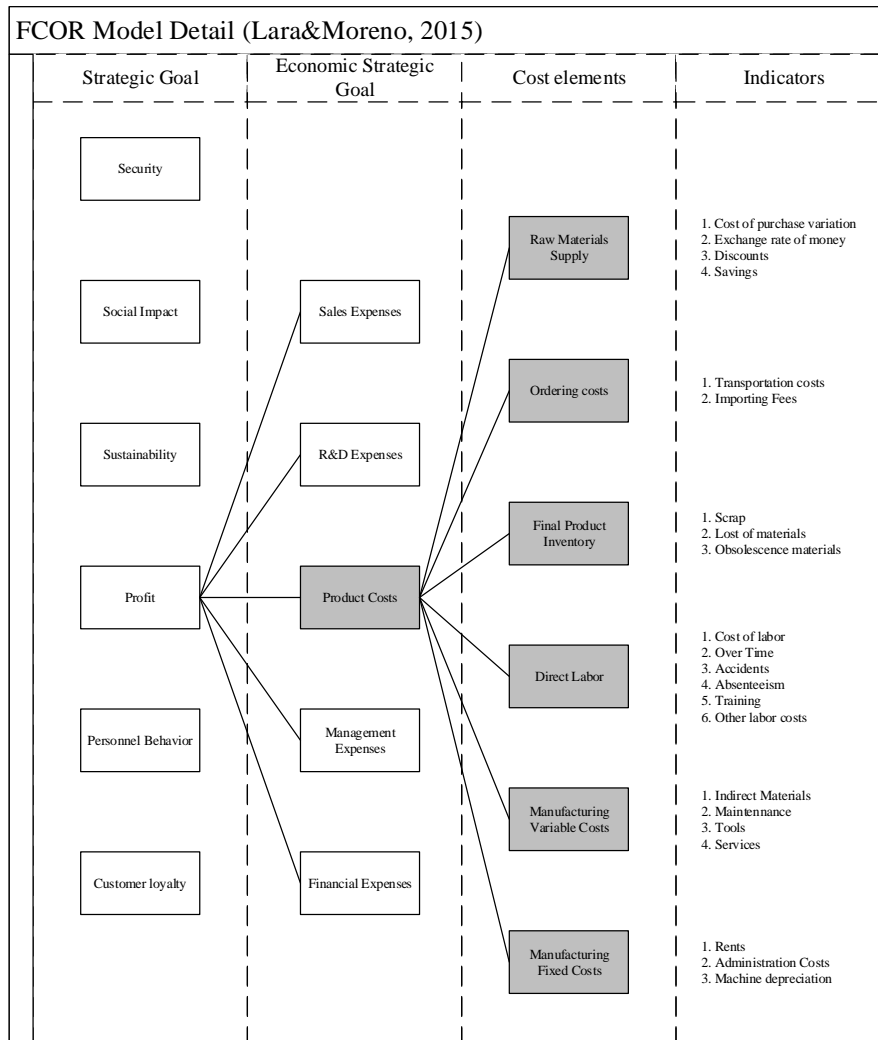


Fig. 4. Strategic map with metric costs. Source: [16]

All components and variables that affect the financial results are generally the same for all companies; however, their impact and the opportunities are always exclusive of each firm, so the FCOR model does not propose to focus on a specific financial aspect, but in finding the ways to analyse the elements that impact the most and that are worth the effort for improvement.

The results of this analysis should be shared with the rest of the executive board, so agreements can be made and support for necessary projects and activities to reach the financial goals. Once this process is concluded we go to the next level of the FCOR model.

3.4. Implementation level

In the implementation level, a deployment of the objectives determined as keystones is made, so the financial strategic results throughout the whole company are accomplished, following the Hoshin Kanri methodology [17]–[19], see Fig. 5.

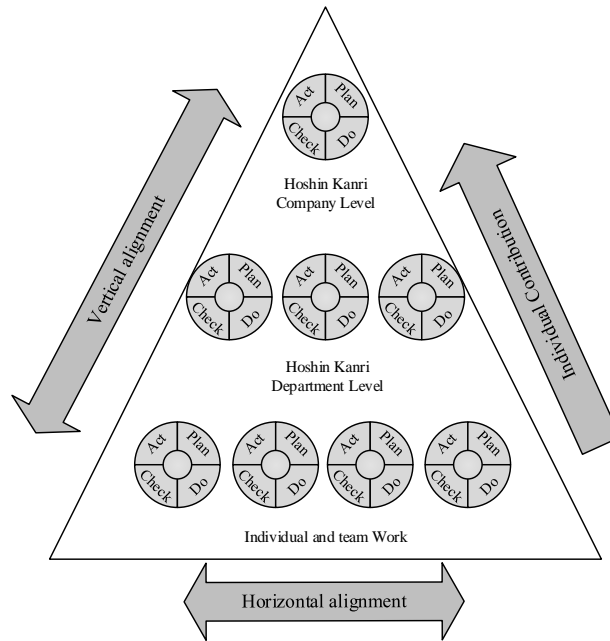


Fig. 5. Deployment of objectives strategy bases on Hoshin Kanri. Source: [16]

Therefore, the FCOR proposed model allows for the organization to have a structured guide to integrate the financial components in daily operations, achieving both profitability and long term sustainability.

4. Case study

In this section we present a case study of the success of implementing the FCOR model of the manufacturing unit of *SKF Sealing Solutions Guadalajara*. This is a clear example of how a financial data analysis through a structured system can find the specific objectives that aids in achieving the strategic objectives of the plant. Thus, by defining a financial strategic objective of the entire company, it is possible to better focus the analysis tools and seek the support of the entire company to achieve the proposed objective. In the case presented, it was defined based on experience and analysis of the Controller of the plant and the general manager, that the Production Cost of Goods Sold should be the focus of the analysis, since it is the area of greatest opportunities for improvement.

At level 2 of the FCOR model, the main components of the strategic objective, cost of production, were analyzed. Through a comparative analysis of the components we were able to find those that represented the greatest impact on the total cost; such information helped define that the main item of cost within our control was the direct material equivalent to 53% of the total product cost. Having determined that the direct cost of material is what concerns us most in the total product cost, we proceeded to analyze what were its elements. Thanks to the financial system's information, it was found that within this category, the largest spending material was attributed to the acquisition of metal stamping, accounting for 52% of the total purchase cost of raw materials.

We used the breakdown of the results once again to find a more user-evaluate and control, where we checked which were the components that influenced the business of the metal stamping, in order to take specific and targeted actions. With such information we were able to clearly see that if we made a change in the use or the cost of the stamping 091031, we could generate a great advantage in the overall result, and therefore it was necessary to keep under control the metric of this specific material.

Upon reaching level 3 of the FCOR model, we had to analyze the metrics that we kept under control in order to achieve the proposed objective, in this case we analyzed two: Purchase Price Variance (PPV) and Scrap, Losses and Rework (SLR), finding that our efforts should be focused in reducing SLR of materials used in the stamping 091031.

At the FCOR model level 4, we put together a horizontal and vertical deployment of strategic objectives for the entire plant and, derived from this, several projects that are aligned to Strategic Objective Production Cost of sales were proposed, namely: (a) the components department conducted a project to monitor the process of cementing this stamping, with this they were able to reduce the defect of bubbles in the final product; (b) the production department in conjunction with quality, deployed a very aggressive plan to reduce the parts used to make adhesion tests; (c) the production department in conjunction with the materials department, carried out a Kanban project in this channel, which helped to reduce inventory of this stamping.

Based on these accomplishments, financial metrics were impacted positively in 2015. Compared to 2014, there was a decrease by 5.3% on spending for waste materials, which was reflected in the reduction of variable expenses by 4.6%. This in turn contributed to the total production costs being reduced by 1.7% even though the deliveries increased by 4.5%. The steps of the FCOR model allowed us to systematically break down and structured the different layers of the tree diagram of the income statement of the company, allowing us to locate the variables that affected it more. This result is quite favorable for the company, and the contribution of all improvement projects are key to continue on the path to reduce waste and increase Returns On Investment (ROI) through better material flow, excellent quality and a culture of continuous improvement.

5. Conclusions

The SCOR model has been widely used for several years and has proved to have an adequate structure and methodology to establish the supply chain's performance metrics. Based on this structure, it is possible to create models of reference for different areas of a company, as is the case in the financial area, as we proposed in this paper, with the FCOR model. In this way, and though a structured and logical sequence, we have proposed the key elements and metrics for the control and improvement of the processes involved in reaching the strategic financial objectives. Given that the starting point for the definition of such metrics in different areas, is to know where we are headed, where we stand and what are the obstacles on our way to the goal, we can use the methodology to describe in this paper to have actions and projects that contribute to reaching such goal. Therefore, the FCOR model allows organizations to have a structured guide to integrate financial components in daily operation, achieving profitability and sustainability in the long run.

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