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Making outsourcing decisions based on activity costing and their role in achieving sustainable value

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Abstract

The current research aims to identify what are the decisions of sustainable external supply, which represents the purchase of a good or service from a third party, a third party that was originally obtained internally, and the relationship of sustainable external supply lies in the fact that external supply, it is not just a buying decision as it is the primary decision to refuse to absorb an activity which makes it a very strategic decision. The study came to various results in addition to identifying activity-based accounting as one of the most cutting-edge management accounting techniques, the most important of which can be linked to this ABC system with modern administrative methods that suit the modern business environment to achieve sustainable value, such as the balanced scorecard, As this integration leads to reduce unit cost, achieve quality. Achieving competitive prices.

Keywords: Outsourcing decisions, Sustainable outsourcing, Sustainable outdoor equipment, Activity-based costing, Sustainable value

1. Introduction

The rapid technological developments facing contemporary companies represent a challenge to their management, especially at present, where profit is no longer the most important goal, but the environmental aspect has gained great importance. Thus, the concept of sustainable external processing activities emerged from the modern concepts that lead through the integration of all activities to provide sustainable friendly products. The environment by using environmentally friendly raw materials and reducing energy consumption by using modern equipment that reduces waste which leads to obtaining a safe environment, and the deterioration in environmental conditions has led to a serious need to provide information about the environmental costs of activities to take decisions related to environmental protection activities [1-3]. The management of environmental costs has become the subject of focus and attention because of this topic of great importance to achieve sustainable development The gas filling company must employ the tools of total quality for the environment and strategic cost management in managing costs at the level of environmental supply chain activities, thus achieving a sustainable supply chain. Since the beginning of the third millennium, business organizations have been interested in the concept of sustainable development, to the extent that it was possible to assert that the majority of local and international organizations, whether production or service, began to realize the importance of the role played by their positions and choices, including their sustainable strategies, as a contemporary philosophical trend that contributed to changing the trend of contemporary interest in organizations. , not only in coexistence with the environment but also in how to preserve the environment and

strive towards its permanence and sustainability [4]. Based on the identified issues, the research problem was formulated around two primary questions: first, to what extent do activity-based cost-based sustainable outsourcing decisions enhance the sustainable value of the organization? [5]. Second, how familiar are the management and employees of the company with the concepts of activity-based costing and the sustainable value of the organization and its various dimensions [6]. The significance of this research lies in its focus on sustainable external supply decisions and the critical components of the activity-based costing system, emphasizing their role in achieving sustainable value. By clarifying the activity-based costing system as a foundation for allocating indirect costs, this study highlights its importance as a tool for accurately and realistically determining production costs. This approach aims to address some of the limitations present in traditional indirect costing systems, particularly in light of the economic and technological changes that have become defining characteristics of the manufacturing environment. The practical implications of this research are considerable. It is posited that implementing sustainable external processing decisions alongside the activity-based costing system within companies will enhance production efficiency and bolster competitiveness in both industrial and marketing domains. The insights gained from applying this system are expected to provide relevant cost data that can inform planning, control, and decision-making processes, ultimately contributing to the achievement of sustainable value. The study aims to accomplish several objectives, including identifying the main factors influencing decisions regarding sustainable external supply and their associated significance and benefits. Additionally, it seeks to assess the importance, constraints, and appropriate applications of activity-based accounting—one of the most innovative management accounting techniques of the twenty-first century. Furthermore, the research will evaluate the extent to which activity-based costing-based sustainable external supply decisions contribute to creating sustainable value .

In light of these objectives, the researchers have developed a hypothesis stating that relying on the activity-based costing method for making decisions related to sustainable external processing will significantly improve the value generated for industrial companies [7, 8].

2. Literature review

Over time, the definition of outsourcing has evolved. Although outsourcing dates back to the 1950s, it really gained traction in the 1980s when businesses began using it as a means of cutting expenses associated with service-oriented activities, which were generally non-core business operations. In the 1990s, the benefits of outsourcing also had an impact on outsourcing practices. They began outsourcing jobs they had little experience with in order to cut costs.

Sustainable outsourcing plays a crucial role in establishing long-term strategic relationships with suppliers, encompassing key functions such as supplier selection and material sourcing [9, 10]. The definitions surrounding sustainable external equipment vary, yet they consistently highlight its significance as a driving force for companies aiming to develop environmentally friendly products and services while ensuring a sustainable supply chain [4, 11]. Sustainable outsourcing entails that the products and materials procured from suppliers meet specific criteria, including the requirement for suppliers to possess an environmental management system adhering to international standards, the prohibition of environmentally harmful substances during extraction, treatment, or manufacturing processes, and ensuring that final products do not contain such prohibited substances [12]. Furthermore, sustainable outsourcing arrangements involve a strategic decision where a company opts to procure goods or services from external sources rather than relying solely on internal capabilities. This partnership emphasizes that outsourcing is not merely a transactional purchase but a strategic choice that can influence various operational needs over time. The academic literature presents diverse perspectives on outsourcing, each contributing essential elements to the decision-making process [9]. Unlike purchasing activities, which are typically high-level strategic decisions about what to acquire, outsourcing encompasses a broader range of activities, including identifying the need for new suppliers, establishing decision criteria, selecting appropriate suppliers, negotiating terms, and monitoring supplier performance [13]. To achieve sustainable external equipment, several guidelines must be considered [14], such as prioritizing

natural resources and raw materials by seeking alternatives with lower environmental impact, fostering integration and strong relationships with suppliers to ensure a steady supply of sustainable materials, developing products to minimize harmful ingredients without compromising their essential characteristics, exploring opportunities for waste reuse—successfully implemented in industries like furniture and paper and enhancing energy efficiency through the adoption of machines and equipment that consume less energy

3. Stages of the sustainable outfitting process

The sustainable outsourcing process comprises a series of successive phases that guide organizations from the initial recognition of a need for a specific material or service to the subsequent review and evaluation of performance. Researchers have identified various stages in the decision-making process for sustainable outsourcing, reflecting different perspectives on the purchasing behavior of business organizations. According to [15], the sustainable external processing stages can be categorized into five key phases: Need Recognition, where the requirement for a particular material or service is identified; Identification of Alternatives, which involves exploring potential options; Evaluation of Alternatives, where different options are assessed; Purchase Decision, culminating in the selection of a supplier; and Post-Purchase Behavior, focusing on the evaluation of the procurement's effectiveness. Similarly, Lok et al. [16] outline a slightly different five-stage process for sustainable external processing, which includes Organizational Needs, emphasizing the importance of understanding internal requirements; Cargo Vendor Analysis, assessing potential suppliers; Purchase Activities, detailing the procurement process; Purchase Decision, where the final selection is made; and Post-Purchase Behavior, which reviews the outcomes of the purchasing decision. Together, these frameworks highlight the complexity and strategic nature of sustainable outsourcing in business operations.

Outsourcing activities have a role in achieving sustainable development in all its dimensions (Environmental dimension, social dimension, economic dimension, technological dimension) by adopting the concepts of external processing activities. The impact of these activities is reflected on the economic dimension through the selection of environmentally sound materials and thus obtaining an environmentally friendly product, which leads to no need for importing these products is also reflected in the impact of applying this strategy on the social dimension, by focusing on social justice and making people the core of development, as well as the impact of applying this strategy on the environmental dimension, by eliminating the environmental problems resulting from the company’s practice of its activities [17]. The relationship between external processing activities and sustainable development is represented in paying attention to environmental considerations and directing individuals and the economic unit to change their view towards consumption, as well as paying attention to environmental costs. The dimensions of sustainable development meet with one goal, which is to serve humanity in the present and the future, and the role of external processing activities appears in all these dimensions [17]. Through social responsibility, the need to adopt external processing activities has emerged to achieve sustainable development by reconciling development goals and the need to protect the environment, this relationship is reciprocal to preserve the first and ensure the continuity of the second if the environment is the place in which individuals live, development is represented in the actions they take to improve their lives on this environment [18]. The philosophy of sustainable development is based on the fact that attention to the environment and the resources it contains is the basis for economic, health, cultural, and other development. And the units in the projects you establish, but also the role of the individual in society, and accordingly the environmental dimension takes the most important aspect in the dimensions of development the role of managing environmental costs using external processing activities is reflected in the environmental costs of the four types, as this is reflected in the costs of prevention through the extraction of environmentally friendly materials to obtain a safe environment [19]. Evaluation by knowing the existing environmental situation and determining the degree of conformity with environmental quality specifications. As for the costs of failure, both internal and external, reducing products that do not conform to the environment, as a result of attention to prevention and evaluation costs, which led to a decrease in failure costs. The commitment of the economic unit does not end when designing and producing environmentally friendly products, but it must integrate sustainable

development within all the functions of the organization, and this is evident through the economic dimension of development, which contributes to the activities of external processing effectively, through the design, provision, and delivery of a certain standard of living for the community accordingly, the economic development that all countries seek to achieve in varying degrees cannot satisfactorily take place without the development and growth of their systems, including (design, purchase, manufacturing, storage, marketing, and transportation) [19, 20]. The role of activities is not only to achieve the goals of the economic unit but also to achieve the welfare of the community through the responsibility placed on it, which starts from paying attention to the problems of society to reducing their effects, especially about the quality of life, providing the best product, facing unemployment and consumer dissatisfaction and grumbling, by counting responsibility Social is the basis for its performance [21].

4. The cost of sustainable external processing based on activities

The ABC activities-based costing system is defined as: (The system refines the costing system by focusing on activities as basic cost objectives, and this system calculates the costs of these activities and then allocates the costs of these activities to cost objectives such as products, services, and customers) [22]. Rathod [23] defines it as: (a cost-effective method that first assigns costs to activities and then allocates costs to products in proportion to what they consume from those activities). Hilton [24] believes that the ABC system (assigns indirect costs to products using two-stage procedures that focus on activities, the first stage determines the necessary activities, and each activity includes an activity cost pool) and allocates indirect costs to them (activities) in the cost accumulator depending on the resources of the organization that was used, and then the cost driver is determined for each cost accumulator, then in the second stage the costs of the activities are distributed on the production line). It is concluded from the previous definitions that the ABC system is a system for distributing and allocating costs in two stages. Costs are distributed to more than one cost target, the costs are distributed among the cost pools using the so-called cost driver, which means: (the factor that causes the occurrence of any activity cost [25], so it is sometimes called the cost driver, meaning that it is causally related to the cost which it distributes.

In the second stage, costs are allocated to cost targets such as products, services, or customers, and this allocation is done using cost vectors, which are called vectors which are used to allocate costs to activities or their centers (cost basins) with the first-stage vectors, while the vectors that are used to allocate costs to products are called second-stage vectors. It also concludes that the ABC system is not just a method or method for distributing indirect costs, but rather is an integrated cost system through which the cost of the product unit can be obtained from the products, non-financial data represented by information related to cost vectors) and process operations (which include mathematical processing operations and take place in the activity centers to extract the unit cost) and output outputs (represented by distributing the costs of these activities to the cost targets) and finally the feedback where the system outputs (information) are used as inputs system again. The first step in the sustainable outsourcing process involves identifying the main activities of the organization's sustainable outsourcing. At this stage, a thorough examination of the facility is conducted to determine the nature of sustainable external equipment, which aids the system designer in pinpointing the activities associated with each product to be processed. This phase is crucial as it requires skilled individuals to fully grasp all activities necessary for product creation [26].

Activities are fundamental drivers of processing costs, while products, or cost targets, generate demand for these activities. To effectively connect costs to activities, it is essential to accurately identify and treat these activities as cost centers. The Activity-Based Costing (ABC) system plays a pivotal role in identifying and analyzing activities from the initial request for materials or services through the production process until delivery to the consumer. According to the ABC system, activities related to sustainable external regeneration can be categorized into several levels. Unit-level activities encompass costs linked directly to the production of each unit. These costs increase with each additional unit produced and decrease when production decreases. Unit-level vectors are measures that fluctuate with the number of units produced and sold, represented by output

volume. Examples include direct labor hours, direct labor costs, machine hours, and units produced. Batch-level activities relate to groups of units produced and include tasks such as machinery preparation, preliminary product checks, and material handling. The costs associated with these activities vary with the number of batches produced but remain constant for all units within a given batch. As the number of batches increases, so do the instances of machine setup, material handling, and quality checks. Product-level activities involve costs associated with general production processes, including setting product specifications and preparing designs that provide distinct advantages over competitors. These activities contribute to an increase in overall product costs and become more expensive with a greater variety of products. Unlike unit or batch-level activities, product-level costs are not specific to individual units or batches but pertain to the entire production line. Additionally, some operational activities, such as administrative tasks, security, maintenance, and insurance, are considered general costs that benefit all products. These costs are challenging to allocate directly to specific products and are typically recorded as period costs on the income statement for all lines of productivity at the enterprise level [27].

From the above, it was found that the first three types of activity levels (unit, batch, and product) are among the main activities that enter into the production of the product, i.e. the direct and productive activities. As for the last type (activities at the level of the facility or the production process as a whole), they are activities that serve production processes and do not have a direct link to the production of the product, so they can be considered indirect activities.

The second step in the sustainable outsourcing process involves determining the measures of activities, commonly referred to as cost drivers. In this stage, cost vectors for the various activities are selected, and it is essential that there is a strong correlation between each cost vector and the corresponding activity. The concept of the cost vector, as defined by [28], indicates that the costs associated with each activity are influenced by these vectors, which can cause the costs to rise or fall. For instance, in the material purchase requisition process, the cost vector could be represented by the number of purchase orders processed. The nature of the business conducted by the facility plays a significant role in selecting appropriate activities and cost vectors, along with the bases for loading, as noted by Datar and Rajan [22]. From this understanding, it becomes evident that the cost factor serves as a fundamental basis for allocating the costs of an activity to products and other final cost objectives. Drury [27]outlines several criteria to consider when choosing cost vectors. First, there must be a clear explanation of costs within each activity cost pool. Second, the cost vector should be easily measurable, with data that is relatively simple to obtain and identifiable with specific products, thus necessitating consideration of measurement costs. When selecting a cost vector for each activity, careful attention is required to ensure that these vectors represent a reasonably homogeneous measure of the outputs associated with each activity. The Activity-Based Costing (ABC) system shares similarities with traditional systems in that it utilizes cost vectors to allocate costs in two distinct phases, ultimately leading to final costs for cost objectives. Each phase employs its own set of cost vectors. The first stage involves First-Stage Driver Directives, where the cost groups within each activity center reflect the activities performed there. During this phase, input costs are tracked to these cost groups, with amounts for each activity center determined based on the chosen cost drivers.

These initial drivers are referred to as resource drivers. A key advantage of the ABC system is its reliance on a greater number of cost centers, which enhances the accuracy of measuring overhead costs attributed to various cost targets. The second stage introduces Second-Stage Driver Drivers. After tracking the costs associated with resources consumed by activities in each center, the cost drivers for this stage are selected. This phase marks a significant transition from traditional systems to the ABC approach, as traditional systems typically utilize a limited number of cost vectors. In contrast, the ABC system employs a broader array of cost vectors that may not be solely volume-based; however, there are instances where volume-related cost vectors, such as direct labor hours, may still be applicable. To accurately calculate the costs associated with final cost targets, it is crucial to maintain a strong correlation between the chosen cost vector and the relevant activity. Ultimately, precision in selecting cost vectors will lead to more accurate calculations of costs for final cost objectives [24].

5. Results and discussion

Analysis of the cost of sustainable external equipment based on the activities of the gas filling company using the Activity-Based Costing (ABC) method is essential for understanding how these costs contribute to achieving sustainable value. The process begins with identifying the activities that incur costs, followed by a thorough analysis of these activities to uncover their underlying causes. The ABC method facilitates this analysis through a structured approach that comprises several stages. The first stage involves cost analysis, specifically focusing on external processing activities related to raw materials. This stage is divided into two key steps. The first step entails examining the sustainable costs incurred by the gas filling company and subsequently grouping these costs into cost pools. It is important that the elements within each group share homogeneity concerning their characteristics and specifications. This grouping allows for a clearer understanding of the sustainable costs associated with the gas filling operations, which can then be presented in a comprehensive table. By systematically analyzing these costs and categorizing them appropriately, the gas filling company can gain insights into how its activities impact overall sustainability and value creation. This foundational analysis sets the stage for further stages in the ABC method, ultimately leading to more informed decision-making and strategic planning in pursuit of sustainable practices. Table 2 shows the indirect costs of the gas filling company.

Table 1. The main and supporting activities guide in the gas filling company

Activity level	Activity name	Cost prompt	Test standard
Activities by Unit	Production Operations Activities	Number of units produced	Benefits received
Activities supporting production processes	maintenance activity	maintenance orders	reasonableness
	lab activity	Number of units produced	Benefits received
general support activities	Administrative financial activities	Number of employees	reasonableness

Table 2. Indirect costs

Details	Proceeds
Imported gas-leaching treatment valves	1215123936
Importing filters with water-leaching treatment	14435834
Total indirect environmental costs	1229559770

The second step involves determining and analyzing the main activities that are undertaken to provide products. These activities are then organized either within activity complexes or individually, ensuring that the activities within each group are specific to one of the cost centers in the company. The environmental activities of the gas filling company can be clarified through a designated table. The second stage focuses on assigning costs to activities and products. This stage encompasses steps from the third to the eighth. During this phase, the costs within the cost pools are allocated to the activities by utilizing the cost drivers identified in the first step for each group of cost pools. Subsequently, these costs are charged to each activity within a group based on the cost drivers established in the second step, as illustrated in the accompanying figure. The source is based on the data of the gas-filling company.

Table 3. The environmental activities and the appropriate basis for downloading according to the (ABC) method

Activity	Cost prompt
Gas extrusion treatment activity	Number of valves of interest
Water pollution treatment activities	number of filters
sustainable training activities	Hour/time of training sessions
Research and development activities	Hour/time of research and development

The third step (linking cost and activity): - Under this step, the company's cost pools and the activities they are engaged in are linked by relying on the direct or indirect causal relationship between cost, activity, and the company.

The fourth step: - Determine the percentage of consumption in the dependency matrix between cost and activity:

After determining the relationship between cost and activity pools and linking them between cost and activity, the relationship is represented as a percentage, by applying the following equation:

$$\text{The ratio of the activity} = \frac{The\ volume\ of\ the\ cost - bearer\ for\ each\ activity}{Total\ cost - effective\ volume\ of\ activities}$$

The fifth step (calculating the cost of the activity) Through this step, the cost of each of the activities in the matrix between the cost and the company's activities is calculated by merging the cost pools as in the tables shown later.

The sixth step (linking activities and products): - Through this step, the environmental activities and the company's products are linked by relying on the causal relationship between environmental activity and the product. The seventh step (determining the percentages of effort expended in the matrix between the activity and the products) Through this step, the activity and the product are linked in percentages that represent the amount of effort expended on the activity to achieve a specific purpose.

The eighth step (calculating the cost of the product): - This step is the final result of the application of the costing system based on activities, through which the cost of each of the existing products is calculated and is based on the costs of environmental activities.

Table 4. The link between cost pools and environmental activities of the company in percentages.

N.B.	Environmental costs Activities	Degassing treatment costs	water treatment costs	Training and development costs	medicinal materials
	Cost cause	Number of osmotic valves	Contaminated water	The number of training hours	number of patients
1	Gas extrusion treatment activity	100%			
2	Water pollution treatment activities		100%		
3	sustainable training activities			100%	
4	Activities related to treating workers for pollution				100%

Table 5. The link between environmental activities and cost drivers in the company in percentages.

N.B.	Activities Products	Gas leaching treatment activities	Water Pollution Prevention Activities	Research and development activities	Activities related to treating workers for pollution
1	LPG gas	45 %	25 %	30 %	30 %
2	manufactured cylinders	30 %	45 %	50 %	40 %
	Valve repair				
3	The upper part	10 %	15 %	10 %	15 %
4	lower part	10 %	15%	10 %	15 %
5	other parts	5 %			
6	Total	100 %	100 %	100 %	100 %

Table 6. The link between the cost of sustainable activities and products in the company according to the (ABC) method.

N.B.	Activities Products	Gas leaching treatment activities	Water Pollution Prevention Activities	Research and development activities	Activities related to treating workers for pollution
1	LPG gas	546805771.2	3608958.5	8237500	1222850
2	Manufactured cylinders Valve repair	364537180.8	6496125.3	17100200	1468000
3	The upper part	121512393.6	2165375.1	3009500	591550
4	Lower part	121512393.6	2165375.1	3009500	357500
5	Other parts	60756196.8			
6	Total	1215123936	14435834	31356700	3639900

Comparison between the external processing of raw materials and the external processing of gas cylinders, is according to the table below.

Table 7. Costs of activities

Gas cylinder externalization		External processing of raw materials	
Details	Amounts \ dinars	Details	Amounts \ dinars
Import 250 thousand cylinders	17000000000	Gas degassing treatment costs (valves) for 250 thousand cylinders	1215123936
		Water treatment costs (valves) for 250 thousand cylinders	14435834
Total	7000000000	Total	1229559770

Thus, it is suggested that the company support the local product and obtain a safe environment, first, to adhere to the standard specifications issued by the Standardization and Quality Control Organization for iron cylinders, and secondly, to add the treatment of damaged gas cylinders, which leads to reducing the costs incurred by the company in the case of external processing of gas cylinders.

The impact of external processing activities for raw materials is reflected in the environmental dimension through the disposal of environmental problems resulting in the company during the exercise of its activities, which damages the employees of the company as well as the damage caused to consumers. It can be said that the environmental dimension is the backbone of sustainable development. It affects development trends and the choice of development to preserve the integrity of the environment, this dimension is achieved in the research sample company by adopting the activities of external processing of raw materials and using plastic cylinders instead of iron cylinders or continuing to produce iron cylinders while adhering to the requirements of the standardization device and quality control at the level of external processing activities for raw materials as well as getting rid of cases of injuries that are exposed It has workers during their work from welding, which causes many injuries to workers.

The Gas Filling Company aims to contribute to supporting the country’s economy by operating gas plants, filling gas cylinders, and supplying gas to consumers and meeting their needs. The impact of external processing activities for raw materials is reflected. on the economic dimension of sustainable development through the rationalization of economic possibilities, this is embodied through production compatible with the ecosystem, and the use of sustainable activities at the level of the entire production process, in turn, leads to a reduction in the costs incurred by the company resulting from environmental damage. The impact of the activities of external processing activities for sustainable raw materials is reflected in the social dimension by reducing unemployment as a result of employing workers as a result of proposing a production line for the manufacture of plastic cylinders.

6. Conclusions and recommendations

The results indicate that the costs of importing gas cylinders amounted to 7,000,000, while the costs of maintaining these cylinders reached 1,126,577,897. This figure includes the costs of gas dewatering treatment at 1,113,129,363 and treatment costs for valves at 13,448,534, suggesting that maintenance costs have become significantly lower than import costs. There are several managerial approaches to analyzing outsourcing decisions and environmental sustainability, including activity-based costs that will assist decision-makers in comparing the environmental impacts of various policies before taking any action. The application of the activity-based costing system (ABC) is fairer in distributing costs between products, as it is based on the main causes of cost emergence, activities, and utilizes several cost vectors according to the nature of each expense. This approach aids management in making informed decisions regarding planning, control, and overall decision-making. Additionally, the balanced scorecard, target cost, and entry to total quality management are examples of contemporary administrative techniques or instruments that can be integrated with the ABC system to create sustainable value in today's corporate environment. This integration enhances performance and reduces unit costs, achieving both competitive pricing and quality.

The company should prioritize supporting local products and ensuring a safe environment by adhering to the standard specifications issued by the standardization and quality control device for iron cylinders. Furthermore, it is recommended to include the treatment of damaged gas cylinders, which would reduce costs incurred by the company when relying on external processing. Many employees are not fully informed about ABC, leading to limited adoption and implementation within firms. Consequently, the effectiveness of ABC will depend on how well it is embraced and practiced by staff members. Therefore, the study suggests increasing awareness among employees by enrolling them in training programs or seminars related to this subject.

Declaration of competing interest

The authors declare that they have no known financial or non-financial competing interests in any material discussed in this paper.

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Author contribution

Amal Abdulhussain Kuhait: Conceptualized the study, developed the research framework, and conducted the literature review. She was responsible for drafting the initial manuscript and coordinating revisions. Haifa Kazem Ibrahim: Contributed to the methodology design and data analysis. She provided critical insights into the application of activity costing in outsourcing decisions and helped refine the manuscript. Razzaq Mikhwir Dawood: Assisted in data collection and interpretation. He contributed to the discussion on sustainable value and its implications for outsourcing decisions, as well as editing the final manuscript for clarity and coherence.

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