Organisation size, innovativeness, self-organisation and inter-organisational coordination

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Abstract

Purpose – The purpose of this study is to examine how humanitarian organisation size affects inter-organisational coordination and further tested the mediating role of organisational innovativeness, self-organisation in the relationship between humanitarian organisation size and inter-organisational coordination among humanitarian organisations in Uganda.

Design/methodology/approach – The study is based on cross-sectional survey; data was collected from 101 humanitarian organisations. The analysis of the proposed hypotheses was done with the help of PLS-SEM using SmartPLS version 3.3.0 for professionals.

Findings – The results show that humanitarian organisation size significantly relates with inter-organisational coordination. In addition, self-organisation and organisational innovativeness play a complementary role between humanitarian organisation size and inter-organisational coordination.

Research limitations/implications – The findings of this research provide useful insights into the role of humanitarian organisation size in boosting inter-organisational coordination in humanitarian relief delivery. High levels of self-organisation and organisational innovativeness not only improve inter-organisational coordination in humanitarian relief delivery but also enhance the transformation of humanitarian organisation size benefits into inter-organisational coordination.

Originality/value – This research is one of the few studies that investigated the effect of humanitarian organisation size and inter-organisational coordination. It also brings into the limelight the mediating role of self-organisation and organisational innovativeness between humanitarian organisation size and inter-organisational ordination in humanitarian relief delivery.

Keywords Humanitarian organisation, Humanitarian organisation size, Self-organisation, Humanitarian relief delivery, Organisational innovativeness, Inter-organisational coordination

Paper type Research paper

1. Introduction

This study examines how humanitarian organisation size affects inter-organisational coordination (IOC) and whether organisational innovativeness and self-organisation play a mediating role in the relationship between humanitarian organisation size and IOC. Recently, IOC has received increasing interest in humanitarian logistics and supply chain management (Mutebi *et al.*, 2020; John *et al.*, 2019; Banomyong *et al.*, 2019). Previous studies have pointed out the need for IOC in relief delivery to improve information exchange on the needs of the victims and for knowledge of their location for timely delivery of emergency services (Balcik *et al.*, 2010). IOC utilises the scarce resources available, minimises duplication of services and

improves accountability to the donors and beneficiaries. However, the presence of a multitude of organisations of different sizes with different mandates in offering relief services such as health, food, medicine and education, among others, makes coordination difficult in a complex environment as they tend to compete for scarce resources from the same donors (Pazirandeh and Maghsoudi, 2017).

Contextually, the Government of Uganda wanted to distribute food items directly during the COVID-19 lockdown and met resistance from Parliament because the distribution plan was not clear. The Government of Uganda later decided to coordinate with Uganda Red Cross Society (URCS) because of its experience and structures in handling relief items. Humanitarian organisations tend to interact during emergency situations whether international or local. Humanitarian organisations and the government prefer partnering with URCS during relief delivery when emergency situations arise. This is because of the URCS' operational structure at all levels in the country. Specifically, this partnership came in useful during the distribution of food to those Ugandans most affected by the lockdown in the fight against the COVID-19 health emergency. The Government of Uganda opted to involve URCS in the distribution of food items to the more vulnerable people throughout the country because of its big number of employees and volunteers. By its nature, IOC is challenging in the sense that many organisations think that it is the duty of relatively small organisations that need to coordinate with relatively large organisations which remains uncertain and beset by ambiguity. It is thus not surprising that it is the latter that coordinate more with each other than with small organisations.

Existing studies have used mechanisms such as self-organisation, adaptability and organisational networks (Mutebi *et al.*, 2020), resource sharing (Pazirandeh and Maghsoudi, 2017), cluster systems (Jensen and Hertz, 2016), inter-organisational communication, shared goals and level of trust (Kożuch and Sienkiewicz-Małyjurek, 2016) and inter-organisational and intra-organisational factors (Moshtari and Gonçalves, 2016), organisational culture (Prasanna and Haavisto, 2018). On the other hand, Zhang *et al.* (2017) have focussed on emergency organisation, information, resource obstacles and plan command obstacles. This study contributes to the literature by filling theoretical and empirical gaps on humanitarian organisation size and IOC. A number of employees may help an organisation to coordinate with other organisations (Meyer and Leitner, 2018). IOC is related to the number of employees, experience and educational level, which are necessary in handling coordination-related issues such as learning, resource sharing, communication and conflict harmonisation (Goes and Park, 1997). Organisational innovativeness and self-organisation play a role in the relationship between humanitarian organisation size and IOC (Alshammari, 2015). Even when the area of innovativeness is bourgeoning, there are astonishingly few studies on the relationship between organisational innovativeness and IOC (Knott and Vieregger, 2020).

The study aims to provide evidence on the association between organisation size and IOC and the mediating role of organisational innovativeness, self-organisation in the relationship between humanitarian organisation size and IOC. This aim was achieved through a questionnaire survey of 101 humanitarian organisations. The results suggest that humanitarian organisation size significantly relates with IOC. In addition, self-organisation and organisational innovativeness play a complementary role between humanitarian organisation size and IOC. This study results are critical to academics, policymakers and humanitarian organisation employees. This study adds to the existing literature on IOC activities. Also, to the policymakers and humanitarian organisation employees, this study illustrates the exact mechanisms through which IOC activities can be improved.

In the next section of this paper, we review the literature and develop hypotheses, describe the methodology used to collect and validate the data as well as the methods of analysis and

present the results. The final section of the paper discusses the results, conclusion, implications and limitations and areas for future study.

2. Theory and hypotheses development

2.1 Theoretical underpinning

Complex adaptive system (CAS) theory posits that organisation size is the basis for self-organisation and innovativeness, which are prerequisites for coordination among organisations (Turner *et al.*, 2018; Lewin *et al.*, 1998; Levy, 2000). IOC is a CAS since it reflects the main features of a CAS. Notably, a system of coordinated individual agents strives to achieve their goals by addressing their concerns, but end up causing the emergence of similar collective patterns at the wider system level. Thus, this perspective assumes that organisation size is considered first. Then IOC is possible as it involves synchronisation of the work of different organisations to achieve collective goals. CAS underpins this study because it explains organisation size, innovativeness, self-organisation and IOC study variables during service delivery in a complex environment (Levy, 2000; Ellis and Herbert, 2010).

2.2 Humanitarian organisation size, self-organisation and inter-organisational coordination

Organisation size is conceptualised as the number of employees an organisation has (Blau and McKinley, 1979). According to Moshtari (2013), organisation size is related to IOC in relief operations, while IOC connotes specific ways of implementing and conducting joint actions during relief delivery (Wankmüller and Reiner, 2020a,b). Stephenson (2005) and Oliveira and Lumineau (2019) acknowledge that IOC is not costless. This suggests that the size of the organisation may affect its effective pursuit of collective actions even in scenarios where aid organisations balk at cooperating with others. Further, Zhang *et al.* (2017) posit that the size of the organisation determines the scope of duties, working process, information delivery and resource preparation required for an organisation to work with others.

Scriven (2013) finds the size of the organisation necessary in developing relationships of trust among similar actors, in bringing diverse actors together, for knowledge management and information exchange, advocacy, resource mobilisation and, in some cases, the implementation of humanitarian programming. Scriven affirms that relatively bigger humanitarian organisations have been found to possess enough resources in terms of human resource and money that are needed to implement relief operations. An organisation that has such resources increases its commitment towards working with others (Moshtari, 2013). Also, resources are a powerful direct determinant of communications and consensus among coordinating organisations (De Ven and Walker, 1984). Additionally, relatively big humanitarian organisations can easily partner with other humanitarian organisations, like community-based organisations (CBOs), in the implementation of relief activities because they are likely to have operational systems in place that enable them to work with partners harmoniously in terms of planning, monitoring and reporting for accountability purposes (Moshtari and Gonçalves, 2012). Conversely, an organisation that lacks such ingredients may find challenges in rational emergency planning, transmission of information, resources scheduling and uncertainty in emergency command. This may lead to untimely delivery of relief in terms of food, water, sanitation and health services (WASH), medicine, shelter to the affected (Zhang *et al.*, 2017).

According to Kauffman (1993), self-organisation is the spontaneous reallocation of energy and action and the creation of a coherent pattern and order out of local interaction through which autonomous and self-reinforcing organisational systems achieve a collective goal in a changing environment. The question of what drives self-organisation is of interest to many relief organisations in developing countries owing to the increase in the number of

emergencies and their responses to such emergencies. Several studies have considered the number of employees an organisation employs, experience, skill/specialisation and financial resources as predictors of self-organisation. All these factors can be packaged neatly as humanitarian organisation size. According to Pocock and Whitman (2016), the size of an organisation can lead to the emergence of structures and patterns and its effective functionality with other relief actors. Dolinskaya *et al.* (2011) emphasise that to be able to handle emergency situations through leveraging self-organisation in terms of decentralisation of authority by setting up new administrative offices, reallocation of employees from one department or region to another and switching and sharing of roles depends on the number of employees an organisation has (Abbasi *et al.*, 2018).

According to Anzola *et al.* (2017) and Kożuch and Sienkiewicz-Małyjurek (2016), self-organisation has been found to produce cooperation, which is developed as a strategy to adapt to the requisite variety of operational environments, thus offering more efficient solutions to problems that change in time than those obtained with traditional techniques. Self-organisation brings integrative understanding of the operational issues among coordinating partners (Donaires and Martinelli, 2019). Ricciardelli *et al.* (2018) posit that self-organisation enhances the resilience of each actor to respond. This is because it allows inter-coordinating members to share information and acquire the necessary knowledge of modes and places of engagement and collaboration to deliver the necessary relief items to meet the needs of the beneficiaries.

As earlier indicated, the size of a humanitarian organisation can influence its collaborative working with other humanitarian organisations (Roehrich *et al.*, 2020). This process is either direct or indirect. The direct relationship between the size of a humanitarian organisation and IOC appears because relatively big humanitarian organisations can easily partner with other humanitarian organisations, such as CBOs, in the implementation of relief activities. This is because they are likely to have operational systems in place that enable them to work with partners harmoniously in terms of planning, monitoring and reporting for accountability purposes (Moshtari and Gonçalves, 2012). The emergence of new structures, patterns and functionality reflects self-organisation of the organisation. Dolinskaya *et al.* (2011) emphasise that, in order to be able to handle emergency situations, the actors can self-organise in terms of decentralising authority by setting up new administrative offices, reallocation of resources, such as fleets and employees, from one department or region to another, and switching and sharing of roles, after which they can go back to their daily roles (Abbasi *et al.*, 2018). Furthermore, Comfort and Kapucu (2006) point out that the spontaneous order that arises in terms of structures and processes helps organisations learn, which enables them to work effectively and efficiently with other organisations (Huggett, 2012) by sharing roles, activities and operational zones in settlements. Hussein *et al.* (2018) point out that successful models are then emulated by other organisations, which helps them to work together; and, secondly, that the new systems can also instigate harmony and commitment for each organisation to carry out its function well. This is enhanced by observing what other activities organisations of the same size are performing and the manner in which they are performing them (Kotzab *et al.*, 2019). As joint efforts are celebrated, organisations feel reinforced, especially if positive effects in terms of timely delivery (Kaynak and Tuğer, 2014), wider coverage of relief activities among disaster victims and media coverage and recognition of what each organisation is offering are achieved (Ivanov, 2015). From the foregoing, we deduced that humanitarian organisation size has both direct and indirect relationships with IOC. In this study, we contribute new knowledge on IOC among humanitarian organisations in developing countries. We, therefore, hypothesise that:

H1. Humanitarian organisation size and IOC are significantly related.

H2. There is a significant relationship between humanitarian organisation size and self-organisation.

H3. Self-organisation positively relates with IOC.

H4. Self-organisation mediates in the relationship between humanitarian organisation size and IOC.

H5. Organisational innovativeness mediates in the relationship between humanitarian organisation size and self-organisation.

2.3 Humanitarian organisation size, organisational innovativeness and inter-organisational coordination

Extant literature indicates that there is a relationship between organisational size and organisational innovativeness (Aldieri and Vinci, 2019; Jaakson *et al.*, 2019; Mote *et al.*, 2015; Jaskyte, 2013), although empirical results on the relationship between them have been disturbingly mixed and inconsistent. Mote *et al.* (2015) found a negative relationship between organisational size and innovation processes, particularly the amount of time spent on research and professional activities, how research time is spent and exchanges of technical knowledge. In contrast, some potential advantages of larger size, such as greater research resources, better perceived managerial quality or a visionary strategy, were not found to be significant. Yet Baregheh *et al.*'s (2016) findings suggest that organisational engagement in innovation is not affected by either age or size. Damanpour (1992) notes that organisational size is more positively related to innovation in manufacturing and profit-making organisations than in service and non-profit-making organisations. He further indicates that the association between size and innovation is stronger when a non-personnel or log transformation measure of size is used. Furthermore, Lee and Xia's (2006) findings are based on meta-analysis of 54 correlations derived from 21 empirical studies between organisational size and IT innovation adoption among firms.

Organisational innovativeness enables organisations to collaboratively work together (Rush *et al.*, 2014; Lee and Xia, 2006). Innovations are adapted as an organisational response to changes in both internal and external operational environments. Ramalingam *et al.* (2009) posit that organisational innovativeness stimulates positive change by capturing the humanitarian imagination and provides new ways of delivering assistance to those who need it most by implementing new ways of working together to ensure delivery. They further indicate that the theory and practice of innovation, originating from the private sector, are themselves evolving and have been adapted and reapplied to fit the different needs and realities of companies and entrepreneurs. It is, therefore, relevant for humanitarian organisations to aim to work in partnerships and focus on positive and proactive approaches to improving their work. However, according to Ramalingam and Bound (2016), a sector-wide mechanism to promote and facilitate innovation is missing from the humanitarian sector. Innovation intermediaries have been successfully used by private-sector companies and increasingly also by non-profit organisations, but no organisation in the humanitarian sector has yet taken up this role. Yet a focus on innovations could help to support shifts towards proactive work to prevent disasters, rather than only reacting after the event, and towards increasing local ownership of humanitarian activities, thus enabling a shift from "catastrophe-first" innovation towards "vulnerability-first" (Obrecht and Warner, 2016).

Organisational innovativeness serves as a useful intermediary to understand the relationship between humanitarian organisation size and self-organisation. Organisational innovativeness accounts for the emergence of spontaneous and unpredictable changes, patterns and structures in an organisation (Shin and Choi, 2019; Hasanov and Zuidema, 2018).

The process of innovation is, therefore, essential for understanding the interface between organisational size and self-organisation (Betts and Bloom, 2014). The organisation will influence the development of new ideas and innovations, which shapes what is happening in the organisation through interaction and learning. Therefore, what self-organises is not the employees *per se* or their practices within the organisation, but the innovations that are generated through interactions. Organisational size can influence organisational innovativeness and is, simultaneously, a tangible vehicle for self-organisation at organisational level. Hence, the following hypothesis is considered:

H6. Humanitarian organisation size and organisational innovativeness are significantly related.

H7. Organisational innovativeness positively relates with IOC.

H8. Organisational innovativeness mediates in the relationship between humanitarian organisation size and IOC.

2.4 Organisational innovativeness, self-organisation and inter-organisational coordination
Anecdotal evidence suggests that there is a relationship between organisational innovativeness and self-organisation (Mariussen, 2014; Steiner *et al.*, 2014). In addition, some scholars have impliedly tended to link aspects of organisational innovativeness and self-organisation in their studies (Silva and Guerrini, 2018; Guo *et al.*, 2019). They argue, while studying innovation networks, that innovation networks have no conventional hierarchical relationship, which poses new management challenges. It is these new management challenges that innovation networks pose that force organisations to self-organise to be able to adapt and use them to meet common goals, shared needs and compatible viewpoints (Uhl-Bien *et al.*, 2007). In this way, organisational innovativeness is related to self-organisation, although this relationship is merely inferred. Uhl-Bien *et al.* (2007) did not study the direct relationship between organisational innovativeness and self-organisation as this study does.

Additionally, Ricciardelli *et al.* (2018) carried out a study on the impacts of implementing SDGs in sustainable collaborative communities in the aftermath of disasters caused by an earthquake in the city of Macerata. They advanced that, as learning organisations, human communities that adopt creative flexibility in decision-making and problem-solving are more likely to consider resilience as the most appropriate approach to ensuring the sustainability of human communities and natural resources. In this way, the aspect of creative flexibility in decision-making and problem-solving becomes part of organisational innovativeness, while resilience is deemed the most appropriate approach to ensuring the sustainability of human communities and natural resources.

CAS theory is used to examine how organisational innovativeness and self-organisation enhance IOC in relief delivery (Polani *et al.*, 2013), leading to increased role integrity and flexibility in the delivery of the relief services to the affected people. Owing to the complex nature of the environment characterising emergency situations, relief organisations need to have an innovative climate that allows them to come up with creative ways of delivering relief. Other relief organisations will get attracted to the new ways, which increases their level of commitment to each other during relief delivery. At the same time, to attract collaborative organisations to these innovative ways so as to deliver relief punctually to the affected, organisations need to continuously re-organise to be able to maintain their collaborative working in managing their activity interdependence while, at the same time, reducing the lead time for the delivery of relief to the beneficiaries. The insights gained through these innovative ways can reduce uncertainty, especially when they minimise the resources, at increased speed of relief delivery. This study attempts to provide empirical evidence on the association between organisational innovativeness, self-organisation and IOC and, at the

same time, test the mediating role of self-organisation between organisational innovativeness and IOC using CAS theory. Hence, it is hypothesised that:

H9. Organisational innovativeness significantly influences self-organisation.

H10. Self-organisation mediates in the relationship between organisational innovativeness and IOC.

3. Methods

3.1 Research design and study sample

For this study, we adopted a cross-sectional research design which is analytical in nature to collect and analyse data so as to establish the correlational effects on the hypotheses stated (Creswell and Creswell, 2017; Chih-Pei and Chang, 2017). The sample was drawn from humanitarian organisations that have participated in relief delivery to the people concerned in gazetted settlements under the auspices of the Office of the Prime Minister (OPM). Owing to the relatively small number of humanitarian organisations, we targeted all of them (unit of analysis). In order to ensure a high response rate, the researchers made personal visits to the humanitarian organisations. We requested three or more participants (project manager, programme manager, supply chain manager, response manager and logistics coordinators) from each humanitarian organisation, as a unit of inquiry. Out of the 136 humanitarian organisations that we targeted, 101 participated. This sample of 101 humanitarian organisations is within the statistical power analysis principles suggested by Cohen (1992) and, also, follows the procedure for implementing power analysis in PLS-SEM provided in Hair *et al.* (2016). Further, Hair *et al.* (2013) highly recommend such a sample size for such studies where it is anticipated that structural equation modelling techniques will be applied for data analysis, whereby such techniques are sensitive to sample size.

Given the fact that humanitarian organisations are very busy in times of emergency operations, this is a relatively good return rate. Overall, 74.26% of the humanitarian organisations we contacted consented to participate, with a total sample of $N = 315$ individual participants. For each of the humanitarian organisations, we received three completed questionnaires. The sample characteristics are shown in Table 1. The age of the organisations varied between 1 and 15 years, and the number of employees varied between 1 and over 100. Overall, of the participating humanitarian organisations, 27 were small, with less than 50 employees, 42 were medium-sized, with between 50 and 100 employees while 22 had over 100 employees. Additionally, 30 humanitarian organisations were development-

Sector	F	%	Age of org.	F	%	No. of staff	F	%
Service delivery NGO	28	27.7	1–5	5	5	1–25	20	19.8
Development-oriented NGO	30	29.7	6–10	16	15.8	26–50	17	16.8
Professional NGO	9	8.9	11–15	19	18.8	51–75	24	23.8
Advocacy NGO	28	27.7	>15	61	60.4	76–100	18	17.8
Government department	6	6				>100	22	21.8
Total	*101*	*100*	*Total*	*101*	*100*	*Total*	*101*	*100*

Location					
	Central			43		42.5
	Northern			48		47.5
	Western			10		10
	Total			101		100

Source(s): Analysis of quantitative data

Table 1.
Sample characteristics

oriented NGOs, followed by 28 in the service delivery category, 37 were professional and advocacy NGOs and 6 were governmental organisations. In terms of location, 48 were operating in northern Uganda and 43 were operating in the central region of Uganda.

The results with regard to participating respondents within these humanitarian organisations indicated that 52.4% were male and 47.6% were female. Further, the results showed that the majority of the respondents in the total sample were aged between 34 and 45 (41.6%) and had worked with their organisations for 4–6 years (44.2%). The highest education qualification among the respondents was a university degree, at 62.9 %. Among the sample respondents, 32.7 and 32.3% were programme and project managers, respectively, which indicated that they were knowledgeable about IOC.

To coordinate data collection, a contact person (human resource manager [HR]) within each humanitarian organisation was identified. Printed closed-ended questionnaires were sent to the HR, who handed out the questionnaires to the employees within the organisation. The HR also distributed the questionnaires to those employees who were in distant field operational offices. Completed questionnaires could either be sent back directly to the research team or returned to the researcher through the contact HR in a sealed envelope. In some instances, the HR called back the researcher to pick up some filled questionnaires from the head office of the humanitarian organisation. In return for participation, humanitarian organisations were offered a report, but no other/monetary incentives were offered for study participation.

3.2 Measure and instrument development

Prior to data collection, the content validity of the instrument was established by grounding it in literature. Pre-testing the measurement instrument before data collection further validated it. Researchers as well as practising managers in the field of relief operations were involved in the process (Cohen *et al.*, 2013). These were from the United Nations High Commissioner for Refugees (UNHCR), URCS, Save the Children, Oxfam Uganda, International Aid Service (AIS), Norwegian Refugee Council (NRC), Danish Refuge Council (DRC) and ZOA, which were asked to review the instrument for structure, readability, ambiguity and completeness. The final instrument incorporated minor changes to remove a few ambiguities that were discovered during the validation process.

Inter-organisational coordination: This was operationalised as a second-order construct assessed using a reflective-reflective model (Hair *et al.*, 2017) formed by communication, conflict harmonisation, commitment, flexibility and role integrity (Medlin *et al.*, 2005), all reflectively measured on a six-point answer scale ranging from 1 ("strongly disagree") to 6 ("strongly agree") as recommended by Chomeya (2010). This was meant to eliminate the middle points of "neither agree nor disagree" and to reduce the deviation arising from respondents' indecision and to increase the level of discrimination and reliability values.

Humanitarian organisation size: We operationalised humanitarian organisation size, in terms of number of employees (Camisón-Zornoza *et al.*, 2004; Damanpour, 1992; Kimberly, 1976). This is because organisational size in terms of number of employees may affect their level of willingness to coordinate with humanitarian organisations other than smaller ones as they have enough resources that are needed for an organisation to be innovative and self-organising.

Organisational innovativeness: Owing to the challenges associated with measuring organisational innovativeness (Fischer *et al.*, 2018; Norman and Verganti, 2014), we adapted questionnaire items to measure innovativeness (Fischer *et al.*, 2018; Ruvio *et al.*, 2014) in terms of creativity, openness, proactiveness, future orientation and risk taking by an organisation while carrying out its activities in a dynamic environment. One of the advantages of this scale is that the items were formulated as objectively as possible and most of them had been validated in earlier organisational innovativeness research (Kraśnicka *et al.* 2018).

Self-organisation: This is when a humanitarian organisation causes new structures, patterns and properties to emerge at the system level without being externally controlled or imposed by any single agent (Choi *et al.*, 2001; Nilsson, 2019). This means that the emergence of new structures, patterns and properties enables the internal organisation of a humanitarian organisation to adapt to changes in its goals and the environment without explicit external control. Self-organisation was operationalised as a lower-order construct that is reflectively measured with eight items deriving from prior studies that focussed on changes in an organisation's process, structure and function as a CAS (e.g. Partanen, 2015; De Wolf and Holvoet, 2004; Di Marzo Serugendo *et al.*, 2005). These measurement items have been found to be reliable and valid in the same study contexts (Mutebi *et al.*, 2020).

3.3 Non-response bias test

In order to eliminate the possibility of differences between the responses of early respondents and late respondents that characterises survey data (Armstrong and Overton, 1977), we used Mann–Whitney *U*-tests on the two halves of the data collected basing on the date it was received (Sheel and Nath, 2019; Dubey and Gunasekaran, 2016). The results are presented in Appendices (Table A1 as attached in Appendix 1) and reveal no significant differences between the two groups ($p > 0.05$) on all the study constructs, that is, humanitarian organisation size, IOC, self-organisation, organisational innovativeness and their manifestations. This suggests that non-response bias was not a significant concern.

3.4 Measurement validation

To establish that the measures used for the study represented the constructs of interest, the measurement model was assessed following the recommendations of Hair *et al.* (2019). We assessed (1) item loading of > 0.708, (2) internal consistency reliability using both the Cronbach alpha coefficient and composite reliability above 0.7 and (3) convergent validity by considering average variance extracted (AVE) > 0.5. Convergent validity examines the extent to which the construct converges in order to explain the variance of its items. The results in Appendices (Table A2 in Appendix 2) indicate that all these conditions were met, implying that the measurement items were both reliable and valid (Hair *et al.*, 2006).

3.5 Discriminant validity

To assess the measure of shared variance of similar constructs and all other reflectively measured constructs in the structural measurement, we compared the constructs' AVE with the squared inter-construct correlation (Fornell and Larcker, 1981) and heterotrait–monotrait ratio (HTMT) mean value of the item correlations across constructs, which should be < 0.85 (Henseler *et al.*, 2015). The results in (Table A3 in Appendix 3) reveal that the variable AVE is higher than the squared inter-construct correlations (Fornell and Larcker, 1981). Also, results in (Table A4 as attached in Appendix 4) show that the HTMT value, as recommended by Henseler *et al.* (2015) for all study construct loadings, was lower than 0.85, implying that discriminant validity between our study constructs was achieved. Finally, the cross-loading results in (Table A5 as Appendix 5) show that items of a particular study variable load higher on it than on other factors, further indicating discriminant validity (Hair *et al.*, 2017). Figure A1 as attached in Appendix 6 shows the HOC measurement model for IOC and its antecedents and their lower-order constructs that were used to assess the internal consistency, convergent and discriminant validity.

3.6 Common method bias

Both procedural and statistical methods were adopted to control for common methodological bias involving cross-sectional data (Srinivasan and Swink, 2018). First, in each humanitarian

organisation we split the sample into two, where one-half responded to independent variables and the other half to IOC (Fruhen and Keith, 2014; Zohar, 2002). Additionally, Harman's (1967) single-factor test was used to rule out common method variance (CMV). The results indicated that a single-factor solution does not emerge, since the maximum covariance explained by one factor is only 17.438%, which is significantly below the threshold value of 50%, meaning that CMV is likely not to be an issue. Then a common method factor approach (Liang *et al.*, 2007) recommended for field studies was used. In this approach, the independent and dependent variables are obtained from the same source and the source of method bias cannot be identified (Podsakoff *et al.*, 2012), yet at the same time it controls for any systematic variance among the items that is independent of the covariance due to the constructs of interest (Hair *et al.*, 2019; Kalubanga, 2019). The CMF model results, as presented in Table A6 in Appendix 7, reveal that the average substantively explained variance of the indicators is 0.5339, while the average method-based variance is 0.0102. The ratio of substantive variance to method variance is about 44.204:1, an indication of no CMV since the indicator's substantive variance results are significantly greater than their method variances. Furthermore, drawing on the bootstrapping procedure [using 5,000 subsamples, the two-tailed test at 5% margin of error, with the no-sign change options and bias-corrected and accelerated confidence intervals (BCa CI)], the CMF loadings are all insignificant while the loadings for the substantive constructs are all significant (Figure A2, also confirming the absence of CMV). Figure A2 in Appendix 8 is the diagrammatical presentation of the SmartPLS-SEM CMF model from which these results derive.

3.7 Testing for endogeneity bias

Endogeneity arises when one or more predictor variables are correlated with the error term of the regression. According to Rutz and Watson (2019) and Antonakis *et al.* (2014), endogeneity can arise from a number of issues, which may include omitted selection or variables, measurement error or common-source or common-method variance which causes the ordinary least square (OLS) to yield inconsistent results (Stock and Watson, 2003). To address the endogeneity issue in this study we applied IV estimation, where we identified theoretically derived IVs (type of the services offered and location of the humanitarian organisation), variables that can be considered exogenous to the model, to retrieve a consistent estimate for the relationship of interest for which the endogenous covariance is controlled (Bollmann *et al.*, 2019). Basing on Dharmasena and Bessler (2019) and Semykina (2018), a two-stage least square (2SLS) procedure (using Stata 14.0) was used to examine whether theoretically derived exogenous variables are valid IVs from a statistical point of view by applying Durbin's (1954) X^2-score and Wu–Hausman's (Wu, 1974; Hausman, 1978) F-statistic. The appropriateness of instruments was tested using the Sargan (1958) score χ^2 test and the Basmann (1960) χ^2 test. The results obtained did not reject the null hypotheses of exogeneity of organisation size, organisational innovativeness and self-organisation on IOC. This is because the test generated a non-significance of Durbin X^2-score and the Wu–Hausman test, Sargan X^2 score and Basmann X^2 test at 5% level of significance. Table A7 in Appendix 9 summarises the results, which support the robustness of the structural model; hence, we deduce that endogeneity does not have any effects on our conclusion (Dharmasena and Bessler, 2019).

3.8 Heteroscedasticity test

To determine whether the regression model can predict the dependent variable consistently across all values of the explanatory variables (Khaled *et al.*, 2019), we first regressed all the independent variables on the dependent variable by saving both unstandardised values of the predicted and residual value. The ANOVA test results and standardised beta coefficients

Characteristics		F	$\%$
Gender	Male	165	52.4
	Female	150	47.6
Age bracket	<33	82	26
	34–45	131	41.6
	46–55	84	26.7
	56–64	17	5.4
	>65	1	0.3
Qualification	Diploma	47	15
	Degree	198	62.9
	Master's	70	22.2
Total		*315*	*100.0*
Characteristics	*F*	*%*	
Position	Programme	103	32.7
	Projects	102	32.3
	Emergency	26	8.3
	Logistics coordinator	84	26.7
Total		*315*	*100.0*
Respondents' years of operation	1-3	124	39.4
	4-6	139	44.2
	7-9	38	12.1
	10 and above	14	4.4
Total		*315*	*100.0*

Source(s): Analysis of quantitative data

Table 2.
The individual respondent characteristics

for all the independent variable were significant ($p < 0.05$). When the preliminary test indicated likelihood of heteroscedasticity in our OLS model, a Breusch–Pagan/Cook–Weisberg test (Breusch and Pagan, 1979) was used to establish whether there exists heteroscedasticity. This was accomplished by squaring the unstandardised regression residual values, then the new squared values (SRESV) were used as the dependent variable, which was regressed on the independent variables. The ANOVA and standardised beta coefficients for all the predictor variables were non-significant ($p > 0.05$). This shows the non-existence of heteroscedasticity; hence, all our independent variables predict the dependent variable consistently (Astivia and Zumbo, 2019).

3.9 Testing for non-linear effects
We carried out the quadratic effect analysis as recommended by Hair *et al.* (2018a) when using PLS-SEM and Svensson *et al.*'s (2018) guidelines to test for potential non-linearities in structural equation model relationships. This involved assessing the *p*-value or the corresponding t-value and generating the distribution parameter by use of bootstrapping with 5,000 samples using 95% confidence interval. The non-linear effect does exist if the confidence interval values do not include the value zero. Then the non-linear effect is significantly different from zero at a 5% significance level but when it includes the value zero, then we conclude that the variable of interest has a significant non-linear effect (Hair *et al.*, 2019; Belzak and Bauer, 2019). Also, we considered the strength of the non-linear effect by means of f^2 effect size (Hair *et al.*, 2019), which indicates the contribution of the quadratic effect to the explanation of the dependent variable R^2 in the model. We followed Hair *et al.*'s (2019) guidelines of assessing f^2 values of 0.005, 0.01 and 0.025, which represent small, medium and large effect size, respectively. The results of the non-linear effect presented in Table A8 in Appendix 10 suggest that self-organisation has a quadratic effect on

inter-organisation ($\beta = 0.109$, $p \leq 0.007$) with an f^2 effect size value of 0.08, which falls above the lower limit of 0.02 but below the middle limit of 0.15 which, according to Cohen (2010), would, at a minimum, represent a small effect size. However, according to the liberal interpretation by Kenny and Judd (2019), an f^2 effect size value of 0.08 suggests a large effect size basing on his proposal of 0.005, 0.01 and 0.025 effect size values.

4. Analysis and results

4.1 Descriptive statistics and correlations among study variables

The results indicate that the mean and standard deviation scores were in the range of 4.57 and 4.73 and 0.45 to 0.55 for self-organisation, organisational innovativeness and IOC, respectively. This implies that the variables of organisational innovativeness, self-organisation and IOC are feasible and existed with the organisations that participated in this study. Furthermore, standard deviation values for the study variables are close to zero, indicating that the study sample was likely to be an accurate reflection of the population and that the participants in this study may have had a close or similar understanding of the study variables. While (Mean = 3.04, S. D = 1.46) for humanitarian organisation size implies that these are medium humanitarian organisations that employee between 50 and 100, with an average organisational tenure of 5–10 years. In addition, the results in Table 3 reveal that there is a significant positive relationship between organisational innovativeness, self-organisation, networks, activity mechanism and IOC, which enabled us to proceed to test the hypotheses, as is required.

4.2 Direct hypothesis testing

The hypothesised structural model (Figure 1) used Smart-PLS 3.3.0 (Hair *et al.*, 2018a). We developed five metrics to assess the PLS-SEM structural models first: variance accounted for (R^2), path coefficients, effect size f^2, predictive relevance Q^2 (Grewal *et al.*, 2004; Latan *et al.*, 2018c). Further, we carried out the PLS prediction procedure (Dolce *et al.*, 2017; Shmueli *et al.*, 2016) using training and holdout samples to generate and evaluate predictions from PLS path model estimations. All these rules were applied to testing directly and indirectly as suggested by Ali *et al.* (2018) and Hair *et al.* (2017) and all statistical tests were assessed at 5% level of significance using two-tailed *t*-tests.

The results in Table 4 show that H_1, H_2, H_3, H_4, H_5 and H_6 were substantiated by revealing a significant positive relationship between humanitarian organisation size and IOC ($\beta = 0.190$, $p = 0.013$); humanitarian organisation size and self-organisation ($\beta = 0.196$, $p = 0.011$); self-organisation and IOC ($\beta = 0.398$, $p = 0.000$); humanitarian organisation size and organisational innovativeness ($\beta = 0.232$, $p = 0.030$); organisational innovativeness and IOC ($\beta = 0.415$, $p = 0.000$); and organisational innovativeness and self-organisation

Study variable	N	Mean	S. D	Range		1	2	3	4
HO size	101	3.04	1.46	1.00	5.00	1.000			
Inter-organisational coordination	101	4.67	0.45	1.00	6.00	0.423**	1.000		
Organisational innovativeness	101	4.73	0.48	1.00	6.00**	0.232**	0.737**	1.000	
Self-organisation	101	4.57	0.55	1.00	6.00	0.351**	0.752**	0.714**	1.000

Note(s): **Correlation is significant at the 0.01 level (two-tailed). *Correlation is significant at the 0.05 level (two-tailed) (Hair *et al.*, 2017)
Source(s): Analysis of quantitative data

Table 3.
Descriptive statistics and correlations among study variables

(β = 0.668, p = 0.000). Subsequently, the results indicate that 5.4% of the variance in organisational innovativeness is explained by humanitarian organisation size, 54.6% of the variance in self-organisation is explained by humanitarian organisation size and organisational innovativeness, while all the independent variables combined explain 67.8% of the variance in the IOC (R^2 = 0.678).

4.3 The mediating effects of organisational innovativeness and self-organisation

To test for the mediating effect of self-organisation and organisational innovativeness in our model (H_4, H_7, H_9 and H_{10}), we used Bontis *et al.*'s (2007) four-casual steps procedure. These steps are recommended when using PL-SEM to evaluate the mediation effect that relies on ordinary least regression analysis, as the path coefficient generated by PLS provides an indication of relationships and is similar to the traditional regression coefficient (Bontis *et al.*, 2007; Wilden and Gudergan, 2015). They involve establishing a relationship between the independent and dependent variables first, then a relationship between the independent and the mediator variables, the mediator variable with the dependent variable and, finally, the
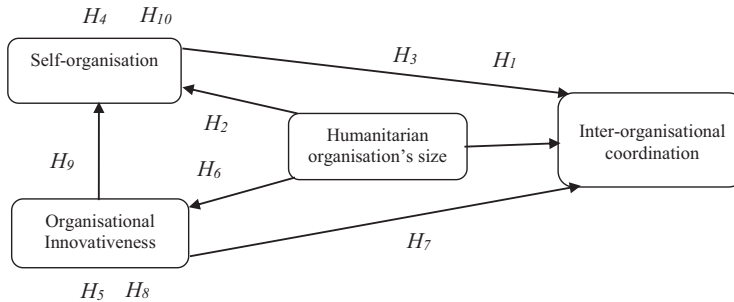

Figure 1.
The conceptual framework for inter-organisational coordination

Hypothesised direct path	F^2	β	μ	δ	t-value	p values	CI
HOs size → Inter-organisational coordination	0.098	0.190	0.185	0.077	2.477	*0.013*	0.044, 0.344
HOs size → Organisational Innovativeness	0.057	0.232	0.234	0.107	2.171	*0.030*	0.007, 0.429
HOs size → Self-organisation	0.080	0.196	0.192	0.077	2.541	*0.011*	*0.045, 0.346*
Organisational innovativeness → Inter-organisational coordination	0.263	0.415	0.417	0.102	4.069	*0.000*	*0.204, 0.602*
Organisational innovativeness → Self-organisation	0.931**	0.668	0.673	0.059	11.358	*0.000*	0.529, 0.766
Self-organisation → Inter-organisational coordination	0.213	0.389	0.391	0.098	3.970	*0.000*	0.186, 0.577

Model predictive power	R^2	Adj. R^2
Inter-organisational coordination	0.678	0.669
Organisational innovativeness	0.054	0.044
Self-organisation	0.546	0.537

Note(s): Significance of *, **, *** is at 0.05, 0.01, 0.001 at two (2) tailed (Hair *et al.*, 2017)
Source(s): Analysis of quantitative data

Table 4.
Direct path coefficients and hypothesised relationship

relationship between the independent and the dependent variables, which should reduce significantly for mediation to occur. The results presented in Table 5 fulfil the first three steps. Then in the fourth step, we tested the mediating effect of organisational innovativeness and self-organisation in the relationship between humanitarian organisation size and IOC and the mediating effect of self-organisation in the relationship between organisational innovativeness and IOC.

The results in Table 5 and PLS-SEM in Figure 2 indicate a significant positive mediation effect of self-organisation and organisational innovativeness in the relationship between humanitarian organisation size and IOC ($\beta = 0.076$, $p = 0.040$ $\beta = 0.096$, $p = 0.042$, with lower and upper boundaries of the 95th BCa CI values of 0.018 and 0.166; 0.009 and 0.218, respectively and variance accounted for 18.67 and 22.07%, in that order). Further, our analysis reveals a significant positive mediating effect of self-organisation in the relationship between organisational innovativeness and IOC ($\beta = 0.260$, $p = 0.000$, with lower and upper boundaries of the 95th BCa CI values of 0.123 and 0.409 and variance accounted for of

Hypothesised direct path	B	δ	t-value	p values	95% BCa confidence
HOs size → Inter-organisational coordination	0.190	0.077	2.48	*0.013*	0.044, 0.344
HOs size → Organisational innovativeness	0.232	0.107	2.17	*0.030*	0.007, 0.429
HOs size → Self-organisation	0.196	0.077	2.541	*0.011*	*0.045, 0.346*
Organisational innovativeness → Inter-organisational coordination	0.668	0.059	11.36	*0.000*	0.529, 0.766
Organisational innovativeness → Self-organisation	0.389	0.098	3.97	*0.000*	0.186, 0.577
Self-organisation → Inter-organisational coordination	0.190	0.077	2.48	*0.013*	0.044, 0.344

Specific indirect effects	β	δ	t-value	p values	95% BCa confidence	VAF
HO size → Organisational innovativeness → Inter-organisational coordination	0.096	0.054	1.80	*0.042*	0.009, 0.218	22.70%
HO size → Self-organisation → Inter-organisational coordination	0.076	0.037	2.05	*0.040*	0.018, 0.166	18.67%
Organisational innovativeness → Self-organisation → Inter-organisational coordination	0.260	0.072	3.59	*0.000*	0.123, 0.409	38.85%
HO size → Organisational innovativeness → Self-organisation	0.155	0.075	2.06	*0.040*	0.007, 0.306	44.16%

Total effects	β	δ	t-value	p values	95% BCa confidence
HOs size → Inter-organisational coordination	0.423	0.085	4.99	*0.000*	0.245, 0.575
HOs size → Organisational innovativeness	0.232	0.107	2.17	*0.030*	0.007, 0.429
HOs size → Self-organisation	0.351	0.095	3.71	*0.000*	0.148, 0.518
Organisational innovativeness → Inter-organisational coordination	0.675	0.062	10.80	*0.000*	0.535, 0.785
Organisational innovativeness → Self-organisation	0.668	0.059	11.36	*0.000*	0.529, 0.766
Self-organisation → Inter-organisational coordination	0.389	0.098	3.97	*0.000*	0.186, 0.577

Table 5.
Mediations test results

Note(s): Significance of italics *, **, *** 0.05, 0.01 and 0.001 at two (2) tailed (Hair *et al.* 2017)
Source(s): Analysis of quantitative data
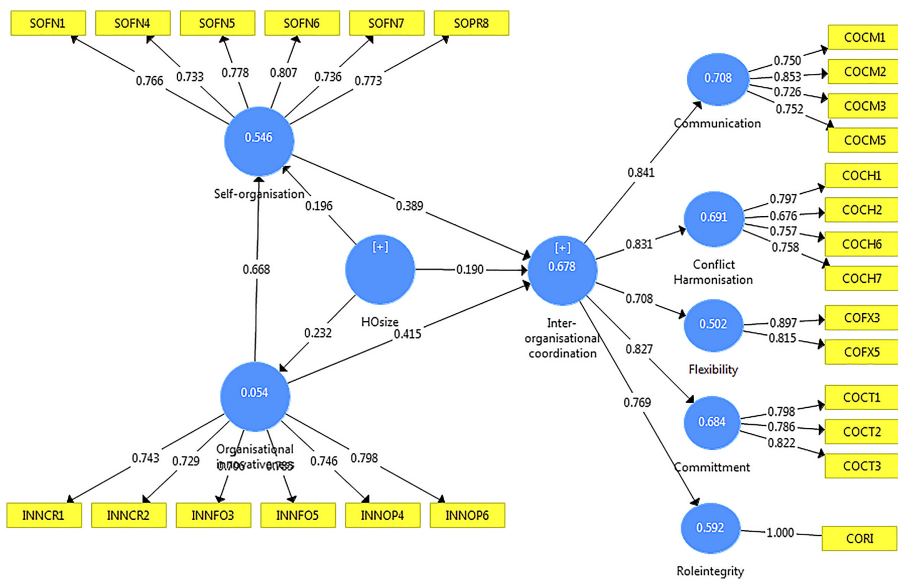
Figure 2.
PLS-SEM for inter-organisational coordination

38.85%) and a significant positive mediating effect of organisational innovativeness in the relationship between humanitarian organisation size and self-organisation (β = 0.155, p = 0.040, with lower and upper boundaries of the 95th BCa CI values of 0.002 and 0.285 and variation inflation factor (VAF) of 44,16%.

These results support hypotheses H_4, H_7, H_9 and H_{10} since the non-mediated and the mediated total effects, as well as the non-mediated and the mediated total indirect effects, are all significant. Therefore, this is what Hair *et al.* (2018b) refer to as a complementary mediation effect since the indirect effects and the direct effects are significant and move in the same direction.

5. Discussion and conclusions
5.1 Discussion of findings
We document how humanitarian organisation size significantly related with IOC. This implies that the high number of employees of differing ages, educational levels and working experience employed by an organisation are able to keep other relief organisations informed about operations through the exchange of accurate, frequent and timely information. In addition, when there is an adequate number of employees who are experienced, they will tend to be committed to delivering the needed relief, based on the organisation's mandate, in time and to handle operation-related conflicts for the mutual benefit of all stakeholders. Moreover, Clarke and Ramalingam (2008) emphasise that humanitarian organisations should hire adequately trained employees with the skills necessary to handle emergency situations as they require a lot of flexibility and commitment to alleviate the immediate suffering of the victims. This finding of the study supports the findings by Zhang *et al.* (2017), Bisri (2016a), Moshtari and Gonçalves (2016) and McEntire (2002) which indicate that an organisation's size in terms of adequate number of employees with appropriate skills who are able to learn from each other and improve on their organisational capabilities will eventually enable them to coordinate with others and provide the right humanitarian services at the right time and in the right quality.

This study also empirically shows that humanitarian organisation size significantly influences an organisation's level of innovativeness. This implies that when an organisation has a big number of employees who possess a diversity of skills and experience, this encourages innovative behaviour like coming up with creative ideas that make the employees resourceful problem-solvers who are always willing to search for fresh new ways. Also, the finding implies that an organisation's size becomes necessary to enhance administrative innovativeness like the creation of a realistic vision and ensuring that the vision for the future is achievable. This finding is consistent with Camisón-Zornoza et al.'s (2004) revelation that organisational innovativeness largely depends on the number of employees in an organisation and their level of skill diversity. In consonance with Kimberly and Evanisko (1981), this study supports the finding that increasing size creates a "critical mass", which justifies the acquisition of particular innovations. They further note that an organisations's size enhances the adoption of administrative innovations.

The results of our empirical investigation also support the claim that organisational innovativeness positively impacts IOC. This implies that humanitarian organisations that are creative and future-oriented increase their level of communication and commitment and deliver their mandate as expected, which enables them to collaborate with other humanitarian organisations. Such an outcome is in line with the results of some previous research (Bisri, 2016b; Chen et al., 2013; Lee et al., 2011). However, our results are inconsistent with the results of some other studies that found insignificant effects of organisational innovativeness on coordination (Abdallah et al., 2014; Flynn et al., 2010; Stank et al., 2001). Organisational innovativeness is sought by organisations in different industries around the world as a key to managing coordination more efficiently. In other words, organisational innovativeness will help decrease system-wide costs and enhance service levels. Humanitarian organisations, just like other organisations, are looking for ways to cut costs, enhance service levels, improve performance and make their relief activities sustainable. Hence, more attention is being paid to ways of achieving more efficient management of the humanitarian relief delivery (Kazemzadeh et al., 2012; Callender and Grasman, 2010). The results of the empirical data fortify the assumption that organisational innovativeness is indeed an important gateway to the achievement of humanitarian relief delivery.

The study finds that humanitarian organisation size is pivotal for the organisation to self-organise to collaboratively work with other organisations during relief delivery. This finding implies that an organisation with a big number of employees has the ability to adapt to changing conditions and to align its functions by adjusting priorities basing on its resource budgets, which increases its flexibility in providing its services to the victims. This further implies that organisational size creates the potential for self-organising agents to learn and adapt to dynamic environments (Dawes et al., 2004). Though this is possible for an organisation with big numbers of employees, smaller organisations may find it challenging to self-organise owing to lack of the required number of employees, which consequently affects their commitments and flexibility, and the fulfilment of their mandates to their beneficiaries (Van Brabant and Place, 1999). Our study findings corroborate those of Comfort and Kapucu (2006) and Dolinskaya et al. (2011), whose conclusion is that self-organisation mechanisms, such as the distribution of control in the systems, reallocation and readjustment of resources and responsibilities and the development of new delivery systems, depend on the number of employees an organisation has.

The results reveal a positive and significant relationship between self-organisation and IOC. This implies that when a humanitarian organisation is well prepared to undertake its work during situations of emergency, it can easily cooperate with other humanitarian organisations in the provision of relief services. This is possible where the organisation has the ability to change its existing operations processes by coming up with new patterns of

delivery response and adjusting its priorities and capacity plans, which helps it to adapt to changing operational conditions and meet the needs of the victims during an emergency situation. Such a humanitarian organisation becomes able to handle emergencies by providing competent human resources to deliver its mandate. These findings support those of an earlier study conducted by Mutebi *et al.* (2020), who established that self-organisation has a significant impact on IOC during relief delivery. Also, in support of this finding is empirical literature by Zietlow *et al.* (2018), which insinuates that risk management that involves capacity planning ultimately has an effect on the use and availability of financial and other resources. In support of this relationship, the CAS theory (Lewin *et al.*, 1998) argues that, given the ever-complex environment in which organisations perform their tasks, they are always forced to adapt to changing circumstances so as to remain committed to the delivery of what they are meant to offer.

The results lend support to the positive relationship between organisational innovativeness and self-organisation. This implies that an organisation with the ability to generate ideas and innovate continually over time can easily adjust its systems, thus enabling new patterns to emerge. Additionally, this finding implies that organisations where creativity is encouraged can strive to develop self-organising procedures and processes that lead to the development of valuable ideas, services and products that help in alleviating the suffering of the beneficiaries. This is because creative organisations are able to spot new opportunities that they need to tap into, hence necessitating them to create procedures and processes to hatch these new ideas into useful solutions to the problems faced by the beneficiaries. This finding corroborates Williams *et al.*'s (2011) argument that the design process in an organisation is determined by the level of creativity in the organisation. This means that the processes that humanitarian organisations go through to deliver their relief services are dependent on how well creativity in terms of new ways, ideas and valuable solutions are generated in the organisation, which prompts the design of new procedures and processes to enable the generation of further new ideas. When organisations come up with initiatives that help the victims, this can lead to the development of adaptive structures, processes and functionality that are supportive in the sense that they will be able to meet the ever-changing needs of the beneficiaries in a timely manner. Keeping such creativity on track requires adjustable organisational structures and processes. To achieve such organisational innovativeness, humanitarian organisations should put more emphasis on changing their operational structures, guidelines and capacity plans to be able to adapt to the changing conditions in relief activity delivery.

This study discovered that there is an indirect effect of humanitarian organisation size on IOC that is partially mediated by organisational innovativeness. Also, the study results indicate that innovative capabilities can help humanitarian organisation size, leading to better IOC. This implies that the features of CASs can also result in IOC benefits in relief delivery. In this respect, even though humanitarian organisation size and IOC are directly related, the effect of humanitarian organisation size on IOC might as well be indirect, implying that it could be mediated by organisational innovativeness. This indirect effect of humanitarian organisation size through organisational innovativeness accounted for 23.44% variance in IOC. These results corroborate those of Tuan (2016), who indicates, plausibly, that the relationship between organisation size and IOC might be mediated by organisational innovativeness.

This result is in line with our earlier hypothesis that self-organisation mediates the relationship between humanitarian organisation size and IOC. The results reveal that self-organisation plays a complementary mediating role in the relationship between humanitarian organisation size and IOC (VAF = 20.93%). This means that humanitarian organisation size not only directly influences IOC but also goes through self-organisation. In line with the CAS theory, an organisation's size contributes to the improvement of

coordination in humanitarian relief delivery so that it is more responsive to victims' needs. Likewise, humanitarian organisations would surely benefit from organisation size based on their level of self-organisation. This is confirmed by the empirical data presented in the current study. Moreover, what adds to the importance of organisation size in humanitarian relief delivery is the fact that saving lives and helping victims to live a comfortable life are the ultimate outcomes of humanitarian relief delivery activities. Self-organisation enhances the organisation's size (Ambrose *et al.*, 2010). Therefore, the present outcome of this study, which confirms the centrality of self-organisation to enhancing an organisation's size in humanitarian relief delivery, cannot be overstated.

This study confirms that organisational innovativeness plays a partial mediation role between humanitarian organisation size and self-organisation (VAF = 44.16%), implying that humanitarian organisation size directly relates to self-organisation but also through organisational innovativeness (Alshammari, 2015). In line with Alshammari, our result suggests that an organisation with a large number of employees creates a "critical mass", which justifies the development of particular innovations and of new ideas. This enables them to learn, as a self-organising process, through testing of the different new ideas through interaction, leading to the emergence of coherent functional patterns.

This study established a partial mediation effect of self-organisation in the relationship between organisational innovativeness and IOC (VAF = 37.89%). This means that self-organisation partly acts as a conduit through which organisational innovativeness could affect IOC. It also means that organisational innovativeness can affect IOC without the help of self-organisation. In addition, this relationship implies that an organisation that adjusts its priorities to meet the needs of its beneficiaries can more effectively prepare for its future operations. Contextually, it was established that humanitarian organisations that strive to participate in any future relief operations adjust their priorities basing on the current relief operation by providing services and products that meet the needs of those concerned. This helps them to be able to provide services that meet the needs of the beneficiaries, which wins them the reputation of fitness to engage in future operations of the same nature. Relatedly, organisations that have the ability to change their functions to successfully perform a task encourage their employees to think and come up with creative solutions through which they are able to deliver on their mandate in time. This is because, for an organisation to change its functions to successfully perform a task, it becomes incumbent upon the employees to think and rethink within their own jurisdiction the other possible ways through which to execute their own work if they are to deliver on time. Lastly, this finding also implies that an organisation that has the capacity to adjust its resource budgets to meet the changing needs of beneficiaries is likely to convey a clear sense of future direction. This finding is supported by Seo *et al.* (2014), who argue that adaptive structures and processes increase the level and quality of creativity, openness, proactive behaviours, mistakes-bearing behaviours and assistance behaviours which, in turn, result in enhanced IOC.

5.2 Conclusions

In this study, we have sought to advance theory and research in humanitarian logistics and supply chain management by developing a parsimonious model of humanitarian organisation size and IOC and how self-organisation and organisational innovativeness enable the occurrence of this relationship. The empirical findings in support of the hypothesised relationships corroborate our main theoretical assertion that the size of the organisation affects IOC. Additionally, this study concludes that self-organisation and organisational innovativeness are important enablers of humanitarian organisation size and could be considered as a key to enhancing IOC. The current study contributes to the existing knowledge by offering significant information about humanitarian organisation size,

innovativeness, self-organisation and coordination impact, which is presently lacking. Moreover, the existing body of knowledge contains conflicting findings concerning the effect of organisational innovativeness on IOC. Such conflicting findings further vary according to the country where the study was carried out and according to the specific context (Wehn and Montalvo, 2018; Sohn, 2018; Pouwels and Koster, 2017). Some studies have confirmed the effect of organisational innovativeness as an enabler of IOC. However, other studies have not found any direct effect of organisational innovativeness on IOC. Consequently, the current study provides an important insight into the effect of self-organisation and organisational innovativeness on the relationship between humanitarian organisation size and IOC in humanitarian logistics and in Uganda. Lastly, most of the previous studies lack the empirical examination of humanitarian logistics (Behl and Dutta, 2019; Jabbour *et al.*, 2019). This fact also adds to the contribution of the current study.

5.3 Implications

Practical implications: This study shows that a humanitarian organisation's size can have a direct positive effect on the collaborative working of humanitarian organisations when managing activity dependences. At the firm level, the results suggest caution in recommending that large humanitarian organisations coordinate more with others, because the results show that, whether large or small, they *do* coordinate when they know that their flag will remain high. Coordination presents an opportunity for them to acquire more resources, and when it does not expose their source of funding or even when they have been coerced by their donor to partner with others, it leads to network expansion. An additional firm-level implication of our results is that humanitarian organisations need to consider their level of self-organisation and innovativeness for their size to effectively help them work with other organisations during relief delivery.

Managerial implications: Since humanitarian crises are complex and generate a range of specific and varied needs among affected groups and populations, the managers in charge of the implementation of humanitarian relief activities need to consider their size and to allow their staff to modify the implementation of humanitarian relief delivery for coordination to ensure timely emergency handling. Managers should create an environment that nurtures, enriches and encourages employees to formulate new ways of solving coordination-related operational challenges. This can be achieved where a manager creates an error management culture and is open to innovations, which encourages employee to take the risk of coming up with new ways of doing things while knowing that sometimes these are prone to error. Lastly, managers should promote flexible standard operating procedures that allow the coordination needed for adjustment during emergencies. The results of this study show that relief delivery is context-specific, requiring standards that meet the changing needs of the beneficiaries. Therefore, basing on the findings, managers should design operational work plans and attendant procedures that can accommodate emerging patterns during relief delivery, such as an increase in the number of beneficiaries, that may lead to adjustments to relief budgets and delivery schedules. In addition, managers should come up with job descriptions that are also context-specific and that are not rigid, to allow relief coordinators to carry out their routines.

Policy implications: One such implication relates to the antitrust policy. Given that large humanitarian organisations seem to have greater resources and a bigger capacity than small firms, policymakers may want to consider compromises between the anti-competitive effects of large humanitarian organisations and the innovative benefits of large scale. This is in line with Williamson's (1968) argument that the efficiency benefit of large organisations may outweigh their anti-competitive effects. We add the innovative and self-organisation benefit to Williamson's efficiency benefit.

5.4 Study limitations and future research
Like other studies, the present study has its own limitations. First, our study respondents were located only in Uganda. This study needs to be further validated. Second, this study uses a cross-sectional design. Coordination among humanitarian organisations in relief delivery evolves over time (Sahay, 2003). Thus, future research on IOC should use a longitudinal study that will be more capable of capturing the development of such collaborative relationships. Based on our research limitations, we have identified the following future research directions. One, future research could examine other factors that might influence IOC, specifically the moderating effect of organisational size on the relationship between self-organisation and organisational innovativeness and IOC. Furthermore, case research could be explored to validate the research results. Two, future studies could extend our model to other industries and include more theoretical lenses. In particular, we suggest extensions of the activity domain theory, which may provide further insights into the antecedents of IOC.

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Appendices

Appendix 1

	HO size	SORG	Orginnov	Orgcoord
Mann–Whitney U	1113.000	1209.500	1193.500	991.500
Wilcoxon W	2241.000	2694.500	2678.500	2476.500
Z	−1.114	−0.408	−0.517	−1.893
Asymp. Sig. (two-tailed)	0.265	0.683	0.605	0.058
Source(s): Analysis of quantitative data				

Table A1.
Non-response bias test

Appendix 2

Study constructs	Items	Standardised item loadings	Item reliability	VIF	α	rho_A	CR	(AVE)	Fornell–Larcker criterion	Cross-loadings	HTMT criterion
Inter-organisational coordination					0.889	0.892	0.907	0.783	YES	YES	YES
Conflict harmonisation	COCH1	0.797	0.631	1.537	0.737	0.743	0.835	0.560	YES	YES	YES
	COCH2	0.676	0.463	1.305							
	COCH6	0.757	0.567	1.380							
	COCH7	0.758	0.578	1.462							
Communication	COCM1	0.750	0.562	1.768	0.771	0.774	0.854	0.596	YES	YES	YES
	COCM2	0.853	0.727	2.176							
	COCM3	0.726	0.527	1.411							
	COCM5	0.752	0.566	1.460							
Commitment	COCT1	0.798	0.632	1.402	0.723	0.722	0.844	0.643	YES	YES	YES
	COCT2	0.786	0.620	1.370							
	COCT3	0.822	0.678	1.543							
Flexibility	COFX3	0.897	0.805	1.291	0.644	0.675	0.846	0.734	YES	YES	YES
	COFX5	0.815	0.664	1.291							
Role integrity	CORI1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	YES	YES	YES
HO size	HO Size	1.000	1.000	1.000	1.000	1.000	1.000	1.000	YES	YES	YES
Organisational innovativeness	INNCR1	0.743	0.546	1.866	0.840	0.841	0.882	0.555	YES	YES	YES
	INNCR2	0.729	0.541	1.713							
	INNFO3	0.706	0.527	1.666							
	INNFO4	0.785	0.549	1.652							
	INNOP4	0.746	0.559	1.625							
	INNOP6	0.798	0.605	1.785							
Self-organisation	SOFN1	0.766	0.593	1.831	0.859	0.859	0.895	0.587	YES	YES	YES
	SOFN4	0.733	0.534	1.690							
	SOFN5	0.778	0.610	1.890							
	SOFN6	0.807	0.656	2.086							
	SOFN7	0.736	0.538	1.734							
	SOPR8	0.773	0.588	1.803							

Source(s): Analysis of quantitative data

Table A2.
Evaluating the measurement models for both higher- and lower-order constructs

Appendix 3

Study constructs	1	2	3	4	5	6	7	8	9
Commitment (1)	0.802								
Communication (2)	0.580	0.772							
Conflict harmonisation (3)	0.542	0.624	0.748						
Flexibility (4)	0.574	0.461	0.455	0.857					
HO size (5)	0.385	0.311	0.299	0.413	1.000				
Inter-organisational coordination (6)	0.827	0.841	0.831	0.708	0.423	0.647			
Organisational innovativeness (7)	0.581	0.662	0.619	0.466	0.232	0.737	0.752		
Role integrity (8)	0.629	0.529	0.595	0.528	0.326	0.769	0.578	1.000	
Self-organisation (9)	0.606	0.602	0.583	0.568	0.351	0.752	0.714	0.725	0.766
Source(s): Analysis of quantitative data									

Table A3.
Fornell–Larcker
criterion results for the
constructs

Appendix 4

	1	2	3	4	5	6	7	8	9
Commitment									
Communication	0.771								
Conflict harmonisation	0.734	0.818							
Flexibility	0.824	0.647	0.645						
HO size	0.451	0.355	0.339	0.515					
Inter-organisational coordination	1.018	1.018	1.030	0.925	0.444				
Organisational innovativeness	0.735	0.823	0.787	0.617	0.249	0.848			
Role integrity	0.739	0.603	0.691	0.650	0.326	0.799	0.623		
Self-organisation	0.767	0.739	0.723	0.750	0.379	0.850	0.831	0.780	
Source(s): Analysis of quantitative data									

Table A4.
Heterotrait–monotrait
(HTMT) ratio results
for the constructs

Appendix 5

	COCT	COCM	COCH	COFX	HO size	IOC	OI	CORI	SORG
COCH1	0.390	0.585	*0.797*	0.304	0.255	0.663	0.503	0.438	0.448
COCH2	0.350	0.302	*0.676*	0.337	0.111	0.524	0.408	0.408	0.357
COCH6	0.517	0.486	*0.757*	0.395	0.289	0.681	0.467	0.512	0.516
COCH7	0.350	0.464	*0.758*	0.326	0.216	0.602	0.470	0.416	0.407
COCM1	0.407	*0.750*	0.484	0.288	0.230	0.621	0.559	0.421	0.419
COCM2	0.525	*0.853*	0.454	0.337	0.267	0.684	0.537	0.403	0.444
COCM3	0.369	*0.726*	0.529	0.368	0.237	0.626	0.494	0.382	0.458
COCM5	0.479	*0.752*	0.463	0.427	0.225	0.661	0.454	0.427	0.537
COCT1	*0.798*	0.536	0.472	0.325	0.410	0.680	0.577	0.551	0.503
COCT2	*0.786*	0.470	0.435	0.533	0.237	0.667	0.456	0.461	0.504
COCT3	*0.822*	0.384	0.394	0.528	0.276	0.641	0.359	0.500	0.449
COFX3	0.584	0.433	0.461	*0.897*	0.360	0.680	0.446	0.500	0.542
COFX5	0.378	0.351	0.301	*0.815*	0.350	0.518	0.344	0.395	0.420
CORI	0.629	0.529	0.595	0.528	0.326	0.769	0.578	*1.000*	0.725
INNCR1	0.437	0.552	0.538	0.266	0.097	0.569	*0.743*	0.371	0.470
INNCR2	0.332	0.491	0.501	0.271	0.129	0.503	*0.729*	0.319	0.464
INNFO3	0.467	0.450	0.379	0.362	0.197	0.532	*0.706*	0.506	0.618
INNFO5	0.451	0.524	0.473	0.362	0.208	0.577	*0.785*	0.476	0.526
INNOP4	0.440	0.494	0.501	0.340	0.178	0.568	*0.746*	0.472	0.561
INNOP6	0.479	0.480	0.418	0.481	0.223	0.570	*0.798*	0.441	0.563
NOEMPL	0.385	0.311	0.299	0.413	*1.000*	0.423	0.232	0.326	0.351
SOFN1	0.550	0.501	0.437	0.451	0.223	0.622	0.492	0.622	*0.766*
SOFN4	0.462	0.473	0.371	0.392	0.226	0.538	0.569	0.481	*0.733*
SOFN5	0.369	0.402	0.390	0.368	0.328	0.498	0.576	0.539	*0.778*
SOFN6	0.442	0.455	0.437	0.301	0.182	0.542	0.594	0.569	*0.807*
SOFN7	0.481	0.438	0.511	0.551	0.345	0.605	0.451	0.492	*0.736*
SOPR8	0.477	0.493	0.521	0.535	0.307	0.640	0.591	0.617	*0.773*

Source(s): Analysis of quantitative data

Table A5.
Cross-loading

Appendix 6

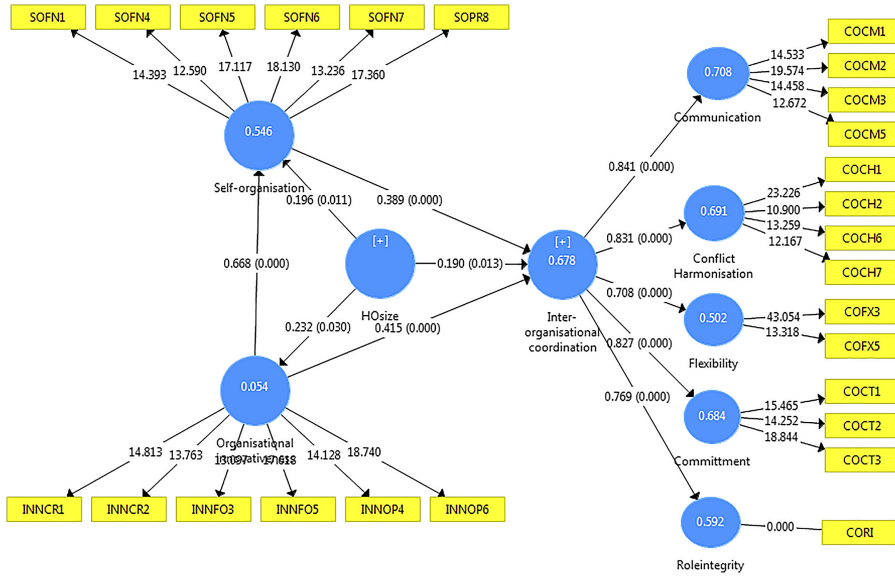**Figure A1.**
HOC measurement
model for
inter-organisational
coordination and its
antecedents with their
lower-order
constructs (LOCs)

Appendix 7

Lower-order construct	Indicator	Substantive factor Loading $R1$	Sig.	$R1^2$	Common method factor Loading R^2	Sig.	$R22$
Inter-organisational coordination	COCM1	0.81	*	0.656	−0.037	n.s.	0.0014
	COCM2	0.992	*	0.984	−0.15	n.s.	0.0225
	COCM3	0.665	*	0.442	0.074	n.s.	0.0055
	COCM5	−0.107	n.s.	0.011	0.458	*	0.2098
	COCH1	0.799	*	0.638	−0.007	n.s.	0.0000
	COCH2	0.774	*	0.599	−0.105	n.s.	0.0110
	COCH6	0.81	*	0.656	−0.053	n.s.	0.0028
	COCH7	0.617	*	0.381	0.158	n.s.	0.0250
	COCT1	0.742	*	0.551	0.1	n.s.	0.0100
	COCT2	0.582	*	0.339	0.617	*	0.3807
	COCT3	0.997	*	0.994	−0.186	n.s.	0.0346
	COFX3	0.81	*	0.656	0.119	*	0.0142
	COFX5	0.746	*	0.557	−0.128	*	0.0164
	COR16	0.549	*	0.301	0	n.s.	0.0000
Self-organisation	SOFN1	0.705	*	0.497	0.074	n.s.	0.0055
	SOFN4	0.72	*	0.518	0.013	n.s.	0.0002
	SOFN5	0.926	*	0.857	−0.16	n.s.	0.0256
	SOFN6	0.967	*	0.935	−0.172	n.s.	0.0296
	SOFN7	0.674	*	0.454	0.066	n.s.	0.0044
	SOPR8	0.59	*	0.348	0.193	n.s.	0.0372
Organisational innovativeness	INNCR1	0.77	*	0.593	−0.025	n.s.	0.0006
	INNCR2	0.878	*	0.771	−0.154	n.s.	0.0237
	INNFO3	0.577	*	0.333	0.159	n.s.	0.0253
	INNFO4	0.87	*	0.757	−0.143	n.s.	0.0204
	INNOP4	0.665	*	0.442	0.09	n.s.	0.0081
	INNOP6	0.715	*	0.511	0.067	n.s.	0.0045
HO size		0	n.s.	0.000	0	n.s.	0.0000
Sum		14.949		12.6202	−0.001		0.2855
Average		0.5339		0.4507	0.0000		0.0102
Ratio			44.204			1	

Note(s): *Sig. ($p < 0.05$). n.s. is for not significant
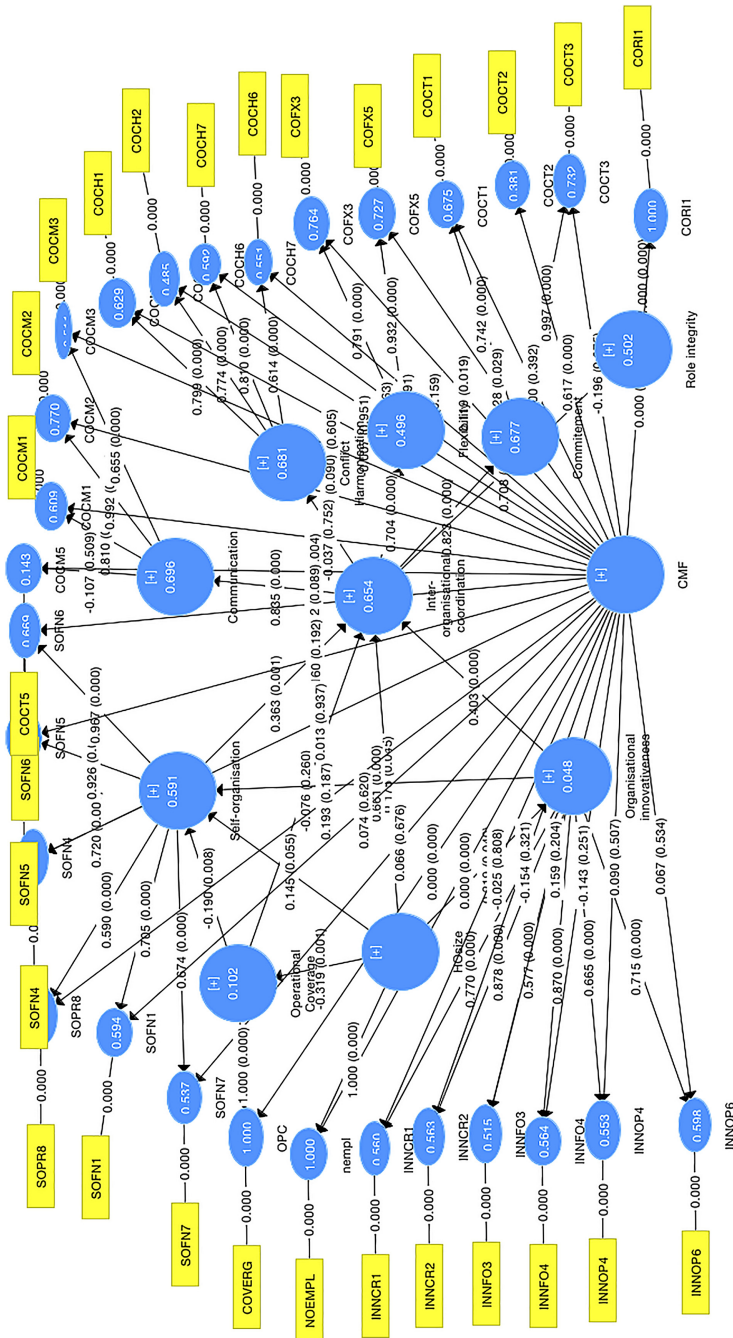
Table A6.
Common method bias analysis using the common method factor model

Appendix 8

Appendix 9

Endogeneity test		Durbin X^2 score (*p*-value)	Wu–Hausman (*p*-value)	Over identification test (instruments are valid)	Sargan X^2 score (*p*-value)	Basmann X^2 (*p*-value)
Variable	Null hypothesis			Null hypothesis		
HO size	H_0: HO size	0.055 (0.354)	0.054 (0.356)	H_0: HOsize	0.678 (0.256)	0.653 (0.258)
SORG	H_0: SORG	0.045 (0.832)	0.043 (0.836)	H_0: SORG	1.677 (0.195)	1.620 (0.203)
OI	H_0: OI	1.715 (0.190)	1.656 (0.201)	H_0: OI	0.578 (0.447)	0.553 (0.457)

Source(s): Analysis of quantitative data

Table A7.
Assessment of endogeneity test using two-stage ordinary regression approach results

Appendix 10

Non-linear relationship	Coefficient	*p*-value	f^2
SORG*SORG → IOC	0.109	0.007	0.080
HO size*HO size → IOC	−0.023	0.704	0.003
OI*OI → 1OC	0.005	0.940	0.000
HO size*HO size → SORG	0.144	0.498	0.000
OI*OI → SORG	0.050	0.337	0.009
HO size*HO size → OI	−0.045	0.699	0.001

Source(s): Analysis of quantitative data

Table A8.
Assessment of non-linear effects

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