Policy planning to achieve sustainable development goals for low-income nations

Abstract:
Methodical planning for formulating sustainability policy is needed to meet the ambitious United Nations Sustainable Development Goals (SDGs). This paper proposes an approach for such planning for low-income nations by systematically dividing the principal sustainability policy into manageable policy categories. These categories encompass all 17 SDGs, enabling policymakers to take into account the complex interlinkages of the SDGs for sustainability planning. Key actions that need to be taken in each policy category to enhance sustainability are then identified. In order to ensure that the planning process is holistic, analysis of the interlinkages of SDGs is carried out based on prioritisation of the relative importance of each Goal. Although the priority of each Goal can be country specific, interlinkages among Goals 1, 7 and 9 are analysed as an example to illustrate the proposed approach. Top-down approach of the UN’s global sustainability agenda is integrated with a bottom-up approach of empowering and promoting local knowledge of low-income nations to develop the planning and policy approach presented in this paper. Finally, research gaps are highlighted to support the achievement of sustainability targets and further enhance the benefits of academic research to low-income nations.

Keywords:
United Nations; Sustainable Development Goals; Policy planning; Low income nations; Poverty eradication; Governance

1 Introduction
The United Nations (UN) has declared 17 Sustainable Development Goals (SDGs) and 169 targets aimed to be met by 2030 (United Nations, 2015). It has recognized that sustainable development cannot be realized without the ending of global poverty and has stated that special attention should be given to low-income nations (United Nations, 2015). Here the term ‘low-income’ used is as per the UN classification of nations (United Nations, 2018). Several approaches for sustainable development have been proposed (Broman et al., 2017; Loorbach, 2010; Jabareen, 2008; Robert, 2010) for the world in general, but there is a need to develop approaches to achieve sustainable development that are exclusively focused on low-income nations as their priorities on socio-economic
and infrastructure development policies are different than the developed nations or emerging economies. This is of great importance because although the global average of extreme poverty has been declining over the past few decades (DESA, 2020), the number of people living in extreme poverty in Sub-Saharan Africa has remained fairly constant (Beltekian and Ortiz-Ospina, 2018) and the statistics of decline in the global average of extreme poverty is mainly due to the falling of extreme poverty in China (Weiping, 2018) and India. Furthermore, strategies required for achieving SDGs can be radically different for high-income, middle-income and low-income nations. High-income nations require strategies for carbon footprint reduction whilst maintaining quality of life and social equity. For the middle-income nations, the strategy for sustainable development is mainly focused on maximising energy efficiencies through innovative technologies and processes and improve quality of life through social equity, infrastructure, health and comfort. For low-income nations, sustainability is driven by requirements such as elimination of poverty, job creation, training of unskilled workforce, providing safe shelter and drinking water amongst other issues. The main factors that could either enable or cripple sustainable development in low-income nations have been identified as complex interactions among poverty, climate change, rapid urbanisation and food insecurity (Cobbinah et al., 2015).

It has been argued that sustainable development and green growth discourses do not fit the crucial socioeconomic needs of low-income nations (Arif, 2015). This argument is based on the idea that low-income nations cannot afford to implement the policies of sustainable development and green growth because the majority of their citizens live under the poverty line. Similarly, unplanned urbanization and poverty have been reported to be major threats to sustainable development for low-income nations (Cobbinah, 2015).

This paper proposes a systematic approach to formulate and implement robust sustainability policies solely focused on low-income nations in order to achieve the SDGs. Firstly, the methodology is described (Section 2) and then the overarching sustainability policy is divided into manageable policy categories and the key actions needed to implement each policy category are suggested (Section 3). Given the pressing need to reconcile sustainable development with poverty alleviation and economic growth in low-income nations, a proposition that the SDGs be ranked based on their relative importance is then made (Section 4). To further refine the policy planning, analysis of interlinkages among three SDGs is carried out by choosing Goals 1 (ending extreme poverty), 7 (ensuring access to sustainable energy), and 9 (building sustainable infrastructure and industries) as illustrative examples (Section 5). Then, main research gaps that need to be addressed to achieve SDGs for low-income nations are highlighted to promote and stimulate academic research in the field (Section 6) and finally conclusions are drawn in Section 7.
The main original contribution of this paper is that it provides an easy-to-use planning approach that can be utilised by low-income nations to plan for sustainability without requiring extensive sophisticated resources unavailable to them. Additionally, research directions are set out to maximise the benefits of academic research to low-income nations. This paper aims to bridge the gap between academic research and its utilisation in low-income nations. Therefore, the identified research directions, and evidences and rationale for the approach presented here are based on intense consultations among academics, personnel involved in development sector and citizens of the low-income nations, in addition to literature review.

2 Methodology

The planning approach developed in this paper is based on formal and informal group discussions with professionals, literature review and the experiences of the authors. The group discussions on sustainability policy planning for low-income nations were initiated at the 5th conference organised by the Society of Nepalese Engineers, UK in 2019 and continued throughout 2020 (formal and informal discussions are continuing). Discussions and consultations were held with professionals in the development sector, government officials and academics with the aim of systematizing sustainability planning process. The findings of the discussions were then compiled and supplemented with literature review. Google Scholar and Web of Science were the primary searching tools utilised to conduct literature review by using keywords such as “Sustainable development goals”, “sustainability planning for developing countries”, “low-income nations policy planning” and “sustainability policy framework for poor nations”. The methodology was also guided by the authors’ experiences of working in the development sector of Nepal (one of the least developed nations) and an aim of making the findings of academic research more accessible to low-income nations. Therefore, the methodology attempts to enhance the interaction between research and practical implementation (Zeigermann & Böcher, 2020; Böcher & Krott) to maximise overall benefits.

3 Classification of principal sustainability policy

This paper proposes a novel classification of overarching or principal sustainability policy by recognising that sustainability consists of multiple dimensions, inter alia, politics, society and environment. Critical earth-system processes such as climate change, rate of biodiversity loss, nutrient cycles and environmental pollutions (Griggs et al., 2013) are taken into account to prepare the classification. This classification helps organise the broad sustainability policy into manageable categories so that effective planning can be systematically carried out for each category. Strategic plan for
sustainability could be developed at the macro level, which can then be detailed further based on the categories and sub-categories linking to the SDGs individually, which will enable planning, management and monitoring in a methodical manner. Technical expertise and resources for rigorous planning are often lacking in low-income nations and this classification will help in systematically planning for sustainability. The authors could not find similar classification during the literature review and to the knowledge of the authors, such classification may not yet exist in the context of low-income nations. The classification proposed here is a bottom-up template that encourages low-income nations to set their own sustainability priorities, thereby empowering them and at the same time, also supporting the realisation of the SDGs. By encouraging low-income nations to set their own regional/national sustainability priorities, this classification integrates top-down SDGs with bottom-up policies and also enhances the sense of ownership the low-income nations have on global sustainability agenda. It may be pointed out here that this classification supplements SDGs and promotes local adaptation of the SDGs, and in no way is the classification intended to replace SDGs.

As recognised by Game et al. (2018), evidence for sustainability policy should be drawn from broader domains – e.g. expert knowledge, health communities etc. – rather than solely relying on standard disciplines. The rationale for the policy classification presented below is that it allows governments and policy makers of low-income nations to focus exclusively on their most pressing needs and thus maximise the benefits of their limited resources. The sheer numbers of SDGs and associated targets can be overwhelming to low-income nations and it is anticipated that the classification proposed below will aid in consolidating and prioritising the relevant SDGs in a case-by-case basis. This allows broad SDGs and targets, which are hard to tackle, to be broken into manageable and affordable chunks. While a low-income nation does not have adequate resources to tackle all the SDGs designed for global scale, it may be able to leverage its limited resources to tackle its most pressing and relevant sustainability issues at local scale.

Figure 1 shows the classification of overarching sustainability policy (Principal Sustainability Policy) into three categories, namely, Governance, Livelihood and Control, with all seventeen SDGs falling under at least one of these categories. Livelihood category is further sub-divided into ‘Poverty eradication’ and ‘Infrastructure & Urbanisation’ sub-categories. Likewise, the Control category is further sub-divided into ‘Environmental Conservation & Pollution control’ and ‘Accounting for local culture’ sub-categories. The scope covered in each of the categories and associated sub-categories and key actions needed to achieve the SDGs goals are presented in the following section.
Figure 1 Classification of sustainability policy

3.1 Governance policy

Governance policy guides the management of top-level government operations. Meadowcroft et al. (2005) point out that governance for sustainability is a future driven continuous process where governments need to address issues such as environmental limits, sustainable resource management and demographics among other things. They also emphasise that multilevel governance and coordination at local, regional, national, international and global scales is crucial where decision-makers remain responsible to citizens, communities and stakeholders. Key requirements for sustainability governance as pointed out by Meadowcroft et al. (2005) could be adapted for low-income nations. Brief summary of key requirements that they have described is provided in Table 1.
Table 1  Key requirements for sustainable governance (adapted from Meadowcroft et al. 2005)

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Examples</th>
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<tbody>
<tr>
<td>Appropriate political frameworks</td>
<td>Goal identification, monitoring, evaluation and continuous improvement at all levels of governance</td>
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<tr>
<td>A long-term focus</td>
<td>Inter-generational strategies, not a reactive response</td>
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<tr>
<td>Understanding of ecological processes and of social/ ecological interactions</td>
<td>Biodiversity, importance of preserving natural habitats, ecosystem services</td>
</tr>
<tr>
<td>Knowledge integration from natural and social sciences into decision making process</td>
<td>Circular economy, climate change, sustainable production and consumption patterns</td>
</tr>
<tr>
<td>Use learning processes</td>
<td>Experiment with options, draw lessons from failures</td>
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The governance policy for sustainability should embrace the principles of decentralisation and empowering lower level administrations as well as making them accountable. The degree of decentralisation has been found to be much less in low-income nations compared to high-income nation (Olowu, 2003). This implies that the lesser degree of autonomy of local governments in low-income nations affects their growth potential. Sustainability oriented governance policy should ensure and promote decentralization so that local governments can effectively execute local level development projects and programs. For instance, the need to accelerate the decentralization of Cameroon for sustainable development has been highlighted by Kimengsi & Gwan (2017). Since decentralization empowers local communities, it should be a crucial component of governance policy.

The lack of accountability of decision-makers in low-income nations is a key factor leading to corruption and malpractices in the implementation of sustainable development. Peace, justice and strong institution is Goal 16 (United Nations, 2015) of SDGs and Transparency International (TI, 2017) has highlighted that SDGs cannot be achieved without tackling corruption. Low-income nations rely heavily on aid from donor agencies for various development initiatives. Although finding exact data is hard and maybe not even possible, corruption on aid money is one of the biggest challenges in poor nations (Kenny, 2017). Donor agencies need to work with governments to develop robust aid flow monitoring mechanisms to understand how and where corruption happens.
Furthermore, all levels of governance require focused political will to combat corruption by ensuring transparent and trackable coordination amongst all stakeholders as suggested by Mackey et al. (2018).

3.2 Livelihood policy

A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base (Krantz, 2001). The livelihood policy category includes strategies to tackle major livelihood challenges of low-income nations such as poverty and economic growth. Thus, this policy can be further sub-divided into poverty eradication policy and infrastructure and urbanization policy as discussed below:

3.2.1 Poverty eradication policy

This policy aims to achieve Goals 1 (No poverty) and 2 (Zero hunger) of the SDGs. Approaches to poverty eradication have to be identified on a case by case basis for every nation (possibly detailed to provincial, municipal and local/village level) and be built into the poverty eradication policy. Nevertheless, some key guiding principles that generally apply to majority of middle and low-income nations are: improving agricultural yields, improving non-farm economy and expanding income-earning opportunities (Yanagihara, 2003) in general.

3.2.2 Infrastructure and urbanisation policy

This policy combines two major Sustainable Development Goals of the United Nations, i.e. Industry, Innovation and Infrastructure (Goal 9) and Sustainable Cities and Communities (Goal 11) (United Nations, 2015). Two main purposes of this policy are to:

a) guide infrastructural development and expansion and b) direct the urbanization process. As opposed to high-income nations, infrastructure, often built by depleting natural resources, is not highly developed in low-income nations. Therefore, low-income nations have the opportunity to utilize sustainable materials, techniques, and technologies for construction and management of sustainable infrastructure. Therefore, utilization of energy sources and materials that are regenerative and sustainable has to be built into infrastructure planning and policy.

Since the populations of middle- and low-income nations are expected to move to urban areas, the United Nations Development Programme (UNDP) has identified
inclusiveness and resilience as important factors to promote sustainable urbanization (UNDP, 2016). Therefore, urbanization policy should help improve equality and inclusiveness in cities so that equal opportunities are accessible to all the population. Likewise, a resilient city is able to adapt to changes without compromising its stability and measures that improve city resilience should be a part of urbanization policy (Coaffee et al., 2018; Keen & Connell, 2019; Brakman et al., 2015). Other important factors that should be considered in urbanization policy are approaches to tackle urban poverty and unsustainable modes of transportation. Options such as a car-free city (Nieuwenhuijsen & Khreis, 2016), and electric buses and trams also need to be explored for low-income nations as these options have thus far only been primarily focused for high-income nations.

3.3 Control policy

Control policy provides regulatory framework to ensure that development and construction works carried out under infrastructure and urbanization policy (see Section 3.2.2) ensure sustainability. The Control policy can be further divided into two divisions as discussed below:

3.3.1 Policy for environmental conservation and pollution control

This policy aims towards achieving Goals 6 (clean water and sanitation), 7 (affordable and clean energy), 13 (climate action), 14 (life in water) and 15 (life in land). Infrastructural development and expansion demand massive consumption of natural resources and energy, which can eventually to lead to severe environmental degradation. Therefore, policy and guidelines need to be developed to control consumption of natural resources while building new infrastructure, as well as expanding existing infrastructure. The policy framework for sustainable urbanization as well as sustainable infrastructure development and expansion should include mandatory sustainability analysis. This analysis should objectively, and possibly quantifiably, measure sustainability by using applicable sustainability indices or metrics while planning infrastructural development or expansion and urbanisation. Carbon footprint, ecological footprint and exergy are some examples of sustainability metrics that could be utilised; however, formulation of new easy-to-use metrics may also have to be done on a case by case basis depending upon practicality. It is noteworthy that low-income nations may not have sufficient resources to perform complex sustainability analyses, especially if the analyses require high skilled manpower and high computational processing.

Issues of waste management and pollution control are likely to be critical with the construction and expansion of infrastructure as well as urbanization. Therefore, policies
for the optimal management of waste and pollution are required. Adoption of circular economy can be explored to minimize waste, pollution and natural resources consumption. Prospects of circular economy in ensuring sustainable development has been stated by Korhonen et al. (2018) which defines circular economy as economy constructed from societal production-consumption systems that maximizes the service produced from the linear nature-society-nature material and energy throughput flow. This is done by using cyclical materials flows, renewable energy sources and cascading-type energy flow.

3.3.2 Policy of accounting for local culture

This policy indirectly supports achieving Goals 5 (Gender equality), 8 (Decent work and economic growth) and 10 (Reduced inequalities) of the SDGs. Culture-led development programmes promote greater social inclusiveness and rootedness, resilience, innovation, creativity and entrepreneurship for individuals and communities, and the use of local resources, skills, and knowledge (UNESCO, 2012). On the other hand, ignoring culture can lead to bad policy (Small et al., 2010). Furthermore, culture has been identified as one of the pillars of sustainable development by United Cities and Local Governments (UCLG, 2018). Therefore, cultural beliefs and sensitivities of a community have to be carefully taken into account before formulating any policy on community development.

It may be noted that the policy classification proposed here is to help low-income nations either develop their own or identify high-priority UNSTATS indicators and actions (UNSTATS, 2017) most relevant to them. We argue that all low-income nations should be encouraged to identify and adapt the SDGs and their associated targets and indicators depending on the most pressing needs of individual low-income nations. This bottom-up approach of low-income nations proactively developing and identifying their own sustainability agenda will supplement the top-down approach of the United Nations handing the SDGs to low-income nations. Additionally, this bottom-up approach will enable the optimal utilisation of local knowledge and empower low-income nations by actively engaging them in the sustainability planning process.

4 Goals prioritisation

Previous sections of this paper systematically classified the overarching sustainability policy into manageable categories. This allowed detailed planning for implementation of sustainability policy by identifying key actions and measures that need to be taken in each category. Furthermore, all of the seventeen Sustainable Development Goals (SDGs)
were assigned to the relevant policy category (refer Figure 1). In this section, we propose that every low-income country prioritize the SDGs by taking local and regional contexts into account. The benefit of such prioritisation is effective planning that enables low-income nations to tackle their most pressing issues. For instance, if one takes a case of a landlocked country like Nepal, Goal number 14 may not be very important because this goal primarily deals with oceans. On the other hand, this Goal could be extremely important to the Republic of Maldives, which is also in South Asia, as the Maldives consists of islands. Furthermore, low-income nations typically have shortages of high skilled manpower, so addressing all the seventeen SDGs with equal priority is not practical. Another benefit of this prioritisation approach is that it allows low-income nations to set their own sustainability priorities and therefore ensures their higher degree of participation and ownership of the global UN agenda. It also empowers low-income nations by giving them more flexibility and leverage. The need for the Goals prioritisation was the main finding of the group discussions.

One approach to ensure that the prioritisation of SDGs is robust is to quantify the priority levels of all the Goals. This can be done by simple ranking or assigning a numerical value to each Goal based on its priority for a specific country. Once the prioritisation of the SDGs is done, interactions among high priority goals should be analysed. Such analysis provides valuable insights for planning and policy purposes and also helps to make the complex planning process more manageable. Here, it is noteworthy that all SDGs are interlinked and broad analysis of interlinkages among all of the Goals can be carried out. However, examining only high priority Goals and analysing their interlinkages can be very useful for regional and local-level planning, particularly considering the limitations of resources available to low-income nations. This paper examines Goals 1, 7 and 9 to analyse their interlinkages (Section 5). These goals are mainly chosen as examples for illustration, and similar analyses can be performed with other goals. One motivation for choosing these particular three Goals is that they are generally considered to be major challenges in achieving SDGs (Arif, 2015; Cobbina et al., 2015) in low-income nations. It has been reported that focusing on Goal 1 can have compound positive effects on all SDGs (Lusseau and Mancini, 2019) and low-income nations such as Ethiopia recognise Goal 7 as a precondition to meet other Goals (Tosun & Leininger, 2017). Likewise, infrastructure (Goal 9) is at the forefront of G20’s work to strengthen global growth (OECD, UNDP, 2019).

5 Analysis of interlinkages

The analysis of interlinkages between the categories, sub-categories and the SDGs (see Figure 1) is important to ensure that the plans and policies developed for achieving
SDGs are harmonious such that a policy that positively impacts one SDG does not negatively impact other SDGs. Although this might not always be practical, evaluating impacts of a policy on all other prioritised SDGs rather than only on the Goal intended by the policy will help in fine tuning the policy to optimise the trade-offs. Figure 2a shows the interrelationships between the governance, livelihood and control – the governance being the main enabler for sustainable livelihood, and both of these leading to the need for setting control policy for environmental protection. It highlights the importance of sustainable governance policy (see Section 3.1) in ensuring that livelihood enhancement does not cause negative environmental impacts. Unchecked consumption of natural resources to maintain livelihood is not feasible in the long-term as scarcity of natural resources will affect quality of living. Therefore, control policies that ensure conservation of natural resources while also enabling poverty alleviation are important. The interrelationships between governance, livelihood and control policies mean that any one of these policies can affect the other two as shown in Figure 2b. For instance, if the control policies only ensure environmental protection by negatively affecting living standards and livelihood of people by severely restricting consumption of natural resources, such policies will fail and lead to the need of re-formulating governance policies. Therefore, policies cannot be developed in isolation and a holistic approach to policy development that takes into account the interdependence of governance, livelihood and control is necessary.

**Figure 2 Interlinkages between Three Key Categories**

Policy formulation can be an iterative process where each policy option has to be evaluated multiple times to understand its collective effect on overall sustainability and individual effect on each SDG. For example, if a new policy on poverty eradication
(Livelihood policy category) is formulated, its effects on environmental conservation and pollution control (control policy category) need to be analysed and vice versa. In order to illustrate the importance of analysing SDGs for holistic and effective policy formulation, analysis of interlinkages among Goals 1, 7 and 9 is done below as an example. Planning for poverty eradication (Goal 1) should not be done in isolation but by ensuring that the planning is in harmony with other SDGs. If poverty reduction is accomplished by degrading the environment in such a way that the land eventually becomes infertile and uninhabitable, then poverty alleviation will only be temporary. Therefore, Goal 1 should focus on long term poverty alleviation, achieved by ensuring that natural capital is sustained during poverty alleviation. Long term success of Goal 1 can be greatly enhanced by access to sustainable energy (Goal 7) and development of sustainable infrastructure and industries (Goal 9) as Goals 7 and 9 ensure that environmental sustainability is taken into account while achieving Goal 1.

The experiences of China and India illustrate the roles of Goals 7 and 9 in achieving Goal 1. China drastically reduced its poverty over the past few decades (Yao, 2000) in which massive infrastructure development and industrialization played a major role (Huang et al., 2017; Athukorala, 2015; Lavopa and Adam, 2012). Likewise, infrastructure development has been found to be positively correlated with economic development in India (Kumari and Sharma, 2017). Both infrastructure development and industrialization require consumption of huge amounts of natural resources and energy. For instance, China surpassed the US as the world’s largest energy consumer in 2009 (US EIA, 2011), and studies (Gozgor et al., 2018; Ozturk et al., 2010) have shown a direct relationship between economic growth and energy consumptions for middle and high-income nations. Overall, poverty eradication (Goal 1), energy access (Goal 7), and infrastructure development and industrialization (Goal 9) are strongly interlinked and are likely to be high priority goals for low-income nations.

The interrelationships among Goals 1, 7 and 9 are analysed by creating a conceptual representation shown in Figure 3. This figure shows that the realisation of Goal 9 can be greatly enhanced by meeting Goal 7. However, achieving Goal 9 can also enable meeting Goal 7, and thus there exists a co-dependence and synergy between these two Goals. Likewise, realisation of Goal 1 can be greatly enhanced by meeting Goals 7 and 9.
As Goals 7 and 9 co-depend on each other and both these Goals support achieving Goal 1, policy planning that leverages interlinkages among Goals 1, 7 and 9 can be very effective for achieving the SDGs. Planning based on interlinkages among these Goals is discussed below.

5.1 Planning for Goal 1

In order to plan for achieving Goal 1, two key factors, i.e. agricultural sustainability and rural non-farm sectors, are discussed here.

5.1.1 Agricultural sustainability

Agriculture plays a vital role in poverty alleviation, and agricultural sustainability is found to reduce the food-energy-water poverty nexus in Sub-Saharan Africa (Ozturk, 2017). It could be for this reason that one major objective for the Least Developed Nations has been to make agriculture significantly more productive in order to achieve greater food security (UNTCAD, 2018). Some policies for higher agricultural output and income that have been stated are: increasing yields and labour productivity, diversification, crop upgrading and international certification, strengthening cross-
sectoral linkages, and commercialization (UNTCAD, 2018). However, achieving all these can be greatly facilitated by agricultural mechanization, which in turn requires energy access. If agricultural mechanization is accomplished utilizing conventional agricultural machinery, the needed energy is likely to come from fossil fuels such as diesel and other petroleum products.

Since massive consumption of fossil fuels is not sustainable environmentally or, in low-income nations, feasible economically, sustainable agricultural mechanization should be supported by deployment and implementation of renewable energy based electric agricultural machinery. Although mechanization is not mandatory for achieving Goal 1, it can greatly enhance the prospects of poverty eradication as mechanization increases agricultural yields and allows farmers to uplift their living standards. Electric drives for agricultural machinery have been explored (Buning, 2010), and the use of electric tractors is anticipated soon (NFU, 2017) in high-income nations. However, agricultural mechanization in low-income nations should also be based on renewable energy in order to minimize greenhouse gas emissions and ensure energy security. Since renewable energy generally utilizes resources available within a given country instead of importing from other nations, it increases energy security. Additionally, use of renewable energy also reduces depletion rate of natural resources. Overall, sustainable energy access (Goal 7) that does not rely heavily on fossil fuels should be considered as the means to realize poverty eradication in order to achieve long term success of Goal 1.

5.1.2 Rural non-farm sector development

Rural non-farm activities consist of all non-agricultural activities which generate income to rural households, either through waged work or through self-employment (Davis, 2003). These activities are shown to reduce poverty (Davis, 2003; Hoang et al., 2014; Imai, et al., 2015) and are important to achieve Goal 1. Since all these activities require energy and infrastructure, sustainable energy (Goal 7) and infrastructure (Goal 9) should be utilized for the development of the non-farm sector because poverty alleviation that utilizes non-renewable energy resources, unsustainable infrastructure, or other limited natural resources will only be short term. For example, if a small agro-processing enterprise is planned as a non-farm activity, the electricity used by the agro-processing machineries should be renewable energy based. Likewise, if a construction of a house to be utilised as a hotel/tourist home-stay is planned as a non-farm income generating activity, the construction of house could be done by utilising sustainable building materials.
5.2 Planning for Goals 7 and 9

The planning for achieving Goals 7 and 9 should take into account the co-dependence of these Goals and the roles of these Goals to achieve Goal 1. Improvement in living conditions of the low-income people of Rwanda after access to electricity has been documented (Lenz et al., 2018). However, there is a need to couple energy access with income generating productive activities by developing the non-farm sector. Furthermore, energy access should support infrastructure development that aids in poverty reduction. For instance, communication and information have been identified as catalysts for poverty reduction and sustainable development (UNESCO, 2016), and energy is required to build communication and information infrastructure. On the other hand, infrastructure development is also required to enable energy access, e.g. power plants construction and distribution infrastructure. Additionally, factories and other industrial infrastructure that manufacture renewable energy components such as wind turbines, water turbines, and electric generators secure energy access. Thus, Goals 7 and 9 enable one another and these two goals have to be met by understanding their co-dependence and synergistic relationship.

6 Research gaps

This section points out research gaps in sustainable development studies of low-income nations in order to set out an agenda for future research. While some of the research gaps discussed below are derived from previous sections, it may be noted that this section also encompasses other broad sustainability issues pertaining to low-income nations that were identified from focused group discussions and consultations with development practitioners during the research period. Therefore, addressing these research gaps can facilitate in bridging the gaps between academic research and practical implementations in low-income nations. An important research gap for ensuring sustainability is the lack of qualitative and quantitative indicators that prioritize SDGs for low-income nations. This may have to be performed on a case by case basis for every low-income country because priorities can be country specific. Systematic approaches to prioritize SDGs also need to be explored for different geographical, political and cultural contexts.

Low-income nations lack sufficient data on the natural resources required to build large scale renewable energy systems and other infrastructure, which has been identified as one major challenge to achieving Sustainable Development Goals (Ndzabandzaba, 2015). Research is required to develop robust data acquisition and management systems for low-income nations because these nations lack the sufficiently detailed data needed for almost every aspect of development. Furthermore, analysis based on ecological
footprint and biocapacity accounting has found that there is no strong correlation between per capita biocapacity and economic growth in low-income nations (Wackernagel et al., 2019). Biocapacity here refers to the capacity of a geographical area to supply renewable resources on a continual basis and to absorb its spillover wastes. This means that only very small portions of economic value chains are flowing back to the low-income people who own and manage their bioresources. Therefore, research is needed to better understand the interactions between biocapacities and poverty reduction in rural communities. Also, given the importance of a country’s resource security, investigating the economic implications of resource dynamics is crucial (Wackernagel et al., 2019).

Another major gap is the lack of research on methodologies for the robust evaluation of international aid effectiveness. International development and donor agencies provide financial and other support for low-income nations, but how much of the provided support really reaches low-income people? Objectively verifiable indicators to evaluate the effectiveness of international aid need to be developed. Likewise, proper mechanisms to monitor public trust in governments need to be developed. Although the importance of governance structures based on welfare regimes that guarantee basic human rights and social security have been highlighted (Wood and Gough, 2006), such welfare regimes cannot function efficiently unless the public trust in government is high. The public trust in government and the public perception of the legitimacy of the government needs to be thoroughly examined for international financial and other supports to effectively function in low-income nations.

Analysis of the consistency of SDGs based on the DPSIR (Drivers, Pressures, States, Impacts and Responses) framework by Spangenberg (2016) has pointed out that pressures and drivers causing unsustainability are not sufficiently analysed and this is a major challenge in achieving the SDGs. In this context, it is necessary to identify pressures and drivers of unsustainability in low-income nations.

From a global sustainability point of view, an important research gap is the lack of analysis on the share of responsibility of low-income nations in causing impacts that threaten global sustainability such as anthropogenic climate change and environmental degradation compared to middle and high-income nations. If the share of low-income nations is insignificant compared to that of middle and high-income nations in threatening global sustainability, the United Nations should consider developing new sustainability agenda exclusively targeting middle and high-income nations. The discourse on sustainable development is considered to be of great significance because it is viewed as a crucial tool to achieve global sustainability but is the notion of ‘sustainable development’ still suitable for high-income nations or is this notion only suitable for middle and low-income nations? This question needs to be explored, specifically since the idea that perpetual growth and development can be indefinitely sustained is debatable.
Exploring this question will allow us to rigorously define the term ‘development’ and provide us valuable insights on how the definition of ‘development’ could be different for high, middle and low-income nations. It is noteworthy that the high relevance of ‘sustainable development’ is only due to the fact that it is considered to be a pathway and process to achieve sustainability at a planetary scale. Therefore, it is necessary to explore the types of ‘development’ that can be sustained indefinitely.

7 Conclusions

This paper provides a systematic approach to conduct sustainability policy planning for low-income nations by creating three categories of policies, i.e., Governance, Livelihood and Control. The Livelihood category is further divided into poverty eradication, and infrastructure & urbanisation. Similarly, the Control category is further divided into two sub-categories, namely, ‘environmental conservation & pollution control’ and ‘accounting for local culture’. Relevant United Nations Sustainable Development Goals (SDGs) are assigned to each category/sub-category. We then highlight key actions needed in each policy category to achieve SDGs. By creating a sustainability policy structure (Figure 1), we facilitate much needed analysis on sustainability policy planning exclusively focused on low-income nations.

We underscore the importance of prioritising SDGs based on their relative importance in a case by case basis for different countries as every low-income nation can have different priorities and therefore generalisation may not be feasible. We then provide an approach to further support the policy planning for the fulfilment of the SDGs based on analysing interlinkages of high priority SDGs. The importance of studying the interactions amongst categories, themes and SDGs goals has been discussed. This approach is illustrated by conducting interlinkage analysis of Goals 1, 7 and 9 (Figure 3) as an example since these Goals are of high priority to many, if not all, low-income nations. Moreover, research gaps that need to be filled are identified and discussed in order to set out research agenda for future research. We call for extensive collaborations among research institutions, universities, government bodies, international development and donor agencies and other stakeholders to work towards filling the research gaps highlighted in this paper.

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References


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