Blockchain in Humanitarian Aid: A Way out of Poverty and Famine?

A case study of the use of blockchain technology by the World Food Programme in Jordan

By: Anna de Vrij
Student number: 1367226
Supervisor: Dr. Vera Skepanovic
Second reader: Dr. Jonathan London
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This thesis goes into blockchain technology as a possible solution to the lack of effectiveness in contemporary humanitarian aid delivery. The literature review lays out the contemporary humanitarian aid supply chain and the bottlenecks that hold back the effectiveness. The supply chain is divided into three separate chains and problems inherent to that specific chain are analyzed. Blockchain and its potential for the humanitarian aid industry is outlined and applied to the within- case study of the use of blockchain technology by the United Nations World Food Programme. The case study analyses the solution that blockchain has to offer to the bottlenecks in practice. This thesis concludes with stating that blockchain has the potential to increase effectiveness in certain parts of the contemporary humanitarian supply chain.

Introduction

In Istanbul, Turkey, in May 2016, 9000 representatives from member states, NGOs, civil society, the private sector, international organizations and affected people came together to make over 3700 commitments to change humanitarian aid. The goal was to alleviate human suffering, reduce risk and vulnerability worldwide. The United Nations (UN) stated that the world is confronted by one of the biggest challenges of our time. There are namely 125 million people in need of humanitarian assistance, 60 million people forced to flee their homes, 37 countries affected and $20 billion needed (United Nations, 2018). Per year the amount of people in need, and the amount of money needed to help them, is growing. At the same time, aid organizations are under pressure to act more effectively and demonstrate that the money actually has value. Therefore, there has been an international call to reshape aid. Each year, trillions of dollars are spent on aid, people, however, do not seem to be getting better.

Humanitarian aid is defined as: ”the impartial, independent and neutral provision of aid to those in immediate danger” (Rysaback- Smith, 2015). The question is often asked whether humanitarian aid delivery is effective and whether it meets the needs of the affected people. The humanitarian aid system contains all the assets that should make it reach results, however, it is not producing consistent and optimal results (Scott, 2014). Humanitarian effectiveness is defined by the OECD as: “Effectiveness measures the extent to which the activity achieves its purpose, or whether this can be expected to happen on the basis of the outputs” (OECD, 1999). Effectiveness matters because humanitarian investments should be targeted and used in the best possible way (Scott, 2014, p. 2).

This thesis aims to contribute to ways on how to make humanitarian aid delivery more effective. It will do so by dividing the humanitarian supply chain into the following three separate chains: donors, intermediaries and recipients. Problems inherent to the humanitarian supply chain will be connected to each of these chains. In addition, the overarching problem of the lack of transparency will be outlined. One technology that has recently made its up rise in supply chain management and the humanitarian aid industry is blockchain. In this research therefore will be made an objective analysis of blockchains possible potential for the humanitarian aid supply chain. Scholars believe blockchain technology could be the next disrupter of the aid industry (Purvis, 2017). However, there is still research to be done. In general, humanitarian aid logistics are understudied and literature on how blockchain technology could potentially help remove certain bottlenecks is lacking. For that reason, this research will be innovative and contribute to the gap in literature. The research question that will be answered in this thesis is the following: “*How can blockchain technology provide solutions for problems inherent to the contemporary humanitarian aid supply chain?*”. This thesis will provide an answer to this question by analyzing literature and conducting a within- case study on a Jordan refugee camp where the United Nations World Food Programme (WFP) is conducting a pilot on the use of blockchain in humanitarian aid delivery. This case study was chosen because the UN is seen as the center of the international aid architecture (Ross, 2011, p. 1). Thereby has the WFP grown into the most significant and largest UN agency (Barrett & Maxwell, 2005, p. 220). Given this, the WFP is a strong case for analysis. The UN putting trust in the technology indicates the level of interest and trust in blockchain by significant actors involved in the humanitarian aid industry.

This thesis will first go into the methodology. The second chapter is the literature review. In this chapter, the effectiveness of humanitarian aid and the humanitarian aid supply

chain will be outlined. Thereby, there will be an introduction of blockchain, the contemporary use and potential of the technology, including the drawbacks. Hereafter, there will be a within- case study conducted on the use of blockchain by the WFP in a Jordan refugee camp. Following, there will be an analysis of the research and a discussion, resulting in a conclusion wherein the research question will be answered.

Methodology

The aim of this thesis is to contribute to literature and the debate surrounding the effectiveness of humanitarian aid delivery. It will do so from an analytical and an empirical perspective. From the analytical perspective, the literature review will go into different bottlenecks that create hurdles to the effectiveness of humanitarian aid delivery. From an empirical perspective, the use of blockchain technology in practice will be analyzed by conducting a case study. This thesis will focus on the ways in which the contemporary humanitarian aid supply chain undermines aid effectiveness. It will do this by dividing the supply chain three chains: donors, intermediaries and recipients. Problems that are inherent to the humanitarian aid supply chain will be connected to each of these chains. Thereby, the overarching issue of the lack of transparency will be discussed. A solution that has been proposed by scholars and policy makers to enhance the effectiveness of aid delivery is the use of the rather new technology blockchain. This thesis will objectively assess whether or not this technology appears to solve the problems inherent to the humanitarian aid supply chain that are stated in this thesis. Because the use of blockchain is a rather new phenomenon, there has not been written much scientific literature about the concept in relation to the aid industry. One of the challenges of this thesis therefore is to connect blockchain to the humanitarian aid supply chain. In theory, blockchain offers many opportunities for optimization of the delivery and supply chain. It is therefore crucial to research the practical implications of the use of blockchain in humanitarian aid. This thesis will fill the gap that exists in literature about the potential of blockchain in the humanitarian aid industry and will expand the knowledge about the usage of blockchain technology in humanitarian aid delivery. The method used for this thesis will be qualitative. There will be made use of secondary sources, such as scientific articles and newspaper articles. I will also draw from my own experience with development cooperation that I gained while interning for the Dutch ministry of Foreign Affairs. I worked with the international financial institutions (IFIs) and therefore gained knowledge of multilateral development cooperation from up close.

The literature review will outline humanitarian aid effectiveness and the supply chain. Contemporary problems inherent to the humanitarian aid supply chain will be analyzed. The challenges to efficient aid delivery will be discussed and the aid delivery system will be explained. Following this, there will be an introduction of blockchain wherein the technology will be explained. Hereafter the potential that blockchain has to offer to the aid industry will be outlined, including some critiques regarding the technology.

For the empirical analysis and to support the research done in this thesis, a within-case study will be conducted on the use of blockchain by the United Nations World Food Programme in a refugee camp in Jordan. This case study was chosen because this pilot is based on lessons learned from previous experiments that the WFP has conducted in 2017. The UN and the WFP are highly respected and legitimate agencies in the international aid architecture. The use of blockchain by these agencies adds a certain credibility and level of trust to the technology. This thesis aims to sketch an example on what potential blockchain might hold for the future and the delivery of humanitarian aid. This case study contributes to this by critically analyzing the contemporary use of blockchain in the pilot by the WFP. Furthermore, it will give insight on what role blockchain can play in the delivery of aid and how it can improve the effectiveness. Thereby the criticism on the pilot and the use of blockchain in humanitarian aid in general will be outlined. It is important to, throughout the thesis, keep in mind that blockchain technology is still in its infancy and is being developed

on a day-by-day basis. Please note that humanitarian aid is also called humanitarian assistance or disaster- relief aid, these terms will be used interchangeably in this thesis.

Literature Review

Effectiveness of humanitarian aid

The amount spent on humanitarian aid throughout the years has reached trillions of dollars, and is increasing each year. Drivers of crises that result in the increase of money spent on humanitarian aid are: “environmental, social and demographic, and geo-political shifts, coupled with the increasing influence of technology, a globalized economy, and rising inequality” (Scott, 2014, p. 2). Countries affected by these crises are often developing countries that do not have the capacity to take care of the affected people on their own. The need for humanitarian assistance will therefore keep growing. However, even though in 2017 US$27.3 billion was channelled for humanitarian aid alone, the need for humanitarian assistance is not decreasing and this extensive amount of money does not alleviate the suffering of millions of people (OCHA, 2012). Policymakers and scholars therefore speak of a growing ineffectiveness of humanitarian aid.

Humanitarian aid gets funded through several channels. The highest amount of humanitarian aid comes from governments. Governments can choose to channel the funding through two types of channels. These two channels are: 1) bilateral, which entails aid delivery from one donor country to the developing country, including transactions with NGOs, or 2) multilateral, which can only be delivered by a financial institution that conducts its activities in favor of development, such as the World Bank (Gulrajani & Honig, 2016, p. 7). Both channels operate in countries that face humanitarian and development conditions and their span of engagement often covers the same sector and countries. Donor funding for humanitarian assistance is channelled through a variety of organizations. The aid delivery does not simply go bilaterally from one donor country to the developing country, or multilaterally from donor country, to international financial institution (IFI), to the developing country. It has to go through several levels of recipients before it reaches the actual people in need (Development Initiatives, 2018, p. 45). During crisis situations, there is often a call for private funds to contribute funding. For this reason, private funding is a significant humanitarian aid delivery channel. Private funding consists of companies, individuals or trusts and foundations (ibid., p. 42). Private funding mostly gets transferred through NGOs, either on the international or the national level.

Before going into the (in)effectiveness of humanitarian aid, it is important to clarify what is meant with effectiveness of humanitarian aid in this thesis. As effectiveness speaks more to ends than to means, inherent to the idea of effectiveness are the intentions, aims and goals of aid actors (Ross, 2011, p. 183). Scholars have divided effectiveness into relative and absolute effectiveness. Relative effectiveness takes the nature of the donor into consideration and absolute effectiveness refers to the absolute standards of, for example, the eradication of poverty and hunger worldwide (ibid.). In this thesis, the focus will lay on the absolute notion of effectiveness. This decision was made because there will be researched how blockchain technology may contribute to the prevention of loss of financial aid throughout the humanitarian supply chain. It is argued that part of the ineffectiveness of aid has to do with the humanitarian logistics and the way the aid supply chain is designed.

Logistics and supply chain management are intertwined, but the difference between the two concepts is that logistics is a small part of supply chain management. Humanitarian logistics are concerned with the management of goods in an efficient way. The supply chain is a broad term referring to the connection between supplier and consumer.

The ineffectiveness of aid is due to many different problems inherent to the humanitarian aid supply chain. The humanitarian aid supply chain includes the following activities: “preparation, planning, procurement, transportation, storage, tracking and customs clearance” (da Costa, Gouvea Campos & de Mello Bandeira, 2012, p. 600). The humanitarian aid supply chain is complex because there is a multiplicity of objectives and there is a great number of stakeholders involved (ibid., p. 599). In fig. 1 the complexity of the humanitarian aid supply chain is laid out. Here it becomes clear how many stakeholders are involved and one can imagine coordination is difficult and consumes time. While especially in such a complex supply chain, efficiency is key because it ensures a proper flow of goods and services.

Fig. 1 - Model of a Humanitarian Supply Chain. Source: da Costa, Gouvea Campos & de Mello Bandeira, 2012, p. 600.

As becomes clear, the issue of the lack of effectiveness occurs on the micro, meso and macro level. Aid workers have to deal with certain issues such as donor fragmentation, the loss of financial aid to transactions costs and uncertainty regarding the recipients. These are all pending problems, associated with the lack of transparency of the humanitarian supply chain. To increase the overview of the problems laid out in this thesis, the supply chain is divided into three chains: Donors, intermediaries and recipients. The overarching issue, and one of the key problems, presented in this thesis is the lack of transparency. The lack of transparency makes up for a significant part of the ineffectiveness of the aid and many other problems flow from this.

As outlined above, the delivery of humanitarian aid is complex because it does not go directly from donor to recipient, whether it is bilateral, multilateral or private funding. Before humanitarian aid reaches its destination, it has to be passed through multiple institutional agencies. These can be international or national NGOs, IFIs, ministries and so on. Aid reaches at least two levels of recipients: the first level recipients being the intermediaries, such as multilateral organizations or NGOs, and the subsequent level recipients, being the people in need in the disaster affected country (Development Initiatives, 2018, p. 44). These different agencies cause difficulties in tracing the delivery of aid and risk the transparency. There has been a call from aid agencies to make aid delivery more direct and decrease the amount of stakeholders involved in the supply chain. The goal for 2020 set by the Grand Bargain, an agreement between donors and providers to get more means to the people in

need, is to make delivery channelled through not more than one intermediary account for at least 25% of all humanitarian aid (ibid., p. 43). In 2017, only 3.6% of all humanitarian aid delivery was channelled either directly to a local or national NGO, or through one intermediary. This means that the aid agencies only have less than two years left to realize a growth of 21.4%. One way of making aid delivery more direct, is by combining in- kind aid, such as food and water, to cash transfers. Aid agencies are switching to cash transfers more because it has several upsides, such as giving autonomy to the recipients and reducing the waste of in- kind aid. However, donors are still wary of the use of cash transfers because there is a lack of transparency and it is unsure whether the cash reaches the actual recipients.

Humanitarian aid supply chain

Contrary to business supply chains, the humanitarian supply chain has not been researched extensively. The research that has been done has proven that the humanitarian supply chain is often unstable. The supply chain sometimes breaks down at the receiving end (Oloruntoba & Gray, 2006, p. 115). To get the aid to where it belongs, the aid delivery system requires the involvement of governments and other international organizations, but also transportation modes (ibid.). Humanitarian assistance therefore also has to deal with logistical and administrative bottlenecks such as bad infrastructure in the recipient country and bureaucratic processes in the involved stakeholders. Now, not all third parties or stakeholders that are involved are unnecessary or form a bottleneck. For example, local NGOs can help the aid reach the intended goal because they are familiar with the situation in the affected country. So even though the NGOs might suffer from administrative bottlenecks, they add value to the supply chain because they know how to deliver the aid on the ground.

What is certain about the humanitarian supply chain is the shared goal of the delivery of the aid from donor to recipient. Both parties believe that effective delivery of the aid is a priority. However, what is often a black box for people involved on either side of the aid delivery system is what is exactly in between the donor and the recipient. This is due to several humanitarian supply chain and logistics related problems. If one simplifies the aid delivery system, one can divide the stakeholders involved in the aid delivery process into three groups: donors, intermediaries and recipients.

All three groups are subject to problems regarding the delivery of humanitarian aid. What we see on the donor side is that there are many donors, which can either be governments, international NGOs, companies and individuals. Then we see many channels through which aid can be donated. After the aid is donated, it goes through many intermediaries. Intermediaries can be, among others, development banks (IFIs), international NGOs, national NGOs and community-based organizations. These are all organizations that are in between the initial donor and the end recipient (Argolla Da Costa, Gouvêa Campos & de Mello Bandeira, 2012, p. 600). Often, these intermediaries are classified as first- level recipients, where the affected people in the recipient country are classified as the subsequent- level recipients. In this thesis, I do not consider the multilateral organizations or the international and local NGOs recipients of the aid, but the actual affected individuals that are in need of humanitarian assistance. The individual end recipients are often unable to identify themselves because they are the people that suffered from the disaster and are often under the radar. From the personal believe that a direct transfer of aid is from donor to

end recipient, the first level recipients will be classified as the intermediaries and the actual victims at the end of the supply chain as the recipients. When you classify the recipient as the affected person, the goal of effectively delivering the aid to the recipient becomes harder to achieve because in a disaster situation, many people have lost their homes, essential documents and access to financial services. After disasters, countries and societies are in a state of chaos. Because there are casualties and people missing, it is hardly manageable to clearly identify individuals and their specific needs regarding humanitarian assistance. In a way, affected people lose their identity. Hence, aid agencies make the choice to identify local or national NGOs as the recipient. It becomes clear that the humanitarian aid delivery system is suffering from multiple problems. This thesis will try to tackle the problem of aid effectiveness by researching problems inherent to the aforementioned three chains of the supply chain: 1) donors, 2) intermediaries and 3) recipients. For each group certain problems will be highlighted that create hurdles for the effectiveness of humanitarian aid. Each chain, and the problems that come with it, will be explained and analyzed. But before the three individual problems will be discussed, the overarching problem of the lack of transparency within the supply chain will be outlined. The lack of transparency affects the effectiveness of aid in a way that it is difficult to, for one, see what aid goes where and how much aid gets lost and second, it is difficult to trace back where it goes wrong and where the bottlenecks are. In the upcoming section, I will elaborate further on this issue.

Transparency

As mentioned above, there is one overarching problem of the humanitarian aid delivery system, namely the lack of transparency. The importance of aid transparency has been placed high on the global agenda. There is a demand for greater transparency and access to more data from stakeholders in both developed as developing countries (IATI, 2018). It is believed that this improved access to data will help keep development actors accountable. The availability of data will therefore help improve the effectiveness of aid because it becomes easier to identify possible bottlenecks where aid gets lost, on both the national as the international level. Full transparency seems like a goal that is nearly impossible to reach when there are so many actors and donations involved in a complicated system. Because there is more awareness of the expenses of humanitarian aid, donors put more pressure on humanitarian aid organizations. They are under scrutiny to monitor the whole operation (van Wassenhove, 2006, p. 475). This means that the operations have to be more transparent. A humanitarian aid operations is about 80% of logistics, it therefore makes sense that the way to achieve more transparency and a more effective aid delivery, is through supply chain management.

There is a lack of transparency in aid because, among others, the high amount of intermediaries in combination with donor fragmentation and the fact that the individual recipients are often unknown puts the transparency of aid at risk. Transparency in aid is important because comprehensive data supports better analysis, coordination and evaluation (Ingram, 2018). This is crucial for journalists, policy makers and analysts. Without transparency the tools are lacking to: ”facilitate collaboration between different finance organization, to ensure effective use of resources, and to hold institutions accountable” (Ingram, 2018). Transparency will not solve all the problems that exist around aid, but it will underpin better decision- making, coordination and cooperation. Aid transparency is needed in order to improve the effectiveness and efficiency of the aid delivery. It is widely accepted

that transparency is crucial to ensure aid effectiveness. Comprehensive data allows the actors involved in the aid delivery system to know where and how to deliver the aid. The more data the actors have, the better they can allocate the resources (ibid.). It goes without saying that if there would be full transparency in the aid supply chain, aid delivery will be optimized. It will be clear where money gets lost to transaction costs, corrupt governments or simply inadequate allocation. It will help avoid gaps and duplication. Per year, millions of aid dollars are lost. Regardless whether aid gets lost to aid fungibility, corrupt government officials, or other causes, increasing transparency will identify the bottleneck and possibly help remove it.

The lack of transparency is an overarching problem of the aid supply chain because it affects all chains. From the beginning of a donation to the end of it, it can be unclear how much money is donated and what amount actually reaches the recipients, how many intermediaries are in between and who the actual recipients are other than the international or national NGOs. Now that there is an increased focus on not just the output, but the entire humanitarian aid supply chain, it becomes increasingly important to identify obstacles in the supply chain. In the next section, each chain and its issue(s) is (are) being analyzed. It is important to note that some issues overflow from one chain to the next. Issues at the first chain can cause issues at the second chain. The division between the three chains aims to create a clear overview, but one has to keep in mind that the chains are intertwined and that the problems are often connected.

Donors

Fragmentation

“The Marshall Plan worked because there was one donor, the United States, and the United States set up rules that ensured the Europeans would themselves take charge” (Knack & Rahman, 2008, p. 333). Throughout history, the Marshall Plan gained popularity. It was widely acknowledged as a success and every couple of years there are calls to launch a new Marshall Plan (ibid.). Compared to the Marshall Plan, contemporary development aid is totally different. Nowadays, there are dozens of bilateral and multilateral organizations, and hundreds of NGOs active in the aid industry (Knack & Rahman, 2007, p. 177). In the early days of aid, recipients received aid from mainly one (governmental) donor, such as what was the case with the Marshall Plan. In today’s aid, loans are being disbursed: “in the form of hundreds of separate donor-managed project in each recipient nation” (Knack & Rahman, 2008, p. 333). In 1960, the average aid recipient received aid from two donors, by 2006 this number had risen to more than 28 (Knack & Smets, 2013, p. 64). So why is there such a high amount of donors prevalent in the humanitarian aid industry nowadays? In the case of humanitarian aid, the need for assistance is often called for after a disaster happens. It is therefore difficult for donors to pre-commit, because they cannot guarantee that they have the fit response (Clarke & Dercon, 2016, p. 19). So when a disaster occurs, dozens of governments, aid agencies, NGOs and international organizations all get involved. This can be traced back to the theory that when many donors contribute to the aid flow to a specific country, the recipient country is less vulnerable to aid shocks when one donor unexpectedly falls short on their aid (Gutting & Steinward, 2015, p. 2). Thereby, the donor has little reputational stake because the responsibility over the success or failure of the aid is shared.

This results in the so-called donor fragmentation in aid delivery. In the recent years we see that donor fragmentation is an upward trend.

One of the main challenges for the humanitarian aid delivery system remains the establishment of a flow of donations from different sources (Argolla Da Costa, Gouvêa Campos & de Mello Bandeira, 2012, p.600). Especially since the actors involved in aid delivery keep increasing each year, it becomes more and more difficult to establish this flow. The sources of funding can either be international or national, which are not always timely, useful or appropriate (ibid.). Donors can, as mentioned before, be governments, or in the private sector flow, individuals, companies or funds. Donors can donate in- kind aid, or cash. Especially when it comes to in- kind donation, donor coordination is extremely difficult because there is a lack of overview of how much has already been donated. One can imagine it is a challenge for organizations to keep track of how much aid actually goes to a certain cause when aid comes flowing from different sources at different times. It has been proven that donor fragmentation has negative implications for the efficacy of aid (Gutting & Steinwand, 2015).. Donor fragmentation has several side effects that affect the other chains, such as the lack of predictability and lack of coordination. At the donor chain, the aid supply chain is not transparent enough. This lack of transparency is caused by the high amount of donations coming from different donor flows, channelling aid through different channels and recipient countries do not know what aid to expect when and from who. The inability of donors to adequately respond to crises therefore results in an inability of recipient countries to effectively respond to crises. Not only does donor fragmentation cause a lack of oversight on the funds that go to a recipient, it is also considered to be a pressing issue because the costs are very high for recipient countries, to the extent that it reduces aid efficiency (Santiso & Frot, 2011). Cash transfers help decrease the issue of donor fragmentation because cash usually cannot go to waste, like food or water can. However, the use of cash transfers often creates problems at the other chains, such as the inability to track the cash and the addition of intermediaries.

Intermediaries

Transaction costs

There are dozens of bilateral and multilateral and hundreds of NGOs involved in the aid delivery. When the aid moves from the first chain, the donors, to the second chain, it reaches the intermediaries. These intermediaries receive the aid from one of the two donor flows, the government flow and/ or the private flow. The intermediaries can be multilateral organizations, NGOs, the International Red Cross, the public sector and public-private partnerships. These intermediaries can be on the international level, or on the national level in the recipient country.

One consequence of donor fragmentation is that the institutional channels through which the aid flows have to deal with many financial streams. As a consequence, the transaction costs that come with dealing with these financial streams rise. The cost of aid is a very debated subject in international relations. Transaction costs reduce the effectiveness of aid, because it reduces the amount of aid that can be donated to the people in need. However, a record on how much aid is actually lost to transaction costs does not exist, simply cause one does not know. Transaction costs in general are defined as: “the costs of running an economic system” (Williamson, 1996, p. 5). However, an agreement on the

definition of aid transaction costs seems non- existing. According to VandenInden & Paul, definitions of aid transaction costs: “do not rest on theoretical grounds and may actually lead to misinterpretations” (Vandeninden & Paul, 2012, p. 1). With the focus on production efficiencies, literature argues that reducing aid transaction costs will increase aid effectiveness (Ashford & Biswas, 2010, p. 482). Aid organizations strive to increase aid effectiveness by reducing the core of these costs: uncoordinated donor practices (Vandeninden & Paul, 2012, p. 2). The high transaction costs underline the importance of changing the aid delivery system. One of the assumptions why the value of aid is significantly lower when it reaches the recipient than when it left the donor is because the aid flows through many institutional channels, being the intermediaries. Donor fragmentation, at its turn, contributes to this high amount of intermediaries as every donor has a different way in delivering aid and a different preference on where to send the aid. Many international debates have centered on the issue of transaction costs. Many efforts have been made to reduce the costs in the assumption that this reduction will improve the effectiveness of aid. Transaction costs occur at every stage of the aid cycle. Transaction costs are associated with all three chains of the humanitarian aid supply chain. Therefore, many aid organizations have called for better donor coordination in order to reduce the transaction costs. Transaction costs also, for example, include administration costs. With a high amount of intermediaries, administrative costs rise and so transaction costs rise as well. Many transaction costs are due to the bureaucratic processes within donor governments and intermediate aid organizations. These are called indirect transaction costs. These occur when aid actors show dysfunctional bureaucratic and political behaviour (ibid., p. 5). These might come about when there is an excessive expenditure of technical assistance or when donors are hoarding information due to donor competition. One does not want financial aid to get lost to (sometimes) unnecessary bureaucratic or political costs. However, one has to realize that not all transaction costs are negative. There are also transaction costs that go into optimizing the aid delivery system, such as management costs. In their article, Ashford & Biswas argue that aid agencies do not stress this enough. There is so little known about transaction costs that even when reducing transaction costs is merely a cost effective goal, it is unclear which particular costs should be targeted (Ashford & Biswas, 2010, p. 482). For example, many individuals involved in the aid delivery system, earn their wages partly from this aid. However, if you want to reduce transaction costs, you cannot just cut wages. This will on its turn possibly lead to an increased ineffectiveness of aid since it might slow the delivery down. And especially in humanitarian aid operations, timeliness of the aid delivery is a key factor to the aids effectiveness.

Speed

Disaster situations require timely responses. There are short windows of time that allow disaster relief workers to respond to the critical needs of affected people. Speed in humanitarian missions is not only required to help the affected people, it is also necessary to prevent other deaths from happening. Experts agree that part of the humanitarian mission is to efficiently execute the operational activities of logistics and the supply chain (Argolla Da Costa, Gouvêa Campos & de Mello Bandeira, 2012, p. 600). There is a general agreement among disaster relief workers and donors that the current humanitarian aid system does not provide adequate emergency resources and a rapid response to emergency situations (Fleshman, 2006). Often, disaster relief comes too late, resulting in many deaths. The help does not cover all the needs and simply does not come on time. In order to deliver the aid as

fast as possible, there have been developed rapid response funds and other gear shifting mechanisms (Swithern, 2014, p. 81). The humanitarian supply chain is dominated by an environment that is unpredictable and ever changing. It is turbulent, unpredictable and needs flexibility (Oloruntoba & Gray, 2006, p. 117).

Speed is universally valued because victims cannot wait (Walton et al., 2011, p. 1). Speed is a central characteristic of good disaster response. However, offering a rapid response to disasters is a difficult task because many donors and intermediaries all have their own organizational structure and operating ways (ibid., p. 2). The more intermediaries are involved, the longer the response therefore takes. The problem of speed is not per se a problem that exists between donors, intermediaries and recipients, it also exists within the governmental or international organizations. Humanitarian logistics remain understudied and under- planned. There is little overhead provided by the organizations for improving the humanitarian logistic models. Especially, because humanitarian logistics are not the same as corporate logistics. Humanitarian logistics are focused on saving lives and have to deal with complex chaotic disasters. Speed therefore is the main driver of the supply chain. Hence, time reduction has become an important area of consideration (Tomasini & van Wassenhove, 2009). To compensate for the lack of effectiveness that slow delivery results in, aid organizations anticipate on this lack of speed (Oloruntoba & Gray, 2006, p, 117). The humanitarian supply chain has to prove to be agile and reactive to disasters. A faster delivery of aid through the intermediaries will have a positive outcome for both the recipient as the donor, by creating a more effective delivery.

Recipients

Surpluses and shortages

In every disaster situation, donors want to help. However, in disaster situations it is often unclear what is needed to help. There are basic goods such as water, food and medicine. However, it is difficult to identify the needs of the affected people when it is already difficult to identify the affected people. It is not unusual for donors and intermediaries to wrongly identify the needs. In multiple disaster situations, planes came full of goods that were not needed (Fessler, 2013). Estimations are that around sixty percent of items donated cannot be used (ibid.). Donations after disasters do not only encompass in- kind aid such as food and water, often, people also donate old clothing or toys. Often in- kind aid is misguided, simply because the donors do not know what the affected people need and how much of the aid is already on the ground. This issue at the last chain can therefore be traced back to the issue of the first chain. This is how the ineffectiveness of the humanitarian aid supply chain reinforces itself.

Disaster aid groups have been searching for solutions for this issue. In- kind donations often dominate humanitarian responses (Harvey, 2007, p. 79). Because food often is not the only thing that is needed in disaster- relief situations, aid organizations have been calling for a shift from in- kind donations to financial donations. A cash transfer is not just an alternative to food aid, but to all sorts of in- kind aid (ibid.). Donating cash has potential for multiple areas of humanitarian assistance. It can for example impact local markets since cash gives the recipients the ability to buy things from their local markets, instead of receiving aid that was shipped from a donor country. In addition, it can actually be more

nutritious for affected people since they can buy goods that they need, instead of receiving what donors have to offer. Thereby, it might increase the effectiveness of aid because it is cost- effective. There are lower transportation and logistic costs (ibid., p. 80). Thereby, a cash transfer is a quicker response to a disaster, than the delivery of in- kind aid is. As was mentioned above, speed is a key factor in a efficient and effective delivery of aid. Currently, not more than six percent of all humanitarian aid donations is via cash transfer (Harvey, 2016). Cash gives people more choice and control over how to meet their needs. In- kind aid does not reflect their needs, and often recipients even sell the in- kind aid to buy what they really need (ibid.). Studies found that 18% more people could be helped at no extra costs if they received cash instead of food (ibid.). So if shifting from in- kind to financial aid can make aid delivery more effective, why is it not being done on a larger scale?

This has to do with the lack of trust that the cash will not fall into the wrong hands. Once again, the overarching problem of the lack of transparency is vital in not making this switch. One other issue is that the affected people that would receive the cash are often not being identified. Because humanitarian aid is given in disaster- relief situations, the recipient country often is in a state of chaos. It is therefore extremely difficult to identify the people in need, often because they have lost their identities on paper and have no legal documents to identify themselves. Globally, over 2.4 billion people do not have a legal identity. (Aid:Tech, 2018a). Present- day, identity is mostly manifested in physical documents like passports and birth certificates. In developed countries, these documents are relatively easy to obtain, but in many developing countries, they are not. Without proof of legal identity individuals face obstacles regarding their rights and access to financial services. The people are often involuntarily under the radar, yet they are the most vulnerable and in need. However, it is extremely difficult to find these people and offer them the help they need, especially when it comes to cash transfers. For a donor to be able to know if the aid is reaching the intended goal, reliable data is necessary. Without an ID that gives access to financial services, it is impossible to trace where the aid is being spent on and therefore also the needs. Providing affected people with a digital ID will therefore ensure donors that the affected people have received the cash and donors will be able to trace where the cash is being spent on, which will increase donors trust.

Blockchain

Introduction of blockchain

Recently there has been an up rise of a certain technology that seems promising and it has been getting increased attention from policymakers and humanitarian aid workers. This technology is called blockchain. Blockchain came up in 2008 when the cryptocurrency Bitcoin was introduced to the world. The method was originally devised for the digital currency, but other potential uses are assessed. Blockchain has the potential to be the next major disruptive technology and worldwide computing paradigm (Kshetri, 2017, p. 1710). Tapscott explains blockchain as: “an incorruptible digital ledger of economic transactions that can be programmed to record not just financial transactions but virtually everything of value” (Tapscott, 2016). Blockchain is known as the distributed ledger technology (Kshetri, 2017, p. 1710). More broadly defined it’s a decentralized, trustless system. It combines BitTorrent peer-to-peer sharing with public key cryptography (Swan, 2015, p.vii.). A standard algorithm is run over a file to compress it into a 64- character code: the hash (ibid., p.viii). This hash is unique for that document. This hash will then be included in a blockchain transaction. This adds the timestamp that proves the digital asset existing at that moment (ibid.). Other than traditional ledger books, the blockchain database is shared across a network of computers (Purvis, 2017). All transactions through blockchain are transparent, but the identities of the parties are shielded (Boucher, Nascimento & Kritikos, 2017, p. 17). Whenever an individual wants to make a transaction on the blockchain, this is broadcasted to the network (Ministry of Foreign Affairs of Denmark, 2017, p. 9). This transaction is public and has to be confirmed by ‘miners’. A miner can be anyone who has the capacity to run blockchain on their computer. A miner has to solve and validate a complex mathematical puzzle to confirm a transaction. To make it comprehensible, you can envision blockchain as an excel sheet shared across many computers. Anybody who is interested in the data that is on the excel sheet can copy it to their computer. The status of the transaction normally is public, comparable to posting it on a public bulletin board. However, companies also have the choice to work through a private blockchain, whereby people need permission from the company to work with that blockchain. Because blockchain has much to offer for individuals, businesses and governments, there is a rapid rise of investments in the technology (Kshetri, 2017, p. 1718). However, not everybody is enthusiastic about blockchain or cryptocurrencies. Many economists claim that Bitcoin is a bubble waiting to burst and other critics see blockchain as a platform for illegal activities. Other negative implications of blockchain are that the technology is extremely energy consuming, the computers working to maintain the distribution ledgers have been using more energy than many countries (Klein, 2018). Plus, one Bitcoin transaction consumes the same amount of energy as do eight U.S. households per day (Cebolki, 2017). Blockchain is very expensive and at this moment very slow. Visa’s payment network can process 24,000 transactions per second, where Bitcoin can only process seven. One other issue with blockchain is that some believe that it threatens privacy. Because it is such a public system, created for the sake of transparency, it is important that personal data keeps secure. According to the General Data Protection Regulation, personal data has to be protected from misuse. This privacy issue is still a struggle for the blockchain technology users. To deal with this struggle, there are design choices that can be made while making use of blockchain. There are two governance models, a permissionless blockchain, where anyone with a computer and internet can write consensus data and the permissioned blockchain, where there is a restricted ability to

manipulate the blockchain (Reinsberg, 2018, p. 10). The use of both of these governance models has pros and cons. A permissionless blockchain is preferable for decentralized computing applications, like identity management. A permissioned blockchain can be used when the participants trust each other, and there is no need for a decentralized trustless system. In a permissioned blockchain there is one actor that has the central authority to give participants permission to add something to the blockchain. The use of a permissioned blockchain is subject to debate because the central idea of using blockchain technology is the elimination of third parties and a central authority. With a permissioned blockchain, one has to have a central authority.

Blockchain can be seen as a technology that: “entails important system changes in the social, economic and political spheres, including those on the international scale” (Szkarłat & Mojska, 2016, p. xi). Until now blockchain has been used mainly within the private sector on the international scale by tracking the movement of products. One of the world’s biggest retailers, WalMart, uses blockchain to ensure safe trade in Chinese pork. This in order to track the movement of pork and to make the system safer (Nash, 2016). Others followed with exploring blockchains potential. IBM is starting to monitor the movement of diamonds and Toyota Motor Corp. is considering to use the technology to track auto parts (ibid.). Until now blockchain has already been used in supply chain management, land registries and e- government (Reinsberg, 2018, p. 1). In the recent years, blockchain has also made its arrival in the aid industry. Blockchain seems promising for the development industry because it holds promises to boost financial inclusion, improve production processes and make governance more transparent (ibid., p. 11). The possibilities for the use of blockchain seem endless, however, blockchain is still in its infancy. Because of this, there is still a lot of research to be done. However, many companies and policymakers have devoted attention to the technology. It is understandable that within the development aid industry eyes are pointed at blockchain. Development organizations such as the United Nations have been gradually embracing blockchain, with as many as seven UN entities trying blockchain initiatives as alternative ways to aid delivery (Riani, 2018). In the next section, the potential that blockchain offers as a humanitarian aid tool will be outlined.

Blockchain and humanitarian aid

Since a couple of years, the potential of blockchain is being discovered in multiple industries. The disintermediation process (replacing the middlemen by blockchain technology) that the technology offers, can disrupt almost every industry (Ministry of Foreign Affairs of Denmark, 2017). Many blockchain enthusiasts therefore also believe that blockchain is the next humanitarian aid industry disrupter (Purvis, 2017). Blockchain technology can potentially be used for transferring financial humanitarian aid, such is the case with cash transfers. Previously, the combination of in- kind aid with cash transfers was discussed. Because blockchain is a digital ledger, it cannot transfer in- kind aid. The use of blockchain in the humanitarian supply chain can therefore only be used to transfer cash. Because aid agencies are striving for a more direct transfer of aid, mainly by transferring cash and stepping away from in- kind donations, blockchain has the potential to innovate the aid industry by making it more digitised and future- fit. Blockchain technology offers an alternative to cash controlled by national banks or the government. Thereby, because it is impossible to remove blocks from the transaction, blockchain is safe from fraud and offers a way to avoid financial aid getting lost to corrupt governments. Previously, it was discussed how aid agencies are hesitant to make the switch to cash transfers because there is a lack of trust. They are afraid that the cash might end up in the wrong hands and not reach the intended goal. Blockchain might offer a solution to this fear, because there cannot be tempered with a permissioned blockchain. The transaction is completely transparent and the cash can be traced back. If blockchain could enable more aid agencies to switch to cash transfers, less in- kind donations would go to waste and aid delivery would become more effective because more affected people can receive the help they deserve. It comes as no surprise that blockchain has been praised for the opportunities it offers. In general, with the use of a permissionless blockchain, the benefit of blockchain is the fact that it is a decentralized trustless system. There is no centralized institution that owns the blockchain. It can therefore remove problems that are inherent to the humanitarian aid supply chain in theory.

The ultimate aim for policymakers and aid workers is to track every aid dollar, from donor to recipient in order to identify bottlenecks in the supply chain. Blockchain could help create more transparency in the supply chain by creating a transparent transaction that cannot be tampered with. Blockchain can be used in all sorts of shapes and sizes. In theory, blockchain can be used in humanitarian assistance in the following ways: “Information management, coordination of aid delivery, management of crowdfunding, tracking supply chain, cash-transfer programming and boosting humanitarian financing” (Riani, 2018). Thereby, blockchain offers storage for digital identity of vulnerable people on the decentralized digital ledger. Blockchain offers vulnerable people a digital identity connected to a digital wallet. With this digital identity, they do not need physical proof of their identity and may gain easier access to social and financial services. This sounds as a great opportunity however we have to keep in mind that vulnerable people’s identity is extremely valuable information that has to be kept private. This is also what makes humanitarian workers skeptical about the new technology. Nevertheless, it is gaining momentum. Especially now there is an increasing use of cash transfer programs to promote direct funding, international organizations are starting to see the potential. There has not yet been made use of blockchain on an international scale in the humanitarian aid industry involving governments. Therefore, mainly, international aid organizations are setting up pilots and experimenting with the technology. The aid organizations are closer to the ground than

governments. Therefore, we see an up rise in the use of blockchain technology mainly in the two last chains of the supply chain, with an increased focus on the recipient chain.

Blockchain governance models

As previously mentioned, there are two governance models that participants of blockchain can make use of. These are the permissioned blockchain and the permissionless blockchain. The permissionless blockchain is how the developer of blockchain most likely envisioned it; as a trustless, decentralized system. In a permissionless blockchain, there cannot be tampered with the transactions and every transaction can be traced back. The permissioned blockchain however, is in some humanitarian assistance related cases a better choice. Humanitarian aid funding consists of three flows, namely, multilateral, bilateral and private donors. These flows matter when we talk about possible donors using the blockchain technology in aid funding. When speaking of private funding, one can think of individuals donating a small amount to a certain charity when a disaster happens. In this case what happens currently is that the individual transfers the money to the charity, which then distributes the aid to the recipient country or a local NGO for example. You can imagine the money that gets lost to transaction costs and fees in this transfer. With every regular transaction, aid funding or not, there are transaction costs involved. When an individual transfers US$5, most likely, the charity does not receive the full US$5. And what is certain, is that this US$5 does not fully reach the end recipient. For the individual donor, there is a lack of knowledge and a lack of verification (Reinsberg, 2018, p. 13). This is where blockchain becomes interesting for the private donors. Blockchain could establish a peer-to-peer blockchain, where the individual donor can transfer money directly to the end recipient. It does so by establishing a smart contract that contains conditions under which a donation will be released (ibid.). The startup company Aid:Tech is frontrunner in this. Aid:Tech launched an application that enables groups or individuals to be connected through a peer-to-peer network (Aid:Tech, 2018a, p. 23). Users of this app can donate, track and receive notifications in a transparent manner (ibid.). This creates trust and transparency and might result in more donations coming from the private flow of funding.

For bilateral and multilateral aid we have to envision it differently. For one, governments will not make use of a permissionless blockchain because it will take too long to validate transactions. It has to be noted that there is not an existing case of the use of blockchain in bilateral aid delivery yet. Blockchain could potentially enhance aid effectiveness by allowing states to make more credible commitments (Reinsberg, 2018, p. 14). Blockchain offers the use of smart contracts, that specify that the donor transfers the aid once the recipient fulfilled its commitment, for example if they ensure human rights. However, one needs to be critical here and state that the only way that this can take place in the future is if all states involved in the aid industry will replicate all existing contracts onto a permissioned blockchain (ibid.). A permissioned blockchain means that there is a central authority that gives permission to write data on the blockchain. The prerequisite on which there can be made use of a permissioned blockchain is when the interest of the group is the same. The only way in which the participants can be trusted not to collude against the interest of the group is if they draw benefits from the system. As we know, states are not always trustworthy to follow up on their promises, so making use of a permissioned blockchain is very risky. It has been proven that states donate aid not just out of morality, but also for other strategic interests (Degnbol- Martinussen & Engberg- Pedersen, 2003). The aid industry is worth trillions and deals with many vulnerable people. It is therefore crucial

that the actors involved are trustworthy. A permissionless blockchain is not an option because not every individual should have access to private government data. In his article, Reinsberg states that blockchain has potential of succeeding in the aid industry under three conditions: 1) States must share resources, cleared through a central agency, 2) the contemporary systems for exchanges are slow and, 3) all resources are digitally representable and the aid contracts are complete (Reinsberg, 2018, p. 18). These conditions are currently not fully being met. Regarding the first condition, there are central agencies through which states share resources, the World Bank is an example of such a multilateral agency. A growing share of aid is being channelled through multilateral aid agencies, so this condition might be met in the future. Regarding the second condition, the exchanges can be slow, but this is a very subjective condition. Reinsberg should further define what is a fast or a slow exchange before one can say that the condition is met. Furthermore, it is difficult to say whether all resources are digitally representable and if the aid contracts are complete because this data is not open to the public. Reinsberg states interesting conditions but it is unknown whether these are now being, or ever going to be, met. It is therefore too early to conclude if blockchain will in the future be used for humanitarian aid delivery on the international scale.

In theory it seems like blockchain has the potential of succeeding in the aid industry. Because blockchain technology is not yet being used in the aid industry on state level, it is difficult to make a prediction whether blockchain will succeed in the international aid architecture. Later on in this thesis a case study will be conducted of the use of blockchain by an international aid organization. This will help analyze whether blockchain is useful in certain chains of the humanitarian aid supply chain, other than merely on the macro level.

Blockchains drawbacks

Blockchain seems to offer a solution to every problem that humanitarian aid delivery suffers from. But there are undeniably also downsides to the use of the technology. Besides the fact that blockchain is a complicated technology and not many people fully understand it, which fuels the skepticism surrounding it, it is not perfect. Blockchain technology fully runs on the internet. Especially during disaster- relief situations, one cannot depend on an internet connection. Thereby, it is also possible that the disasters happen in countries where the government does not support full access to the internet. When making use of blockchain technology, the demand for many people, servers and computers is extensive. It is therefore also unlikely for blockchain transactions to be successful in a country that suffers from civil unrest where the government shuts the internet down frequently (Purvis, 2017). Also, the technology is extremely energy consuming. Blockchain is resource- intensive by its nature (ibid.). Another technical constraint is that blockchain is not speedy with the transactions. As mentioned before, Visa's payment network can process 24,000 transactions per second, where Bitcoin can only process seven. Consequently, this might result in a slower cash transfer. In the section about the humanitarian aid supply chain, it was explained that speed is a key factor for an efficient and effective delivery of aid. Currently, there is also a lack of action plans on how global transactions could be transferred to the blockchain. It is therefore unlikely that aid agencies will make use of a technology that is slower than what they are working with now.

Besides these technical constraints, there are also bigger issues with the use of the technology. For example, it remains unclear how the capacity needed for blockchain growth

will be financed (Kshetri, 2017, p. 1720). After weighing the pros and cons of the use of blockchain in the humanitarian aid industry, it became clear that the use of blockchain needs to be optimized before applying it to vulnerable people. Especially regarding the idea of storing people's identity on the blockchain, we are speaking of highly valuable data. It is crucial that this data cannot be hacked. With storing this data there comes high responsibility. The questions then are who is responsible for the storing and the security of this data on the permissioned blockchain and which country will accept virtual identity? These are governance questions that need to be debated about on the state level before blockchain technology can be used on the macro level. Blockchain offers potential, but because it is still in its infancy, one cannot promise that blockchain fulfills these promises.

In the upcoming case study, the usage of blockchain in a refugee camp in Jordan will be researched. In theory, blockchain seems like the perfect solution for the problems inherent to the humanitarian aid supply chain. This case study will give an impression on what blockchain has to offer in practice, including the challenges that it brings with it.

Case study

The use of blockchain by the World Food Programme

As was outlined in the literature review, the potential of blockchain in the humanitarian aid industry is still being discovered. In theory, blockchain offers solutions to many problems that are inherent to contemporary humanitarian aid delivery, such as the lack of transparency and high transaction costs. Because the use of blockchain technology is still very new, many projects undertaken by international aid organizations are pilots. This case study will therefore account for an example on what blockchain can mean to the humanitarian aid industry when international aid organizations combine their forces and work together to enable technology to help affected people. Even though it is too early to tell what blockchain has to offer for the entire humanitarian supply chain on a global scale, it is interesting to discover how blockchain is changing the way international aid organizations this day are donating aid to recipients. This case study mainly shows the effect of blockchain technology on the second and third chain of the humanitarian aid supply chain. In this section, a within-case study of a Jordan refugee camp that runs on blockchain will be conducted. The UN World Food Programme launched the so-called Building Blocks pilot. The United Nations argues that blockchain is the future of cash disbursements at the WFP (WFP, 2018a). This is a bold stance to take, especially since the UN is seen as the center of the international aid architecture (Ross, 2011, p. 1). Given this, the WFP is a strong case for analysis. The UN piloting blockchain indicates the growing level of trust in the technology. It is therefore interesting to research if blockchain in practice answers to the humanitarian aid supply chain problems.

The WFP is: “arguably the most successful and politically legitimate of the agencies in the United Nations (UN) system” (Ross, 2011, p. 1). In general, the WFP is responsible for: “all food aid logistics up to the extended delivery points (EDPs) at inland destinations close to the affected area with other humanitarian agencies or governments of recipients responsible thereafter” (Oloruntoba & Gray, 2006, p. 116). The WFP food delivery system is an example of a humanitarian aid supply chain. The delivery of food to affected people is all about logistics. The WFP itself is concerned with its supply chain. Each year, they bring out the WFP Supply Chain Report. Their operations need to be fast and agile when responding to humanitarian crises. In the literature review, the supply chain was divided into three chains: donors, intermediaries and recipients. The WFP food supply can as well be analyzed through these three chains. When analyzing the three chains in the WFP supply chain, one sees that, with regards to the first donor chain, in 2017, 96 donors contributed to the WFP (WFP, 2018a). This includes 42 multilateral donors. It goes without saying that this is an extremely high amount of donors contributing to one humanitarian organization. The WFP has three different donor channels: Governments (that are the principal source of funding), corporations and individuals. The WFP has no independent source of donations, which means that all WFP work gets financed by donations. 93.5% of ones donation goes directly towards the delivery of food, according to the WFP (WFP, 2018b). WFP states that, since they do not have an independent source of funds, every donation must be accompanied by cash in order to facilitate the delivery of the food. Every day there are 20 ships, 5,000 trucks and 92 plans on the move to deliver WFP aid to affected people (ibid.). WFP works together with governments, NGOs, suppliers and local communities (WFP, 2018c). This indicates that in between the donation and the delivery there is a high amount of intermediaries involved.

With such a high amount of donors and intermediaries, naturally, not the full amount of donations can go to the food delivery and gets “lost” to transaction costs. In 2017, the indirect support costs (ISC) rate was seven percent (WFP, 2017). This means that seven percent of all donations go to programme support or management and administration. This indicates that at least seven percent of the aid that the WFP receives, gets lost to transaction costs. What became clear from the literature review is that not all transaction costs are negative. This is also the case for the WFP. The organization is honest and transparent about the fact that they use a certain amount of the donations to facilitate their work. Without these costs, the WFP would not be able to execute her tasks and efficiently deliver aid to the recipients.

Humanitarian aid is increasingly being delivered through cash transfers, also by the WFP, which are likely to reach US$1.6 billion donated through cash transfers in 2018 (WFP, 2018d). The WFP makes use of cash transfers via blockchain in the Jordan refugee camp. By using blockchain, WFP hopes to control financial risks, reduce transaction costs and set up more rapid responses in case of emergency situations. Globally, the WFP helps around 80 million people. The organization does this with the funding of dozens of donors. The Logistics Cluster that was founded to improve international responses to humanitarian crises, helps coordinate the funding, but also acts as an intermediary. Because the WFP coordinates the aid from donor to recipient, they have to manage many intermediaries on the macro, meso and micro level. In the delivery of food, this is not the optimal situation since food has an expiration date and requires fast delivery. In addition, there might be a surplus of a certain kind of food, where there is a shortage of another subsistence, which is often the case in the third chain. Because humanitarian crises have many affected people as a consequence, it is difficult to identify every individual and his/her needs and communicate this back to the donors. As a result, people's needs were not met in the most effective way. In order to improve the aid delivery and meet more needs, the organization switched from delivering food, to transferring money to affected people in 2009 (Juskalian, 2018). The decision to switch to this approach was based on the premise that they would be able to help more people this way, including improving local economies and aid transparency. Thereby, the affected people will then be able to buy food at local markets, which gives them the opportunity to buy exactly what they want and need, and in the meantime boost local markets. In addition, this saves the WFP cash since buying food at local markets is less expensive than shipping food from donor countries. A consequence of this switch to cash transfers is that the WFP now has to deal with different intermediaries, such as regional and local banks, that create hurdles for efficiency and effectiveness. In 2017, the WFP transferred US$1.3 billion in benefits, accounting for thirty percent of its total aid (ibid.). One big, immeasurable, part of these transfers goes into transaction costs and other fees, which could have gone into meals. The goal of this pilot therefore is to run a trial on how to make cash transfers more transparent, efficient and secure. The premise of the use of blockchain technology is that in the refugee camp, the WFP can save up to $150,000 each month in bank fees in Jordan, by eliminating the middlemen (Hempel, 2014). According to Munich WFP innovation lab chief Bernhard Kowatsch, 98% of bank- related transfer fees can be eliminated by the use of blockchain in this refugee camp (Juskalian, 2018).

WFP initiated a proof of concept to confirm the capabilities of blockchain, mainly in the authentication and registration of transactions. WFP first executed this experiment in Pakistan in 2017 and, building on lesson learned, the WFP built and implemented a blockchain system in a refugee camp in Jordan as a pilot and scale up. As per October 2018, more than 100,000 refugees in camps receive their WFP assistance through

blockchain-based systems (Juskalian, 2018). The way it works is as followed, all transactions and entitlements are recorded and verified on the blockchain. Then, a virtual wallet is created for every beneficiary, where all of his or her transactions are being recorded. Up until time of writing, blockchain has already served 100,500 beneficiaries and US$1,000,000 went through 100,000 transactions (WFP, 2018d). What is groundbreaking about this pilot is the fact that the refugees can identify themselves by their eyes and that this gets registered on the blockchain. The camp makes use of existing biometric authentication technology. In this way, refugees can go grocery shopping in a supermarket based in the camp and pay by scanning their iris. The refugee does not have to pay by (credit) card or cash, but he/ she pays with EyePay. By scanning their eyes, the refugees confirm their identity on the traditional UN database (Juskalian, 2018). The fact that the refugees have their identity connected to an eye scan, means that it becomes easier to identify the refugee and answer to his/her needs. The issue of a surplus or a shortage of a certain good gets eliminated because the refugees are all identified and their needs are being registered by keeping track of what they buy most in the supermarket. The refugees making use of the new technology notice a difference. It has to be noted that the eye scan was used already before the introduction of blockchain at the camp. However, the refugees say blockchain technology makes a difference because they are more flexible and not dependent on paper work. The refugees now no longer have to wait in line for in- kind aid. Cash transfers increase the speed with which affected people can be helped because the aid organizations are no longer dependent on logistics and transport. With the addition of the use of blockchain technology in relation to cash transfers, there is no possibility for refugees to lose, for example, their vouchers for food because their papers are connected to their iris. With that the slow bureaucratic processes are eliminated. This also increases effectiveness on the donor side of the supply chain as they can transfer cash instead of in- kind aid. Thereby, cash can always be used, where in- kind food can result in a surplus or a shortage of a certain good. Because the WFP has experienced the pilot as successful they are planning on the next stage where 500,000 Syrian refugees in Jordan will receive help from the WFP (WFP, 2018d).

Because of this technology, reconciliation improved and transaction costs decreased as a result. Building Blocks is based on the Ethereum protocol, this is a blockchain based distributed computing platform. It runs on a custom built blockchain, with no possibility of fraud, censorship or third- party interference (Ethereum, 2018). Building Blocks runs on a private permissioned blockchain. This means that the WFP has control over who joins the network. Thereby, it has the power to rewrite transaction histories. The idea of a public ledger that cannot be overwritten is therefore not applicable to this case. You could say that a downside to the use of blockchain in this case is that blockchain was developed to cut the intermediaries and banks out, and the WFP is in this case acting like a bank. This makes for an opportunity for censorship. The WFP defends her decision to choose for a permissioned blockchain by stating that in an earlier pilot, the use of a public blockchain caused transactions to be validated very slowly. One important aspect to humanitarian crises responses is the agility of the responses, it is therefore argumentative that the WFP chose the blockchain that is most beneficial for the delivery in relation to speed. A public blockchain makes it more difficult to tamper with the transactions, but transactions fees can add up. A permissioned blockchain has upsides, namely that transactions can get processed faster and cheaper. Downsides are that there is a centralized authority that in some ways acts like a bank or government.

Even though the pilot has positive results and the UN has plans to upscale the pilot, the project is not just being praised. Opponents criticize the pilot for several reasons. One of the reasons why the pilot is being criticized is because the project's scope and impact are narrow (Juskalian, 2018). In their opinion, WFP could easily just use a traditional digital database. Especially because before the use of blockchain, refugees already worked with paying their groceries through an eye scan. The only difference was that at that time, a bank was controlling the transactions instead of the WFP, causing the WFP to lose money to transaction costs. Then there are people who are skeptical of blockchain in general. They believe it is too early to use blockchain in humanitarian aid because the people are already vulnerable and should not be used to experiment new technologies on (ibid.). This is more of an ethical criticism, since storing data of vulnerable populations have to be extremely secured because it cannot be in the hands of people with wrong intentions. Then there are critics about the use of the blockchain governance model. They state that a permissioned blockchain ruins the initial idea on which blockchain is based, since it was developed as a trustless, decentralized system. When one organization then sets up a permissioned blockchain, it is acts like an intermediary, who has control over the transactions and the participants of the blockchain. WFP acknowledges these criticisms, but reminds them of one of their goals, namely providing refugees with digital ID's. According to the World Bank, there are globally 1.1 billion people without ID's (World Bank, 2017). These people are unable to prove their identity and can therefore not access social services such as healthcare, education or finances. Blockchain has been considered to help development by the use of digital identity services (Reinsberg, 2018). When vulnerable groups can store their identity, not only will it help the affected people because they do not need physical documents anymore to identify themselves, aid organizations can in this way also keep track on how many people are exactly in need. Nowadays, the number of affected or fleeing people because of disasters are all estimates. It is impossible to know the exact number. Blockchain could help create clarity in these numbers because every beneficiary will receive a virtual wallet that is connected to them. These digital payment services can be combined to a unique digital identity (ibid., p. 12).

Concluding, the use of blockchain technology by the WFP offers solutions for the effectiveness of the humanitarian aid, namely mostly by saving on the costs of fees and transaction costs and providing refugees with a virtual ID and wallet. With this virtual ID and wallet, the UN can, with the use of blockchain technology, track where the money goes and register the needs of individual refugees. This added transparency brings clarity in how many refugees there are in the camp and what exactly are their needs. The WFP can act accordingly to these needs, which will result in less shortage or surplus of certain goods. The digital wallet is connected to a digital ID, which enables the refugees to get easier and quicker access to social and financial services. The speed of refugees receiving help therefore increases. The use of blockchain does not take away the fact that there is donor fragmentation and that the WFP has to coordinate the funding from dozens of donors. However, cash transfers through blockchain create transparent transactions that enable the identification of peoples needs. This can then be communicated clearly to the donors. This will increase donor trust that the cash reaches the recipient and will on its turn increase the use of cash transfers. Downsides of the use of blockchain by the WFP are that the WPF makes use of a permissioned blockchain, and even though this enables quicker validation of transactions, it requires a centralized authority. Thereby there are also ethical constraints that vulnerable people's data is not to be subject to pilots. Also, the pilot is a relative small sample size so critics say WFP could have just used a digital ledger. However, unlike other

solutions such as a digital ledger, blockchain allows these programs to scale up much more. WFP is ambitious and willing to expand their pilot and blockchain will enable the WFP to do so.

Discussion

Humanitarian aid is increasing each year, yet the demand for aid is not decreasing. In this thesis, the problem of humanitarian aid ineffectiveness was researched. In order to create oversight and clarity regarding the way humanitarian aid is being delivered. The humanitarian aid supply chain was explained. The supply chain was divided into three chains, namely: donors, intermediaries and recipients. One key issue of the supply chain that affects the effectiveness of the humanitarian aid delivery is the lack of transparency. The lack of transparency is present in each chain and several problems flow from it. Besides the lack of transparency, the problems of donor fragmentation, transaction costs, speed and unnecessary aid were discussed. One possible solution to these problems that was proposed is blockchain technology. This technology is fairly new and has been called an industry disrupter. In order to see whether blockchain technology might be a solution for the problems stated in this thesis, a within- case study was conducted on the pilot by the UN WFP in a Jordan refugee camp. By conducting this case study, one gained an insight in how blockchain is being used in practice in humanitarian aid delivery. The case study outlined how the WFP makes use of the humanitarian supply chain.

When looking at the use of blockchain in this pilot, it becomes clear that blockchain offers tangible solutions for the two last chains. For one, blockchain creates more transparency. It eliminates a certain amount of transaction costs by eliminating the middlemen. There were no more banks involved in the transfer of the cash of the refugees, which saved the WFP $150.000 each month in bank fees. In absolute terms, and it increases the speed in which refugees can get their groceries now that they do not have to wait for in- kind donations. Thereby, blockchain offers the refugees the possibility to connect a digital ID to a digital wallet. The refugees can pay via an iris scan which makes them independent from any physical documents, so they do not risk the possibility of losing their vouchers or cards. Blockchain can track their spending and allows them to choose for themselves what they want to buy. They are now not dependent on bureaucratic processes and what in- kind donations they receive from the WFP. It enables the refugees to fulfill their needs more accurately and gives the WFP and UN insight in what the actual needs are. For the WFP this is very valuable information because they can track what the refugees need by looking into their transactions and seeing what they mostly buy. This will result in less waste and a more accurately needs fulfillment. Regarding the first chain, Blockchain does not solve the issue of donor fragmentation, because the amount of donors will most likely continue to rise. However, the transparency of the transaction can have better donor coordination as a result. The difference with cash transferred with blockchain is that blockchain makes every transaction transparent and can be traced back from end to start. Transparency makes it easier for donors to align their donations with the needs, resulting in fewer shortages and surpluses. Together this makes up for a more effective way of humanitarian aid delivery.

Conclusion

The research question stated in this thesis was: “How can blockchain technology provide solutions for problems inherent to the contemporary humanitarian aid supply chain?”. This thesis aimed to answer this question by analyzing secondary sources in the literature review and conducting a within- case study. In the literature review the humanitarian aid supply chain was divided into three chains: donor, intermediaries and recipients. The problems that are inherent to the humanitarian aid delivery system were connected to one of these chains, being donor fragmentation, transaction costs, lack of speed and the delivery of unnecessary aid. Thereby, the overarching problem of the lack of transparency was explained. These problems can be seen as bottlenecks in the supply chain that cause the aid to become less effective, the further it flows down. A within- case study was conducted to analyse the use of blockchain technology in the practice of humanitarian aid delivery and whether it can be a solution for the problems stated in the literature review. The case study was conducted on the United Nations World Food Programme that makes use of blockchain in a Jordan refugee camp. In this camp, refugees can buy groceries in the local supermarket through an eye scan. This eye scan is connected to their identity that on its turn is connected to a digital wallet. All transactions that the refugees make are registered on the blockchain. This offers opportunities in several ways. The WFP has been increasingly making use of cash transfers in addition to in- kind aid. This already has made a difference for the issue of donor fragmentation. However, donors are still wary of the use of cash transfers because they do not trust that the money gets allocated to the right recipients. Blockchain creates an issue for this lack of trust because it offers a transparent transaction. For the second chain, the use of blockchain offers a solution to the issue of transaction costs. The use of cash transfers reduces intermediaries related to logistics and transportation, however it adds other middlemen to the supply chain such as financial staff and banks. The use of blockchain in this camp reduces the latter. There are no banks involved in the transaction that the refugees make. This reduces the transactions costs significantly. Regarding the issue of the lack of speed, blockchain is not yet ready for transactions of a global scale. Especially permissionless blockchains cannot fastly validate transactions. It does add speed for the last chain of the supply chain, as recipients are not dependent anymore of bureaucratic processes if they, for example, lose their vouchers. For the third chain, blockchain offers the solution to have the refugees store their identity on the blockchain and connect a digital wallet to their identity. It is for them impossible now to lose their identity. On the other hand, for the WFP this means that the recipients and their needs are easier to identify. Because all transactions at the local supermarket are registered, the supply and demand can be better aligned. As a result, there will less likely be a shortage of surplus of certain goods, which on its turn is beneficial for the issue of donor fragmentation.

Concluding, from this case study it became clear that blockchain can be a solution to the problems identified in the literature review, but mainly the problems inherent to the second and third chain. Currently, in- kind aid delivery is still dominant in humanitarian aid. And blockchain cannot create solutions for the delivery of in- kind aid since blockchain is a digital ledger. However, when there is made use of cash transfers, blockchain could play a role in establishing a transparent flow from donor to recipient. Also, blockchain does not offer a solution to the lack of speed in the intermediary chain. Blockchain cannot process and validate transactions as fast as Visa. It will slow down the delivery of the cash, and speed is a key factor in effective aid delivery. It is therefore unlikely that governments will at this place in time switch from their contemporary way of donating cash to donating cash via blockchain.

Blockchain has proved itself to be useful on the micro level, by providing refugees with a digital ID and a digital wallet. Blockchain is still in its infancy and can therefore not yet be used on a global scale.

Recommendations for further research include to analyse whether it will possible to use blockchain technology on a global scale and what this will then entail. Blockchain offers great solutions on the micro level, so it is interesting to see what it might offer on the macro level. Governments and aid agencies are interested in the use of the technology. Research should take a leading role in researching blockchain's potential for the humanitarian aid industry since optimizing the effectiveness of aid delivery will have significant benefits for millions of people. Blockchain has proven to increase effectiveness in the Jordan refugee camp, so it will be beneficial to explore the options to make use of blockchain technology on a bigger scale, and also on a higher level.

Bibliography

Aid:Tech (2018a). *Empowering through transparency: Transparency as a Service Token (TaaST).* Accessed: 2 August 2018, https://static1.squarespace.com/static/5b35fc188f51300267a78d49/t/5b62ef286d2a73e7fbc05f8d/1533210502058/AIDTech+TGE+White+Paper+V1.2.pdf.

Aid:Tech (2018b). *Overview*. Accessed: 2 August 2018, https://tge.aid.technology/welcome/#overview.

Ashford, R. & Biswas, S. (2010). Aid effectiveness, transaction costs and conditionality in the education sector. *International Journal of Educational Development,* 30, pp. 481-487.

Bauerle, N. (2018). *What is the Difference Between Public and Permissioned Blockchains?* Accessed: 12 August 2018, https://www.coindesk.com/information/what-is-the-difference-between-open-and-permissioned-blockchains/.

Boucher, P., Nascimento, S. & Kritikos, M. (2017). *How Blockchain Technology Could Change Our Lives*. Accessed: 30 May 2018, http://www.europarl.europa.eu/RegData/etudes/IDAN/2017/581948/EPRS_IDA(2017)581948_EN.pdf.

Brown, M. (2018). *Humanitarian Blockchain: Coding for a Humane, Sustainable World.* Accessed: 6 July 2018, https://www.forbes.com/sites/marshallbrown/2018/02/15/humanitarian-blockchain-can-we-code-for-a-humane-sustainable-world/#643fca346f3d.

Cebolki, A. (2017). *Blockchain- the Bane and Blessing of Energy Consumption.* Accessed: 8 July 2018, https://blog.cofound.it/blockchain-the-bane-and-blessing-of-energy-consumption-b449d69cd282.

Chang, A. (2015). *Foreign Assistance in the Digital Age*. Accessed: 11 June 2018, https://www.brookings.edu/wp-content/uploads/2016/07/ChangForeignAssistanceintheDigitalAge.pdf.

Clarke, D. & Dercon, S. (2016). *Dull Disasters? How Planning Ahead Will Make a Difference.* New York: Oxford University Press.

Da Costa, S., Gouvea Campos, V. & de Mello Bandeira, R. (2012). Supply Chains in Humanitarian Operations: Cases and Analysis. *Procedia- Social and Behavioural Sciences*, 54, 4, pp. 598-607.

Davidson, S. De Filippi, P. and Potts, J., (2018). Blockchains and the Economic Institutions of Capitalism. *Journal of Institutional Economics,* 14, 4, pp. 639- 658.

Development Initiatives (2018). *Global Humanitarian Assistance Report.* Accessed on 15 October 2018, http://devinit.org/wp-content/uploads/2018/06/GHA-Report-2018.pdf.

Fessler, P. (2013). *Thanks, But No Thanks: When Post-Disaster Donations Overwhelm.* Accessed on 1 November 2018, https://www.npr.org/2013/01/09/168946170/thanks-but-no-thanks-when-post-disaster-donations-overwhelm.

Fleshman, M. (2006). Fixing the humanitarian aid system. *Africa Renewal,* 4, pp. 6-9.

Gulrajani, N & Honig, D. (2016). Reforming donors in fragile states: Using public management theory more strategically. Accessed on: 21 August 2018, https://www.odi.org/sites/odi.org.uk/files/resource-documents/10479.pdf.

Gutting, R. & Steinwand, M. (2015). Donor Fragmentation, Aid Shocks, and Violent Political Conflict. *Journal of Conflict Resolution,* pp. 1-28.

Harvey, P. (2007). Cash-based Responses in Emergencies. *IDS Bulletin,* 38, 3, pp. 79-81.

Harvey, P. (2016). *Cash transfers: only 6% of humanitarian spending – what's the hold up?* Accessed on 1 November 2018, https://www.theguardian.com/global-development-

professionals-network/2016/jan/22/cash-transfers-only-6-of-humanitarian-spending-whats-the-hold-up.
Hempel, J. (2018). *How refugees are helping create blockchain's brand new world.* Accessed on 16 October 2018, https://www.wired.com/story/refugees-but-on-the-blockchain/.
IATI (2018). *IATI Standard*. Accessed on 30 September 2018, https://iatistandard.org/en/iati-standard/.
Ingram, G. (2018). *How better aid transparency will help tackle global development challenges.* Accessed: 3 July 2018, https://www.brookings.edu/blog/up-front/2018/06/21/how-better-aid-transparency-will-help-tackle-global-development-challenges/.
Juskalian, R. (2018). *Inside the Jordan refugee camp that runs on blockchain.* Accessed: 4 July 2018, https://www.technologyreview.com/s/610806/inside-the-jordan-refugee-camp-that-runs-on-blockchain/.
Kennedy, J. (2018). *Blockchain international aid player Aid:Tech raises €1m.* Accessed: 12 August, 2018, https://www.siliconrepublic.com/start-ups/blockchain-aid-tech-sginnovate-enterprise-ireland.
Klein, E. (creator) (2018). *Explained* [motion picture]. USA.
Knack, S. & Rahman, A. (2007). Donor Fragmentation and Bureaucratic Quality in Aid Recipients. *Journal of Development Economics,* 83, 1, pp. 97-176.
Knack, S. & Rahman, A. (2008). *Donor Fragmentation.* In *Reinventing Foreign Aid,* ed. W. Easterly, 333-348. Cambridge, MA: MIT Press.
Knack, S. & Smets, L. (2013). Aid Tying and Donor Fragmentation," *World Development*, Elsevier, 44, pp. 63-76.
Kshetri, N. (2017). Will Blockchain Emerge as a Tool to Break the Poverty Chain in the Global South? *Third World Quarterly,* 38, 8, pp. 1710-1732.
McGillivray, M. (unknown). *Is Aid Effective? OECD*. Accessed: 3 July 2018, https://www.oecd.org/dev/34353462.pdf.
McGillivray, M., and Morrissey, O. (2004). 'Fiscal Effects of Aid'. In T. Addison and A. Roe (eds), *Fiscal Policy for Development*. Basingstoke: Palgrave/WIDER, pp. 72– 96.
Ministry of Foreign Affairs of Denmark (2017). *Hack the Future of Development Aid*. Accessed: 30 July 2018, https://reliefweb.int/sites/reliefweb.int/files/resources/Hack%20The%20Future%20December%202017v2.pdf.
Nash, K. (2016). *Wal- Mart Turns to Blockchain for Tracking Pork in China.* Accessed: 6 July 2018, https://blogs.wsj.com/cio/2016/10/19/wal-mart-turns-to-blockchain-for-tracking-pork-in-china/.
OCHA (2012). Humanitarian Issues: How effective is the humanitarian aid system? Accessed on 2 October 2018, https://www.unocha.org/story/humanitarian-issues-how-effective-humanitarian-aid-system.
OECD (2016). *Development aid rises again in 2016 but flows to poorest countries dip*. Accessed: 19 August 2018, http://www.oecd.org/dac/development-aid-rises-again-in-2016-but-flows-to-poorest-countries-dip.htm.
OECD (2018a). *Net ODA.* Accessed: 4 June 2018, https://data.oecd.org/oda/net-oda.htm.
Oloruntoba, R. & Gray, R. (2006). Humanitarian aid: an agile supply chain? *Supply Chain Management: An International Journal*, Vol. 11 Issue: 2, pp.115-120.

Purvis, K. (2017). *Blockchain: what is it and what does it mean for development?* Accessed 3 July 2018, https://www.theguardian.com/global-development-professionals-network/2017/jan/17/blockchain-digital-technology-development-money.
Reinsberg, B. (2018). *Blockchain Technology and the Governance of Foreign Aid.* Working paper No. 505. Centre for Business Research, Cambridge University.
Riani, T. (2018). *Blockchain for Social Impact in Aid and Development.* Accessed on 8 October 2018, https://humanitarianadvisorygroup.org/blockchain-for-social-impact-in-aid-and-development/.
Ross, S. (2011). *The World Food Programme in Global Politics.* Colorado: Lynne Rienners Publishers.
Rysaback-Smith, H. (2016). History and Principles of Humanitarian Action. *Turkish Journal of Emergency Medicine,* 15, 1, pp. 5-7.
Santiso, C. & Frot, J. (2011). Herding in Aid Allocation. *International Review for Social Sciences,* 64, 1, pp. 54-74.
Scott, R. (2014). *Imagining More Effective Humanitarian Aid A Donor Perspective.* Accessed on 10 October 2018, http://www.oecd.org/dac/conflict-fragility-resilience/docs/Imagining%20More%20Effective%20Humanitarian%20Aid_October%202014.pdf.
Swan, M. (2015). *Blockchain: Blueprint for a New Economy.* Newton: O'Reilly Media.
Swithern, S. (2014). *Global Humanitarian Assistance Report 2014.* Accessed on 6 October 2018, http://devinit.org/wp-content/uploads/2014/09/Global-Humanitarian-Assistance-Report-2014.pdf.
Szkarlat, M. & Mojska, K. (2016). *New Technologies as a Factor of International Relations.* Newcastle: Cambridge Scholars Publishing.
Tapscott, D. (2016). *Blockchain Revolution*. Penguin UK.
Thomas, A. (2004). Humanitarian logistics: enabling disaster response. Accessed on 15 October 2018, http://www.fritzinstitute.org/pdfs/whitepaper/enablingdisasterresponse.pdf.
United Nations (2018). *Humanitarian Assistance and Assistance to Refugees.* Accessed on 2 October 2018, http://www.un.org/ha/general.htm.
Van Wassenhove, L. (2006). Humanitarian aid logistics: supply chain management in high gear. *Journal of the Operational Research society,* 57, 5, pp. 475-489.
Vandeninden, F. & Paul, E. (2012). Foreign Aid Transaction Costs: What are They and When are They Minimised? *Development Policy Review,* 30, 3, pp. 283-304.
Walton, R., et al. (2011). Defining "Fast": Factors Affecting the Experience of Speed in Humanitarian Logistics. Accessed on 29 September 2018, https://pdfs.semanticscholar.org/81d3/0e0cbf701b22b92e1b49c94387794388d111.pdf.
WFP (2017). *Indirect Support Costs: Definition and Value Proposition.* Accessed on 23 October 2018, https://docs.wfp.org/api/documents/WFP-0000038431/download/.
WFP (2018a). *Funding and Donors.* Accessed on 23 October 2018, http://www1.wfp.org/funding-and-donors.
WFP (2018b). *Supply Chain.* Accessed on 23 October 2018, http://www1.wfp.org/supply-chain.
WFP (2018c). *Corporate Strategy.* Accessed on 23 October 2018, http://www1.wfp.org/corporate-strategy.
WFP (2018d). *Building Blocks.* Accessed on 24 October 2018, https://innovation.wfp.org/project/building-blocks.
Williamson, O. (1996). *Mechanisms of Governance.* Oxford: University Press.

World Bank (2017). 1.1 Billion ‘Invisible’ People without ID are Priority for new High Level Advisory Council on Identification for Development. Accessed on 1 October 2018, http://www.worldbank.org/en/news/press-release/2017/10/12/11-billion-invisible-people-without-id-are-priority-for-new-high-level-advisory-council-on-identification-for-development.