How can digital community currency alleviate hardship during COVID-19 pandemic in Kenya? A necessity effectuation perspective

George Kuk  
*Nottingham Trent University*, george.kuk@ntu.ac.uk

Amon Simba  
*Nottingham Trent University*, amon.simba@ntu.ac.uk

Stephanie Giamporcaro  
*Nottingham Trent University*, stephanie.giamporcaro@ntu.ac.uk

Dave Leslie  
*Nottingham Business School*, dave.leslie.online@gmail.com

Follow this and additional works at: [https://aisel.aisnet.org/ecis2021_rp](https://aisel.aisnet.org/ecis2021_rp)

**Recommended Citation**

[https://aisel.aisnet.org/ecis2021_rp/120](https://aisel.aisnet.org/ecis2021_rp/120)

This material is brought to you by the ECIS 2021 Proceedings at AIS Electronic Library (AISeL). It has been accepted for inclusion in ECIS 2021 Research Papers by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.
HOW CAN DIGITAL COMMUNITY CURRENCY ALLEVIATE HARDSHIP DURING COVID-19 PANDEMIC IN KENYA? A NECESSITY EFFECTUATION PERSPECTIVE

Research Paper

George Kuk, Nottingham Business School, Nottingham, george.kuk@ntu.ac.uk
Amon Simba, Nottingham Business School, Nottingham, amon.simba@ntu.ac.uk
Stephanie Giamporcaro, Nottingham Business School, Nottingham, stephanie.giamporcaro@ntu.ac.uk
David Leslie, Nottingham Business School, Nottingham, dave.leslie@gmail.com

Abstract

Research on how COVID-19 is creating a crisis-within-a-crisis situation for the world’s most vulnerable communities by compounding their daily struggles and economic hardships is still developing. Accordingly, we utilise the everyday trading experiences of micro-entrepreneurs in Kenya’s informal settlements to contextualise how they tackled this unfolding situation through digital community currency (DCC). Our mixed-methods research draws on effectuation and connects entrepreneurial action with DCC. While field work yielded new knowledge on how micro-entrepreneurs sustained their livelihoods and maintained savings by leveraging DCC, statistics demonstrated evidence of effectual reasoning in alleviating the adverse effects of COVID-19 in terms of access to necessities and the application of affordable loss logic in price setting. Micro-entrepreneurs who were able to deploy available means to implement COVID-19 preventive practices were proactive in adjusting selling prices, whereas those who found it difficult were more likely to increase the prices of their traded goods and services.

Keywords: COVID-19, Digital Community Currency, Necessity Effectuation

1 Introduction

The advent of COVID-19 has placed extraordinary constraints upon developing countries. It has exacerbated the economic hardship of people living in informal settlements (OECD, 2020) and particularly, micro-entrepreneurs who trade out of necessity within slum communities. Prior to COVID-19, the achievement of the UN sustainable development goals (SDGs) in the least developed countries was estimated to require additional annual investments totalling $2.5 trillion USD – far more than what the public sector could foreseeably provide (Schmidt-Traub, 2015). With Covid-19 expected to have disastrous consequences on the finances of many developing countries and socio-economic indicators (OECD, 2020), the achievement of the SDGs increasingly rests on the ability to leverage private sector funds for making up the annual investment shortfall (Sutter et al., 2019).

With SDG-related investment opportunities often not financially attractive to institutional investors and neglecting potentially high-impact rural development projects (Walkate & Krosinsky, 2018), donor-aid through mechanisms such as Cash Transfer Programs (CTPs) will continue to play a critical role in meeting developing countries’ socio-economic development needs. CTPs are now widely accepted in developing countries as a key means of social protection (Davis et al., 2016), with evidence of their effectiveness leading to developmental organizations such as UNICEF prioritizing scaling up their use in response to Covid-19 (UNICEF, 2020). However, emerging evidence

concerning their effectiveness has produced mixed results. For example, injecting additional cash flow into some rural communities may cause the sales of perishable commodities to go up in price and in some instances malnourishment amongst non-grant recipients (World Bank, 2019).

In this study, we examine an alternative means of CTP through the use of digital community currency (DCC) for transmitting donor funds to vulnerable population groups in Kenya, while encouraging micro-entrepreneurship at a community level. Similar to most of the community currency systems, although DCC provides a temporary relief to the recipients, it imposes usage constraints by confining spending to basic essentials. Hence, the question is how do recipients involved in necessity entrepreneurship leverage constraints on DCC to pursue entrepreneurial activities. To this end, we examine the use of effectual reasoning in dealing with the effects of COVID-19 pandemic.

Using a mixed-method design, we extend the concept of effectuation (Sarasvathy, 2001, 2008) to develop a framework to understand how micro-entrepreneurs effectuate the potentials of DCC not only as a means for survivals but also as an enabler for necessity entrepreneurship. We used two data sources for the purpose of developing and testing our framework. For data collection Kenya’s informal settlements were deemed suitable settings for our research due to the country’s digitalisation agenda (Omania and Mainye, 2019). Particularly, the country’s flagship M-PESA digital currency system which is universally accepted as a medium for economic exchanges (Yermack, 2017) makes it a unique research setting, if compared with its African counterparts (Ndemo and Weiss, 2017). First, we conducted field work between November 2019 and August 2020 in Kenya’s informal settlements to refine our first-hand understanding on how micro-entrepreneurs organise daily entrepreneurial activities through DCC. With the field work data, we actively constructed our framework. The second source of data came from a May 2020 survey carried out by the Kenyan Red Cross, which focussed on measuring the COVID-19 impact of DCC on access to basic essentials.

Our framework seeks to explore and evaluate the means that micro-entrepreneurs used to enable necessity entrepreneurship within a resource-constrained context (Sarasvathy, 2001; Simba et al., 2020). This rarely explored empirical setting can offer new insights into the specifics of the effectual reasonings under lockdown restrictions that coincided with impoverished societal conditions for these necessity micro-entrepreneurs. Such insights can also contribute to bridging our gaps of knowledge at the intersection between digital innovation, entrepreneurship and crisis management (Doern et al., 2019). With this study, our research question is: How do micro-entrepreneurs leverage DCC to alleviate hardship during COVID-19 pandemic?

1.1 Alternative currency systems

Community currencies (CCs) have been promoted for decades in different countries as a ‘special purpose’ currency designed to provide additional liquidity when a medium of exchange is in shorty supply. They provide a store of value that can be saved for specific purposes, or incentivise certain types of behaviours (Seyfang & Longhurst, 2013). Despite a variety of designs and implementations (Diniz et al., 2019), CCs are generally seen as tools for encouraging local development and social inclusion by fostering financial inclusion (Blanc, 2011). In development contexts, the rationale for CCs is premised on a lack of a medium of exchange for connecting latent supply and demand, retarding local economic growth and development (Ruddick, 2011). In such instances, a complementary currency system can be agreed amongst community members to serve as an alternative means of economic exchanges, encouraging local economic activity in the absence of national currency, while supporting a range of positive social and environmental outcomes such as crisis resiliency and general wellbeing (Place and Bindewald, 2015; Siqueira et al., 2020).

This study examines how DCC can be used to alleviate economic hardship for people living in rural and peri-urban informal settlements during times of economic crisis. We show that despite the vulnerability of poor communities to crises such as COVID-19, DCC can support communities to build resilience to economic shocks by providing a sustainable, alternative medium of exchange for intra-community trade when national currency is in short supply. In framing our study, we draw upon
two complementary streams of work in necessity entrepreneurship and effectuation to contextualize how DCC can be used to alleviate hardship during crisis.

1.2 Necessity entrepreneurship

Effectuation has become a potent theoretical paradigm for understanding the way entrepreneuring individuals make decisions under uncertainty (Sarasvathy, 2009). This research stream acknowledges that effectuation provides entrepreneurs with a decision-making typology for formulating courses of action in situations where making business judgments based on predictions about the future is fundamentally difficult—if not impossible altogether (Grégoire and Cherchem, 2020). Thus, this means that effectuation has profound implications for entrepreneurs facing situations qualified as radically uncertain because the results of their actions are ex ante unknowable (Townsend et al., 2018) due to the unpredictability of continually unfolding events (Herbane, 2010, 2019).

Sarasvathy’s (2001) seminal work on effectuation suggests that in the face of Knightian uncertainty (Knight, 1921) despite the very existence of countable instances over which probability distributions may be estimated is in doubt, entrepreneuring individuals should not be deterred to proceed with their venture activities and they should do so on the basis of the means they have at hand, what they are willing and able to loss (Alsos et al., 2020; Read et al., 2009). The base argument expanded by Sarasvathy (2001; 2008) and elsewhere (e.g. Read and Sarasvathy, 2005; Sarasvathy and Dew, 2005) suggest that when entrepreneurs facing Knightian uncertainty, non-predictive control measures (effectual logic) should shape their courses of action as they encourage them to ask fundamental questions about resources—the means they have (i.e. intellectual, human and social capital), affordable losses, forming alliances, leveraging contingencies, allowing plans evolve along the way.

Although this effectual approach represents a paradigmatic shift in the way it shapes the decision-making heuristic (Welter and Kim, 2018) of entrepreneuring individuals (Johannisson, 2018), only a few researchers have attempted to empirically model and elaborate each principle of effectuation in depth (see Martina, 2020; Perry et al., 2012). Particularly, its principles of affordable lose and leveraging contingencies. Yet such an approach can help to: (i) develop new theorisation on how entrepreneuring individuals facing an uncertain world draw business inspiration through the means, resources and capabilities they have (Grégoire and Cherchem, 2020), (ii) investigate the way entrepreneuring individuals utilise their practical and situational rationality involving switching cognitive gears to adapt their decision-making style to the exigencies of their situation (Dew et al., 2009), and (iii) empirically model how entrepreneuring individuals leverage on contingencies as an alternative to causal logic (Chandler et al., 2011; Hauser et al., 2020; Ranabahu and Barrett, 2020). In the light of the limitations of the current body of knowledge on entrepreneurship, this research develops a necessity effectuation framework for capturing the decision-making heuristics underpinning trading activities amongst micro-entrepreneurs in peri-urban Kenyan communities during country-wide lockdown restrictions.

1.3 Resource constrained context

Scholarship on necessity versus opportunity entrepreneurship characterises push factors such as economic crisis and extreme events as the main drivers for individuals to engage in entrepreneurship and also describes opportunity identification, recognition and exploitation as the main features of opportunity-driven entrepreneurship (Devece et al., 2016; Nikiforou et al., 2019). Yet this research downplays entrepreneurship done out of ‘necessity’ with neither planning nor strategizing (Block et al., 2015; Simba and Thai, 2019). Thus, creating the perception that somehow necessity entrepreneurship is last resort activity to enhance survival and subsistence (Welter et al., 2016), such that necessity entrepreneurs might not reach ‘opportunity-entrepreneur standards’ because their motivations are survival-based with less emphasis on creating successful business ventures (Devece et al., 2016; Solymossy, 1997). Yet COVID-19 has elevated necessity entrepreneurship as a potent process to adopt in the recalibration of conventional business methods (Ratten, 2020). The Global
Alleviating Hardship with Digital Currency

level GEM data have shown that the ratio of necessity to opportunity entrepreneurship grows during times of crisis. Kuckertz et al. (2020) explained that lockdown threatens the existence of many start-ups. In the face of the deep and widespread COVID-19 disruptions (Bacq et al., 2020), necessity entrepreneurs with little experience in establishing and managing a business will be forced to persist with their ventures (Naudé and McGee 2009).

The current crisis somewhat resembles situations described by researchers studying the improvisational behaviors of entrepreneurs in the aftermath of a natural disaster (Villar and Miralles, 2019). Extreme events expose businesses to high levels of strategic uncertainty that impact not only business as usual (Doern et al., 2019), but ultimately business continuity and survival (Sullivan-Taylor and Branicki, 2011). Most recent assessments of COVID-19 impact on small business owners suggests a significant reduction in the number of active small businesses (Fairlie, 2020). In resource constrained environments, resources are scarce and can be quickly depleted. To safeguard their livelihoods, micro-entrepreneurs have to exert control by divesting resources to implement COVID-19 preventive practices. As such, COVID-19 pandemic can exacerbate the daily struggles in the pursuit of necessity entrepreneurship. Thus, we formulate the following hypothesis:

H1: The resource requirement to implement COVID-19 preventive practices in order to continue trading is negatively associated with necessity including access to essentials.

1.4 Creation of new means and ends

Effectuation is based on the effects of resources, capabilities and the entrepreneurial orientation of entrepreneurs in the face of Knightian uncertainty (Alvarez and Barney, 2007) where estimates of neither outcomes nor their probabilities can be estimated ex ante (Hauser et al., 2020; Sarasvathy and Dew, 2005; Welter et al., 2016). Sarasvathy (2001, 2008) details how effectual reasoning often begins with the available means and allows goals to emerge. Contrary to the causal reasoning where the decision-maker first sets a goal and then procures the necessary means to achieve that goal (Hauser et al., 2020), effectual reasoning does not require future predictions (Nelson and Lima, 2020). But it facilitates rapid adaptation to environmental changes as they go about their everyday entrepreneurship (Fisher, 2012; Welter et al., 2016) in conjunction with highly changing conditions (Sarasvathy and Dew, 2005). In contrast to opportunity entrepreneurship, which generally assumes entrepreneurs can have access to a portfolio of opportunities (Johannisson, 2018), the parameters that necessity micro-entrepreneurs confront with are drastically different.

Also, with the lack of technical and organisational capabilities, they often ‘muddle through’ extreme events (Sullivan-Taylor and Branicki, 2011) without a written crisis management plan (Sullivan-Taylor and Branicki, 2011). Yet regardless of their lack of preparation to deal with extreme events, research suggests entrepreneurs who own and manage small businesses often adopt unique entrepreneurial approaches ranging from adaptability (see Branicki et al., 2018; Bullough et al., 2014), improvisation to effectuation (Sarasvathy, 2001).

As hypothesised in a crisis situation, the issues of access to resources can be magnified for micro-entrepreneurs who trade in slum communities. In a sense, they need to ‘making do with what’s on hand’ (Levi-Strauss, 1967), which is integral to leveraging their existing resources and for controlling the environmental uncertainty (Hauser et al., 2020). Baker and Nelson (2005) discussed bricolage stressing how entrepreneurial individuals ‘make do’ with the resources they have at hand by combining them in a way that helps to solve new problems and create new possibilities. Both effectuation and bricolage encourage entrepreneurs to exert control over of the available set of ‘means’ (Fisher, 2012) — the things over which the entrepreneurs have control (Sarasvathy, 2001). With the availability of DCC, micro-entrepreneurs who can better leverage DCC as a new set of means for trading and savings and not just as a means for survival are more likely to mitigate the adverse impact of COVID-19 pandemic. Thus, we hypothesize:

H2: Micro-Entrepreneurs who leverage DCC as a means for trading and saving are less likely to be affected by COVID-19 than their counterpart.
1.5 Responsiveness to delimit constraints

In comparison with causal reasoning in maximising expected returns, applying effectual reasoning can assist micro-entrepreneurs to determine how much loss is affordable as they experiment with the limited means and resources (Sarasvathy, 2008). By taking action based on affordable loss, the risk involved in any one action cannot put an entire project into jeopardy (Read et al., 2009). Such that, entrepreneurs who apply effectual reasoning are known to leverage existing constrains for enabling them to create more options (Dew et al., 2009; Sarasvathy, 2008). Sarasvathy (2001, 2008) argues that when effectual entrepreneurs consider future possibilities within the parameters of affordable loss, this can practically reduce the impact of possible business failure. This contrasts with the predictive methods of forecasting expected returns by selecting an investment option according to its predicted worth (Read et al., 2009; Sarasvathy and Dew, 2005).

For effectual entrepreneurs, business failure is survivable as they are able to constrain the loss to something that they regard as affordable since the venture is considered worth doing even if the invested amount is lost (Dew et al., 2009). Although adopting and embracing such an approach in unpredictable market conditions may result in unintended consequences including underinvesting in attractive options or moving too quickly down unproductive paths, it however provides entrepreneurs with means of exerting some form of control over the occurrence of failure (Read et al., 2009). Explained from a resource perspective, affordable loss entails making decisions by committing a specific amount of resources to an endeavour with the understanding and acceptance that such resources may be lost (Frigotto, 2016). Thus, effectual micro-entrepreneurs will pay attention on things that are within their control and proceed in-spite of uncertainty (Sarasvathy, 2001).

When it comes to pricing, entrepreneurs are subject to a pricing-dilemma decision (Nwankwo and Gbadamosi, 2020). Whilst entrepreneurs are incentivised to under-price commodities early on with the hope of driving adoption, they also have the incentives to ‘skim’ profits from their customers. For effectual entrepreneurs, they will handle the pricing issue ‘locally’, i.e. they consider their social context and make effective use of the knowledge they acquire from their interactions with various stakeholders (Sarasvathy, 2001). Crucially, they are quick to learn the value that the customer derives from an evolving value proposition and how this value is derived, and then adjust pricing as the process unfolds (Read et al., 2009). This effectual reasoning on pricing allows entrepreneurs to control things that they can influence and notably to creatively (re)configure the means at hand by setting “an upper bound on what they are willing to lose” (Drew et al., 2009, p. 110).

In effect, an effectual entrepreneur acts in the capacity of a bricoleur, who views resource limitation as both constraints and opportunities. Pricing can give entrepreneurs a calibratable solution to solve the problems creatively for the sustenance of trading in a resource-constrained environment. In a sense, micro-entrepreneurs who have the means to make the transition of implementing COVID-19 preventive practices (such as social, distancing, regular hand washing, wearing masks) are less likely to adjust pricing whereas those who find it difficult are likely to do so. This reasoning results in the following hypotheses:

**H3:** Responsive pricing moderates the relationship between effectual logic and necessity, such that the positive impact of effectual logic to necessity is stronger when micro-entrepreneurs adopt a more responsive pricing of their traded goods.

**H4:** The implementation of preventive practices moderates the relationship between effectual logic and necessity, such that the positive impact of utilizing DCC as a means of savings on access to essentials is stronger when micro-entrepreneurs are able to adopt COVID-19 preventive practice.
2 Methods

We utilized two data sources for the purpose of theory construction and testing (Eisenhardt, 1989; Eisenhardt and Graebner, 2007). In the qualitative analysis, we adopted an abductive logic to check our inferences with data, allowing us to move back and forth iteratively between data and theory, and using quantitative method to test our qualitative insights (Venkatesh et al., 2013; Webnberg & McMullen, 2019). As prior research has shown this approach not only provides a deeper insight but also ensures that our generated theory is more parsimonious, accurate and generalizable (see Battilana et al 2015; Crilly et al., 2016). This is important especially our aim to advance necessity effectuation as a theory. This will require us to move beyond from a simple description of effectuation through the steps that expert entrepreneurs create opportunities to an explanation of how effectuation is an agent and context dependent process.

Second, theory building that draws upon cases in a necessity context is appropriate where there is either no theory or the existing theory is problematic. Prior studies of effectuation take the entrepreneurial point of view in an opportunity context where means and opportunities are not constrained (Dew et al 2009; Sarasvathy, 2008), but here we examine from the entrepreneurial point of view in a necessity context where often means and opportunities do not exist (Simba et al., 2020).

Thirdly, we used a mixed method approach to deal with hard to measure constructs. Existing measures of effectuation are often tied to a specific context such as R&D (Brettel et al., 2014). Our necessity context with micro-entrepreneurs who live and trade in a slum community is unique, the underlying assumptions and conditions of effectuation render the existing quantitative measures in a necessity context problematic and particularly, when we ask how necessity effectuation happens as opposed to "what" and "how much" questions. In a sense, the qualitative analysis unearths a process perspective of the daily struggles of micro-entrepreneurship in a necessity context and the quantitative analysis allows us to test some of these insights during the Covid-19 pandemic.

2.1 Field work

Our study started in January 2019 studying a small civil society organisation in Kenya, Grassroot Economics (GE), which launched the community currency initiative in 2013. In 2018, GE migrated all different community currencies into a digital token known as Sarafu (aka coin in Swahili). One of their most prominent donors was the Danish Red Cross, and GE used the donations as collateral for the issuance of digital tokens, facilitating their redemption for national currency on the basis of 1 Kenyan shilling to 1 Sarafu token. For this study, our data consisted of two sources: a field survey carried out by Kenyan Red Cross in May 2020; and followed by a series of site visits in informal settlements located in Nairobi, Mombasa and Kwale over a period of 8 months between May 2020 and Dec 2020. Both set of data were collected at the height of the COVID-19 pandemic.

For the survey, in total, 615 respondents were surveyed, and 600 provided usable data for statistical analysis. For the field work, our site visits started in November 2019 as part of a study of the general use of DCC. But when the Kenyan national lockdown was announced on March 16, we restored to online archival work and only resumed our field work when local movement was allowed in May. In a sense, we shifted the direction of our research from the study of DCC in general to an examination of how micro-entrepreneurs leveraged DCC to alleviate hardship. In total, we conducted 55 semi-structured interviews including 7 individuals who also volunteered as part of the Kenya Red Cross disaster response team. All the interviewees (33 females and 22 males) lived in the informal settlements of where they traded.

Our framework of necessity effectuation, shown in Figure 1, discloses how micro-entrepreneurs leverage contingencies through the use of DCC to sustain trade during the national lockdown. The constructs upon which the framework is based emerged abductively. The framework begins with the resource-constrained context of COVID-19 pandemic where micro-entrepreneurs were required to implement COVID preventive practice, and its interplay with effectual logic in the forms of savings and pricing on necessity.
Table 1 compiles representative quotes from the micro-entrepreneurs in the field relating to the main constructs proposed in our necessity effectuation framework. The first construct “resource constrained context” denoted the adverse effect of partial lockdown on reduced trading activities from 6 April 2020 onwards, and the daily struggles in response to lockdown restrictions and mandatory requirement for the micro-entrepreneurs to maintain trade. The second construct “creation of new means and ends” captured the role played by the DCC as a means for sustaining necessity entrepreneurship in time of crisis. However, most recipients would simply use the DCC as a daily aid subsidy for the essentials and only a few would deploy the DCC as a medium for trading and savings.

For the last construct “responsiveness” detailed the application of affordable loss principles in price adjustment. It encompasses the subjective value assigned to DCC by the micro-entrepreneurs surveyed with respect to the national currency and also included the two prominent conditions over which the micro-entrepreneurs involved in trading good and services would accept to be paid in DCC. These conditions included: setting an upper bound in terms of how many DCC they would accept on daily basis; and trading with other traders on quid pro quo basis.

<table>
<thead>
<tr>
<th>Cognitive Processes</th>
<th>Sub-processes</th>
<th>Illustrative Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource constrained context</td>
<td>Impact of COVID-19 on micro-entrepreneurs</td>
<td>There are several problems. No business, difficult in paying rent and other utilities. Some customers default in paying traders. (ME 22) The most pressing problem currently is reduced customers. For instance, I used to sell many chapatis before compared to these days. Also, members are not saving much these days. (ME12)</td>
</tr>
<tr>
<td></td>
<td>Challenges of implementing COVID-19 preventive practices</td>
<td>We are tired of wearing masks; we only wear for fear of being arrested. There is also a lot of fear around the coronavirus (the fear of getting infected). (ME 21) The problem is the ministry of health guidelines of social distancing, sanitizing and wearing masks. Residents here can't buy masks, sanitizers and there is no running water here. (ME 13)</td>
</tr>
<tr>
<td>Creation of new means and ends</td>
<td>DCC as a means for necessity</td>
<td>One can buy a variety of food-related goods like rice, beans using Sarafu. (ME 15) Yes, I was happy to have Sarafu since I can only use the Sarafu tokens in the locality to buy necessities. (ME 6)</td>
</tr>
<tr>
<td></td>
<td>DCC as a mean for trading and savings</td>
<td>Yes, it has improved sales since customers can transact using Sarafu when they have insufficient or lack KS. (ME 3) Yes, because now I get many customers relative to before I started using Sarafu. (ME 14)</td>
</tr>
</tbody>
</table>
Table 1. Qualitative evidence of necessity effectuation from the primary interview data.

2.2 Measures

Dependent variable. Necessity was measured using five self-reported measures on a 5-point Likert scale (1 = much worst to 5 = much better), assessing how DCC(Sarafu) changed access to food, clean water, medicine, toilet facilities and soap. The Cronbach alpha statistic for this variable was 0.73.

Independent variable. COVID-19 was measured using four self-reported measures on a dichotomous scale (0 = no 1 = yes) in terms of coping with COVID-19: implement preventive practice, access to timely information, receive emotional support, and change their behaviour. Cronbach alpha = 0.79.

The mediator – saving was measured using five self-reported measures. One measure on a dichotomous scale asked respondents whether they used Sarafu as a medium for savings. The other items were measured on a 5-point Likert scale, asking whether DCC improved: savings more in national currency, and impact and change in incomes and savings. Cronbach alpha = 0.73.

The moderator. Pricing was measured using three self-reported measures on a 5-point Likert scale. The respondents were asked whether they adjusted the pricing due to an increase in the cost of traded goods and services, and also due to the fact that they valued Sarafu less than the national currency. Cronbach alpha = 0.76.

Control variables. They included five individual-level variables: the gender of the micro-entrepreneurs (62% in our sample were female), business ownership (44% were business owners), informal labour (38% provided informal labour), other sources of aid assistance in addition to Sarafu (11% reported they received other sources of aid assistance), and mobile phone ownership (4% reported that they didn’t own a mobile phone). Table 2 provides a summary of all measures used in the study.

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Necessity</td>
<td>Improvement of access to necessity. A mean composite measure of five questionnaire items on a 5-point Likert-scale where 1 = much worst and 5 = much better. The questionnaire items started with Has the digital community currency changed your access to the following: medicine, toilet facilities, soap, clean water, better quality of food.</td>
</tr>
<tr>
<td>COVID-19</td>
<td>The ability to cope with Covid-19. A mean composite measure of four questionnaire items on a dichotomous scale where 1 = No and 0 = Yes. Do you practice healthy and safe COVID-19 prevention practices?; Do you have access to timely, reliable information on COVID-19?; Do you have access to emotional support when dealing with COVID-19 issue?; During COVID-19, do your behaviour changed as a result of the digital community currency?</td>
</tr>
</tbody>
</table>
| Savings       | The use of the digital tokens as a means for savings. A mean composite measure of 4 questionnaire items. They include: Do you use the digital community currency as a medium for savings? (where 1 = No and 0 = yes); Are you able to save more Kenya shillings, due to the use of the digital community currency? (where 1 = No and 0 = yes); How has your savings changed recently? (where 1 = decreased a lot and 5 = increased a lot); How do
you perceive the digital community currency’s impact on your income? (where 1 = decreased a lot and 5 = increased a lot); How has your income changed recently? (where 1 = decreased a lot and 5 = increased a lot)

| Pricing Cronbach alpha = 0.76 | The need to adjust pricing of goods and services. A mean composite measure of 3 items where 1 = strongly disagree and 5 = strongly agree. Are prices of goods and services bought in Sarafu higher compared to Kenyan Shillings?; When selling goods and services in Sarafu do you increase their price compared to Kenyan Shillings?; Are prices of goods and services more expensive than usual? |

Control variables

| Gender | The gender of the respondents |
| Own business | Is your own business one of the sources of income? (where 0 = no, and 1 = yes) |
| Informal labour | Is informal labour one of the sources of income? (0 = no, 1 = yes) |
| Reliance on aid assistance | How important is assistance aid in your total household income? (where 1 = Not important and 5 = Very important) |
| Mobile Phone | Do you have a mobile phone? (0 = no and 1 = yes) |

Table 2. Description of variables.

3 Results

Below we reported the findings based on two analytical steps and the structural equation models (SEM) with the aim of assessing the reliability and validity of the measures; and also testing research hypotheses H1 to H3.

<table>
<thead>
<tr>
<th>Constructs</th>
<th>CR</th>
<th>AVE</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. COVID (COV)</td>
<td>0.82</td>
<td>0.54</td>
<td>0.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Savings (SAV)</td>
<td>0.79</td>
<td>0.56</td>
<td>-0.34</td>
<td>0.64</td>
<td></td>
</tr>
<tr>
<td>3. Pricing (PRI)</td>
<td>0.78</td>
<td>0.41</td>
<td>0.17</td>
<td>-0.11</td>
<td>0.75</td>
</tr>
</tbody>
</table>

Table 3. Measurement model: Construct reliability, convergent and discriminant validity (CR = composite reliability, AVE = average variance extracted; the diagonal elements are the square root of the variance shared between constructs and the off-diagonal elements are the bivariate correlation between constructs.)

3.1 Measurement model

The factor analysis suggested a three-factor solution based on Kaiser’s criterion (eigenvalue ≥ 1.0), and a scree plot test (Cattell, 1962). Survey items were loaded onto their respective factors with standardized loadings greater than 0.50. The composite reliabilities were all greater than 0.70 and the scores of the average variance extracted (AVE) were also acceptable at 0.41 (Fornell and Larcker, 1981). Finally, the square root of AVE scores were also greater than the correlations between constructs. Table 3 provides a summary of the construct reliability, convergent and discriminant validity of the measurement model.

3.2 Structural equation models

Table 4 shows structural equation model (SEM) estimates of path coefficients of models A, B and C (as shown in Figure 2). The estimation used bootstrapping with 1000 replications to compute standard errors and particularly, the biased corrected and percentile confidence intervals to better reflect the sampling distribution of the conditional indirect effects, which are known to be nonnormally distributed (Preacher, Rucker & Hayes, 2007; Hayes, 2013).
Alleviating Hardship with Digital Currency

Figure 2. SEM models for total, indirect, and conditional indirect effects

Model A tests the direct effect of COVID-19 on necessity. The direct effect is significant and negative. The result supports H1, in that resources required to implement COVID-19 preventive practices is negatively associated with access to basic essentials.

Model B tests the indirect effect of COVID-19 on necessity through the effectual reasoning of using DCC as a means for savings. The indirect effect is calculated based on multiplying the direct effects between two structural paths: COV -> SAV: \(a'_{1}\) and SAV -> NEC: \(b'_{2}\). The result is significant and negative (\(a'_{1} \times b'_{2} = -0.33, z = -6.91\)).

This is also reflected in the changes of the direct effect of COVID-19 on necessity through savings from being significant to being not significant. To obtain the proportion mediated by savings, we computed the ratio of indirect effect to the total effect of COVID-19 on necessity. It amounted to 0.83, which is quite substantial. The result supports H2, that is micro-entrepreneurs who applied the effectual reasoning of necessity entrepreneurship are less likely to be affected by COVID-19. In other words, effectual reasoning mediates the negative impact of COVID-19 on necessity due to the positive relationship between savings and necessity (see Model B in Figure 2).

<table>
<thead>
<tr>
<th></th>
<th>Model A</th>
<th>Model B</th>
<th>Model C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>0.05 (0.04)</td>
<td>0.03 (0.03)</td>
<td>0.04 (0.03)</td>
</tr>
<tr>
<td>Own business</td>
<td>0.19*** (0.05)</td>
<td>0.07*** (0.04)</td>
<td>0.06 (0.04)</td>
</tr>
<tr>
<td>Informal labour</td>
<td>0.05 (0.05)</td>
<td>-0.03 (0.04)</td>
<td>-0.04 (0.04)</td>
</tr>
<tr>
<td>Reliance on aid assistance</td>
<td>0.04 (0.05)</td>
<td>-0.08 (0.05)</td>
<td>-0.07 (0.05)</td>
</tr>
<tr>
<td>Mobile phone</td>
<td>0.44*** (0.08)</td>
<td>0.25*** (0.08)</td>
<td>0.23** (0.08)</td>
</tr>
<tr>
<td>(H_1: \text{COV} \rightarrow \text{NEC} = b_1)</td>
<td>-0.40*** (0.08)</td>
<td>-0.07 (0.07)</td>
<td>-0.21* (0.10)</td>
</tr>
<tr>
<td>(\text{COV} \rightarrow \text{SAV} = a'_{1})</td>
<td>-0.68*** (0.09)</td>
<td>-0.68*** (0.09)</td>
<td></td>
</tr>
</tbody>
</table>
Alleviating Hardship with Digital Currency

SAV $\rightarrow$ NEC = $b''_2$

$H_2$: COV $\rightarrow$ SAV $\rightarrow$ NEC = $a'_1 \times b''_2$

$H_3$: PRI x SAV $\rightarrow$ NEC = $b'4$

$H_4$: COV x SAV $\rightarrow$ NEC = $b'5$

R\textsuperscript{2}\text{NEC} 0.12 0.37 0.18

R\textsuperscript{2}\text{SAV} 0.18 0.43

Proportion of total COVID-19 effect mediated 0.83 0.62

Table 4. Structural estimates of total, indirect and conditional indirect effects (N = 600, bootstrap SE is included in the parenthesis)

Model C tests the conditional indirect effect, such that the indirect effect through savings remains significant when it is subject to the effects of two moderators: pricing (PRI) and the resource requirement of implementing COVID-19 preventive practice (COV). Both interaction effects: PRI x SAV ($b'4 = -0.26, z = -6.81$) and COV x SAV ($b'5 = -0.43, z = -2.70$) are significant and negative, such that pricing and implementing preventive COVID-19 practice decrease the positive relationship between savings and necessity.

<table>
<thead>
<tr>
<th>COVID-19 practices</th>
<th>Pricing</th>
<th>Indirect effect</th>
<th>Boot SE</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>high ability</td>
<td>same</td>
<td>0.40**</td>
<td>0.16</td>
<td>0.13</td>
<td>0.78</td>
</tr>
<tr>
<td>high ability</td>
<td>moderate</td>
<td>0.59***</td>
<td>0.19</td>
<td>0.27</td>
<td>1.03</td>
</tr>
<tr>
<td>high ability</td>
<td>high</td>
<td>0.77***</td>
<td>0.22</td>
<td>0.41</td>
<td>1.27</td>
</tr>
<tr>
<td>medium ability</td>
<td>same</td>
<td>0.48**</td>
<td>0.20</td>
<td>0.16</td>
<td>0.96</td>
</tr>
<tr>
<td>medium ability</td>
<td>moderate</td>
<td>0.67**</td>
<td>0.22</td>
<td>0.31</td>
<td>1.19</td>
</tr>
<tr>
<td>medium ability</td>
<td>high</td>
<td>0.86***</td>
<td>0.25</td>
<td>0.46</td>
<td>1.45</td>
</tr>
<tr>
<td>low ability</td>
<td>same</td>
<td>0.57**</td>
<td>0.23</td>
<td>0.18</td>
<td>1.12</td>
</tr>
<tr>
<td>low ability</td>
<td>moderate</td>
<td>0.75**</td>
<td>0.26</td>
<td>0.34</td>
<td>1.36</td>
</tr>
<tr>
<td>low ability</td>
<td>high</td>
<td>0.94***</td>
<td>0.28</td>
<td>0.49</td>
<td>1.60</td>
</tr>
</tbody>
</table>

Table 5. Conditional indirect effects of COVID-19 on necessity through savings by implementing COVID preventive practice and pricing.

To obtain the conditional indirect effect, we multiplied SEM coefficients based on Model C: $a'_1 \times (b''_2 + b'4 COV + b'5 PRI)$ for three different values of each moderator: mean – 1 SD (low moderation), mean (medium moderation), and mean + 1 SD (high moderation). With 3 levels of moderation per moderator, there were nine combinations in total. Table 5 shows that the conditional indirect effects of COVID-19 on necessity via savings are positive and significant. The effects increase with increasing levels of pricing coupled with decreasing levels of ability of implementing preventive practices. As shown in Figure 3, entrepreneurs who were able to implement COVID-19 preventive practice were less inclined to increase prices compared to those who found it difficult to do so.
4 Discussions

Similar to other extreme events (Branicki et al., 2018), the COVID-19 crisis raises significant research questions and unveils some of the gaps in our knowledge that will require interdisciplinary scholarship and international research (Budhwar and Cummins, 2020). Thus, our efforts to develop a deeper understanding based on the daily struggles of micro-entrepreneurs in some of the world’s most vulnerable communities meaningfully advances our understandings at the intersection between entrepreneurship and crisis management (Herbane, 2010, 2019; Doern et al., 2019). The entrepreneurship literature streams that we reviewed to develop our framework of necessity effectuation direct our current focus on the practices of everyday entrepreneurship in slum communities and particularly, the heuristics attuned to necessity effectuation as and when the crisis continuously unfolds.

Similar to Nelson and Lima (2020), we noted parallels in the existing literature, warranting us to apply alternative templates for sorting our field data and disciplining our analysis. Both the alternative templates and the exploratory empirical approach that we applied in our analysis enabled us to identify the underlying mechanisms that would define necessity effectuation in crisis situations. While undertaking this iterative process, we were attentive to those features of our data signalling the need for extending the constructs we studied in the effectuation and necessity entrepreneurship literatures.

From that perspective, our empirical analysis offered additions and enhancements to the concept of effectuation (see Fisher, 2012; Read et al., 2009; Sarasvathy, 2001), thereby extending its utilisation to study entrepreneurship in a crisis management context and other extreme events (e.g., natural disasters, terrorism etc). Such extreme events are likely to occur again in the future with the rise of climate change and the rising pandemic threats on our societies. Our findings are unequivocal in that as a result of lockdown restrictions, affordable lose comes into the forefront (Read et al, 2009; Sarasvathy, 2008). From our analysis, it emerged that effectual entrepreneurs engaged in trading in necessities ranging from food to essential medicals relied on the heuristic of affordable loss, and that provided them with a normative approach to guide decision and behaviours during lockdown. Our qualitative findings show that in an impoverished neighbourhood, effectual entrepreneurs exhibited a tendency to consider the possible downside of their activities by evaluating alternatives as a way of safeguarding their investments and limit business or personal failure (Read et al. 2009). Furthermore,
we statistically demonstrated that effectual reasoning influenced pricing strategies and was coupled with the ability to implement COVID-19 preventive practices.

On the basis of these outcomes, this study makes three major contributions. It offers new evidence illustrating the interplay of effectuation and bricolage in crisis situations. The research attests effectual reasoning and bricolage as key constructs that define necessity effectuation in crisis situations. Furthermore, the study develops two heuristics of effectuation namely ‘means’ (Drew et al., 2009) and affordable loss (Read et al., 2009; Sarasvathy, 2001) by illustrating their centrality to the effectual reasoning in necessity entrepreneurs within a resource constrained environment. Necessity entrepreneurship processes act as conduits for effective management when the future is less predictable in such constrained conditions. Thus, extending the view that through necessity entrepreneurship aid beneficiaries can also be empowered to tackle grand societal challenges at a local level (Chandy and Narasimhan, 2011). Through necessity effectuation, entrepreneurs can make the most of the ‘means’ they have control over by applying the heuristic of affordable loss. In that context, this research develops an avenue for future studies. It offers other scholars a potent research framework detailing a mixed-method design applicable in studies that aim to gain deeper understanding about the nature of opportunity creation in crisis situations and for evaluating how entrepreneurs who use effectual reasoning can delimit the impact of unfolding events in crisis situations.

4.1 Research implications and limitations

The findings of this study have managerial implications for civil society organizations as well as aid agencies operating in deprived regions of the developing countries. They herald a shift from casual reasoning that emphasizes on premeditated actions in crisis situations with most of the conditional cash transfer programmes (Ladhani and Sitter, 2020), towards the use of effectual reasoning to stimulate necessity entrepreneurship. Furthermore, the findings offer preliminary evidence distinguishing how DCC provide an alternative mechanism for sustaining trading within communities that are experiencing economic hardships during lockdown in their already impoverished communities. This addresses the means to tackle grand societal challenges such as sustainable development goals (SDGs) relating to no hunger (SDG 2) and decent employment (SDG 8).

This present study provides an initial set of evidence of the potential of digital community currency systems as a social protection mechanism for vulnerable communities in times of crisis. As the developing world comes under increasing pressure to meet socio-economic development needs, and the deadline for SDGs looms larger, DCC may provide the type of innovative solution for delivering and monitoring impact required for accelerating progress towards achievement of the SDGs. Future research can draw upon the present findings, especially when it comes to evaluate impact relating to a recent recommendation by United Nations Developing Programme by the means of temporary basic incomes (2020) through implementing digital community currency systems as a social protection mechanism for vulnerable communities in times of crisis.

Our empirical setting also provides an interesting international perspective. Although COVID-19 crisis has widened our research scope, the cross-cultural context will require better instrumentation. In our case, although there exist measures on effectuation, they are largely based on expert entrepreneurs launching new business in developed countries. Our present study provides some measures that can be further refined and deployed across different regions using a similar mixed method design.

References


Nwankwo S. and Gbadamosi, A. (2020). ‘Entrepreneurship marketing: Principles and Practice of


Alleviating Hardship with Digital Currency


