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Citation for the original published paper (version of record):

Troje, D. (2022). Sustainable Facilities Management of Housing Properties in Sweden: Current Challenges and
Future Solutions. Association of Researchers in Construction Management (ARCOM) PROCEEDINGS OF THE 38TH ANNUAL CONFERENCE : 741-750

SUSTAINABLE FACILITIES MANAGEMENT OF HOUSING PROPERTIES IN SWEDEN: CURRENT CHALLENGES AND FUTURE SOLUTIONS

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Despite the potential to contribute to sustainable development, facilities management (FM) work is complex and lacks clear direction, practices, and solutions in relation to sustainability. In response, current and future challenges within FM of housing in Sweden is investigated to understand what possible solutions and practices will be important moving forward. Building on FM research, the findings show how social sustainability is an important focus area. Issues such as unemployment and criminal activity are especially difficult to handle as this requires collaboration with other actors like law enforcement and social services. Increasing the use of digitalisation and AI in different properties is seen as useful solutions to increase sustainability, but it is difficult to know what efforts to prioritize and how much value it contributes. The findings contribute insight into the ongoing development of sustainable FM practices, and identifies possible solutions that may facilitate the transition towards more sustainable FM. Such insights are important not only for building wiser, but also for maintaining what we have already built in a wise way.

Keywords: digitalisation; social sustainability; facilities management; Sweden

INTRODUCTION

The construction and real estate sector have faced many grand challenges in the last few years, such as climate change, quickly diminishing natural resources, social unrest, and the COVID-19 pandemic (Thomson *et al. (*2021). The sector must find ways address these challenges and develop their practices to work more sustainably and to build more sustainable products. For this transition of developing practices and products to become more sustainable, the sector must find ways to think forward, and adopt a long-term perspective of its operations (ibid). The transition towards a more sustainable built environment is urgent for many reasons. For example, buildings account for approx. 40% of energy consumption and 30% of greenhouse gas emissions (Nielsen *et al.,* 2016), where most of those negative climate effects comes from the operations phase. Because the operations phase of a building is the lengthiest and most sustainably detrimental phase of construction, the transition towards more sustainable practices and products must happen also in the facilities management (FM) of the existing building stock, and not just in new production projects (Wood, 2006).

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Troje, D (2022) Sustainable Facilities Management of Housing Properties in Sweden: Current Challenges and Future Solutions *In:* Tutesigensi, A and Neilson, C J (Eds) *Proceedings of the 38th Annual ARCOM Conference,* 5-7 September 2022, Glasgow, UK, Association of Researchers in Construction Management, 741-750.

This means that (FM) practices can contribute greatly to sustainable development both on the organisational level and society level (Nielsen *et al.,* 2016; Opoku and Lee, 2022). Practices within FM that needs to transition to become more sustainable concerns how to meet shifting customer demands for their living environment, managing and improving the housing stock in terms of waste management, energy consumption, and indoor climate, minor repair work, smaller refurbishment of individual dwellings, major renovation work of entire housing complexes, and supplementing the existing building stock with new production. The construction sector thus has an important role to play in working together with property owners to develop FM practices and improve the existing building stock in terms of making refurbishments and implementation of new, sustainable materials and technologies (c.f. Thomson *et al.,* 2021).

So, not only do we have to build wise in order address the aforementioned challenges and transition towards working more sustainably and building more sustainable products, but we must also be able to maintain and manage what we have already built in a wiser way. To understand how we can maintain and improve existing building stocks to contribute to sustainable development in the built environment, the purpose of this paper is to investigate how housing property owners in Sweden see current and future challenges within FM, and possible solutions to these challenges, in relation to sustainability, digitalisation, and other service and technical innovations. To fulfil this purpose, the following research questions are answered: What are the current and future challenges housing property owners see in their FM operations in relation to sustainability? and What does housing property owners see as possible service and technical innovations to help mitigate these challenges and increase sustainability within their FM operations?

FM research is scattered and weakly connected (Nielsen *et al.,* 2016), so this paper, which looks at challenges solutions, sustainability and digitalisation makes several contributions: (1) Gluch and Svensson (2018), who studied FM work of public clients in Sweden, argue that research must explore how to renew and add to existing building stocks while meeting new sustainability demands, and understand what new managerial and technical skills are required for this. This paper contributes such insight. (2) Focusing specifically on sustainability and innovative technologies and services is especially pertinent, as Bröchner *et al. (*2019) argue that digitalisation and sustainability are two major forces that influence FM development, already in the 1970's and even more so today. Because technology and business processes are constantly developing, FM activities also transform. These two forces, sustainability, and digitalisation should be considered in unison. (3) Overall, there needs to be a more holistic perspective on sustainability in FM where all pillars of sustainability are addressed simultaneously (Bröchner *et al.,* 2019), as previous research on FM has been quite limited and mostly addressed only the environmental pillar of sustainability (Nielsen *et al.,* 2016). (4) Future FM research must address real challenges of FM in practice, and address how professionals deal with those challenges (c.f. Bröchner *et al.,* 2019). (5) For contractors and other suppliers, studying how FM practices can become more sustainable provides insight into future client needs to accommodate new demands and address new grand challenges (c.f. Thomson *et al.,* 2021).

Facilities management (FM) is central to an organisation's core business practices and can be defined as a management function that focuses on the use, operations, development, maintenance, and improvement of physical assets (e.g., buildings), and integrates people, places and processes within the built environment (Nielsen *et al.,*

2016). This means that FM encompasses the technical aspects of managing building stocks, the lives of the users, and managerial practices connected to maintaining building stocks (Nielsen *et al.,* 2016). Due to increasing legislation and awareness of sustainability issues, FM have become more and more focused on transitioning towards more sustainable operations. FM practices have a great opportunity to contribute to sustainable development due to the built environment's large impact on the environment (Elmualim *et al.,* 2010), which has given rise to sustainable facilities management (SFM). SFM is a growing field within the wider field of FM research (Nielsen *et al.,* 2016), and combines FM with sustainability through the development of innovative technologies and business practices that considers the environmental, economic, and social benefits of FM operations (Opoku and Lee, 2022).

SFM practices must be holistic and address economic, environmental, and social sustainability simultaneously, and not just focus on specific environmental or technical problems, which has previously been the case in the FM sector. SFM practices must also be adopted and developed together with other stakeholders in collaboration (Opoku and Lee, 2022). To be able to fulfil all the "new" sustainability demands, FM professionals must develop new competencies and personal capabilities on how to manage new technology and programs for how to e.g., recycle smarter or reduce energy use (Elmualim *et al.,* 2012; Sarpin and Yang, 2012). Also, for FM to become more sustainable in practice, strategic sustainability targets must be translated into operational measures. The SFM perspective must therefore be present in several hierarchical organisational levels simultaneously so that operational measures driving SFM can be materialized in practice (Elmualim *et al.,* 2010).

There must be clear drivers to engage in SFM work as SFM work requires resources in terms of new practices and skills. Elmualim *et al. (*2012) and Zakaria *et al. (*2018) found that legislation, rather than corporate image, drives the commitment to sustainability. Commitment of senior management, internal sustainability policies, company ethos, and training of and available practical tools for FM personnel are other important drivers for engaging in SFM.

There are also barriers for engaging in SFM. For example, Elmualim *et al. (*2010; 2012) found several hindrances towards committing to SFM, such as: aligning legislative demands with existing business objectives, a lack of senior management involvement in and priority of sustainability issues, time constraints, financial constraints, FM not being sees as a strategic issue, lack of knowledge, and an overemphasis on financial targets rather than innovation. Also, Wood (2006) state that existing building stocks suffers from the fact that they were built according to old standards that are continually updated to meet steeper sustainability demands. However, there may not be enough incentives to update older building stocks to comply with newer standards, as this may have low economic return and where demolishing a building may be more cost effective, but less sustainable.

METHOD

To investigate how housing property owners in Sweden see current and future challenges within FM, and possible solutions to these challenges, a qualitative research design was used in order to capture the actions and perceptions (Silverman 2013) of people working with SFM. The focus in this paper is SFM of housing properties, which plays an especially important role in sustainable development due to its large resource consumption in terms of energy use, square footage within the built environment, and part in promoting sustainable lifestyles (Nielsen *et al.,* 2009). The

housing companies that were included in the study was chosen to get a wide view of FM in Sweden. Therefore, the sampled organisations were both private and public, located in different parts of Sweden, owned different types of properties (high-income housing, low-income housing, student housing), owned building stocks of different age, and owned properties in neighbourhoods of different socio-economic status.

Interviewees who work with facilities management on a strategic level, and who set the agenda for FM work within their organisations, were purposefully sampled (Etikan *et al.,* 2016). Theywere chosen due to their influential positions within their organisations and overview of both operational and strategic SFM issues. This enabled getting their personal views on SFM as well as capturing the more formal work of their organisations. The interviewees worked mainly as CEOs, sustainability managers, FM managers, business managers, etc. To achieve interview flexibility, semi-structured interviews (Kvale 2007) with 11 people were held during the winter and spring of 2021-2022 (see Table 1). The interviews lasted approx. 1 hour and were digitally conducted via Zoom or Teams. The interviews covered three main topics, based on an initial literature review of SFM research and topics circulating in the FM professional field in Sweden. These three topics related to challenges and innovations connected to SFM: 1) Current state of SFM work, 2) Organisation of SFM activities, and 3) External monitoring, where the first topic is mainly in focus.

Table 1: Information on interviewees

Organization	Company profile	Professional roles	Interviewee codes
Public housing company A	Low-income housing	Business development manager, CEO, FM manager	PubA 1-3
Public housing company B	Mixed income housing	FM manager	PubB 1
Public housing company C	Mixed income housing	R&D manager	PubC 1
Private housing company A	High-income housing Student housing	CEO, FM manager, Technical FM specialist	PriA 1-3
Private housing company B	Mixed income housing	Development manager, Sustainability manager, Sustainability specialist	PriB 1-3

Observational data from two FM industry conferences were also collected. These one-day conference took place during the winter and spring of 2021-2022, and had several speakers from industry, non-profit organisations, public organisations like social services and law enforcement, and contractors and other suppliers. Detailed notes were taken throughout the day and complied as an additional data set.

The interviews and observational notes were transcribed verbatim and imported into the software program NVivo which allowed a systematic sorting and coding of the data. Using a thematic analysis (Braun and Clark 2006), the data were first coded according to the three interview topics, where the first topic (Current state of SFM work) was chosen as the focus in this paper. Then, the data within the first topic were recoded into smaller themes as more detailed patterns in the data were identified. After several coding rounds, where codes were abductively produced by iteratively going back and forth between previous research on SFM and the empirical material (van Maanen *et al.,* 2007), two themes were identified: Challenges to transition towards SFM, and Service and technological innovations to transition towards SFM.

FINDINGS

The interviewees explain how FM begins in the planning and construction phase. They emphasize the importance of building wisely so that houses can be maintained equally wise: “We build housing, and then we manage them, and then refurbish them,

so we're there for the whole life cycle. If you don't build so there is low environmental impact also in the FM stage, then things won't be very good twenty years later" (PriB 2). At the same time, FM is a never-ending type of work: "With FM you are never really done" (PriA 2). So, not only does FM work require tremendous foresight, but also a balance of short-term and long-term perspectives. Coupled with the need of continuously keeping up the building stock is also keeping up with the onslaught of new service and technological innovations that can increase SFM: "You should never be content with what you have, that is important. You see that in the houses we have from 2011, they're not old, but they're outdated" (PriA 3). The interviewees say how difficult it is to enact change to implement new practices and technologies and ingraining a sustainable ethos throughout their organisation:

> "I believe the largest challenge is to implement new working practices and services from north to south. It's easy to sit up high and say that 'this is how we're going to be more efficient', but then you're also in a situation where you need to fight fires on the local level. We need more competencies in change management" (PriB 1)

The foremost sustainability topic the interviewees talk about is social sustainability. It is clear that social sustainability is by far the most pressing, or at least complex, issue the interviewees work with. This complexity stems from several reasons. 1) There is a lack of housing in general, and more so for housing that caters to low-income or special need tenants. It is difficult to find a good level of refurbishments that do not force low-income tenants to move due to increased rent prices. 2) It is complex to manage the supply chain and different contractors to ensure fair working conditions. 3) Social sustainability is multi-faceted, vague, and difficult to measure. 4) Uncertainty for how to mitigate negative trends such as low graduation rates, unemployment, diminished feelings of safety, and criminality. One interviewee summarized this work as:

> "Social sustainability is very broad. Besides doing good social work within the company, you must also do good social work in your business affairs and good social work in relation to wider society" (PubA 1).

The very last point, regarding safety and criminality, was something that the interviewees spoke at length about. Despite property owners having no formal responsibility to fight crime, the interviewees emphasize how this is some of their most important work. Partly because diminished safety and increased criminality negatively impacts property values, but also because they have a moral responsibility to do so, for the sake of their tenants. Recruitment to criminal networks, unlawful renting, money laundering and tenant registration offenses are some of the specific issues being raised. However how to practically go about fighting these issues are unclear. The interviewees say that it requires extensive collaboration with other actors such as law enforcement, social services, and local non-profits, but that there are few formal practices in place to facilitate this collaboration: "I wish that there would be a coordinating unit, or person, in every city that you could email or call. Both to get information but mainly to give information [about ongoing criminal activity]. I feel very frustrated that I don't have anywhere to provide information" (PriA 1).

Although social sustainability is on the top of the sustainability agenda for FM professionals, environmental sustainability is still a pressing issue:

> "The company's environmental impact is largest when we build new housing, but at the same time only 1% of our housing stock is new production each year. So, the largest part is in the existing building stock where we see that there is lots to be done" (PriB 2)

Much of the issues circles on refurbishing buildings to handle new climate conditions, how to install new energy efficient technologies, how to work more with circular economy and recycled building materials, how to refurbish dilatated building stocks resource efficiently, or how to meet new customer demands from tenants having new preferences because of Covid-19, in terms of space, functionality, and sustainability of their housing. The question is how to find sustainable and profitable business models to enable these new practices:

> "How do you find the business model for change when you have an existing building stock?" (PubC 1).

Large technical solutions like BIM (building information modelling), digital twins or AI-run buildings are often spoken of in the Swedish real estate sector. Interviewees say that there is much potential in using digital solutions, especially to monitor and optimize indoor climate to maximize comfort but minimize energy use. However, although such digital solutions are possible useful tools to increase sustainability within the building stock, the interviewees spend more time talking about less conspicuous technical solutions, like digital name plates and locks on doors, apps that enable tenants to communicate with each other and the property owner, robotic lawn mowers, and sensors that monitor snowfall or the state of recycling rooms. Overall, the interviewees say that the sector is inert and slow to adopt new technologies. One future development that many interviewees wished to see was to adapt technologies and services from other industries to make FM and contact with tenants more efficient. For example, using online tracking services like delivery companies, using online communication like in healthcare apps, or using online booking systems to schedule renovation work:

> "You don't have to come up with everything yourself, you can look at what other organisations are doing, and it doesn't even have to be in the same industry. If you buy clothes no one is going to call customer services to see where their package is, but today we don't have the same tools to communicate with our customers like other industries do. We have a lot to learn" (PriB 1).

COVID-19 is said to have greatly increased the interest for these types of solutions. Much like social sustainability is said to be a major challenge due to its breadth and complexity, the range of possible solutions to increase social sustainability is equally broad. One solution that is used by several organisations is to hire unemployed tenants to work with simpler FM tasks like cleaning stairwells and managing green areas, either in-house, through contracting social enterprises, or by requiring contractors who does refurbishment work to hire unemployed tenants. This is said to decrease unemployment, which is high in disadvantaged neighbourhoods, as well as getting a better-quality service:

> "We hire women who are unemployed and live in our neighbourhoods. It's good for our finances, better than when we bought that service, we have higher quality in our cleaning, and safety is perceived to be higher when our women are working in the neighbourhood" (PubA 1).

Also, in disadvantaged neighbourhoods there is often issues with overcrowding, making it difficult for youths to do homework and leisure activities indoors, which in turn can increase the risk of youths being recruited into criminal networks. Therefore, new activity spaces have been created, and collaboration with different non-profits and sports clubs have been set up to help children in their education or to offer leisure activities. Other services, like job searching workshops have also been created to help unemployed tenants get closer to the labour market. Something that characterizes

these social initiatives are collaboration with other actors, especially in crime prevention activities. New technology can also be used in crime prevention, e.g., to deter youths from loitering in basements or stairwells, which creates a sense of insecurity for other tenants, property owners have adopted a technology used to deter rats. It is a box that emits painful soundwaves, making lingering in such environments uncomfortable. Another solution to connect property owners with other organisations for crime prevention was suggested by a speaker at an industry conference: "We need speed dating or Tinder for property owners and municipal officers". In difference to solutions to increase social sustainability which are still emerging and somewhat undefined and unformalized, there are many concrete solutions to increase environmental sustainability, such as using new materials like ash from burnt rice peels in concrete, using more efficient heating systems, or using fossil free car fleets. The solution that seems to show most promise amongst the interviewees are practices related to circular economy and recycled materials, like reusing kitchens when refurbishing rather than installing completely new ones, using old batteries from electric buses to power buildings, or reusing old bricks from demolished buildings in new production:

> "I hope there will be better business models for resource efficiency, in terms of recycling. There is some reuse of bricks, but that is more expensive and more difficult than buying new, it's too cheap to buy new materials" (PriB 2).

The proposed service and technical innovations have their own challenges embedded in them, and there is scepticism about how environmentally sustainable technical solutions are, how financially sound such investments are, and how digital solutions can be embedded in older, analogue building stocks. There is a fear in investing in different solutions or services before they are tried and true and properly tested: "With digitalisation there are many choices to be made. You don't want to jump on too early, but not jump on too late. And most importantly not jump on the wrong thing. It's such large investments that must last over time" (PriA 1). The interviewees continuously emphasize how the transition towards SFM, and the adoption of new services and technologies must always be profitable, or at the very least not be detrimental to the financial bottom line. This is a main reason for why the interviewees are hesitant in implementing larger digital solutions like digital twins.

It is clear that FM professionals struggle with pursuing multiple sustainability goals, choosing between possible service and technical innovations, and that the work is complex with much uncertainty on how to balance financial and sustainable pressures and different time perspectives. Nevertheless, FM has large potential to contribute to sustainable development. Previous research has emphasized how FM has a large role to play in environmentally sustainable development as buildings are large contributors to negative environmental output (Nielsen *et al.,* 2016, Elmualim *et al.,* 2010). This study highlights how this is true also for socially sustainable development, e.g., hiring tenants had effects exponentially larger than just decreasing unemployment, it also increased service quality and perceived safety. So, in the case of social sustainability, the findings support Nielsen's *et al. (*2016) conclusion that FM goes beyond the maintenance of physical assets and encompasses the people who live and work in the physical assets. Such socially sustainable initiatives, although not directly linked to the physical assets of the buildings, thus have a large impact on FM practices. Besides implementing employment-generating initiatives, there are also other social practices such as mitigating criminal activity, creating summer sports activities, or creating hubs for homework support for children. Previous research concludes that

SFM practices must be adopted and developed in collaboration with other stakeholders (Opoku and Lee, 2022). This seems to be especially true for social initiatives where property owners lack the expertise to take on such issues on their own as it lies outside of the core business of owning properties. Collaboration is not inherently a problem, but it does require new ways of working, resources and commitment between actors who have different competencies, but also different goals and work practices. For example, having a coordinating unit between property owners, law enforcement and social services to exchange information for crime prevention would be a necessary, yet resource heavy, collaborative investment.

Previous research (Elmualim *et al.,* 2012; Zakaria *et al.,* 2018) highlights how SFM is driven by commitment of senior management and internal policies and tools. The interviewees from this study all have management or expert positions within their respective organisations, and all express a commitment to transitioning towards SFM. Also, there are, as shown by the breadth of different service and technical innovations mentioned by the interviewees, many possible tools available. However, available tools may cause new problems, in terms of providing too many solutions to choose from, without knowing which solutions are actually sustainable and contribute to the organisations' bottom line. In addition, the findings show how difficult it is to combine the financial bottom line with costly technological innovations, as well as difficult to create new business models that work for old buildings stocks. Wood (2006) made similar conclusions already 15 years ago and claimed that there are rarely incentives enough to spend money on updating old building stocks to newer standards, and that demolition may be cheaper than updating. The same sentiment is mirrored by this study where the interviewees express frustration that recycled materials are more expensive than new, and that there are few business models to support using recycled materials. So, it is not only legislation that may be difficult to align with business objectives, but the available business models, practices, and tools as well. In 2010 Elmualim *et al.,* found that there is often an overemphasis on financial goals rather than innovation, and the same seems to be true 10 years later.

Previous research found that FM professionals must develop new competencies and personal capabilities for how to manage new technology (Elmualim *et al.,* 2012; Sarpin and Yang, 2012). However, it may not be skills in managing new technology that is most important, but rather change management capabilities. Without skills for how to drive and manage organisation-wide change from top to bottom, local issues will likely overtake strategic development of SFM work in the organisation. Change capabilities are also vital to be able to translate strategic sustainability targets into operational measures and materialized practices on all hierarchical levels in the organisation, which is necessary to engage in SFM (Elmualim *et al.,* 2010). Thus, if there are not change capabilities embedded in the organisation, adopting and implementing new practices and technologies will be very difficult in the first place.

An interesting finding from the study that stands in contrast with previous research in FM is the focus on social challenges and solutions. Where previous FM research has tended to focus on environmental sustainability (Nielsen *et al.,* 2016; Opoku and Lee, 2022), the findings rather point to how social challenges and solutions are moving to the top of the FM agenda. Moving forward, it will be interesting to see how property owners will prioritize between spending time and resources on investing in more socially sustainable or more environmentally sustainable practices and technologies. These are not mutually exclusive but requires different types of investments: environmental technologies may be costly, while social investments are difficult

because they are vaguer and more difficult to measure. Nevertheless, this wider view on SFM that focuses on both social and environmental sustainability is hopeful, as the FM sector have usually tended to focus on specific technical or environmental problems rather than looking at SFM holistically (Opoku and Lee, 2022).

Either way, the focus on the financial bottom line overshadows every conversation of environmental and social sustainability. It is clear that sustainability cannot be something one engages in to be nice; it must also be economically advantageous. This mainly manifests in terms of not wanting to invest in new solutions that may be costly, thereby creating inertia in the sector. Perhaps the main issue is not about doing things right like previous research has suggested (Elmualim *et al.,* 2010), but rather about doing the right things in the first place. There is a strong uncertainty amongst the interviewees on what the right path forward is, which leads to an aversion to being a first mover. This in turn means that it is unclear who will drive innovation and development of SFM in the sector. So, transitioning towards SFM may mean trade-offs between older, known challenges, and newer, unforeseen challenges embedded in new services and technologies. The question is, what trade-offs between solving old challenges and creating new challenges are more acceptable to bear?

CONCLUSIONS

This study sought to investigate how housing property owners in Sweden see current and future challenges within SFM, and possible solutions to these challenges. It is very complex to work with SFM, as this is a field which lacks clear direction, practices, and solutions to transition towards more sustainable operations. This is problematic, as FM work is never-ending where properties age and require continuous refurbishment and improvement. The findings highlighted how social issues are at the top of the agenda and must be balanced alongside environmental sustainability measures and financial constraints where an overemphasis on financial goals often overshadows the work with SFM. The findings showed how there are a multitude of possible service and technical solutions to enable SFM, but these solutions and their implementation have issues embedded in them as well. These findings contribute a more holistic insight into the ongoing development of SFM work amongst housing property owners, and identifies issues that needs to be mitigated to facilitate the transition towards more sustainable operations within FM (c.f. Nielsen *et al.,* 2016; Bröchner *et al.,* 2019). This includes issues such as how to prioritize between different environmental and social challenges and solutions, how the overemphasis on the financial bottom-line impacts SFM work, and how the challenges embedded in new technologies and services will be tackled. Practical problems of SFM have thus been identified, thereby meeting Bröchner's *et al. (*2019) call for research that focuses on real challenges of FM in practice. The findings also contribute insight to contractors and other suppliers in the construction sector by indicating what improvements property owners want to implement in their existing binding stock. Thereby contractors and other suppliers can foresee future client demands and develop their service and product offerings accordingly.

If the issues identified in this paper are not addressed, the transition towards SFM may be negatively impacted. This may cause property owners to be unprepared for coming regulatory changes, a changing business landscape, or new customer needs created by Covid-19, or new, unknown crises. If research can investigate these challenges and solutions more in depth, and most importantly, adopt a long-term perspective that goes beyond the construction phase, this could help outline not only how the sector can

build back wiser, but also maintain what has already been built in a wise way, and thereby create long-term positive sustainable impact.

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