

## Breaking the Vicious Circle of Underdevelopment through Science and Technology: The Case of Least Developed Countries

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**Abstract :** *Since the beginning of the 20th century, the Least Developed Countries (LDCs) have become the main issue of a hot debate on development and under the lead of the United Nations, both the international community and the LDCs themselves spent huge efforts for the LDCs' achieving the goal of sustainable development. Nevertheless, the steps taken so far for the LDCs' development remained insufficient and hence, point out that there is an evident need for designing a different development strategy with a novel perspective. It has been recognized that the previous strategies have been mostly economy-centered and hence, are lacking of the necessary potential to enable the LDCs break the vicious circle that they have been experiencing. This made clear the need for a new conceptualization of the development strategies by including the human dimension. Science and technology (S&T) provided the required solution to fill this gap within the development strategies. Structural transformation, which is essential for the maximum use of both the LDCs' domestic resources and capabilities and of the external aid, has been understood as possible only by integrating S&T to the development strategies. Hence, it has become obvious that solely with making progress in their S&T, LDCs can increase the benefit that they would get from the existing development aids and also can create new and local resources and capacities. This, in the long term, would trigger a development process enabling the LDCs meet their own needs and realize their goal of sustainable development.*

**Keywords :** Least Developed Countries, Sustainable Development, Capacity Building, Science and Technology

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## Introduction

Achieving the goal of sustainable development has become the main issue for any country from the most developed to the least developed. Nevertheless, while the developed and developing countries have various capacities, such as political, economic, social, and human in order to achieve this goal, the Least Developed Countries (LDCs) either have a minimum amount or lack of these capacities. This causes a serious obstacle for the LDCs' achieving the goal of sustainable development, which is "to create and maintain prosperous social, economic and ecological systems for future generations of humankind".<sup>1</sup> In addition to the shortage or lack of these capacities, the recommendations and the policies targeting LDCs' development have remained insufficient since they have been formulated by the developed countries. In other words, by their development partners, which assess the issue of development within the framework of their existing capacities and capabilities.

This leads to a vicious circle for the LDCs because the recommendations offered and the policies formulated lack the understanding of the real deficiencies and needs of the LDCs. Since the beginning of the 1980s, any policy designed towards the LDCs mainly assume that the LDCs would find the exit point from the status of the least development by improving their economies and this has been understood to become real with the financial help of the development partners such as providing official development assistance (ODA) and making foreign direct investment (FDI) to the LDCs while liberalizing their trade and fiscal policies.

Nevertheless, the expected improvement in the conditions of the LDCs has not been witnessed despite the efforts of the LDCs and the development partners. There has been a gap between the expected and the real outcomes of the policies designed and implemented by the LDCs and their development partners. The decadal conferences organized by the United Nations (UN) that were instrumental in leading and coordinating the efforts towards the LDCs' development offered a forum for both building policies and assessing these policies.<sup>2</sup> Hence, in the last decade it has become apparent that the existing outlook needs to be revised and alternative policy options should be taken into consideration for sustainable development.

Given this need, science and technology (S&T) emerged as a new dimension for achieving sustainable development with its potential to become an activator in several aspects. Regarding the futile process that the LDCs have been experiencing despite the efforts spent so far both by the LDCs and the international community, S&T is recognized both at the root of the obstacles towards development and at the top of the most reasonable policy fields that can provide the LDCs with quite promising progress.

## The Least Developed Countries and the International Community

The notion of least development was built upon three main criteria formulated by the Committee for Development Policy (CDP), a subsidiary body of the United Nations Economic and Social Council (ECOSOC).<sup>3</sup> These criteria have been mainly drawn on income, human capital and economic vulnerability indicators that are under a certain level.<sup>4</sup> A country below the limits that are set for all of these three criteria is considered as belonging to the LDC category and in case of its making an acceptable progress in any two of these criteria, that country is considered as graduation from this category.<sup>5</sup>

The United Nations is the leading international organization for the whole process including the LDC categorization and graduation in addition to the coordination and follow-up of the efforts spent towards the goal of LDCs' development. After a ten-year period following the LDC categorization in 1971,<sup>6</sup> the first remarkable activity through which the international community expressed its readiness and willingness to ameliorate the LDCs' problems was the "1<sup>st</sup> United Nations Conference on the Least Developed Countries" organized in Paris on 1-14 September 1981. The Conference mainly aimed to discuss the problems that the LDCs had to cope with and the ways of solving these problems or at least of avoiding their worsening. The recommendations put forward in the Conference focused on LDCs' achieving economic growth and industrial development under the light of the developed countries' experiences. Establishment of policies and measures on commerce, industry, trade, transport, communications and agriculture in addition to the transfer of financial resources and technology was expressed as the primary steps necessary to be taken for the LDCs' development.<sup>7</sup>

The 2<sup>nd</sup> UN Conference on the LDCs was organized in Paris on 3-14 September 1990 with the aim of discussing the improvements realized within the previous decade and of analyzing the effectiveness of international support measures undertaken by the development partners towards the LDCs.<sup>8</sup> It was concluded in the Conference that the expected development was not experienced in the conditions of the LDCs during the 1980s and there was the need for preparing a new plan of action in order to put an end to the LDCs' poverty and enable economic growth in their economies.<sup>9</sup> Accordingly, in the Paris Declaration, it was concluded that the economic, social and ecological worsening witnessed in the LDCs were not irreversible, but international support was indispensable for putting an end to the worsening of the LDCs' conditions. The Action Report similarly underlined the importance of international cooperation for development in addition to its emphasis on the significance of national efforts necessary to be spent by the LDCs themselves.<sup>10</sup>

The 3<sup>rd</sup> UN Conference on the LDCs was organized in Brussels on 14-21 May 2001 with the awareness of the need for the LDCs' integration to the global system and with the recognition of distance from realizing this goal. In the Conference,

LDCs' lacking of vital capacities essential to avoid their ongoing isolation from the global system was discussed as the main obstacle towards their achieving the goal of sustainable development. At the end of the Conference, Brussels Declaration and the Programme of Action reiterated the commitments of the international community that were mainly concentrating on building human, institutional and productive capacities in addition to developing trade facilities and financial resources of the LDCs.<sup>11</sup>

Similarly, the 4<sup>th</sup> Conference organized in İstanbul on 9-13 May 2011 underlined the significance of developing human and production capacity.<sup>12</sup> The UN has attached special importance to the Conference due to its being the first high-level international conference since the economic crisis experienced all over the world in 2008.<sup>13</sup> In addition, the Conference has been interpreted as the step that would enable going beyond the efforts spent during the previous three decades since it has accepted the need for looking elsewhere other than finance. In other words, the Conference has indicated the necessity of creating a different outlook with new policy options in order to reach the target of alleviating the LDCs' poverty. Hence, it has called for a "renewed global partnership for LDCs' development and...establishment of new international support architecture for the LDCs".<sup>14</sup>

The commonly agreed understanding of development by the international community reflected the importance of economics and finance. This was also the same for the LDCs' alleviating their poverty in the short-run and achieving sustainable development in the long-run. Through interaction with the LDCs at the beginning of 1990s, it was decided that the "...population growth, poverty and environmental degradation, policy shortcomings, the problems associated with the design and implementation of structural adjustment programs, natural disasters, and adverse external conditions, such as depressed commodity prices, difficulty of access to markets and lower-than-expected aid flows"<sup>15</sup> were the main reasons behind the LDCs' problems.

Hence, designing a macro-economic policy; developing human resources through effective population, health, education, training and employment policies; managing the environment with the aim of using natural resources effectively and coping with the natural disasters; improving agricultural sector; and developing entrepreneurship and enabling access to international market were decided as the main goals necessary to be achieved in order to cope with the problems above.<sup>16</sup> Accordingly, diversification of the LDC economies besides regulating FDI, ODA, and debt flow to the LDCs and reviewing structural adjustment programmes and decentralization activities were considered necessary. In addition to these, (S&T) were also considered as a component of development by the international community even though it was not given the concern that it was worthy of.<sup>17</sup>

Nevertheless, when the 2000s arrived, it was realized that the outcomes of the actions carried out in the previous decade were less fruitful than expected, despite the fact that most of the LDCs complied with the economic reform programmes to a

great extent.<sup>18</sup> Hence, a new path emphasizing the importance of trade, FDI, macro-economic policies, flow of ODA, and debt management for the LDCs' development was formulated.<sup>19</sup> However, despite its resemblance to the previously designed programmes of actions with its emphasis on these dimensions, it also introduced a novel outlook to the development agenda by expressing the need for establishing human-oriented policies and for capacity-building.<sup>20</sup> As the significance for improving human and productive capacities was given concern by the development partners, an awareness on the part of the international community for the possible impact of the development of S&T on the LDCs' realizing their goal of sustainable development came forward.<sup>21</sup>

### **Paradigm Shift for Sustainable Development**

Since the challenges that the LDCs have to cope with could not have been resolved to a great extent, the need for finding alternative ways of solution has become clear. There has been observed a gap between the recommendations of the international community and the needs of LDCs. The existing policy options do not help to fulfill this gap, instead, the conditions of the LDCs have worsened in time. The main assumption was that the economic growth would enable the LDCs' development and this could be realized through FDI, ODA flow, and debt allocation to these countries. Nevertheless, due to unstable and inefficient aid flows to the LDCs in 2000s,<sup>22</sup> in addition to the increasing debt burden on the LDCs, the belief for development have remained vague in the recent decade too.

Upon this, the need for a novel actor with the power to trigger the economic development of the LDCs has become obvious. S&T offers a hope to meet this need and became to be recognized as "...a necessity for the future economic viability of the LDCs"<sup>23</sup>. In other words, S&T has emerged as the dimension that can build a bridge between the goal of sustainable development and the problems of LDCs, such as contagious diseases, natural disasters, environmental problems, unemployment and insufficiency of FDI, overburden of debt, lack of sources of energy and of clean water, food insecurity, social inequalities and weak productive capacities.<sup>24</sup>

While the efforts to draw FDI, allocate ODA, and/or debt could not offer a long-term and sustainable exit point from the conditions of being underdeveloped, S&T offers a break with the vicious circle that turns around underdevelopment and dependency. It offers the opportunity to strengthen infrastructure, resolve energy and food problems, promote private sector development, improve human capacity, enable social development, achieve a balance between production and consumption, to open new areas of employment, to find key solutions to existing challenges like natural disasters and diseases and to new challenges like climate change, indicate new dimensions of cooperation, and make financial resources much more abundant and various.<sup>25</sup>

All of these can become possible as a result of the development of production capacity due to the scientific and technological developments. Given the fact that the production capacity determines the chances of a country for achieving sustainable development,<sup>26</sup> the impact of S&T on development, particularly for the LDCs, can be much more easily recognized. The LDCs having only basic technologies are unable to realize development on sustainable basis. Even though continuous support guaranteed by the development partners to the LDCs is necessary, it is not sufficient because sustainable development depends on generating its own production and human capacities.<sup>27</sup> Without self-production and human capacities, meeting the future challenges and catching up with the world is almost impossible.

The Korean case illustrates this point much clearly. The Republic of Korea has achieved economic growth to an extraordinary extent through technological change. Public institutions to manage S&T were established, legal infrastructure was ameliorated, and several incentives were created to promote investment in research in addition to the investment on human resources.<sup>28</sup> Hence, building production capacities that are supported by transforming technologies and developing human capacities appear as the vital requirements for sustainable development.

In relation to this, developments in S&T enable local capacity building and the efficient use of local resources. It is central to the improvement of productive capacities. As knowledge gets become locally accumulated with developments in S&T, in the end it becomes concrete with production and this opens the way towards development.<sup>29</sup> Moreover, it offers a real linkage between the underdeveloped and the developed world when the developments in S&T reach to the point that the cooperation between these two worlds shifts from a relationship between unequals to the one between equals.

Nevertheless, this does not mean that S&T can be the only solution by itself for sustainable development. It should also be accompanied by the previously suggested international support measures and recommendations, which are mainly FDI and ODA, but with a great difference. In other words, aid provided by the development partners should also cover S&T dimension.<sup>30</sup> Unlike the previous implementations, the FDI should include the goal of building productive capacity and knowledge circulation. Accordingly, the ODA should aim at allocating funds for specific use in the field of S&T.<sup>31</sup>

At this point, given the need to get and maximize the benefit from the aid provided by the development partners, the absorptive capacity of the underdeveloped countries plays an important role.<sup>32</sup> This is also true for getting benefit from the aid allocated in terms of S&T since absorbing new technologies is essential for development through technology transfer. Unless the LDCs develop their absorptive capacities, the aid allocated cannot be converted into long-run gain and this prevents the development of self-production capacities.<sup>33</sup>

Science and technology appears at the intersection of the development of both absorptive and productive capacities. Any development in S&T can activate a structural change both in the economic and social structure because it enables the improvement of absorptive and productive capacities. Scientific and technological developments mobilize and renovate the economy of which reflection appears through creation of new job opportunities. The change in the dynamics of economic life inevitably pushes a social transformation.<sup>34</sup> This all summarizes the process through which economic and social transformation occurs following the development of S&T and the role of S&T for promising an economic growth that is self-dependent and sustainable.<sup>35</sup> Therefore, it becomes clear that as negative change causes another negative change when the S&T dimension is excluded, a positive change pushes another positive change and this goes on benignly when the S&T is integrated into the process.<sup>36</sup>

### **Role Sharing for Development through Science and Technology**

The goal of sustainable development can be realized through science and technology, both of which can be recognized as the key sources of economic growth due to their impact on building and developing capacity in several aspects. As mentioned, solely focusing on the economic dimension does not suffice in order to achieve sustainable development. It requires a broader approach that comprises the establishment of three main capacities which are the human, infrastructural, and institutional capacities.

Since development is a dynamic process, it needs the interaction of several factors and demands the implementation of diverse reforms in various aspects. Accordingly, it has also been influenced by deficiencies experienced in different fields. Lack of human, infrastructural and institutional capacities do appear as the most basic obstacles on the way towards development through S&T, despite the fact that these cannot be improved without S&T.<sup>37</sup> More specifically, lack of absorptive and productive capacities at public and private sectors, weakness of political initiative, absence of awareness of the linkage between S&T and national development, deficiencies in the legal framework necessary to promote investment in S&T, lack of partnership between public and private sector in the field of research and development, insufficiency of skilled labor, and lack of infrastructure to stimulate research and development are the major difficulties that the LDCs should take into consideration.

Due to the abundance of the challenges that the LDCs have to cope with, role sharing between the LDCs and the development partners is a must. There are tasks that should be separately carried out by the LDCs themselves and by the international community in addition to the joint tasks that can only be managed through bilateral and multilateral international cooperation networks.

Among the responsibilities that the LDCs should assume, first of all being aware of the role of S&T for development is crucial. This can be achieved at two levels, which are the political and social levels.<sup>38</sup> The political awareness comes prior to all subsequent steps that the LDCs will take since it is the main impulse behind the willingness to go beyond the traditional strategies implemented so far.

Solely with the political awareness and willingness to achieve sustainable development through S&T, the inclusion of S&T dimension to national development plans can be possible.<sup>39</sup> In particular, it means the establishment of new institutions for national research and for the management of S&T in addition to the allocation of public funds for research<sup>40</sup>. In relation to this, reforming legal framework and providing certain incentives in order to attract investment in S&T and encourage public-private partnerships with the aim of developing absorptive and productive capabilities are among the major responsibilities of the LDC governments.

In addition to the institutional and infrastructural initiatives of the LDC political authorities, they should also assume responsibility to develop human capacities. Education and training comes first in order to improve human capacities and to include the social dimension within the development agenda. National education systems should be modernized and equal access to education should be guaranteed. Vocational training should be another matter of concern in order to improve human capacities in that regard, national technical and vocational training institutions should be reformed.<sup>41</sup> Moreover, education systems should also be revised to cultivate the awareness of the importance of S&T for development and raise qualified people with certain skills of making research.<sup>42</sup> All of these measures can reverse the brain drain and add to the human capital of the LDCs.<sup>43</sup>

Paired with the responsibilities and roles of the LDCs, the development partners should bear responsibility and contribute to the LDCs' development by S&T through several ways. One of these can be increasing the share of S&T in ODA by the donor countries. Similarly, certain amount of FDI can be allocated to promote technological learning and encourage S&T related activities. This means establishing partnerships with the awareness of the need for cooperation in the field of S&T to enable technology transfer and access to technologies, cultivation of know-how, and use of scientific and technical learning for fighting against the challenges that the LDCs have to cope with.

Moreover, cooperation networks on a triangular basis should be set up by establishing partnerships among the LDCs and development partners<sup>44</sup> in addition to the ones solely between development partners and the LDCs (North – South) or within LDCs (South-South) in order to exchange practices and experiences.<sup>45</sup> Diversification of partnerships would facilitate the establishment of more effective cooperation networks for the LDCs. Building working mechanisms and creating enabling environment for these mechanisms' efficiently functioning would be much easier with the developing states, compared to the ones established with the developed ones. Such networks can provide the LDCs with the opportunity to explain



their needs and priorities on a much common basis and can enable them getting much fruitful results through these partnerships. In other words, a wider inclusion of the developing countries to the development strategies designed for the LDCs' development would avoid, or at least minimize, the design and implementation of policies that neglect specific characteristics of the LDCs. Hence, it can lead to the formulation of much accurate development policies for the LDCs.

Additionally, the international community can also provide support to the LDCs' developing their institutional and infrastructural capacities.<sup>46</sup> It can set up training programs on S&T capacity-building, such as S&T management and use of databases and statistical information, which are as crucial on the previously mentioned measures for S&T developments.<sup>47</sup> It can also provide consultancy to the LDC political authorities to design their legal and economic infrastructure with the aim of preparing suitable conditions for the S&T development and to compose policies integrating the society as an actor complementing these efforts.<sup>48</sup>

Furthermore, besides allocating a certain share of ODA for S&T, the international community can also build specific grants targeted these countries and put up a separate budget in order to provide scholarship for the citizens of these countries.<sup>49</sup> Now, it can also set up exchange programmes that enable the flow of information from the developed and developing to the underdeveloped in a more accurate way.

Hence, the goal of sustainable development can become much possible with the introduction of S&T to the traditional development strategies implemented so far. It requires the responsibilities stemming from this newly formulated development strategy to be assumed both by the development partners and the LDCs since they both need each other in order to get concrete results.

## Conclusion

The four-decadal analysis of the case of the LDCs indicates that there has been a misleading point in the development strategies formulated by the international community in order to eradicate LDCs' poverty and initiate a development process on sustainable basis. The main focus of the development plans is to achieve economic growth and the means to achieve this goal was mostly economy-centered and hence, overlooking human dimension. These development plans are far from reaching the target of sustainable development for the LDCs. Being both dependent on external support and vulnerable to external conditions for their development have resulted in minor changes in their conditions for a better direction.

This made obvious the need for rethinking the development strategies and policies implemented so far and to consider including other dimensions that can contribute to breaking the vicious circle that the LDCs have experienced. Science

and technology provide the necessary tools to give hope for getting out of this circular underdevelopment process. It is clear that the underdeveloped world has to build its own absorptive capacities in order to maximize its benefit from the support that its development partners provide. One step beyond this is the improvement of productive capacities in order to further the benefits of the support attained from the external world and to enable the sustainability of the development process. With the aim of developing these capacities, infrastructural, institutional, and human capacities appear as the fundamental capacities necessary to be developed.

Due to this novelty in the conceptualization of the sustainable development issue, S&T has become to be understood as both the cause and effect of underdevelopment. It offers the possible exit point from the circle that goes around the current problems and future challenges that the LDCs do and will have to cope with. Accordingly, it has become clear that the use and improvement of domestic resources and capabilities can be possible through a structural transformation, which can be achieved by incorporating S&T to the development strategy.

S&T can be shown as the means both to take advantage of the international support and to use and improve local capacities of the least developed world. It complements the previous development strategies with introducing a formula that triggers a developmental process based on continuous learning and cooperation. This puts forward a path that is not only focused on catch-up and designed by the developed world as it has been so far, but also a *sui generis* one that can be shaped and revised in due process by the LDCs themselves in compliance with its needs and goals as it becomes much more self-reliant and self-confident with the developments in its S&T.

## NOTES

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5 The list of LDCs is reviewed every three years by the ECOSOC with the information provided by the CDP. As of 2011, the number of the LDCs is 48; 33 of them is in Africa, 14 of them is in Asia and one is in Latin America and the Caribbean. For the list of Least Developed Countries, see UN Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, "Least Developed Countries: Country Profiles", <http://www.unohrrls.org/en/ldc/related/62>.

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- 16 United Nations Conference on Trade and Development, *Paris Declaration and Programme of Action for the Least Developed Countries for the 1990s* (Doc. No. UNCTAD/RDP/LDC/58/1992), 1-2.
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- 18 United Nations General Assembly, *Brussels Declaration and the Report of the Third United Nations Conference on the Least Developed Countries* (Doc. No. A/CONF.191/13), 10.
- 19 United Nations General Assembly, *Brussels Declaration and the Report of the Third United Nations Conference on the Least Developed Countries* (Doc. No. A/CONF.191/13), 8.
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- 21 United Nations General Assembly, *Brussels Declaration and the Report of the Third United Nations Conference on the Least Developed Countries* (Doc. No. A/CONF.191/13), 32-33.
- 22 United Nations Conference on Trade and Development, *The Least Developed Countries Report 2010: Towards a New International Development Architecture for LDCs* (New York and Geneva: United Nations Publications, 2010), 90.
- 23 United Nations Conference on Trade and Development, *The Least Developed Countries Report 2007: Knowledge, Technological Learning and Innovation for Development*, (New York and Geneva: United Nations Publications, 2007), 4.
- 24 Cozzens shows the S&T as the solution to vertical and horizontal inequalities. She explains vertical inequalities as the inequalities that are related to rich-poor dimension and horizontal inequalities as the ones within culturally defined groups such as gender, ethnicity, religion, and status. Susan E. Cozzens, "Equity and Equality in STI Development for LDCs" (paper presented at the Science, Technology and Innovation: Setting Priorities and Implementing Policies for LDCs Conference organized by TÜBİTAK and UNIDO, Istanbul, February 7-8, 2011).
- 25 See the "Priority Areas for Action" described in the Fourth United Nations Conference on the Least Developed Countries, *Programme of Action for the Least Developed Countries for the Decade 2011-2020* (Doc. No. A/CONF.219/3)
- 26 UNCTAD's Least Developed Countries Reports particularly the 2007 and 2010 reports, reiterate several times the linkage between the development of productive capacities and economic growth as the key to sustainable development.
- 27 Improving production and human capacities are among the prior aims of the UN. United Nations Conference on Trade and Development, *The Least Developed Countries Report 2009: The State and Development Governance*, (New York and Geneva: United Nations Publications, 2009), 161.
- 28 United Nations Conference on Trade and Development, *The Least Developed Countries Report 2007*, 66.
- 29 The concept of 'developmental state' defines this process. United Nations Conference on Trade and Development, *The Least Developed Countries Report 2007*, 82. For detailed analysis of the concept of developmental state see Omano Edigheji, (Ed)., *Constructing a Democratic Developmental State in South Africa: Potentials and Challenges* (Cape Town: HSRC Press, 2010).
- 30 United Nations Conference on Trade and Development, *The Least Developed Countries Report 2007*, 177.
- 31 Dale relates the inefficiency of the development assistance to their narrowly defined framework and argues that the support programmes should be designed considering the possible impact of those programmes on the urgent needs of the LDCs. Reidar Dale. "The Logical Framework: An Easy Escape, a Straitjacket, or a Useful Planning Tool?", *Development in Practice* 13, No: 1 (2003): 67. Supporting this argument, Munro states that instead of designing support programmes based on specific goals and sectors, building support programmes with a certain strategy would increase the efficiency of those programmes. Lauchlan T. Munro,

“Focus-Pocus? Thinking Critically About Whether Aid Organizations Should Do Fewer Things in Fewer Countries?”, *Development and Change*, “Vol. 36, No. 3” (2005): 444.

32 United Nations Conference on Trade and Development, *The Least Developed Countries Report 2007*, 94.

33 Article 66.(2) of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) encourages developed countries to transfer technology to the LDCs in order to enable them establishing their own technological base. However, this article is not sufficient to promote an ongoing technology transfer to the LDCs since it remains obscure to define the meaning of technology transfer in addition to its lacking necessary mechanisms through which this transfer can be realized. United Nations Conference on Trade and Development, *The Least Developed Countries Report 2007*, 209. As the lack of clarity of the concept of ‘technology transfer’ prevents the practice of technology transfer from becoming continuous and effective, the lack of clarity of the concepts of scientific support and technological support can also decrease the efficiency of the development assistance provided to the LDCs. That is why, they should be defined clearly. David Simon et al., “Poverty Elimination, North-South Research Collaboration, and the Politics of Participatory Development”, *Development in Practice*, “Vol.13, No. 1” (2003): 54.

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37 Smith also states that in order to establish partnerships in the field of science and technology, a number of logistical and practical obstacles should be resolved. Smith, “Context Bound Knowledge Production”, 652.

38 Mosse argues that the LDCs should enable their people gaining an awareness of the additional responsibilities and burden that the goal of sustainable development leads to. David Mosse, “Is Good Policy Unimplementable? Reflections on the Ethnography of Aid Policy and Practice”, *Development and Change*, Vol. 35, No: 4 (2004): 639-671.

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40 Nelofar Arshad. “Building of S&T Institutions for Sustainable Development”, *Capacity Building for Science and Technology*, Commission on Science and Technology for Sustainable Development in the South (Islamabad: M/s Kamran Printers, May 2003), 64-70.

41 Fourth United Nations Conference on the Least Developed Countries. (Doc. No. A/CONF.219/3), 23.

42 Harrison shows investing on health, education, and social infrastructure appears as vital for sustainable development. Graham Harrison, “Why Economic Globalization is not Enough?”, *Development and Change* 35, No: 5 (2004):1045. Also see, Zainab H. Siddiqui and Noshin Masudand Hasibullah, “Education for Sustainable Development”, *Road to Sustainable Development*, Commission on Science and Technology for Sustainable Development in the South (Islamabad: M/s A. R. Printers, January 2006), 49-69; Khwaja Yaldrum, “Scientific Culture: A Pre-requisite for Sustainable Development”, *S&T Policies and Strategies for Sustainable Development*, Commission on Science and Technology for Sustainable Development in the South (Islamabad: M/s New United Printers, August 2008) 18-28.

43 The presence of human capital is recognized as necessary for achieving development on sustainable basis. Trevor Goddard, "Corporate Citizenship: Creating Social Capacity in Developing Countries", *Development in Practice* "Vol. 15, No. 3-4" (2005): 433.

44 Fourth United Nations Conference on the Least Developed Countries, (Doc. No. A/CONF.219/3), 45.

45 South-South cooperation indicates the willingness of the South to implement joint activities in science, while North-South cooperation that were mainly built by the Northern partners shows that the willingness of the North to assist the South. This can make establishing triangular cooperation networks much easier. Moneef R. Zou'bi. "North-South and South-South Scientific Co-Operation: Lobbying for Transformational Technologies in Decision-Making Circles", Paper presented at the COMSTAS' Meeting on South-South and South-North Collaboration in Science and Technology: Present Scenario and Future Prospects, (Islamabad, March 2004)

46 Fourth United Nations Conference on the Least Developed Countries. (Doc. No. A/CONF.219/3), 12.

47 United Nations Economic and Social Council, 36th Plenary Meeting. *Resolution 8*, (24 July 2009)

48 The full involvement, integration and participation of all groups, especially women, in the development process are significant. United Nations Conference on Trade and Development. *Paris Declaration and Programme of Action for the Least Developed Countries for the 1990s* (Doc. No. UNCTAD/RDP/LDC/58/1992), 25.

49 Fourth United Nations Conference on the Least Developed Countries. (Doc. No. A/CONF.219/3), 24.