



## SRMUN ATLANTA 2017

*Development through Dialogue: Using Global Cooperation to Build Lasting Change*

**November 16 - 18, 2017**

[unctad\\_atlanta@srmun.org](mailto:unctad_atlanta@srmun.org)

Greetings Delegates,

Welcome to SRMUN Atlanta 2017 and the United Nations Conference on Trade and Development (UNCTAD). My name is Jacob Howe, and I am serving as your Director for UNCTAD. This is my third conference on SRMUN staff. Previously, I served as the Assistant Director for the World Health Organization and General Assembly Plenary in SRMUN Atlanta 2015 and 2016, respectively. I am currently a graduate student at Boston University for Political Economy, having graduated from the University of Central Florida with my degree in International Affairs.

Our committee's Assistant Directors are Noah Vetter and Carl Morelli. This is Noah's first time on staff, but was previously a Chair for GA 1<sup>st</sup> at SRMUN Charlotte 2016. Noah is currently attending the University of North Carolina at Charlotte studying Business and International Studies. This will also be Carl's first time on committee staff. Previously, he was a Research Assistant for the Economic and Financial Affairs Council for SRMUN Charlotte 2017. In addition, Carl served as a Chair/Rapporteur for NATO at SRMUN Charlotte 2016. Carl is currently a student at the University of Florida and is studying Political Science.

UNCTAD's main objective is to increase the competitiveness of markets in developing Member States in order for them to be viable players in the global economy. Diversification, technological access, protection from financial volatility, and fair competition are some of the values that the organization works towards for all Member States. The organization also places emphasis on aiding other UN departments in meeting the Sustainable Development Goals (SDGs). UNCTAD greatly believes that cooperation and development within the private market and civil society should exist, but UNCTAD specializes in equipping governments with various preparation tools as a means to become more competitive while also staying in line with the SDGs established by the UN.

By focusing on the mission of UNCTAD and the SRMUN Atlanta 2017 theme of "*Development through Dialogue: Using Global Cooperation to Build Lasting Change*," we have established the following topics for delegates to discuss come conference:

- I: Enhancing Trade and Development to Landlocked Developing Member States through Multinational Development Projects
- II: Examining the Impacts of Additive Manufacturing on Global Trade

This background guide provides a strong introduction to the committee and its topics, and should be utilized as a foundation for the delegate's independent research. While we have attempted to provide a holistic analysis of the issues, the background guide should not be used as the single mode of analysis for the topics. Delegates are expected to go beyond the background guide and engage in intellectual inquiry of their own. The position papers for the committee should reflect the complexity of these issues and their externalities. Delegations are expected to submit a position paper and be prepared for a vigorous discussion at the conference. Position papers should be no longer than two pages in length (single spaced) and demonstrate your Member State's position, policies and recommendations on each of the two topics. For more detailed information about formatting and how to write position papers, delegates can visit [srmun.org](http://srmun.org). ***All position papers MUST be submitted no later than Friday, October 27, 2017 by 11:59pm EST via the SRMUN website.***

**UNCTAD at SRMUN Atlanta 2017 will be a report writing committee.** Delegates are encouraged to visit the SRMUN Website for report writing preparation materials. We are enthusiastic about serving as your dais, wish you all the best of luck in your conference preparation, and look forward to working with you in the near future. Please feel free to contact our Deputy Director-General Keith Brannum, Noah, Carl or myself if you have any questions while preparing for the conference.

Jacob Howe  
Director  
[unctad\\_atlanta@srmun.org](mailto:unctad_atlanta@srmun.org)

Noah Vetter and Carl Morelli  
Assistant Directors  
[unctad\\_atlanta@srmun.org](mailto:unctad_atlanta@srmun.org)

Keith Brannum  
Deputy Director-General  
[ddg\\_atlanta\\_economics@srmun.org](mailto:ddg_atlanta_economics@srmun.org)

## History of the United Nations Conference on Trade and Development

The United Nations Conference on Trade and Development (UNCTAD) was established in 1964 as a principal organ of the United Nations (UN) to address trade, investment, and development policies. It reports to the UN Secretariat, General Assembly, and Economic and Social Council; yet maintains its own leadership. For 2012-2013, the annual budget for the organization totaled approximately USD 108 million.<sup>1</sup> UNCTAD's main goals are to "maximize the trade, investment and development opportunities of Member States and assist them in their efforts to integrate into the world economy on an equitable basis."<sup>2</sup> The conference convenes every four years in Geneva, with the primary objective to formulate policies relating to all aspects of development including trade, aid, transport, finance and technology. Currently, the organization is overseen by Secretary-General Mukhisa Kituyi. Secretary-General Kituyi is a former Trade Minister from Kenya. He was nominated for his position in 2013 and will be serving in the position until the end of 2017. A unique quality of UNCTAD that differentiates itself from other development organizations is that it operates mainly as a consultative body. The organization specializes in providing technical advice to Member States and other organs of the UN while involving itself minimally with field work. The organization believes that policy making backed by research, as well as open forums for constructive dialogues, is important for technical assistance to transition to positive changes on the ground.<sup>3</sup>

During the 1950s and 1960s, many developing Member States received their independence from their respective colonial powers and expected to experience strong economic growth, but instead witnessed lower economic performance. UNCTAD was formed in part out of frustration by developing states who felt underrepresented in United Nations' bodies like the Economic and Social Council (ECOSOC) and the General Assembly Second Committee (Economic and Financial).<sup>4</sup> After the UN failed to create the International Trade Organization, members of what became the Group of 77 (G77) urged the creation of a conference addressing trade and development.<sup>5</sup> They desired a forum that would give voice to the needs of developing states. In the first meeting of UNCTAD, Member States of both UNCTAD and the G77 released the "Joint Declaration of the Seventy-Seven Developing Countries."<sup>6</sup> The initial agenda of UNCTAD revolved around providing an international framework for commodity agreements, providing supplementary financing, and demanding preference in developed markets for the industrial exports of developing Member States.<sup>7</sup>

UNCTAD has a unique organizational structure compared to most UN bodies and is made up of smaller commissions comprised of the Trade and Development Board (TDB) which meets annually in September and up to three other times throughout the year. The board meets to address policy issues such as trade policies, management, and institutional concerns. The TDB also has two subsidiary commissions who meet once a year and then report to the TDB: The Commission on Trade and Development and the Commission on Investment, Enterprise and Development.<sup>8</sup> UNCTAD's Secretariat is broken into five divisions: the Division for Africa, Least Developed Countries (LDCs) and Special Programmes, Division on Globalization and Development Strategies, Division on Investment and Enterprise, Division on International Trade in Goods and Services, and Commodities, and the Division on Technology and Logistics.<sup>9</sup> These divisions work to support the organization's Secretariat and carry out the substantive work of the committee.<sup>10</sup>

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<sup>1</sup> A/66/6. *Proposed programme budget for the biennium 2012-2013 Part IV, International cooperation for development, Section 12, Trade and development*. United Nations General Assembly.  
[http://www.un.org/ga/search/view\\_doc.asp?symbol=A/66/6\(Sect.12\)](http://www.un.org/ga/search/view_doc.asp?symbol=A/66/6(Sect.12)) (accessed April 4, 2017).

<sup>2</sup> "UNCTAD's Programme Budget and Financing of Technical Cooperation Activities," UNCTAD,  
<http://unctad.org/en/Pages/About%20UNCTAD/Programme-Budget.aspx> (accessed August 23, 2017)

<sup>3</sup> Gardner, Richard N. "The United Nations Conference on Trade and Development." *International Organization* 22, no. 1 (1968): 99-130. <http://www.jstor.org/librarylink.uncc.edu/stable/2705826>. (accessed June 2, 2017).

<sup>4</sup> Ibid.

<sup>5</sup> John Toye, "Assessing the G77: 50 years after UNCTAD and 50 years after the NIEO," *Third World Quarterly* 35, no. 10 (2014): 1759-1774.

<sup>6</sup> *Message by Mr. Rubens Ricupero Secretary-General of UNCTAD to the Special Ministerial Meeting to commemorate the 40th anniversary of the Group of 77*. UNCTAD. 11 June 2004.

<sup>7</sup> Masoumed Sahami, "UNCTAD's history, mission, and structure," Induction Course 2012. UNCTAD,  
[http://unctad.org/meetings/en/Presentation/indcourse2012\\_ISS\\_en.pdf](http://unctad.org/meetings/en/Presentation/indcourse2012_ISS_en.pdf)

<sup>8</sup> "Organization," UNCTAD <http://unctad.org/en/pages/organization.aspx>. (accessed July 1, 2017).

<sup>9</sup> Ibid.

<sup>10</sup> Panitchpakdi, Supachai. "Secretary-General of UNCTAD, Opening Address to JAG." Address, Opening Remarks for 46th Session of ITC, May 21, 2012.

Current UNCTAD policy is primarily guided by the Addis Ababa Action Agenda (AAAA) and the Sustainable Development Goals (SDGs).<sup>11</sup> The AAAA was released in July 2015 during the Third International Conference for Financing Development.<sup>12</sup> The document highlights the need for sustainable methods that respect human rights, while also emphasizing the role that UNCTAD has in implementing these values through its focus in the areas of finance, technology, investment, and sustainable development.<sup>13</sup> The AAAA also upholds ECOSOC's "Financing for Development," which requests increased UN Secretariat support in previous Finance and Development Conferences in order to assure the agreements and commitments are met.<sup>14</sup>

UNCTAD has contributed towards progressing 10 out of the 17 SDGs.<sup>15</sup> Secretary-General Kituyi highlighted the need to focus on building productive capacity, reducing corruption, increasing marketing efficiency and resilience, tackling vulnerabilities, and strengthening multilateralism.<sup>16</sup> The most recent conference was UNCTAD XIV held in Nairobi, Kenya in July 2016.<sup>17</sup> The conference emphasized the need to continue developing solutions for the targets laid out in the SDG's and the AAAA inside of the conference's Presidential Report.<sup>18</sup> A particular point of interest of the conference was the request from representatives for UNCTAD to help implement international conventions into trade agreements, decrease trade blocs ability to decrease market access for states outside of trade agreements, mobilize resources to support targets for SDG goal 17, and to further cooperate with other organizations to increase trade, development, and investment to reduce market constraints and to help increase private market access.<sup>19</sup>

While UNCTAD does not normally conduct field work, they do effectively coordinate with governments to aid in various development projects. A noteworthy project that UNCTAD has been involved in is its "Trade Facilitation" initiative.<sup>20</sup> Since the global environment is currently at a point of relatively low tariffs, the most common hurdle for developing states to overcome lies within administrative hurdles. It is estimated that over 75% of delays of shipments are caused from complicated border procedures.<sup>21</sup> In 2013, the WTO adopted an Agreement on Trade Facilitation that set the guidelines for reducing these issues in order to reduce transaction costs and red tape.<sup>22</sup> Under the Trade Facilitation Programme, UNCTAD has been working with states that are still not in compliance with the guidelines set forth by the WTO.<sup>23</sup> UNCTAD utilizes a complex, yet accommodating system to help integrate noncomplying Member States' trade, transit, and transportation laws and codes.

Due to its ability to analyze vast amounts of data and produce original research, UNCTAD provides unique and vital contributions to both the United Nations and global trade. With all Member States of the United Nations represented inside of the organization, the organization makes credible progress towards developing governments and private sectors that will integrate policy that reduces poverty while protecting environmental standards. Still, UNCTAD is only a consultative and report writing body. Member States are free to ignore any recommendations put forth by the organization. UNCTAD will have to continue to try to find innovative ways to positively affect economic growth in the developing world if it hopes to convince Member States to adopt its recommendations.

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<sup>11</sup> Ibid.

<sup>12</sup> *The Addis Ababa Action Agenda*. Third Conference of Finance and Development. July 13-16, 2015. pgs. 1-2.

<sup>13</sup> Ibid.

<sup>14</sup> "Financing For Development," Department of Economic and Social Affairs, <http://www.un.org/esa/ffd/overview/missionstatement.html> (accessed August 24, 2017).

<sup>15</sup> "UNCTAD delivers on the Sustainable Development Goals," UNCTAD, <http://unctad.org/en/Pages/About%20UNCTAD/UNCTAD-and-the-Global-Goals.aspx> (accessed 22 August, 2017).

<sup>16</sup> Ibid.

<sup>17</sup> *Report of the United Nations Conference on Trade and Development on its Fourteenth Session*. UNCTAD. 15 September, 2016. p. 1.

<sup>18</sup> *Report of the United Nations Conference on Trade and Development on its Fourteenth Session*. UNCTAD. 15 September, 2016. p. 4.

<sup>19</sup> Ibid.

<sup>20</sup> "Trade Facilitation," UNCTAD, <http://unctad.org/en/Pages/DTL/TTL/Trade-Facilitation.aspx> (accessed June 4, 2017).

<sup>21</sup> "WTO Trade Facilitation Agreement entry into force – What next," UNCTAD, [http://unctad.org/en/pages/newsdetails.aspx?OriginalVersionID=1418&Sitemap\\_x0020\\_Taxonomy=Trade%20Facilitation;#1721;#Transport;#20;#UNCTAD Home;#1450;#Technology and Logistics](http://unctad.org/en/pages/newsdetails.aspx?OriginalVersionID=1418&Sitemap_x0020_Taxonomy=Trade%20Facilitation;#1721;#Transport;#20;#UNCTAD%20Home;#1450;#Technology%20and%20Logistics) (accessed August 23, 2017).

<sup>22</sup> Ibid.

<sup>23</sup> Ibid.

## I: Enhancing Trade and Development to Landlocked Developing Member States through Multinational Development Projects

*“Development is entirely possible everywhere. But to develop, to transform the fabric of one's economy and to modernize, it is critically important to, on the one hand, tackle one's handicaps and, on the other hand, fully exploit the opportunities for sustained growth.”*<sup>24</sup>

-UNCTAD Deputy Secretary-General Joakim Reiter

### Introduction

Landlocked developing countries (LLDCs) are Member States that lack territorial access to the sea, and as a result face unique challenges when participating in international trade.<sup>25</sup> Currently, there are 31 Member States that are classified as LLDCs: fifteen located in Africa, twelve in Asia, two in Latin America, and two in Europe.<sup>26</sup> These Member States face economic challenges in accessing trade and development related to their lack of direct territorial access to the sea, remoteness, and isolation from global markets. Geographical factors have a profound impact on the capability of LLDCs to effectively integrate into the global network of economic systems; since their domestic economies rely heavily on land transportation via trucks, trains, and canals. These systems of transportation stunt economic growth in LLDCs, due to weak infrastructure, lack of paved roads, and poor conditions of road and railways.<sup>27</sup>

For LLDCs to facilitate international trade, domestic goods must travel through at least one or more neighboring Member States. As a result of their dependence on surrounding Member States, LLDCs face very high transit costs. When compared to the average developing Member State, transportation costs in LLDCs are double their export earnings and three times more than the average developed Member State.<sup>28</sup> In 2014, the average cost for LLDCs to export and import a shipping container was USD \$3,433 and USD \$4,343, while transit in developing Member States averaged USD \$1,301 and USD \$1,559.<sup>29</sup> High transportation costs negatively impact the economies of LLDCs, as it increases the prices of all imported consumer goods and undermines the competitiveness of their exports in foreign markets. Those bordering LLDCs may place large tariffs, use currencies with high exchange rates, and promote unfair transport policies, to sustain a more competitive economy and compete with Non-LLDCs.<sup>30</sup> These unfair trade practices reduce the international competitiveness of LLDCs in the global market, since the extremely high costs for transportation often outweigh the minimal profits that cannot be guaranteed. Over time, Member States suffer from stagnant economic growth and lack the necessary investments to maintain the infrastructure, healthcare, and education systems in place. These characteristics are unfavorable for foreign Member States that invest in LLDCs, since the root of the problem cannot be solved by their sole involvement, and require additional international support.<sup>31</sup>

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<sup>24</sup> Reiter, Joakim. "Fifth Meeting of Trade Ministers of Landlocked Developing Countries," Fifth Meeting of Trade Ministers of Landlocked Developing Countries. June 23, 2016.

<http://unctad.org/en/pages/SGStatementDetails.aspx?OriginalVersionID=212>. (accessed August 22, 2017).

<sup>25</sup> "Landlocked Developing Countries (LLDCs)," UNOHRLLS, [http://unohrrls.org/UserFiles/File/UN\\_LLDCs\\_Factsheet.pdf](http://unohrrls.org/UserFiles/File/UN_LLDCs_Factsheet.pdf) (accessed August 26, 2017).

<sup>26</sup> "Landlocked Developing Countries (LLDCs)," UNCTAD, <http://unctad.org/en/Pages/ALDC/Landlocked%20Developing%20Countries/UN-recognition-of-the-problems-of-land-locked-developing-countries.aspx>. (accessed April 1, 2017).

<sup>27</sup> "Landlocked Developing Countries," United Nations Information Service, <http://www.unis.unvienna.org/unis/en/topics/lldc.html> (accessed April 1, 2017).

<sup>28</sup> "The Way To The Ocean: Transit corridors servicing the trade of landlocked developing countries," United Nations Conference on Trade and Development, 2013, [http://unctad.org/en/PublicationsLibrary/dtlb2012d1\\_en.pdf](http://unctad.org/en/PublicationsLibrary/dtlb2012d1_en.pdf) pgs. 2-8, (accessed 03 July, 2017).

<sup>29</sup> "Landlocked Developing Countries (LLDCs) Factsheet," United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, [http://unohrrls.org/custom-content/uploads/2017/03/LLDCs-Fact-Sheet\\_2017\\_REVISED.pdf](http://unohrrls.org/custom-content/uploads/2017/03/LLDCs-Fact-Sheet_2017_REVISED.pdf) (accessed July 1, 2017)

<sup>30</sup> Uprety, K. (1970, January 01). The Transit Regime for Landlocked States: International Law and Development Perspectives. <https://openknowledge.worldbank.org/handle/10986/7405> p. 15. (accessed June 1, 2017).

<sup>31</sup> Ibid.

### *What has been done by the United Nations?*

In 2003, the United Nations General Assembly convened the International Ministerial Conference of Landlocked and Transit Developing Countries.<sup>32</sup> During their first conference the Almaty Programme of Action was adopted by the International Ministerial Conference of Landlocked and Transit Developing Countries.<sup>33</sup> This adoption mandated a ten-year programme and created a global partnership between the United Nations, donor Member States, international financial institutions, and international development institutions.<sup>34</sup> The overarching mission of the programme was to integrate LLDCs into the international trading system, and creating a global framework for developing efficient transit support systems in LLDCs.<sup>35</sup> To achieve this mission the Almaty Programme of Action recommended Member States to focus on the priority areas of: fundamental transportation development policies, infrastructure development and maintenance, international trade and trade facilitation, interpersonal support measures, and implementation and review.<sup>36</sup> The Almaty Programme of Action addressed the individual needs of LLDCs with a New Global Framework, allowing LLDCs to use developmental assistance to build groundwork for sustainability. The Programme had some success, however, after 10 years there is still much work to be done. One achievement was moderate economic growth in LLDCs, as seen by an increased average gross domestic product (GDP) of 4.5 percent in 2003 to 6.3 percent in 2013.<sup>37</sup> Average shipping times for LLDCs to import and export were reduced by 10 percent and 7 percent, respectively.<sup>38</sup> Economic improvements in LLDCs were made from the increased investments in open access infrastructure.<sup>39</sup> However, there is still much room for improvement, as the average per capita GDP in 2/3 of LLDCs remain well below USD 1,000, and 50 percent of all LLDCs are still in the lowest ranking in the human development index.<sup>40</sup>

In preparation for the Second United Nations Conference on Landlocked Developing Countries in 2014, UNCTAD published *Landlocked Developing Countries: Facts and Figures*.<sup>41</sup> This publication presented key economic, social and trade information on all 31 LLDCs with the goal showing developmental challenges using benchmarks. At this conference, the Body adopted the Vienna Programme of Action for Landlocked Developing Countries for the Decade 2014-2024.<sup>42</sup> The objective of this document was to further develop the groundwork in the Almaty Programme by continuing to address the development needs of LLDCs. The Vienna Programme of Action also led to the creation of new sustainable growth objectives known as Sustainable Development Goals (SDGs) which were developed in accordance with the UN's 2030 Agenda for Sustainable Development. The core goal of the Vienna Programme of Action is to focus on increasing trade, structural transformation, and regional cooperation through the expansion of efficient transit systems and transport development.<sup>43</sup> In order to address these core goals, individual objectives were established to create efficient transport systems that are cost-effective to and from the sea and are easily accessible. Regulations will be simplified and standardized to reduce trade and transit costs, as well as improve international trade. LLDCs will develop transport infrastructure networks to fix the missing links that will connect them to other Member States. Bilateral, regional, and international legal instruments will be implemented to

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<sup>32</sup> A/58/388. *International Ministerial Conference of Landlocked and Transit Developing Countries*. United Nations General Assembly. (accessed June 29, 2017).

<sup>33</sup> Ibid.

<sup>34</sup> E/ESCAP/72/2. *Regional implementation of the Vienna Program of Action for Landlocked Developing Countries for the Decade 2014-2024*. United Nations Economic and Social Commission for Asia and the Pacific. (accessed June 31, 2017).

<sup>35</sup> Ibid.

<sup>36</sup> Ibid.

<sup>37</sup> A Report of the International Ministerial Conference of Landlocked and Transit Developing Countries and Donor Countries and International Financial and Development Institutions on Transit Transport Cooperation, Almaty, Kazakhstan, 28 and 29 August 2003. (accessed June 15, 2017).

<sup>38</sup> "Vienna Program of Action for Landlocked Developing Countries for the Decade 2014-2024," United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, <https://www.unohrrls.org/custom-content/uploads/2015/03/Vienna-Programme-of-Action.pdf> (accessed June 15, 2017).

<sup>39</sup> Ibid.

<sup>40</sup> "Landlocked Developing Countries" United Nations Information Service. <http://www.unis.unvienna.org/unis/en/topics/lldc.html> (accessed August 20, 2017).

<sup>41</sup> *Landlocked Developing Countries: Facts and Figures, 2014*. United Nations Conference on Trade and Development. [http://unctad.org/en/PublicationsLibrary/aldc2014d1\\_en.pdf](http://unctad.org/en/PublicationsLibrary/aldc2014d1_en.pdf)

<sup>42</sup> Vienna Programme of Action for Landlocked Developing Countries for the Decade 2014-2024. United Nations General Assembly. November 5, 2014. (accessed June 17, 2017).

<sup>43</sup> Ibid.



strengthen regional integration. In order to foster global trade, increasing participation in structural transformation can enhance productive capacity development, value addition, diversification, and reduce dependency on commodities.<sup>44</sup> International support for LLDCs will be strengthened to address the needs and challenges arising from landlockedness, in order to reduce poverty and increase sustainable development.<sup>45</sup>

### *What are the priorities of UNCTAD?*

At the Fifth Meeting of Trade Ministers of Landlocked Developing Countries in 2016, UNCTAD Deputy Secretary-General Joakim Reiter spoke on the vital importance of addressing the handicap of high trade costs in LLDCs.<sup>46</sup> In order for LLDCs to achieve the SDGs, Member States must use trade to produce inclusive growth and development through harnessing the potential of trade demands: regional infrastructure, integration into global value chains (GVC), and efforts on trade facilitation.<sup>47</sup> UNCTAD urges Member States to consider all aspects of economic expansion including: policy, trade, aid, transport, finance, and technology, to maximize the investment and development of LLDCs.<sup>48</sup>

Global value chains (GVCs) are the international exchange of intermediate goods and services that are fragmented production processes.<sup>49</sup> GVCs are attractive for both investment and commerce for development, because they are coordinated by multinational corporations who conduct cross-border trade of imports and exports. Transnational corporations trade within networks of affiliates, contractual partners, and suppliers based on the close proximity of their geographical location. UNCTAD observed that Member States with greater exposure to foreign direct investment (FDI) relative to the size of their economies have a more active role in GVCs and generate more domestic value from trade. This is seen in developing Member States, as value added trade results in a 30 percent increase to their GDP on average, while developed Member States only see an average of 18 percent. UNCTAD also observes a positive correlation between participation in GVCs and growth rates of GDP per capita, since GVCs have a direct economic impact on value added, jobs, and income.<sup>50</sup> In order for LLDCs to integrate into GVCs, UNCTAD must assist Member States in making productive investments.

When compared to their non-landlocked counterparts, LLDCs have historically seen low economic growth due to decreased foreign direct investment (FDI) and lack of participation in globalized trade and production. UNCTAD defines FDI as a long-term investment in enterprises operating outside the economy of the investor, and believes that LLDCs can attract foreign investments by expanding their connectivity to regional markets.<sup>51</sup> In LLDCs where access to financial resources is lacking, FDI can accelerate economic development and international trade. Regional markets are vital for LLDCs, since the fragmentation of GVCs allows LLDCs to profit from value chains. LLDCs use regional integration to create a competitive advantage in the specialized production of a goods or service. Over the past few years the need for FDI has become a major challenge. The year 2016 marked the fifth consecutive year that regional investment trends to LLDCs decreased.<sup>52</sup> Since 2015, FDI to LLDCs has decreased by 20 percent from USD \$29.7 billion to USD \$24 billion.<sup>53</sup> LLDCs must also promote the connectivity of regional markets through

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<sup>44</sup> Ibid.

<sup>45</sup> "Vienna Program of Action for Landlocked Developing Countries for the Decade 2014-2024," United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, <https://www.unohrrls.org/custom-content/uploads/2015/03/Vienna-Programme-of-Action.pdf> (accessed July 1, 2017).

<sup>46</sup> Reiter, Joakim. "Harnessing the Trade Potential of the LLDCs to implement the Vienna Programme of Action and Agenda 2030." United Nations Conference on Trade and Development. June 23, 2016. <http://unctad.org/en/pages/SGStatementDetails.aspx?OriginalVersionID=212> (accessed April 1, 2017).

<sup>47</sup> Ibid.

<sup>48</sup> "Landlocked Developing Countries (LLDCs) Factsheet," United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, 2013, <http://unohrrls.org/custom-content/uploads/2013/09/Landlocked-Developing-Countries-Factsheet-2013.pdf> (accessed May 7, 2017).

<sup>49</sup> *World Investment Report 2013*. United Nations Conference On Trade And Development. Washington, DC: United Nations. 2013.

<sup>50</sup> Ibid.

<sup>51</sup> *Trade, Trade Facilitation, and Transit Transport Issues For Landlocked Developing Countries*. Global Event of Landlocked Developing Countries and Transit Countries on Trade and Trade Facilitation: 42-43. <http://unohrrls.org/UserFiles/File/Elle%20Wang%20Uploads/LLDCs%20Publication.pdf>. (accessed August 21, 2017).

<sup>52</sup> Ibid

<sup>53</sup> Ibid.

regional integration, as 60 percent of world trade now consists of intermediate goods and services.<sup>54</sup>

Integration into regional and global value chains can be accomplished from the UNCTAD trade facilitation assistance. Trade facilitation is the simplification, modernization and harmonization of export and import processes by using international economic policy to reduce trade costs and administrative burdens.<sup>55</sup> UNCTAD has taken a strong stance in support of trade facilitation and the breakdown of all unfair barriers of trade. Foreign investors look favorably upon laissez faire economic conditions, since it reduces profits that would be lost and allows fluidity in international trade.<sup>56</sup> UNCTAD assists Member States in identifying their trade and transport needs, and helps them implement measures to facilitate trade and transport. UNCTAD also hosts workshops, publishes relevant information and training materials, and provides technical assistance in various projects.<sup>57</sup> UNCTAD supports trade facilitation in LLDCs by using the Automated System for Customs Data (ASYCUDA), a management system for international trade and transport operations.<sup>58</sup> The ASYCUDA Programme allows investors and customs administrations to streamline international standards on imports, exports, and transit. As exemplified by Zambia, who implemented ASYCUDA in 1997 to bring a modern data processing system into boarder customs for the purpose of faster clearance of cargo, the program resulted in improved revenue controls, and accurate information on all imports, exports, and transit.<sup>59</sup> The addition of ASYCUDA led to significant improvements in Zambian control on trade flows and custom duties, and their ability to produce reliable data for economic policy. Using ASYCUDA has decreased corruption in illegal bribery and smuggling at customs stations.<sup>60</sup> The ASYCUDA system has also helped increase customs revenue and reduce transit time at borders.

### ***Multinational Development Project in Africa***

Multinational developmental projects are vital for LLDCs lacking the financial independence to jumpstart infrastructure development. The African Development Bank (AFDB) focuses on regional integration in African economies that are too small and fragmented to achieve economies of scale on their own. UNCTAD often formulates policy recommendations and works together with entities like the AFDB, who uses regional integration to pool resources together and enlarges markets, stimulate national production, trade, and investment. Regional integration creates a mutually beneficial situation where LLDCs benefit from improved access to new markets, while neighboring Member States gain additional business in its ports and transport services. An example of regional integration is a joint project of AFDB and the World Bank to fund major upgrades to the African Northern Transport Corridor, an integrated multimodal transport network of road, rail, gas pipeline and inland water transport. The function of this corridor is to advance internal and external trade using transport and logistics by providing a gateway for LLDCs to competitively reach new markets.<sup>61</sup> The total cost for the northern corridor was USD \$190.5 million. The main financiers of the project were the AFDB and World Bank who contributed USD \$46.4 million and USD \$138.1 respectfully.<sup>62</sup> The northern corridor addressed LLDCs lack of direct access to sea by creating a transportation link to the landlocked Member States of Burundi, Democratic Republic of the Congo, Rwanda, and

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<sup>54</sup> Economic Report of the President: transmitted to the Congress, February 2010, together with the annual report of the Council of Economic Advisers. Washington, DC: US Govt. Printing Office, 2010.

<sup>55</sup> "Trade facilitation," World Trade Organization, [https://www.wto.org/english/tratop\\_e/tradfa\\_e/tradfa\\_e.htm](https://www.wto.org/english/tratop_e/tradfa_e/tradfa_e.htm) (accessed May 17, 2017).

<sup>56</sup> "Foreign Direct Investment for Development: Maximizing Benefits, Reducing Costs," Organization For Economic Co-Operation and Development, <https://www.oecd.org/investment/investmentfordevelopment/1959815.pdf> (accessed May 20, 2017).

<sup>57</sup> "Trade Facilitation," United Nations Conference on Trade and Development. <http://unctad.org/en/Pages/DTL/TTL/Trade-Facilitation.aspx> (accessed May 25, 2017).

<sup>58</sup> "Customs Automation - ASYCUDA," United Nations Conference on Trade and Development, <http://unctad.org/en/Pages/DTL/TTL/ASYCUDA-Programme.aspx> (accessed May 25, 2017).

<sup>59</sup> TD/B/WP/224. *In-depth evaluation of UNCTAD's technical cooperation activities dedicated to least developed countries, landlocked developing countries, Small Island developing States and other structurally weak, vulnerable and small economies*. United Nations Conference on Trade and Development. (accessed June 1, 2017).

<sup>60</sup> Ibid.

<sup>61</sup> "The Development of Trade Transit Corridors in Africa's Landlocked Countries" <http://www.mcli.co.za/mcli-web/downloads/ARIA4/chap7.pdf> (accessed June 5, 2017).

<sup>62</sup> *Multinational Institutional Support for East Africa Trade and Transport Facilitation Project: Appraisal Report*. African Development Fund, October 2006, <https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/MN-2006-123-EN-ADF-BD-WP-MULTINATIONAL-AR-INST-SUPPT-FOR-EAST-AFRICA-TRADE-TRANSPORT-FACILITATION-PROJECT.PDF>

Uganda to the Kenyan seaport of Mombasa. Intra-regional trade has improved significantly in these LLDCs, increasing 50 percent from 2009 to 2014.<sup>63</sup> The corridor has also promoted cost-saving measures by establishing a policy for a single customs territory (SCT). LLDCs greatly benefit from trade facilitation where SCT is implemented, because it helps promote efficiencies to expand local trade and facilitates public-private sector growth.<sup>64</sup> This is accomplished by eliminating “the cost of doing business” in road transit, as costly redundancies and regulatory requirements are eliminated, resulting in decreased transport time for both trucking and shipping, reduced transport costs, and increasing traffic volume.<sup>65</sup>

In 2014, UNCTAD published its review on Zambia’s implementation of investment policy and found successful trends that can be implemented in other LLDCs. The Zambia Development Agency (ZDA) was established to facilitate foreign business and enterprise development.<sup>66</sup> The ZDA reduced licensing requirements of investors and became the sole entity to streamline and oversee company registration procedures.<sup>67</sup> The Bank of Zambia promoted finance and macroeconomic policy by creating policies to minimize the cost of borrowing by reducing interest rates and partial reduction of tax rates.<sup>68</sup> These policy reforms resulted in decreased inflation rates and a stabilized exchange rate. Improved infrastructure was seen from the reducing licensing fees for telecommunication services to increase competition in voice and data services.<sup>69</sup> All of these reforms reflect the cooperation between government policy and private sector development, collectively tripling average FDI inflows from \$600 million USD in 2006 to \$1.8 billion in 2012.<sup>70</sup>

The largest concern of UNCTAD is that LLDCs face isolation from international markets, exorbitant transit costs, and inadequate infrastructure due to the economic handicap of no direct access to maritime ports.<sup>71</sup> Even when LLDCs can legally access the sea through neighboring Member States, outrageous shipping costs and long wait times often significantly reduce profit. To address challenges in maritime access, LLDCs must promote regional infrastructure to transport corridors and enhanced connectivity at the national and regional levels. Sustainable transport for Member States would promote both economic and social development in a way that is safe, affordable, accessible, and efficient. Currently only nine LLDCs have greater than 50 percent of their roads paved.<sup>72</sup> The development of infrastructure, combined with regional transport policy are ways in which Member States can address LLDCs’ lack of access to sea. An integration of regional infrastructure provides the opportunity to improve growth and development through reducing transaction costs, increasing trade and investment, expanding economic diversification, and achieving economies of scale. UNCTAD emphasizes the importance for the creation of international public-private partnerships as a means of financing sustainable transport systems in LLDCs.<sup>73</sup> In recent years, regional development banks (RDBs) are becoming increasingly popular source for funding. Many completed infrastructure development projects have been successfully financed by RDBs. Some of the most prominent projects have been funded by the: AfDB, Asian Development Bank (ADB), Inter-American Development Bank (IADB), and the European Investment Bank (EIB).<sup>74</sup>

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<sup>63</sup> Impact Assessment of Northern Corridor Performance Improvement Activities: Prepared for Northern Corridor Transit and Transport Coordination Authority (NCTTCA), Canadian Pacific Consulting Services, May 2015, [http://www.ttcanc.org/documents/Impact\\_AssessStudy.pdf](http://www.ttcanc.org/documents/Impact_AssessStudy.pdf) (accessed June 6, 2017).

<sup>64</sup> Ibid.

<sup>65</sup> Memo Beatrice, “Single Customs Territory - The East African Community Model,” Kenya Customs, [https://www.eiseverywhere.com/file\\_uploads/e26c1737987db648d42027e2c9149ae1\\_D2RT2BeatriceMemo.pdf](https://www.eiseverywhere.com/file_uploads/e26c1737987db648d42027e2c9149ae1_D2RT2BeatriceMemo.pdf) (accessed July 6, 2017).

<sup>66</sup> *Report on The Implementation of the Investment Policy Review*. United Nations Conference on Trade and Development, [http://unctad.org/en/PublicationsLibrary/diaepcb2014d2\\_en.pdf](http://unctad.org/en/PublicationsLibrary/diaepcb2014d2_en.pdf) (accessed July 6, 2017).

<sup>67</sup> Ibid.

<sup>68</sup> Ibid.

<sup>69</sup> Ibid.

<sup>70</sup> Ibid.

<sup>71</sup> “Landlocked Developing Countries Factsheet,” United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, <http://unohrrls.org/custom-content/uploads/2013/09/Landlocked-Developing-Countries-Factsheet-2013.pdf> (accessed July 7, 2017).

<sup>72</sup> Ibid.

<sup>73</sup> Ibid.

<sup>74</sup> TD/B/C.I/MEM.6/2, *Supporting Infrastructure Development to Promote economic Integration: the role of public and private sectors*. United Nations Conference on Trade and Development. (accessed June 20, 2017).



## ***Conclusion***

When compared to their developed counterparts, LLDCs have historically seen low economic growth due to decreased foreign investment and lack of participation in globalized trade. The implications of being an LLDC are severe because production, input use, consumption, and exportation are all influenced by the cost and reliability of transport to and from surrounding Member States. In order to solve these issues, Member States must address landlockedness as the obstacle to development that it is. Multinational projects can be used to reduce transport costs in LLDCs and increase levels of trade. This would lead to economic growth and increased sustainability in Member States who have historically been unable to prosper in international trade. Reduced transport costs deflate the prices of imported goods in LLDCs while strengthening the competitiveness of their exports in foreign markets. Similarly, low costs of transportation in LLDCs reduce their import costs and increase export earnings.<sup>75</sup> Transport costs are also directly related to inadequate infrastructure and policy in LLDCs.<sup>76</sup> The main causes for the LLDCs' disappointing development performance are related to inadequate facilitation of trade and transport connectivity. Member States should consider ways to integrate trade and transport connectivity to create international policy that is symbiotic for LLDCs and their investors.

## ***Committee Directive***

While preparing research, delegates should consider the goal of our conference theme to promote “*development through dialogue, using global cooperation to build lasting change.*” Delegates should come prepared with knowledge of the 2015-2030 Sustainable Development Goals and the ability to relate specific goals to problems that fall under UNCTAD's mandate. Delegates should also understand the central elements of UNCTAD and its influence in intergovernmental organizations, nongovernmental organizations, and private parties. Consideration should be placed in identifying how Member States, specifically landlocked developing ones, can promote trade facilitation to enhance trade and development. In order for Member States to best meet the individual needs of LLDCs, delegates must research what has led to the current state of economic, transport, political, and foreign affairs in LLDCs. Delegates should ask themselves what their Member State has done to enhance trade and development. Do Member States have best practices that can be shared and implemented into those Member States without? What was the economic impact and what were the results in Member States? What is the best way to facilitate trade between LLDCs and their surrounding Member States? What are the potential benefits that can entice surrounding Member States to cooperate with LLDCs?

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<sup>75</sup>LLDC/2003/8. *Challenges and Opportunity for Further Improving the Transit Systems and Economic Development of Landlocked and Transit Developing Countries*. United Nations Conference on Trade and Development. New York and Geneva: United Nations. 2003. (accessed July 21, 2017).

<sup>76</sup> UNCTAD, *The Least Developed Countries Report ii* (United Nations 1986).

## II. Examining the Impacts of Additive Manufacturing on Global Trade

### *Introduction*

Additive manufacturing (AM), most widely known as three-dimensional (3D) printing, is an emerging production technology.<sup>77</sup> While still in the growth phase, AM processes are likely to revolutionize our approaches to manufacturing, utilized since the beginning of the Industrial Revolution. As the technology continues to develop and manufacturers integrate AM into existing production models, AM has the capacity to remake the global economy at both the macro- and micro- levels. AM will not only dramatically change the consumer market and the models of production used by manufacturers, but it will also affect trade relationships between Member States.<sup>78</sup> With its potential for change, it is important to begin examining AM, its benefits, challenges, and its potential impacts on the global economy.

### *History*

AM is the process of combining materials, layer upon layer, based on three-dimensional modeling data to form a product.<sup>79</sup> This is in contrast with traditional manufacturing processes such as machining and casting and subtractive manufacturing, in which pieces are cut away from a larger block of material.<sup>80</sup> AM comes in many forms, including three dimensional (3D) printing, stereolithography (SL), fused deposition modeling (FDM), and selective laser sintering (SLS).<sup>81</sup> The first AM system, a stereolithography apparatus, was patented in 1986. However, it was not until the late 2000s that AM technologies started to become readily available to smaller companies and individuals. In 2007, the first 3D printing system priced below USD \$10,000 was brought to market.<sup>82</sup> Since then, the market for AM technologies has expanded with more inexpensive models readily available to consumers for the creation of small prototypes and designs. While also expanding into the consumer market, AM technologies have become cheaper and more efficient for commercial use, making them an increasingly appealing alternative to traditional manufacturing systems.

To this point, AM has been used primarily to develop prototypes in a process known as Rapid Prototyping.<sup>83</sup> Rapid Prototyping allows designers to create individual models prior to large-scale production. Early AM technology was limited to prototyping, because techniques did not allow for the synthesizing of traditional manufacturing materials such as metals and polymers.<sup>84</sup> In 2014, products made using AM made up less than one percent of the total products manufactured in the United States.<sup>85</sup> However, with the rapid development of AM technologies, its uses in large-scale manufacturing are becoming more prevalent, and could serve as a replacement to the traditional manufacturing techniques established in the 1900s, such as the Ford-based assembly line.<sup>86</sup> AM's role will become

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<sup>77</sup> "History of 3D Printing," 3D Printing Industry, <https://3dprintingindustry.com/3d-printing-basics-free-beginners-guide/history/> (accessed April 16, 2017).

<sup>78</sup> Swedish National Board of Trade "Trade Regulation in a 3D Printed World" (2016), [http://unctad.org/meetings/en/Contribution/dtl\\_eweeek2016\\_Kommerskollegium\\_en.pdf](http://unctad.org/meetings/en/Contribution/dtl_eweeek2016_Kommerskollegium_en.pdf) (accessed 16 April 2017).

<sup>79</sup> Muthu, Subramanian Senthilkannan, and Monica Mahesh Savalani. *Handbook of Sustainability in Additive Manufacturing*. 1 (2016).

<sup>80</sup> Creative Mechanics. "Additive Manufacturing vs Subtractive Manufacturing." *Creative Mechanics Blog*, <https://www.creativemechanisms.com/blog/additive-manufacturing-vs-subtractive-manufacturing>, (accessed April 16, 2017).

<sup>81</sup> Mellor, Stephen, Liang Hao, and David Zhang. "Additive Manufacturing: A Framework for Implementation." *International Journal of Production Economics* 149 (2014): 194-201.

<sup>82</sup> "History of 3D Printing" 3D Printing Industry. <https://3dprintingindustry.com/3d-printing-basics-free-beginners-guide/history/> (accessed April 16, 2017).

<sup>83</sup> Ibid.

<sup>84</sup> Ibid.

<sup>85</sup> Thomas, Douglas S., and Stanly W. Gilbert. "Cost and Cost Effectiveness of Additive Manufacturing." National Institute of Standards and Technology, U.S. Department of Commerce (2014).

<sup>86</sup> Wohlers Report (2013) Additive manufacturing and 3D printing state of the industry annual worldwide progress report. ISBN 0-9754429-9-6.

especially important in industries that desire a high degree of customization and precision, such as the automobile and aeronautics industries. By 2019 the 3D printing industry alone is expected to be worth USD \$6 billion.<sup>87</sup>

### ***Benefits of AM***

AM technologies are becoming more popular because they offer a multitude of benefits to both consumers and manufacturers. For consumers, AM technologies allow for increased customization. With a trend towards mass customization over the last several decades, consumer demands for personalization has risen for products, ranging from cars to computers to shoes.<sup>88</sup> Consumers want to design their products to suit their needs, have the desired features, and look the way they want. While currently consumers are limited in what products they can customize, and to what degree they are able to customize, AM technologies will allow for more products to be customizable to a larger degree. For example, the furniture and interior design industry has a unique opportunity to utilize AM technologies for mass customization.<sup>89</sup> Currently to achieve a high level of uniqueness, a consumer must have the furniture custom made by a carpenter, who has higher production costs in time, labor, and resources. However, AM technologies would allow of manufacturers to work closely with consumers to customize furniture quickly, and at less expense.<sup>90</sup> Thus, AM technologies allow for more consumer driven design while also reducing costs to both the consumer and the producer.

The mass customization desired by consumers is possible; AM allows manufacturers to produce single products at significantly lower cost than allowed by traditional manufacturing systems.<sup>91</sup> Traditional manufacturing systems, like assembly lines, incur significant costs in attempting to provide customization. In an assembly line, companies sacrifice customization to take advantage of economies of scale, trying to fulfill large customer demand with cheaper goods and little customization. Depending on the degree of requested customization, the manufacturer may be forced to halt an assembly line and run a special line to achieve the desired market demand, incurring higher costs to producers. In the case of machining, in order to provide customization a manufacturer is forced to recalibrate machines or create new molds for one-time production. Because AM processes produce one product at a time, where the user can change inputs through computers and adjustments in programming, producers can quickly and easily customize a product at little to no additional cost. This ability to rapidly respond to changes, while using the same inputs and machines, is known as flexible manufacturing.<sup>92</sup> Flexible manufacturing allows manufacturers to more readily respond to the desires of their consumers compared to more rigid traditional manufacturing techniques, while also reducing expenses, which in turn makes goods cheaper for consumers.

AM technologies also allow manufacturers to produce new goods more quickly. Similar to customizing products, traditional manufacturers must often purchase new machines or retool old ones to produce new products.<sup>93</sup> AM technologies eliminate this need and allow for the rapid introduction of new products without new capital purchases or changing production inputs. Manufacturers can more acutely respond to market demands and product obsolescence. It also allows them to efficiently alter and update existing products to increase performance or eliminate defects.<sup>94</sup> In addition, AM technologies allow manufacturers to reduce other fixed and variable costs, including labor, facilities overhead, warehousing, etc.

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<sup>87</sup> Kietzmann, Jan, Leyland Pitt, and Pierre Berthon. "Disruptions, Decisions, and Destinations: Enter the Age of 3-D Printing and Additive Manufacturing." *Business Horizons* 58, no. 2 (2015): 209-15.

<sup>88</sup> Zhu J.L., Cui C.C., Fordham K. "Consumers' Need for Uniqueness and Customization Behavior Among Chinese Consumers." In: Spotts H. (eds) *Revolution in Marketing: Market Driving Changes. Developments in Marketing Science: Proceedings of the Academy of Marketing Science*. (2015).

<sup>89</sup> Cotteleer, Mark, Jonathan Holdowsky, and Monika Mahto. "The 3D opportunity primer: The basics of additive manufacturing." *Deloitte University Press* (2013).

<sup>90</sup> Ibid.

<sup>91</sup> Holmström, J., Partanen, J., Tuomi, J., Walter, M. "Rapid manufacturing in the spare parts supply chain: alternative approaches to capacity deployment." *Journal of Manufacturing Technology Management* 21 (6) (2010), 687–697.

<sup>92</sup> Gerwin, Donald. "Manufacturing flexibility: a strategic perspective." *Manag. Sci.* 39 (4) (1993), 395–410.

<sup>93</sup> Ibid.

<sup>94</sup> Ibid.

AM technologies condense supply chains, because AM technologies require fewer input materials than traditional manufacturing processes, reducing logistical costs and the potential for delays due to supply chain disruption.<sup>95</sup> Consider for example the manufacturing of smartphones. Each smartphone is created from many different components that are manufactured separately and then assembled to generate the final product, creating many steps in the supply chain. In addition, each component has its own individual supply chain that feeds into the much larger supply chain for the final product. However, AM could allow all of the components to be manufactured in the same location and in fewer steps. Therefore, the supply chain for an AM manufactured smartphone only consists of two steps; the delivery of raw materials for production and the delivery of the finished product to the purchaser. Since long and complex supply chains can cause large delays in production, manufacturers are always interested in shortening and simplifying their supply chains as much as possible. Thus, locating manufacturing near the final consumer would reduce transit costs and allow for quicker delivery, leading to an increase in localized manufacturing.<sup>96</sup> Localized manufacturing would have an impact on the global economy and trade by reducing the power of large manufacturing Member States like China, the United States, and Japan, and increase manufacturing in Member States primarily reliant on the import of manufactured goods.<sup>97</sup>

AM also leads to reduced waste in the manufacturing process. One study suggests that in the case of titanium aerospace parts, AM techniques would require only 10% of the raw material needed by traditional machining.<sup>98</sup> Consider the creation of airplane parts. Each part is cut from a larger piece of raw material and then machined into the correct dimensions. Even using the most efficient methods, the machining process creates scraps. The scraps are a loss to the manufacturer because they are wasted materials and must be disposed of, increasing environmental impact and costs. Alternatively, AM techniques layer the raw materials together to create the desired product, creating little waste.<sup>99</sup> Minimizing waste reduces costs for manufacturers, as well as reducing the environmental impact of manufacturing. For this reason, AM has been increasingly appealing in industries like the automotive, construction, and aeronautics industries.<sup>100</sup> However, AM also presents opportunities in less traditional manufacturing fields like biomedical engineering. Similar to the way in which traditional 3D printers layer polymers and plastics on top of each other, specially designed 3D printers are able to layer human cells on top of each other to fabricate organs and tissues.<sup>101</sup>

### ***UNCTAD and the Global Communities concern regarding AM***

The global community and technical experts have identified several general areas of concern for AM. The first is the hazard surrounding the usage of AM and the products created by it. Multiple UNCTAD working papers have noted that there is a lack of safety and quality control since products might not be subject to checks.<sup>102</sup><sup>103</sup> This concern is further escalated in products that have that experience customization, since it might create hazards. These hazards could have already been fixed by standards and regulations, or might be entirely unknown and thus harder to detect. The second concern is the future of intellectual property rights and how they might affect both the right of the individual as well as under representation of developing Member States. In a 2015 World Intellectual Property Organization (WIPO) report, it was noted that 75 percent of patents for 3-D printing, robotics, and nanotechnology

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<sup>95</sup> Ibid.

<sup>96</sup> Mace, Brian and Dave Food. "The Shape of Tomorrow's Supply Chains, The Science of Sustainability" *Oracle*.

<sup>97</sup> Ibid.

<sup>98</sup> "Solid print: making things with a 3D printer changes the rules of manufacturing," *Economist*, April 2012.

<sup>99</sup> Ibid.

<sup>100</sup> U.S. Department of Energy, "Additive Manufacturing Technology Assessment" (2015).

<sup>101</sup> Melchels, Ferry P.w., Marco A.n. Domingos, Travis J. Klein, Jos Malda, Paulo J. Bartolo, and Dietmar W. Hutmache" Additive Manufacturing of Tissues and Organs." *Progress in Polymer Science* 37, no. 8 (2012): 1079-104.

<sup>102</sup> "Issue Paper on Digital Foresight," UNCTAD, January 11-13, 2017.

[http://unctad.org/meetings/en/SessionalDocuments/CSTD\\_2015\\_Issuepaper\\_Theme2\\_ForesightDigitalDev\\_en.pdf](http://unctad.org/meetings/en/SessionalDocuments/CSTD_2015_Issuepaper_Theme2_ForesightDigitalDev_en.pdf) (accessed September 3, 2017).

<sup>103</sup> "Consumer Product Safety in an Era of Technology-Driven Products And Supply Chains: Project Proposal," Organization for Economic Co-operation and Development, March 7, 2017. [http://unctad.org/meetings/en/Contribution/dtl\\_eWeek2017c01-oecd\\_en.pdf](http://unctad.org/meetings/en/Contribution/dtl_eWeek2017c01-oecd_en.pdf) (accessed September 3, 2017).

were filed in France, Germany, Great Britain, Japan, South Korea, and the United States.<sup>104</sup> While it is logical that Industrial Member States would have a head start in developing AM, the vast underrepresentation of the developing economies is quite alarming since many of these Member States are not seeing the discussed benefits. One final concern is the malicious usage of AM to commit acts of violence by non-state actors. Former United Nations Secretary-General Ban Ki-Moon has noted in a speech his concern of the usage of AM manufactured firearms and drones to be used for violence and the lack of attention the issue is receiving in the global community.<sup>105</sup> There also other concerns with the usage of AM. These include: the energy intensity of the process, environmental impact, and labor issues. Almost all of these issues have been highlighted by ECOSOC's Commission on Science and Technology for Development.<sup>106</sup>

There are also concerns about the overall quality and reliability of products constructed through AM techniques compared to traditional manufacturing.<sup>107</sup> These concerns are generated in part by a commitment to traditional manufacturing techniques, but also by the fact that AM remains relatively untested and therefore unknown. Until proper testing has been conducted on products created using AM, there will be concern about its reliability and strength.<sup>108</sup> The concern will be especially strong in some of the industries that could most benefit from AM, like the aeronautics industry as previously discussed. However, airplane manufacturers will not be willing to use parts created by AM until they have been tested, because they do not want to jeopardize the quality of their products or the safety of passengers. Thus, parts and products created using AM will need to undergo extensive testing for factors like strength, durability, and reaction to extreme condition before manufacturers and the public are convinced of their safety.<sup>109</sup>

One of the biggest challenges presented by AM technologies involves the protection of intellectual property rights.<sup>110</sup> The Internet creates potential for easy distribution of plans and models of specific products. Individual consumers with access to AM technology can replicate an exact product without the need to buy it from the manufacturer.<sup>111</sup> However, even more concerning would be the large scale production of intellectual property by a competing manufacturer. Internationally, there are concerns about protecting intellectual property and the sale of knockoff products; AM could make this duplication easier and increase violations of intellectual property rights.<sup>112</sup> Current laws and international agreements do not specifically consider AM. They are instead designed to prevent the duplication of products. With the development of AM technologies, these laws and agreements may not be adaptable to future conditions and will need to be revised by the international community.<sup>113</sup>

The most unknown threat presented by AM is its capability to create items for malicious usage. While this threat is still unknown and of great concern, it is also one of the sub-topics most commonly associated with the technology inside of the UN. A recent development was the Second Meeting of Government Experts (MGE2) held in 2015 under the Programme of Action (POA) to discuss the illicit usage of weapons.<sup>114</sup> One of the most commonly

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<sup>104</sup> Clare, Scott, "United Nations Encourages More Countries to Invest in 3D Printing," 3DPrint, November 11, 2015. <https://3dprint.com/105046/united-nations-wipo-report/> (accessed September 4, 2017).

<sup>105</sup> Mendoza, Hannah, "UN Secretary-General Ban Ki-Moon Lists 3D Printing Among Potential Global Threats," 3DPrint, August 25, 2016. <https://3dprint.com/147046/ban-ki-moon-3d-printing-threat/> (accessed September 3, 2017).

<sup>106</sup> E/CN.16/2016/3. *Foresight for Digital Development*. Economic and Social Council Conference on Science and Technology for Development. [http://unctad.org/meetings/en/SessionalDocuments/ecn162016d3\\_en.pdf](http://unctad.org/meetings/en/SessionalDocuments/ecn162016d3_en.pdf) (accessed September 4, 2017).

<sup>107</sup> Ford, Simon, and Melanie Despeisse, "Additive manufacturing and sustainability: an exploratory study of the advantages and challenges," *Journal of Cleaner Production* 137 (2016) 1573-1587.

<sup>108</sup> Ibid.

<sup>109</sup> Ibid.

<sup>110</sup> "How to explore the potential and avoid the risks of additive manufacturing," *Mayer-Brown*, 2013

<sup>111</sup> Bechtold, Stephan, "Economic Research Working Paper No. 28: 3D Printing and the Intellectual Property System," *World Intellectual Property Organization* (2015).

<sup>112</sup> Ibid.

<sup>113</sup> Malaty, Elsa and Guilda Rostama. "3D Printing and IP Law" *World Intellectual Property Organization Magazine*. (2017).

<sup>114</sup> Krasserstein, Brian, "United Nations' Second Meeting of Governmental Experts Discusses Dangers of 3D Printable Firearms," 3DPrint, July 22, 2015. <https://3dprint.com/83422/united-nations-mge2/> (accessed September 3, 2017).



discussed issues during this session was the AM's ability to create polymer firearms.<sup>115</sup> The conference noted that for the time being the overhead cost of AM made it inaccessible to most individuals, and thus reduced the associated risk. However, a recommendation was presented to monitor the reselling of 3D printers.<sup>116</sup> This regulation could possibly reduce the usage of the technology for violence.

## Other Issues

One challenge is the energy intensive nature of many AM technologies, which restricts usage to areas that are unable to draw large quantities of energy.<sup>117</sup> This would limit regions and communities suffering from energy poverty, or the lack of modern energy services, like rural sub-Saharan Africa and Southeast Asia.<sup>118</sup> In turn it would benefit those areas with existing energy infrastructure that could support AM facilities, like more developed Member States with established manufacturing industries. Thus, negating the potential for localized manufacturing in many of the areas that would most benefit from it, including rural and isolated communities.<sup>119</sup> Increased energy consumption also raises questions about the net environmental impact of AM, as greater energy consumption results in increased greenhouse gas emissions.

Another challenge to AM is the environmental impact of its inputs, or the components used to manufacture a product, including raw materials and chemical additives. While requiring fewer raw materials than traditional manufacturing techniques, the raw materials must be altered for the AM process. In traditional manufacturing techniques, raw materials like wood, metal, plastic, and rubber are examples of inputs that are combined to form the final product. In AM, the inputs must be converted into powders, liquids, resins and other forms that can be layered by the AM process.<sup>120</sup> However, because many of the resources used in AM are relatively new, they have undergone little testing. As a result, there is concern about their environmental or public health impacts.<sup>121</sup> There is specific concern about the use of metals in the AM process. In order to be usable, metals must be converted into metal powders through an atomization process, of which little has been studied about consumption or emissions.<sup>122</sup> Another concern about inputs, at least in the short-term, is the lack of access to the necessary materials.<sup>123</sup> Currently there are very few companies who create the powder and liquid inputs needed by 3D printers and other AM technologies.<sup>124</sup> As a result the companies that currently control these inputs are able to charge increased and inflated prices that drive up the prices of input materials, especially those that are metal.<sup>125</sup> Thus, current AM manufacturing can be more expensive than traditional methods. However, with the increase in market demand there will likely be an influx in the suppliers of raw materials used in AM processes.<sup>126</sup>

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<sup>115</sup> "Second Open-ended Meeting of Governmental Experts 2015," Programme of Action on Small Arms and Light Weapons, 2015. [https://s3.amazonaws.com/unoda-web/wp-content/uploads/2015/03/2015-06-17-Chairs\\_Summary-MGE2.pdf](https://s3.amazonaws.com/unoda-web/wp-content/uploads/2015/03/2015-06-17-Chairs_Summary-MGE2.pdf) (accessed September 4, 2017).

<sup>116</sup> Ibid.

<sup>117</sup> Baumanns, Martin, Phill Dickens, Chris Tuck, and Richard Hague, "The cost of additive manufacturing: machine productivity, economies of scale and technology-push," *Technological Forecasting and Social Change* 102 (2016) 193-201.

<sup>118</sup> International Energy Agency, "Energy poverty" (2017) <https://www.iea.org/topics/energypoverty/> (accessed April 16, 2017).

<sup>119</sup> Holmstrom, Jan, Jouni Partanen, Jukka Tuomi, and Manfred Walter. "Rapid Manufacturing in the Spare Parts Supply Chain: Alternative Approaches to Capacity Deployment." *Journal of Manufacturing Technology Management*. 2010. 21(6) 687-697.

<sup>120</sup> U.S. Department of Energy, "Additive Manufacturing Technology Assessment" (2015).

<sup>121</sup> Ibid.

<sup>122</sup> Farinia Group, "Environmental Impact of Metal Additive Manufacturing" (2017) <http://www.farinia.com/additive-manufacturing/3d-technique/environmental-impact-metal-additive-manufacturing> (accessed 16 April 2017).

<sup>123</sup> U.S. Department of Energy, "Additive Manufacturing Technology Assessment" (2015).

<sup>124</sup> Lindemann C., U. Jahnke, M. Moi, and R. Koch. "Analyzing Product Lifecycle Costs for a Better Understanding of Cost Drivers in Additive Manufacturing." Proceedings of the 2012 Solid Freeform Fabrication Symposium. <http://utwirendr.utexas.edu/lff/symposium/proceedingsArchive/pubs/Manuscripts/2012/2012-12-Lindemann.pdf> (accessed 16 April 2017).

<sup>125</sup> Atzeni, Eleonora and Alessandro Salmi. "Economics of Additive Manufacturing for End-Usable Metal Parts." *International Journal of Advanced manufacturing Technology*. (2012) 62: 1147-1155.

<sup>126</sup> Thomas, Douglas S., and Stanly W. Gilbert. "Cost and Cost Effectiveness of Additive Manufacturing." National Institute of Standards and Technology, U.S. Department of Commerce (2014).

There will be significant opposition to converting to AM processes by groups economically and culturally committed to traditional methods. Perhaps the largest population committed to maintaining traditional manufacturing methods as opposed to AM, is the labor group because AM requires less human capital than traditional manufacturing and could threaten the employment of many laborers.<sup>127</sup> In several Member States, the manufacturing industry still accounts for a large portion of their labor force and typically represents an important political alliance.<sup>128</sup> Many of these communities have already experienced pushback against automated manufacturing—of which AM is one form—because it significantly reduces the need for human capital, including laborers and their skills. Thus it can be expected that there will be a significant pushback against the use of AM technologies. The large-scale implementation of AM technologies will require a redesign of the economy and the labor market to provide jobs to those once employed in manufacturing, presenting challenges and resistance in both developed and developing economies.<sup>130</sup>

### ***Impacts on Development and Global Trade***

The widespread use of AM could potentially revolutionize global trade, by moving the production of certain goods back to local areas, and reducing the absolute and comparative advantage of some Member States in international trade. AM also provides opportunities to encourage economic development in communities that could not support traditional manufacturing facilities.<sup>131</sup> If communities are able to increase local manufacturing, then they will have increased access to technologies and goods that could help to increase their economic development. For example, if a community had access to AM technology, they would be able to produce goods like shoes for themselves. Access to shoes would not only increase comfort for people but it would also contribute to their ability to carry out different tasks without concern of injury.

AM technologies allow for an increase in the localization of the manufacturing process, which inherently decreases global trade. Because AM does not require the space or scale requirements of traditional manufacturing, it is easier to develop in a small community that provides for the needs of that community while eliminating expensive transportation and delivery costs.<sup>132</sup> The reduction of transportation and delivery costs, and the condensing of the supply chain could undercut the advantage enjoyed by large manufacturers working in Member States with low wages.<sup>133</sup> Localized manufacturing could be used not only for the creation of consumer goods, but also for industrial goods, like machine parts.<sup>134</sup> For example, the case study conducted by Khajavi et al. (2014) demonstrated that localized manufacturing was more efficient compared to centralized manufacturing in terms of creating spare parts for the US Navy's F-18 Super Hornet fighter jet.<sup>135</sup> The jet's manufacturer, Boeing, originally produced the air-cooling ducts of the environmental control system on the F-18 using AM technology. Khajavi et al. studied the benefits of having a centralized facility produce spare parts for the jet versus using localized production at each base where the jets were housed. The study found that producing the parts locally, using AM technology, significantly reduced transportation and inventory costs, inventory obsolescence costs, and perhaps most importantly—aircraft downtime costs.<sup>136</sup> Producing the part locally allowed the aircrafts to get back into the air quicker, as well as reduce

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<sup>127</sup> Thomas, Douglas S., and Stanley W. Gilbert. "Cost and Cost Effectiveness of Additive Manufacturing." National Institute of Standards and Technology, U.S. Department of Commerce (2014).

<sup>128</sup> "Employment by sector – ILO modeled estimates, Nov. 2016." International Labor Organization. <http://www.ilo.org/global/statistics-and-databases/lang--en/index.htm> (accessed August 22, 2017).

<sup>129</sup> Katz, Harry C., Thomas A. Kochan, and Alexander Colvin. "Labor, Management, and Government Interactions." Cornell University ILR School (2015).

<sup>130</sup> Prettnier, K., "A note on the implications of automation for economic growth and labor share," *Macroeconomic Dynamics* (2017): 1-8.

<sup>131</sup> Weller, Christian, Robin Kleer, and Frank T. Piller. "Economic implications of 3D printing: Market structure models in light of additive manufacturing revisited" *International Journal of Production Economics* 164 (2015): 43-56.

<sup>132</sup> *Ibid.*

<sup>133</sup> *Ibid.*

<sup>134</sup> Lipson, Hod, Kurman, Melba. Fabricated. "The New World of 3D Printing." (2013).

<sup>135</sup> Siavash H. Khajavi, Jouni Partanen, Jan Holmström, "Additive manufacturing in the spare parts supply chain," *Computers in Industry*, Volume 65, Issue 1 (2014) Pages 50-63.

<sup>136</sup> *Ibid.*

other costs, thus allowing better overall performance by the US Navy.<sup>137</sup> It is worth noting that at the time of the study, the major drawback to localized production was the initial cost of purchasing the AM technology.

Consider also the implications of this localized manufacturing on other industries. For example, if it were used to locally producing replacement parts for tractors and other agricultural technologies, accessibility to parts allows farmers to get back to work more quickly when their equipment is damaged. Similar benefits can be seen in the case of manufacturing operations that can more quickly repair damaged machinery.<sup>138</sup> Another important consideration in many parts of the world is the use of older machinery for which replacement parts are discontinued; meanwhile its users cannot afford to purchase new machinery. Parts of the Kingdom of Saudi Arabia have experienced this challenge because many of its industries are older and lack the necessary spare parts. Many oil & gas, desalination, mining, and cement plants in Saudi Arabia were built in the 1970s and 1980s, and around 30% of all spare parts have become obsolete, discontinued, or no longer offered by manufacturers.<sup>139</sup> As a result, engineers have been relying on reverse engineering to design the necessary parts to then reproduce them.<sup>140</sup> If these parts could be reproduced onsite using AM technology, they could significantly increase the efficiency of the industries. However, as beneficial as the system of localized manufacturing would be to individuals and industries, it would decrease overall trade because consumers would no longer have to import or acquire parts or products from elsewhere. Trade occurs because one group has a good that another group needs and cannot produce for themselves, or can only produce at a much higher cost. However if individuals can produce those goods for themselves, or if there is a member of their immediate community who can produce the goods, then there is no need for trade with an outside group. Thus, if goods can easily be manufactured at the same price all around the world then there is less need for global trade.

AM will have an impact on global trade, which will affect the way Member States and IGOs interact with each other. Locally manufactured goods reduce the need for international trade agreements like the General Agreement on Trade and Tariffs (GATT) or organizations like the World Trade Organization (WTO), as well as regional trade agreements like the North American Free Trade Agreement (NAFTA) or the Association of Southeast Asian Nations (ASEAN).<sup>141</sup> These agreements have been an important part of international relations in the latter half of the twentieth century and the beginning of the twenty-first century, thus even the possibility of their obsolescence presents many questions in terms of international policy.<sup>142</sup> Economic relationships between Member States help to maintain international security; when two Member States have a vital trade relationship they are less likely to come into conflict that will jeopardize that relationship. However, if that trading relationship is significantly reduced by local production, then those Member States have less of a connection. Trade has been one of the driving forces behind globalization, however if trade decreases then so might globalization.

Some of the most important trade relationships in existence since the Industrial Revolution are the trade of raw materials for manufactured goods. Often, developed Member States have the technology and infrastructure to produce manufactured goods, which they trade to developing Member States in exchange for the raw materials to produce more goods. If there is a transition to localized production then one side of the trade relationship is eliminated.<sup>143</sup> Instead of their being a mutually beneficial situation where each side has something the other wants or cannot produce for themselves, now only one side has something the other wants. Moving to localized production could increase the power of Member States that control the raw materials needed for production, while reducing their dependence on more industrialized Member States.<sup>144</sup> Yet it is also likely to be the industrialized Member

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<sup>137</sup> Ibid.

<sup>138</sup> Lipson, Hod, Kurman, Melba. "The New World of 3D Printing." (2013).

<sup>139</sup> Damanhour, Layan, "Localization of industrial parts to save cost, generate Saudi jobs," *Saudi Gazette*, 3 January 2017. <http://saudigazette.com.sa/article/170277/Localization-of-industrial-parts-production-to-save-cost-generate-Saudi-jobs> (accessed July 9, 2017).

<sup>140</sup> Ibid.

<sup>141</sup> Swedish National Board of Trade "Trade Regulation in a 3D Printed World" (2016). [http://unctad.org/meetings/en/Contribution/dtl\\_ewweek2016\\_Kommerskollegium\\_en.pdf](http://unctad.org/meetings/en/Contribution/dtl_ewweek2016_Kommerskollegium_en.pdf) (accessed April 16, 2017).

<sup>142</sup> Ibid.

<sup>143</sup> Ibid.

<sup>144</sup> Weller, Christian, Robin Kleer, and Frank T. Piller. "Economic implications of 3D printing: Market structure models in light of additive manufacturing revisited" *International Journal of Production Economics* 164 (2015): 43-56.

States who develop and manufacture AM technologies that can be used in localized production.<sup>145</sup> This concern has been noted by the global community.

### ***Conclusion***

Companies, policy makers, and international organizations need accept the disruption to the status quo of trade and adapt to it accordingly. Fortunately, with special reservations on the topic of intellectual property rights, many trade agreements from the 20<sup>th</sup> century can act well enough to form a basis of understanding for how the international trade framework for AM should work.<sup>146</sup> While we have yet to see the emergence of AM in large-scale manufacturing it is a technology that more researchers and companies are beginning to investigate. There is little doubt that AM is going to play an important role in the future of manufacturing, therefore it is important that the international community and specifically the United Nations Commission on Trade and Development continue to take into consideration and begin creating policies to address its effects.

### ***Committee Directive***

In their research, delegates should pay special attention to the ways in which AM will change the status quo and alter global trade. One of the first things to consider is how AM will affect manufacturing. How will AM benefit communities and individuals? What are the implications of trade becoming localized? In turn, it is important to consider how the change in manufacturing will affect trade. How will localized manufacturing reduce global trade? What are the concerns of less trade? Finally it is important to consider how trade affects international relationships. What are the implications of less economic interdependence? AM may seem to be a novel new technology, but it brings with it some very weighted questions that delegates should consider.

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<sup>145</sup> Swedish National Board of Trade “Trade Regulation in a 3D Printed World” (2016).

[http://unctad.org/meetings/en/Contribution/dtl\\_eweeek2016\\_Kommerskollegium\\_en.pdf](http://unctad.org/meetings/en/Contribution/dtl_eweeek2016_Kommerskollegium_en.pdf) (accessed April 16, 2017).

<sup>146</sup> Ibid.

## Technical Appendix Guide

### I: Enhancing Trade and Development to Landlocked Developing Member States through Multinational Development Projects

E/ESCAP/73/3 “*Regional implementation of the Vienna Programme of Action for Landlocked Developing Countries for the Decade 2014-2024*” Economic and Social Commission for Asia and the Pacific

This is the most recent resolution passed by the Economic and Social Commission for Asia and Pacific dealing with LLDC’s. The BGG utilizes one passed last year. The document builds upon E/ESCAP/73/3, which is the Agenda item discussed in this BGG. One idea to note that is suggested in the resolution, is the creation of an international think tank to solve issues arising in LLDC’s.

Diarra, Cheik. "The MDGS and Least Developed Countries: The Challenges for Landlocked Developing Countries and Small Island Developing States." UN Chronicle, 1st ser., 45, no. 45 (2008): 4-5.

While the Millennium Development Goals are no longer applicable, the SDG’s are their successors in terms of a guiding vision for the UN. This brief article helps cast an understanding of the history of LDC’s during this time.

"Landlocked Developing Countries Meet Incoming UN Chief António Guterres." African Business Magazine. December 21, 2016. <http://africanbusinessmagazine.com/latest/landlocked-developing-countries-meet-incoming-un-chief-antonio-guterres/>. (Accessed 12 July 2017)

A brief recap of a meeting held by Secretary General Antonio Gueterres and Ambassador Mwaba Kasese-Bota of Zambia about the future of LLDC’s in the UN. Ambassador Kasese-Bota highlighted the important need for reform inside of the UN to increase the capacity of LLDC’s, while Secretary General Gueterres highlighted the need for UN reform in this area. This meeting helps demonstrate the role the UN will hopefully be playing in building trade capacity of LLDC’s under the new Secretary General.

Richter, Peter. "Trade Promotion in Nepal." Foreign Trade Review 52, no. 1 (2017): 48-59.

Nepal is a LLDC that has recently experienced a natural disaster. This academic article helps compare and contrast trade and development struggles for Nepal before and after the earthquake. The author also makes the argument that Nepal is an excellent case study to view several other LLDC’s issues in terms of development.

“The Least Developed Country Report 2016” UNCTAD [http://unctad.org/en/PublicationsLibrary/ldc2016\\_en.pdf](http://unctad.org/en/PublicationsLibrary/ldc2016_en.pdf) (Accessed 05 July 2017)

One of the most recent reports published by UNCTAD on the subject, the report states that of the 48 LDC’s, 18 are projected to “graduate” into middle-income levels by 2021. While the report focuses on what is preventing LDC’s from moving into the middle-income bracket, it does highlight some of the reasons why the remaining 30 are not moving forward into graduation. The brief section regarding current account balances on pages 12-13 is one aspect of this issue that might interest delegates.

### II. Examining the Impacts of Additive Manufacturing on Global Trade

Bhasin, Varun. "Impact of 3D Printing on Global Supply Chains by 2020." Massachusetts Institute of Technology <http://ctl.mit.edu/sites/ctl.mit.edu/files/library/public/2014ExecSummary-BhasinBodla.pdf> (Accessed 09 July 2017)

This brief paper demonstrates one of the statements made in this BGG, which is that AM is on the rise. It quantitates that there will be a 50-90% reduction in supply chain costs in the near future with most of the drop off happening in transportation and inventory costs.

Keller, Rebecca. "The Rise of Manufacturing Marks the Fall of Globalization." Stratfor Worldview. <https://worldview.stratfor.com/weekly/rise-manufacturing-marks-fall-globalization>. (Accessed 09 July 2017)



This article argues that the AM process could decrease reliance on supply chains, which might cause adverse effects to globalism. One section to highlight is that Keller argues that LDCs will find it the hardest to adapt to this changing environment. Keller supports his theory by explaining that there will be a reduction of opportunities in the manufacturing sector.

Ibrahim, Ahmed M. S., Rod R. Jose, Amr N. Rabie, Theodore L. Gerstle, Bernard T. Lee, and Samuel J. Lin. "Three-dimensional Printing in Developing Countries." *Plastic and Reconstructive Surgery - Global Open* 3, no. 7 (2015).

This is an article that elaborates on some of the medical usages of the AM process. While the economic effects of AM are still being debated, the article helps to demonstrate that once LLDCs gain access to AM, they should experience better access to health treatment.

"What Is Additive Manufacturing?" Produced by GE Electric. Youtube.  
<https://www.youtube.com/watch?v=l0SXlkrmzyw>.

A Tutorial introduction to the AM process, with visuals presented to help give a better understanding of the method. While the video discusses the process in the setting of a developed economy, it should still be of interest to delegates since it demonstrates visually the progression from subtractive to additive manufacturing.