Leadership Initiatives on Environmental-Based Social Enterprise Toward Green Teaching Factory Practice in Vocational School

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Abstract. Environmental issues are a serious concern for global stakeholders and policymakers in various countries. This study reveals the leadership practices of vocational schools in West Kalimantan, Indonesia, in developing pedagogical approaches based on social entrepreneurship. This practice aims to increase awareness of environmental friendliness for educators and students as one of the residents' leading social problems in their sub-districts. The main objective of this research is to find out how vocational school develops social entrepreneurship in a teaching factory that considers environmental aspects, local vocational education, and interconnection with the business sector in their learning processes. The research strategy uses case studies with data collection in participatory observation, semi-structured interviews, and documentation. The study results indicate that the vocational school development project, which focuses on environmentally friendly creative economic activities through environmentally friendly paper bags, encourages multi-sector collaboration to overcome waste problems, especially plastic waste.

Keywords: environmental leadership, social entrepreurship, vocational school

1 Introduction

Plastic waste is still a challenging problem to solve in efforts to save the environment in countries worldwide. The existence of plastic waste has disrupted and damaged natural ecosystems and is dangerous for the sustainability of human life and other living things. This situation is not a new problem in this world, but a long history has recorded this phenomenon. The issue of plastic waste is inseparable from the condition of world economic growth, which affects production patterns and human consumption behavior and impacts the environment. According to Agarwal and Millican, the attitude of littering, improper waste disposal, and human carelessness through littering emerged as some of the factors responsible for plastic

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pollution in the early 1970s, which remain essentially unchanged to this day [1]. Plastic pollution has become one of the most pressing environmental problems, as the rapid increase in the production of single-use plastic products outstrips the world's ability to solve it. Plastic pollution is most visible in developing countries in Asia and Africa, where garbage collection systems are often ineffective or non-existent [2].

In recent years, the increase in production has mainly been attributed to the growing use of single-use plastic packaging in developing Asian economies, where garbage collection systems may be underdeveloped, developed, or not exist. In 2010, according to Jambeck's estimates, half of the world's unmanaged plastic waste was generated by five Asian countries: China, Indonesia, the Philippines, Vietnam, and Sri Lanka [3]. Data from the Central Statistics Agency of the Republic of Indonesia (BPS) in 2021 states that Indonesia's plastic waste reaches 66 million tons annually. An Indonesian Institute of Sciences (LIPI) study in 2018 estimated that around 0.26 million-0.59 million tons of this plastic flowed into the ocean [4]. This situation is very unfavorable for many parties to realize a healthy and prosperous life.

As stated in the Sustainable Development Goals (SDGs) document, awareness of this environmental problem has emerged from various countries' global leadership initiatives to encourage and create environmentally friendly economic practices. This environmental issue is not limited to the responsibility of the state or the government. This derivative of the SDGs has become a driving force for developing initiatives from global and local business players. The global trend that encourages business people to have an ethical responsibility towards the environment develops new approaches to business operations. Since the 1990s, social entrepreneurship approaches and practices have been recognized in businesses with a social mission and respect for humanity and the natural environment. Social entrepreneurship is a signal that there is a need to stimulate social change. These potential rewards and long-term transformative benefits for society distinguish this sector from its practitioners [5].

The main actors involved in sustainable development (state, private sector, and society) move according to their capacities and competencies to support the realization of this 2030 global vision. As a worldwide movement, social entrepreneurship initiatives are also carried out by education actors. Educational institutions have a significant role in constructing new thinking and acting for the community and business actors to carry out environmentally friendly economic practices. This environmental awareness has become a new discourse in school management practices in Sambas Regency, West Kalimantan, Indonesia. State Vocational High School 2 of Pemangkat is a vocational school in Pemangkat District. Their leaders are aware that plastic packaging is a product that is not environmentally friendly. This vocational school has visual communication design competencies, one of which is the development of product packaging for branding purposes.

School leaders elaborated the competence to build new awareness for local business people by changing the primary packaging material from plastic to paper to make it more environmentally friendly. They develop teaching factory-based learning to improve environmentally friendly entrepreneurial skills for teachers and students. Conceptually, this teaching factory provides a knowledge transfer channel that allows the interactive exchange of ideas, ideas, and innovations in the production process. This interaction seeks to reconcile business needs and academic aspects. This interactive knowledge transfer channel includes

two initiatives for running a learning factory: "factory level" and "academic industry." Teaching Factory's "Factory to Classroom" concept aims to bring natural production/production environments into the classroom. Real production sites should be used for educational purposes to enhance educational activities with knowledge existing in the course of everyday production practices [6].

Research by Tjiptady et al. revealed that the teaching factory in Singapore was carried out by exploring problems and challenges in the real world. Students must complete a product design task. The assignments are based on industrial projects applied daily by following an integrated process. Meanwhile, implementing teaching factories in Indonesia is carried out by forming a small-scale production management organization structure in vocational education that follows the company's organizational design [7]. In Indonesia, the teaching factory is an industry-based learning model that utilizes the production unit as a place to run production and business processes. The teaching factory is also developed and integrated with the production unit as a place of practice for vocational students through the management of the teaching factory, which consists of planning, organizing, implementing, and evaluating[8].

In previous research, Indonesia's teaching factory implementation model was measured using a social problem-solving model. The social problem-solving model in the teaching factory is applied to school management, human resources, marketing promotion, workshops, laboratories, learning patterns, and business and industrial relations [9]. The practice of teaching factory does not only stop efforts to solve social problems but also environmental problems. This paper attempts to describe how the leadership of the principal of the vocational school builds a teaching factory that is environmentally sound through teaching factory.

Vocational school leadership is critical in determining how to develop initiatives to act and take school policies regarding environmental issues. This paper describes a vocational high school leadership initiative in conducting education through an environmentally friendly teaching factory. There are two primary questions to be answered in this paper. First, how does environmental-based leadership in Vocational High Schools encourage such social entrepreneurship? Second, how is the teaching factory development strategy implementing social entrepreneurship in Vocational High Schools?

2 Literature Review

2.1 Awareness of sustainable development and environmental issues

Although plastic is a remarkable material that can transform into many different forms, it is estimated that up to 8 billion tons of plastic pollution have been generated over the past 60 years. According to the amount of litter on beaches, nearly 85% of marine litter in the EU is plastic, of which single-use plastics make up 50%, and fishing-related items make up 27% of the total [10]. Today, in the European consumer context, Euromonitor International's research states that 67% of consumers try to impact the environment through their everyday actions positively. Millennials and Generation Z feel they can make a difference through their choices. This largest spending cohort of the future will use tools to ensure minimal climate impact. The

more offerings align with Climate Changers' expectations, the more brands will see their products and services resonate [11].

2.2 Social entrepreneurship

The main characteristics of social entrepreneurship are social enterprises or social entrepreneurs. They have the initiative to create social values and solutions to unsolved social problems. Its mission is to benefit different individuals, societies, and other groups. A social entrepreneur who empowers a community to improve performance to solve problems such as disability, education, women's issues, and the environment. Environmental problems such as the secretion of harmful waste, climate change, pollution, and the collapse of ecosystems are well known to the general public. Social entrepreneurship is a concept related to the term social and environmental sustainability. The definition of socio-entrepreneurship consists of the term "environmental sustainability as the conservation of natural capital" and social and economic sustainability [5]. Social enterprises should equip themselves with the ability to capture what is happening in the ecosystem and combine it with internal resources to innovate. Social enterprises should provide themselves with the ability to capture what is happening in the ecosystem and combine it with internal resources to innovate. Through their dynamic capabilities, Social enterprise management must learn to manage changes in the external environment (ecosystem). Therefore, Social enterprises must adapt to the ecosystem, which can affect sustainability. Social enterprises must understand environmental changes and strive to attract support from the surrounding community [12].

2.3 Environmental leadership

Environmental leadership was fostered by a more systemic perspective, a long-range view of change, a better capacity to integrate environmental and economic goals, and the ability to deal with various stakeholders, manage complexity, and promote internal participation [10]. This environmental leadership awareness consists of three major stages: pre-conventional, conventional, and post-conventional. Each step of this awareness produces several types of environmentally conscious leadership, namely: Pre conventional (opportunist), Conventional (diplomat, expert, achiever), Post conventional (individualist, strategic, alchemist) [10]. The literature broadly demonstrates the benefits of developing environmental leadership at two levels. First, we connect organizational values and beliefs with the sustainability of human existence on Earth, primarily through a conservation approach. Second, it points to the argument of economic rationalism that environmental development also offers concrete rewards. Recently, "... environmental benefits are not necessarily a loss of revenue." As an individual, environmental leaders have a vision of environmental protection, eco-centric values, and the ability to motivate others. Participate in the process are described as people who show [13].

3 Methodology

This study uses a qualitative approach with a case study research strategy. This research uses primary data collection techniques using participatory observation methods, in-depth interviews, and focus group discussions [14]. Researchers conducted participatory

observations by being directly involved in the environment-based teaching factory development program as school companions and program planners. The duration of the observation is three months, from October – December 2021. In-depth interviews were carried out with principals and teachers, focusing on exploring the stages of strategy formulation to develop an environment-based teaching factory. Focus Group Discussion concentrates on collecting data in groups of selected teachers and developing a teaching factory strategy at State Vocational High School 2, Pemangkat District, West Kalimantan. The Focus Group Discussion was carried out in a participatory manner and reviewed the institutional analysis together through SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis. Secondary data was collected using photo documentation techniques.

Data analysis used an interactive approach from Miles & Huberman, where the steps of data analysis consisted of (1) data collection, (2) data reduction, (3) data presentation, and (4) verification/drawing conclusions [15]. The four stages of the analysis process are not linear processes. The analysis process is interactive, so researchers will likely go back to doing the first step and must have done the second or third step. The researcher moves to the conclusion-drawing stage when the data is adequate and saturated. Researchers used data validity techniques through triangulation of sources and methods [15], [16].

4 Findings and Discussion

4.1 Research site

If we look at the geographical position, Sambas Regency is the northernmost region in West Kalimantan Province. This condition also shows that this district is directly adjacent to the neighboring country of Indonesia, namely Malaysia. The position certainly has a strategic value for the development of the region. The development of settlements and urban infrastructure must, of course, pay attention to various sustainable development issues that have become a global trend and become a joint movement of all policymakers, including the issue of this waste. Sambas Regency is one of the areas with a severe plastic pollution problem.

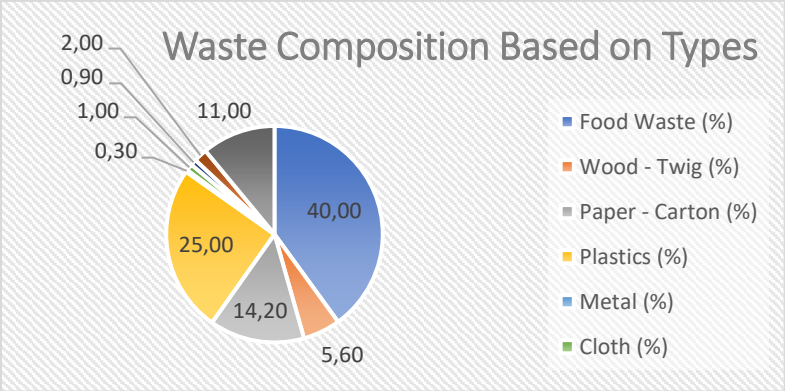

Fig. 1. Waste Composition Based on Types in Sambas Regency 2021.

Plastic waste is the second largest contributor to pollution in Sambas Regency, with a figure of 25%. The data above shows that the problem of plastic waste is a severe problem for environmental sustainability in Sambas Regency [17]. Researchers conducted observations and rapid market surveys in Pemangkat District and its surroundings. From the initial research, data was obtained that the economic practices of residents through food stalls or small food providers (snacks) do not have food packaging branding, specifically packaging with an environmentally friendly mission. The packaging still hangs material in a bag dominated by plastic bags. This situation happened to small traders and convenience stores around the Pemangkat market. None of them have branding, except for big retail players who are expanding their market into the region.

4.2 Consolidation of internal resources and mapping of external challenges by school leaders

In a participatory manner, school leaders mobilize internal potential to conduct the institutional analysis jointly. They use Strength, Weakness, Opportunity, and Threat (SWOT) analysis to develop a teaching factory development strategy. The principal conducts a participatory SWOT Analysis to understand the resources and internal strengths and weaknesses accompanying them through critical observation with the teachers and the education team. Through this participatory SWOT analysis, principals and teachers take pictures of external opportunities and threats for schools now and in the future. The Participatory SWOT analysis by these teachers also resulted in strategic recommendations for developing teaching factories that are effective for student learning and impact society and the environment. The following table shows the results of the dynamics of the Participatory SWOT analysis in the school.

Table 1. Result of Participatory SWOT Analysis

INTERNAL FACTORS	STRENGTHS	WEAKNESSES
	1. The Communication Visual Design teacher who has experience in the field of advertising 2. There are Computer Networking teachers who already have a national level microteaching competency certificate 3. Cooperation with related industries 4. The location of the school is close to the market 5. Cooperation with home industry/SMEs is quite wide	1. Lack of supporting infrastructure 2. The institutional teaching factory is not adequate 3. Curriculum alignment has not occurred 4. The supporting capacity of the Sambas Regency Government is not yet known regarding the regulation of the minimizing use of plastic

	open.	
EXTERNAL FACTORS OPPORTUNITIES 1. There is no closest competitor about this eco-friendly branding packaging yet 2. Many restaurants use unbranded rice boxes and do not use environmentally friendly packaging products at affordable costs	Strength-Opportunity Strategy 1. Implementation of environmentally friendly packaging branding production 2. Intern in the industry to get a product license. 3. The school principal conducted a hearing with the Sambas Regional Government to encourage a policy to limit plastic bags and replace them with paper-based bags	Weaknesses-Opportunity Strategy 1. Conduct cooperation with the job market to use learning equipment in the industry. 2. School opening negotiations regarding product sales goals.
THREATS 1. People's mindset to change the use of plastic bags to paper does not necessarily agree. 2. Printing companies around Pemangkat especially from Singkawang already exist.	Strengths-Threats Strategy 1. Socialization and public campaigns related to the safety of using paper-based bags. 2. Public outreach and campaigns related to hygiene in the use of paper-based bags	Weaknesses-Threats Strategy 1. Approach or hearing to the opinion leaders in the community 2. Conducting audiences and lobbying to Regency Leader about the dangers of using plastic as packaging branding for environmental sustainability.

Source: researcher data (2021)

4.3 Implementation of Teaching Factory Practice-based Social Entrepreneurship through The Development of Green Packaging Project

The principal understands that teaching factory learning is industry-based (products and services) through school synergy with industry to produce competent graduates according to market needs. Industry-based learning means that every product made, whether in the form of goods or services, will be helpful and have economic value or selling power so that the community can accept it. Through teaching factories with the primary competence of visual communication design, vocational schools develop products in the form of packaging bags

with recycled paper as the primary material. This paper is an environmentally friendly product with a base material that is readily biodegradable, in contrast to plastic which has un-organic characteristics and has the potential to become a pollutant.

The strategic planning steps of the school's social entrepreneurship development program include human resource management, production processes, marketing strategies, and financial analysis. They were managing the human resources by arranging the required workforce. The school development program by running this environmentally-friendly packaging branding project requires five elements of human resources. The five elements are manager, production, marketing, logistics/procurement, and maintenance. The strategy implementation to develop a sustainable teaching factory consists of two activity levels: production and marketing. The following is a description of the two activities:

1. Production

   The production of paper bags or paper bags goes through several stages. For example, for about 500 pcs, everyday work will take more or less ten working days. It takes several series to produce one paper bag, which is divided into several stages until they reach the final process (folding), forming a paper bag. Paper bags are different from packaging boxes, which can only be run by machine processing because several parts require human labor. The following is the paper bag production flow.

   1) Production

      The first stage is the design layout. The design process is a creative process that requires imagination to produce a good design. A fitting and attractive design will be an added value for a product. Usually, this design process takes two to three days to produce a design according to consumer desires. This condition happened because revisions have been made several times to get a design that fits the product's character. However, usually, consumers have their designs in the form of their business/company logos so that the design process can be faster.

   2) Printing Processes

      The second stage is the printing process. The process of printing paper bags or printing paper bags is the most decisive activity to produce prints according to the design. So this process requires coordination between the design and the print operator to minimize printing errors. Before the printing process was carried out, for the printing of this paper bag product, the production team used a standard office printer that was used as a production printer but used special ink that is more resistant to water (oil) in order to maintain the branding quality of the environmentally friendly paper bag.

   3) Finishing Processes

      The third stage is finishing, and finishing after the printing process is an additional activity to beautify or give the final touch to the printout. This finishing process has many types: adding lamination, die-cut, hot stamp, embossing, debossing, and spot UV. Of course, not all types of finishing will be done because this will be adjusted to orders or customer requests. For example, if the paper bag ordered uses only

laminated finishing, then after the printing process, the printout will be finished using laminate on request.

4) Production Process

The fourth stage is the production process. The production process referred to here is forming the finished print into a paper bag. Forming a printed sheet of paper into a paper bag can be done manually using human power. Apart from forming a printed sheet of paper into a bag, there are other processes such as attaching ropes and rivets. This folding process determines how good the paper bag will be because neatness and precision in the folding process will significantly affect the results of the paper bag.

2. Marketing

The marketing strategy implemented by school leaders is to provide provision services from several partners and IDUKA-Industri dan Dunia Kerja (Industry and Workplace), who have collaborated with schools. Cooperation has been established with several partners in the form of individual-owned enterprises located around the school. These partners provide goods and services, most of which are still limited to the area around the Pemangkat district. Partners who use environmentally friendly products from the teaching factory include The Cooperative of State Vocational School 2 of Pemangkat, Sasha Shop (a local grocery store that provides nine essential ingredients), and Roda Beringin Store (a Padang restaurant), and several market traders in the Pemangkat District. The product offering in the form of environmentally friendly branding packaging is in line with the implementation of the circular economy principle. In Europe, Businesses need to do more with less. Investing in circular economy initiatives, such as recycling, rental or resale programs, will drive value while positively impacting the environment [11].

In addition, to develop the business and achieve the vision of social entrepreneurship of school leaders, the teaching factory team is campaigning to reduce plastic waste in the Pemangkat District. This activity and program prove the active participation of the secondary education sector in environmental issues. Increase involvement in all environmental programs through sustainable education programs involving primary and secondary schools, relevant awareness campaigns that engage citizens and stakeholders, and an intelligent gamification approach that motivates citizens to respond to global debates. Waste, material exchange, no waste generation, recycling, etc.) are essential [10].

The leader and team of high school teachers developed a plan to market paper bag products through various online sales sites and local marketplaces such as Facebook, Instagram, and other online applications. As a business plan, they set a target within one year to penetrate the market throughout Pemangkat District and the entire Sambas Regency. The composition of social entrepreneurship was developed by scholars in very different contexts, including the Public sector, community organizations, social activist organizations, and charities, to change the balance and relationships between nations,

markets, and civil society in the provision of social services and the integration of work [5].

Fig. 2. The sample of product (environmental friendly packaging).

4.4 Maintaining sustainability: social entrepreneurship and the development of cross-sectoral partnerships

To maintain sustainability in creating environmentally-friendly packaging products, the school leaders take a formal and legal approach to the Sambas Regency government. This approach is intended so local governments have an environmental perspective as a starting point for building a campaign program to use environmentally friendly product packaging and minimize plastic-based products. By developing its potential, namely the competence of Visual Communication Design expertise, it can help the Sambas Regency government care for the environment under the vision of the State Vocational High School 2 Pemangkat, Realizing the Quality of Environment-based Learning. This vision is the spirit and fundamental value of developing an environment-based vocational learning curriculum. Citing the argumentation of Boiral et al. [10], school leaders can be categorized as actors who are aware of their roles as achievers. This actor actively incorporates environmental issues into the organization's goals and procedures. The development of environmental committees to integrate various services, responding to market concerns about environmental issues and performance improvement. As an environmental leader, this actor develops a series of stages so that his social entrepreneurship initiatives run and gain support from the internal and external public of the organization [10].

The researcher found major obstacles when implementing this environmental-based leadership initiative in an area. The barrier is related to the limited awareness of citizens and other stakeholders to build an environmentally conscious society. The undeveloped ecosystem moves local leaders to develop cross-stakeholder networks. The development of this network is carried out as an effort of dialogue and interaction to build an environment-based social entrepreneurship ecosystem. This ecosystem is necessary so that every product produced by the teaching factory does not only stop at job training but also produces economic value for the organization (Vocational High School). The finding is in line with the thinking of Philips et al. [12] that policymakers and stakeholders should deal with the business of developing

networks that are needed in the social innovation process. A solid network's growth will produce an ecosystem and collaboration between sustainable and relevant institutions for educational institutions and local communities [12].

From the perspective of developing the education ecosystem for sustaining the practice of teaching factories, the principal and the teacher team are conducting several vital steps for it. That is socially oriented toward enterprise and environmental leadership. These critical steps include socialization of social/environmental issues, collaboration with industry for internship programs, mastery of technology and product licensing, negotiations with potential consumers to use teaching factory products, and policy advocacy to local governments. The following figure shows the stages developed by Vocational High School 2 Pemangkat to achieve business continuity from the teaching factory.

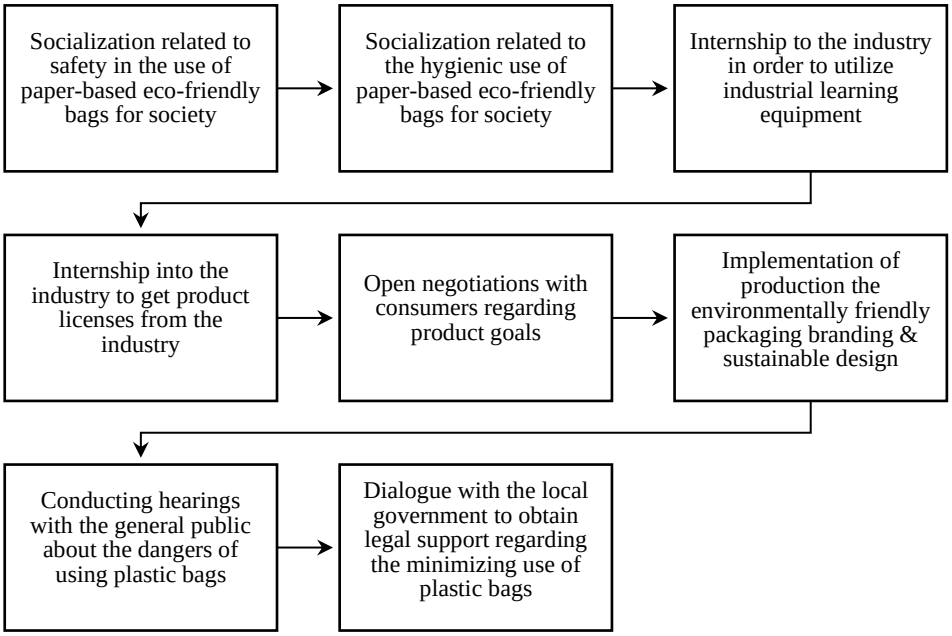

Fig. 3. Step to developing the social entrepreneurship initiative in vocational school

5 Conclusion

The leadership initiative of vocational high schools in developing a teaching factory based on social entrepreneurship has generated new enthusiasm and values in the organization. School services through teaching factories are not solely to meet the needs of large industries but have an environmentally friendly perspective that is in line with the spirit of SDGs. The strategy is developed through strengthening internal capacity and optimizing external opportunities by supporting public campaigns on environmental issues in products and even exploring policy advocacy to local governments. The teaching factory-based social entrepreneurship development program implemented by school leaders received a positive response from

teachers at State Vocational School 2 Pemangkat. This leadership initiative opens opportunities for new insights and creative ideas from internal school stakeholders. The practices of school leaders bring a new spirit to develop innovative product subjects and social entrepreneurship. The environmental-based leadership is the basis for social entrepreneurship towards better environmental conservation, especially in efforts to reduce waste or plastic waste in an area.

In practice, the primary learning emerges from the entrepreneurship spirit of the teachers through the development of environmentally friendly packaging branding products. Another good lesson was to increase competence in designing products and the challenge to continue developing the creations of industrial partners. Institutionally, this school still needs to build a social enterprise business canvas to strengthen the sustainable business model of the teaching factory. The active participation and involvement of stakeholders in the environment, vocational education, local economy, and creative industries is needed to strengthen this good initiative further. This research limits the scope of the discussion of social entrepreneurship in vocational schools to environmental leadership factors. It is still necessary to explore further studies on the dynamics of socio-economic and local political factors, which will also determine the development of the social entrepreneurship ecosystem.

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