Getting off the Digital Divide? Not so Fast! Exploring the Viability of Digital-divide-based Crowdfunding Models

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Abstract

Crowdfunding literature primarily assumes the phenomenon as internet based. With the untapped potential of crowdfunding activities in developing regions, little is known of the viability of non-internet crowdfunding models in explaining crowdfunding success and how they compare with internet models. Non-internet crowdfunding models, particularly SMS crowdfunding, proliferate due to digital divide infringements. This research leverages fit-viability perspectives and crowdfunding literature to explain the significant differences in utilizing either model for crowdfunding. Our analysis reveals that, despite their inherent differences, both the SMS and internet crowdfunding models offer equal opportunities for project success, attributed to their unique economic viability mechanisms. This finding advocates for SMS crowdfunding's continued adoption and refinement, especially within marginalized societies, as an avenue to facilitate digital inclusivity and foster a more balanced global financial landscape. We offer theoretical and practical implications to support our analysis.

Keywords: Crowdfunding Economic Viability, Digital Divide, Digital Inequality, Donation Crowdfunding, Financial Inclusivity

1. Introduction

Modern forms of crowdfunding depend on access to web platforms, social media, and social networking sites. As such, internet access is paramount to their successful adoption and usage. This presents a challenge to economic regions with poor internet infrastructure and low internet penetration. For individuals in such regions, crowdfunding becomes inaccessible due to this digital divide. The digital divide, an aspect of digital inequality, refers to the gap between those who do and those who do not have access to new forms of information technology, including internet access (Dimaggio & Hargittai, 2001; Werle, 2005). Wolf asserts that the digital divide imposes a limit on the ability of crowd fundraisers in internet-deficient regions to capitalize on the value of network externalities in crowdfunding (Wolf, 2017). The low adoption rates of online crowdfunding can be attributed to the "digital divide" on the continent (World Bank Group, 2016).

To bridge the digital divide gap and increase accessibility within the crowdfunding space, one solution has been to provide offline crowdfunding models with SMS (Short Messaging Service) integrations. Individuals with no or unstable internet access utilize local payment tools (i.e., mobile money) and receive customer support from these models. The use of SMS to power offline crowdfunding projects presents an alternative yet promising solution to overcome the "digital divide" and provide crowdfunding access to those without internet access. However, the effectiveness of this offline crowdfunding model is understudied, due to the general belief that crowdfunding phenomenon is driven by internet advancements and Web 2.0.

This study purports to evaluate the viability of the SMS crowdfunding model as an alternative to the online crowdfunding model in internet-underserved regions. While extant literature shows the impact of online factors such as project description and social media on the success of crowdfunding projects (Manning & Bejarano, 2017), their absence in the SMS powered projects could hinder their success in terms of the amount raised and the number of donors. On the other hand, it is possible that the impacts of online components could be significantly reduced by offline crowdfunding models that seek to bridge the "digital divide," such as the SMS model. To this, the study addresses the following research questions:

1) Is there a significant difference between "web-powered" (internet) and offline "SMS powered" crowdfunded projects?
2) What factors are attributable to the difference(s) between the two models, if any?

To address the research questions, we apply a fit-viability framework (Liang et al., 2007; Liang & Wei,

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2004). We collect data from a platform (www.mchanga.ke) that records crowdfunding activities in a developing region in Africa, which serves both online "platform-powered "and offline SMS crowdfunding models. Our analysis reveals that while there are significant differences in the viability of both crowdfunding models, both models offer project founders an equitable chance of crowdfunding success. Specifically, we find that the SMS model offers "digital divide" disadvantaged project founders an equal chance to share in the wealth made possible by crowdfunding.

The following section discusses the literature and study's anchor theory. Based on the review, we develop a set of hypotheses that facilitate the approach of comparing two crowdfunding models from a digital-divide perspective. Data and methods follow. Next, we report the findings and discuss the results to draw out the theoretical and practical contributions of the study. We conclude by providing limitations to the work and future directions for research.

2. Related literature

2.1. Crowdfunding and the digital divide

Access to formal financial services in certain economic regions is limited to a small percentage of the population (Wolf 2017; Oruezabala and Peter 2016). Project founders in these regions often grapple with bureaucratic and unachievable credit requirements from traditional financing channels due to a lack of credible financial history or collateral facility. Without access to such traditional financing channels, crowdfunding provides an alternate yet viable financing channel (Davies et al., 2018). Funds raised on crowdfunding platforms provide essential financial resources to entrepreneurial, innovative, and charitable projects. Crowdfunding also plays a significant role for individuals with low income and limited access to formal financial services such as credit or insurance. For such individuals, crowdfunding offers an alternate platform for quick mobilization of emergency funds in a financial shock or difficulty. Thus, crowdfunding has become an essential area of financial technology as its benefits compensate for the inefficiencies of formal financial services (Oruezabala & Peter, 2016; Wolf, 2017).

Unfortunately, while the popularity and success of crowdfunding continue to soar in developed countries, the same cannot be said for developing parts of the world where the crowdfunding industry remains in its infancy. This is unfortunate since funds raised on crowdfunding platforms provide essential financial resources to entrepreneurial, innovative, and charitable projects. One significant barrier to innovation in developing countries is the lack of funds to provide vital resources to engage in technological and innovative projects. Thus, in developing countries, the adoption and participation rates of crowdfunding are meager as the industry remains stuck in the developing phase with little progress to the growth and maturity stages (World Bank Group, 2016). However, the World Bank believes the potential of crowdfunding in developing countries could amount to $93 billion over the next 20 years (Prodigy Network, 2016).

To overcome high entry barriers to realize estimated potentials, crowdfunding platforms operating in Africa have leveraged mobile technology while using innovative ways to create and promote projects via SMS, popular mobile apps (e.g., WhatsApp, Messenger, Viber), and mobile money to fund projects (Boum, 2016). Thus, combinations of online and offline efforts support fundraising activities by tapping into distinct groups of prospective contributors. Such an approach has received support in earlier studies showing that offline activities play a significant role in sustaining online communities (Lin, 2007).

In a consistent faction to the general understanding of crowdfunding, Mollick (2014) defines crowdfunding as "the efforts by entrepreneurial individuals and groups – cultural, social, and for-profit – to fund their ventures by drawing on relatively small contributions from a relatively large number of individuals using the internet, without standard financial intermediaries" Essentially, three key components describe crowdfunding regardless of the type of crowdfunding: project founders (or entrepreneurs), crowd funders (i.e., backers or fundraisers), and crowdfunding platforms which connect founders to funders (Yuan et al., 2016). Scholars divide crowdfunding into four models: donation crowdfunding, reward crowdfunding, crowdlending, and equity crowdfunding. These types of crowdfunding are premised on internet accessibility and Web 2.0. The prevailing literature and general definition underscore the issue of crowdfunding which is highlighted by the digital divide literature: addressing the internet accessibility gap. There is an increasing need for crowdfunding across developing regions, and results are expected to come from local innovation, boosted by global support (AlliedCrowds, 2016; Prodigy Network, 2016). Due to the potential of crowdfunding to provide alternative funding to economic activities in developing regions, the prime objective is for most people is to have access to crowdfunding, either as individuals, organizations, and entrepreneurs or as

donors, customers, and investors. For people without internet or quality internet access, the integration and use of SMS mobile technology features are deemed a plausible approach (Liang & Wei, 2004). Therefore, we motivate the importance of the digital divide-based perspective of crowdsourcing as a dichotomy of offline crowdsourcing models, specifically, SMS powered models and the online "platform-powered" models.

2.2. Viability of digital-divide-based crowdfunding model

Fit-viability theory provides a useful lens by which the success of mobile technologies such as SMS can be assessed (Liang et al., 2007; Liang & Wei, 2004). Tjan proposed fit and viability as two critical dimensions for evaluating internet initiatives, asserting the need for high fit and high viability for project success (Tjan, 2001). Fit measures how much the technology's capabilities meet the task's requirement. Viability measures the extent of social-technical, economic and organizational-environmental readiness for the use of information technology systems or applications (Liang & Wei, 2004). Thus, the need for fit and project viability to ensure crowdfunding success has been discussed in the crowdfunding literature. For instance, Stevenson et al. argue that equity crowdfunding is contingent on perceived funding fit by entrepreneurs (Stevenson et al., 2021). Veronica et al. discuss the viability of equity (Veronica et al., 2019). Therefore fit-viability perspectives can be leveraged to comparatively explore the differences in SMS powered model and online "platform-powered" model as far as crowdfunding success is concerned.

3. Hypotheses development

In this section, we leverage fit-viability perspectives and the rich crowdfunding literature to develop the study's hypotheses which address the research questions.

3.1. Donation crowdfunding viability and crowdfunding success

Fit-viability literature argues that the viability of the project or application is assessed through the impact of economic, organization and IT infrastructure readiness (Liang et al., 2007; Liang & Wei, 2004; Tjan, 2001). Economic viability is a pivotal consideration when evaluating crowdfunding platforms. A primary determinant of this viability is the transaction costs tied to the technology's use. As highlighted by Liang et al. (2007), these costs can influence a project's contribution goals. In developing regions, the costs associated with internet crowdfunding platforms tend to be higher. This increase is due to factors such as limited infrastructure, inconsistent internet access, and potentially elevated service fees. Both project backers and project founders bear these expenses. Conversely, SMS crowdfunding models might offer a more financially sound alternative. In many developing regions, mobile networks are more widespread and dependable than consistent internet services, making them a foundational support for SMS platforms. Additionally, the straightforward nature of SMS models requires minimal technical knowledge from users. This simplicity, coupled with the potential for lower transaction fees compared to online payment methods, amplifies the attractiveness of SMS platforms. By doing so, it attracts a wider audience and potentially boosts the overall success of crowdfunding campaigns. Owing to its enhanced economic viability, SMS crowdfunding not only makes the fundraising process more accessible but also elevates it to match the demonstrated viability of internet models (Mollick, 2014; Zhou et al., 2018). As such, we posit that,

H1 (The crowdfunding economic viability hypothesis): *Crowdfunding campaign's economic readiness (**average amount pledged per backer**) positively influences crowdfunding success in both SMS and internet models.*

3.2. Crowdfunding viability and crowdfunding success

Crowdfunding literature argues that large numbers of friends on online social networks are associated with crowdfunding success (Mollick, 2014). A high number of backers for a project indicates a high appreciation and involvement in the crowdfunding phenomenon. Many backers provides an inexpensive audience for project founders to access (Stanko & Henard, 2017). Word-of-mouth benefits also accrue from attracting large backers to support a crowdfunding project (Stanko & Henard, 2017). The common criteria for assessing organization viability are readiness of users to support the project indicated by their satisfaction, willingness and ability to use the IT platform (Liang et al., 2007; Liang & Wei, 2004). Therefore, more backers patronizing a project campaign would signal higher acceptability of using the platform to donate funds.

Project backers often evaluate the time and effort required to use a crowdfunding platform, which can influence their funding behavior and, consequently, the success of the crowdfunding campaign (Liang et al., 2007; Liang & Wei, 2004). In a study focused on reward platforms, Kuppuswamy & Bayus (2018) noticed a U-shaped behavioral pattern linking project backers to crowdfunding success. This U-shaped relationship was attributed to an initial surge of fundraising activity at the campaign's start, followed by a lull in the middle, and a resurgence towards the end. However, when it comes to donation platforms, the dynamics might differ. Unlike other campaigns, donation projects often do not have a fixed end date. This might mean that the fundraising activity remains consistent, rather than showing a U-shaped trend. Given this context, we anticipate a direct linear relationship between the perceived readiness or viability of a project and its success in crowdfunding. This holds true for both SMS donation crowdfunding and internet donation crowdfunding. Thus, our hypothesis is:

H2 (The crowdfunding organization viability hypothesis): *Crowdfunding campaign's social readiness (**number of backers**) positively influences crowdfunding success in both SMS and internet models.*

3.3. Comparing crowdfunding models and crowdfunding success

Project descriptions regarding offline models will be less congruent compared to online models because the internet platforms have dedicated pages where fundraisers or backers can go and read consistent communications. Unlike internet crowdfunding models, offline models are heavily dependent on traditional word of mouth and other unconventional means propagating project launch. Therefore, backers may be presented with inconsistent communications of project intent that may be far-removed actual objectives of the project founders or the project campaign. Inconsistent communications and lack of clarity in project objectives would signal a seeming lack of project quality, raising uncertainties about the founders' intent.

Uncertainty between transacting parties impacts transactions costs (Da Silva & Saes, 2007; Williamson, 1981, 2005) and if high uncertainties remain about crowdfunding project objectives, backers will be unwilling to contribute to the project or contribute a fraction of what they originally intended. The crowdfunding literature (e.g. Mollick, 201) asserts that projects that signal higher quality are likely to be funded ensuring crowdfunding success. Thus, platforms that allow for clearly specified project objectives signal higher project quality which positively impact crowdfunding success while uncertainties negatively impacts economic viability (Liang et al., 2007) and consequently performance of the campaign. Therefore, we posit the following hypothesis comparing the viabilities between the SMS crowdfunding model and internet donation crowdfunding model,

H3 (comparative model hypothesis): *Compared to the SMS crowdfunding model, the overall viability of internet crowdfunding model is higher leading to a better crowdfunding success.*

3.4 Omission of task-technology fit and IT infrastructure viability

We address the exclusion of task-technology fit and IT infrastructure viability from our research model. Each campaign group, acting as a quasi-organization, utilizes the same prevailing technology platform for fundraising. Given that the primary objective of raising funds aligns seamlessly with SMS and internet platform capabilities, the influence of task-technology fit remains consistent across various project campaigns, rendering no substantial impact on campaign performance (i.e., crowdfunding success). IT infrastructure encompasses the preparedness of computing resources, information management, and communication platforms. Similarly, as the fundraising task is distinctly outlined by crowdfunding platforms, the IT infrastructure viability remains uniform across campaigns, whether they employ internet or offline SMS methods. Consequently, both the task-technology fit and IT infrastructure viability aspects become inherent and unnoticed.

4. Data and methods

4.1. Data context and data collection

The ideals of 'crowdfunding' are not a new phenomenon in the developing world. Specifically, countries in Africa have long-held cultural practices that allow funds or resources to be pooled from the public to support social and civic causes (Wolf, 2017). However, for a continent where only 26% of its population has internet access (GSMA, 2020), adopting and participating in a modern "e-platform" crowdfunding system presents a considerable challenge. With the aim of evaluating the viability of the "SMS" offline crowdfunding model as an

alternative to the online crowdfunding model, we collected cross-sectional data from the Crowdfunding portal in Kenya using ScrapStorm –software for data extraction following (Shah et al., 2020). The randomized context presents a quasi-experimental underpinning for comparing the two models on subjects with similar social constructions.

M-Changa, a Kenyan platform, is one of Africa's earliest and largest crowdfunding platforms. M-Changa is an online and SMS crowdfunding platform that allows individuals to register via mobile phone or online. M-Changa allows project founders to manage fundraisers on their mobile phones. The platform boasts of giving project founders the support to raise funds for individual needs, organizations, and businesses through mobile technology and mobile money. For the SMS model, potential backers with Safaricom MPESA, Airtel Money, or Equitel registered SIM cards can contribute. For the online model, potential backers can contribute via PayPal, Venmo, SimbaPay, and credit card.

Crowdfunding literature utilizes various metrics to measure project success or performance (Zhou et al., 2018). Such metrics often include the number of backers, threshold levels, amount of funds donated, funding levels, and dummy variables representing project success and failure (Chen et al., 2016; Cumming et al., 2020; Datta et al., 2019; Parhankangas & Renko, 2017). We adopt amount of funds raised as the measure of project success (i.e. crowdfunding success) through which we assess the viability of sms and internet crowdfunding models.

4.2. Variable operationalization and sample statistics

Table 1. Variables and operational definitions

Variables	Definition
Dependent variable	
CrowdfundingSuccess	Amount of actual funds raised
Independent variables	
lnAvgAmountPledgedPerBacker	Natural log of the project goal amount divided by the number of backers associated with each project
lnBackers	Natural log of the number of people that donated to a project
Control factors	
lnFundingDuration	Natural log of the days between last funding date (used day of data collection) and the start date of the project
ProjectDescriptionDummy	A dummy variable where 1 is for campaign with project description (internet-based projects) and 0 for projects with no project description (SMS-based projects)

Table 2. Descriptive statistics for SMS-powered crowdfunding model

Variable	Obs	Mean	SD	Min	Median	Max
AmountRaised	1,801	1658.99	4,053.05	23.00	374	76,230.00
AvgAmountPledgedPerBacker	1,801	705.31	1850.67	0.81	144.32	37,300.00
Backers	1,801	150.00	762.69	1.00	36.00	19,060.00
FundingDuration	1,801	1,202.88	400.64	26.00	1198.00	3,107.00
ProjectDescriptionDummy	1,801	0.00	0.00	0.00	0.00.00	0

Notes: Standard Deviation (S.D.). Descriptive statistics on raw values before variable transformation

Table 3. Descriptive statistics for internet-based crowdfunding model

Variable	Obs	Mean	SD	Min	Median	Max
AmountRaised	1,151	2,671.00	4,860.84	23.00	698.00	51,628.00
AvgAmountPledgedPerBacker	1,151	433.56	1371.21	0.31	124.73	23,225.00
Backers	1,151	172.57	682.88	1.00	46.00	17,604.00
FundingDuration	1,151	1261.65	389.82	44.00	1079.00	3107.00
ProjectDescriptionDummy	1,151	1.00	0.00	1.00	1.00	1.00

Notes: Standard Deviation (S.D.). Descriptives statistics on raw values before variable transformation.

4.3. Empirical model specification and tests

Following (Vulkan et al., 2016), we implemented a linear regression model to assess hypotheses (i.e., H1 and H2) for each model except hypothesis 3. The linear regression model is specified as follows:

$$CrowdfundingSuccess_i = \beta_0 + \beta_1 lnAvgAmountPledgedPerBacker_i + \beta_2 lnBackers_i + \beta_3 lnFundingDuration_i + \beta_4 ProjectDescriptionDummy_i + \varepsilon \quad (1)$$

To perform the comparative hypothesis (H3) test, we used covariance-based structural equation modeling (SEM) together with estat ginvariant commands in STATA and assessed Wald tests for the equality of parameters (i.e., explanatory variables, intercepts, error variances) and joint Wald tests across the two models (Macdonald, 2016). SEM allows for the estimation of a series but independent multiple regression equations simultaneously.

We also run a robustness check on H3 using seemingly unrelated regression (SUR) estimation via Stata. SUR, first introduced by (Zellner, 1962), simultaneously combines the models and gives a robust covariance matrix (Greene, 2003). The approach used in this study follows (Srivastava et al., 2016; Yan & Guan, 2019). The SUR method assumes that all the regressors are independent variables and the error terms in the two models are correlated. That is that is, $\mathrm{Cov}(\mu_{1i}, \mu_{2j}) \neq 0$ for $i \neq j$. The parameters of each equation in SUR estimation are consistently and efficiently estimated by ordinary least squares and identical to the generalized least square estimation because the two equations have identical explanatory variables. The system of two linear equations for the SUR estimation is specified in eqns. 1a and 2a:

$$CrowdfundingSuccess_{1i} = \beta_0 + \beta_1 lnAvgAmountPledgedPerBacker_i + \beta_2 lnBackers_i + \beta_3 LnFundingDuration_i + \mu_{1i} \quad (2a)$$

$$CrowdfundingSuccess_{2j} = \alpha_0 + \alpha_1 lnAvgAmountPledgedPerBacker_j + \alpha_2 lnBackers_j + \alpha_3 lnFundingDuration_j + \mu_{2j} \quad (2b)$$

where $i = 1, \ldots, m$ for project 1 to project m. The equations are seemingly unrelated because they are only related through the error terms μ_{1i} and μ_{2i} for SMS and internet crowdfunding models respectively.

5. Results

5.1. Viability test results for each model (H1 and H2)

The results of our multivariate regression models estimation regarding internet crowdfunding and SMS crowdfunding models are presented in Table 4 and Table 5. We checked for any multicollinearity by assessing VIF among the independent variables. The highest V.I.F. value across all samples or models was 1.413 (See Appendix Table B1, Table B2 and Table B3) which is well below the threshold of 10. We tested for assumptions of normality, independence, and constant variance of the residuals. White's test for heteroscedasticity indicated a constant variance ($\chi 2$ = 2.42, *pvalue* = 0.12). Given our two data samples, the two-sample Kolmogorov–Smirnov (K-S) test (D=0.102 *p-value* = 0.00) for equality of distribution functions Smaller Kolmogorov-Smirnov (K-S) test satisfied normality assumptions ((Srivastava et al., 2016). The hypotheses (H1 and H2) test results presented in Table 6 provide a succinct picture of the Model 2 results reported in Table 4 and Table 5. Regarding the variance explained (R^2); 63% of CrowdfundingSuccess is explained in the SMS-powered model, and 67% of the variance in CrowdfundingSuccess is explained for the internet crowdfunding model.

Table 4. Regression results for SMS-powered crowdfunding model

Variables	[Model 1] CrowfundingSuccess	[Model 2] CrowdfundingSuccess
Control variable		
LnFundingDuration	-1.254***	-0.711***
	(0.785)	*(0.580)*
Direct effects		
LnAvgAmountPledgedPerBacker$_i$		0.248***
		(0.010)
LnBackers		0.946***
		(0.017)
Constant	14.860***	6.316***
	(0.548)	*(0.423)*
Observations	1,801	1,801
R-squared	11	63

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
ProjectDescriptionDummy omitted

Table 5. Regression results for internet-based crowdfunding model

Variables	(Model 1) CrowfundingSuccess	(Model 2) CrowdfundingSuccess
Control variable		
LnFundingDuration	0.017	-0.086
	(0.171)	(0.094)
Direct effects		
LnAvgAmountPledgedPerBacker		0.401***
		(0.021)
LnBackers		1.211***
		(0.024)
Constant	6.422	0.462***
	(1.218)	(0.692)
Observations	1,151	1,151
R-squared %	00	67

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
ProjectDescriptionDummy omitted

Table 6. Hypothesis tests for SMS-powered and internet-based crowdfunding models

Hypothesized Relationships Based on Model 2 in Table 4 and 5		SMS-based model	Remarks	Internet-based model	Remarks
H1	LnAvgAmountPledgedPerBacker → CrowdfundingSuccess	(β= 0.248, *p=0.000*)	Supported	(β= 0.401, *p=0.000*)	Supported
H2	LnBackers → CrowdfundingSuccess	(β= 0.946, *p=0.000*)	Supported	(β= 1.211, *p=0.00*)	Supported
Post-Hoc Analysis					
	LnFundingDuration → CrowdfundingSuccess	(β= -711, *p=0.00*)	Valid	(β= -0.086, *p=0.363*)	Not Valid

We find that Funding duration in the SMS model is significant and has a negative effect on crowdfunding success is negative implying that the longer project campaigns run, the less the crowdfunding success. Although the effect is negative in internet crowdfunding model, it is not significant.

5.2. Comparative model test (H3) and post-hoc analysis

We assessed SEM results for testing H3. The likelihood ratio (LR) test of model vs. saturated: $\chi 2(10)$ = 119263.54 with *pvalue* = 0.000. These results strongly suggest that the simpler (nested) model (model without our theorized predictors) does not fit the data well as the saturated model (Model 2 results). The saturated model is one in which there is a perfect fit to the observed data, often implying a parameter for each data point or category. In practical terms, the results suggest that the predictor variables added to the simpler model are statistically important for predicting and comparing crowdfunding success across different models. The results in Table 7 imply that the relationship between lnAmountRaised and lnMeanAmountPledgedPerBacker is different for the two models. However, the relationship between lnAmountRaised and lnBackers appears to be consistent across the two models being compared.

Table 7. Wald tests for group invariance of parameters based on SEM estimation.

Wald	χ2	df	p>χ2
Measurement on CrowdfundingSuccess			
LnAvgAmountPledgedPerBacker	15.36	1	0.00
LnBackers	0.09	1	0.75

LnFundingDuration	120.97	1	0.00

Notes: Mean of CrowdfundingSuccess is restricted at 0 and variance restricted at 1 degree of freedom (df). The null hypothesis is that there are equal variances in the means of the parameters for both models. Groups are SMS-based and internet-based models

While Table 7 shows the variable critical to the difference in the viability of the two models, Table 8 justifies why we reject the hypothesis of equality across the two crowdfunding models for all structural coefficients. Thus, providing support for hypothesis 3, which is, the two models are statistically different in their levels of viability for predicting crowdfunding success. The findings are also corroborated by the Wald tests for differences in the error terms for each predictor between the two models, shown in Table C1 in the Appendix.

Table 8. Joint Wald test for structural coefficients parameter class based on SEM estimation

	$\chi2$	df	$p>\chi2$
Structural coefficient	136.433	3	0.000

Table 9 presents the robustness results for H3 via a seemingly unrelated regression (SUR) estimation at robust standard errors. The results are consistent with prior results (Table 4 and Table 5), particularly when comparing the differences in the viability of the two models.

Table 9. Results from simultaneous estimation of SMS-based and internet-based crowdfunding models in SUR

	SMS-based model		**Internet-based model**	
Variables	Crowfunding Success [lnvar]	SMSmodel_mean	Crowfunding Success [lvar]	Internetmodel_mean
LnAvgAmountPledgedPerBacker		0.25***		0.40***
		(0.01)		*(0.02)*
LnBackers		0.94***		1.21***
		(0.02)		*(0.02)*
LnFundingDuration		-0.71***		-0.09
		(0.06)		*(0.09)*
Constant	-2.86***	6.31	-2.84***	0.46
	(0.04)	*(0.42)*	*(0.05)*	*(0.69)*
Observations	2,952	2,952	2,952	2,952

Notes: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. *Observations is the total of the observation from*

We tested significant differences in the means of the parameters that predict crowdfunding success in each model to assess the validity of results presented in Table 9 by first performing a Wald test, an approximation of the LR test. The test assessed a series of null hypotheses about the means of the parameters in the SMS model and internet model. The full models are run simultaneously. Each null hypothesis proposes that a specific parameter (i.e., the effect of *LnAvgAmountPledgedPerBacker*, *LnBackers and LnFundingDuration*) in the respective models is equal to zero (implying the parameter does not have a significant different effect on the response variable in the model). The test results in Table 10 indicate that the effects of natural logarithm of amount pledged per backer, natural logarithm of backers and natural logarithm of funding duration on crowdfunding success are significantly different between SMS model and internet model.

Table 10. Wald test for equality of parameter across SMS-based and internet-based crowdfunding models in SUR estimation

Measurement on CrowdfundingSuccess	$\chi2$	df	$p>\chi2$
LnAvgAmountPledgedPerBacker	43.31	1	0.00
LnBackers	79.44	1	0.00
LnFundingDuration	32.06	1	0.00

Notes: Null hypothesis is that parameter X_i in SMS-based is equal to parameter X_i in internet-based model

Table 11 shows the results for the Joint Wald test of each parameter class for all classes. With 3 variables making 6 total predictors from both models, the joint Wald test ascertained whether the structural coefficients for the variables are simultaneously equal to zero and that all the independent variables used to predict crowdfunding success are jointly significant in our comparative modeling. The test results in Table 11 indicate that at least one predictor in the **SMS model** or **internet model** significantly and differently influences crowdfunding success.

Table 11. Joint Wald test for each parameter class simultaneous SUR estimation

	$\chi2$	df	$p>\chi2$
mcoef	6345.98	6	0.000

Notes: mcoeff (measurement coefficients)

Taken together, the results in Table 10 and Table 11 revealed that including these variables in the comparative analysis 1) creates a statistically significant improvement in the fit of the model, 2) provides robustness to our findings from the covariance-based SEM and 3) shows that the two models are statistically different in their prediction of crowdfunding success 4) the dynamics of crowdfunding success is quite different between the two models although they are both viable.

6. Discussion

Our study embarks on an exploratory analysis of the SMS (non-internet) and internet donation crowdfunding models within a marginalized context, to understand their viability for crowdfunding success, as an avenue to reducing digital inequality.

We find support for hypothesis 1, highlighting that the economic feasibility of crowdfunding exhibits a positive influence on project success. Projects that demonstrate robust economic viability by attracting significant funding levels, even within marginalized communities, appear to enjoy a greater success. A juxtaposition of both models reveals that the positive influence of economic viability is more pronounced within the internet model. This observation suggests that projects anchored on the internet model are less likely to fall prey to the adverse effects of unrealistic goal setting, thereby enhancing their prospects of reaping success from elevated funding levels.

We also find support for hypothesis 2 (H2), which states that social readiness viability, operationalized with number of backers, positively influences crowdfunding success. This result echoes several studies that have established that backers influence crowdfunding success (Bitterl & Schreier, 2018; Kuppuswamy & Bayus, 2017, 2018)

We also find support for Hypothesis 3 (H3). Contrary to our initial expectations, the empirical evidence provides a nuanced perspective on the concept of equal opportunity inherent in both SMS and internet crowdfunding models. This complexity not only challenges the assumptions of our initial hypotheses but also introduces an intriguing paradox. While both models are generally viable, their success primarily stems from the economic viability of the project. Our analysis reveals that the impact of social readiness is consistent across both models. Thus, irrespective of the model used, the number of backers influences overall crowdfunding success in a comparable manner. This discovery points to an intricate balance between the crowdfunding models, the prospective backers, and the larger socio-economic contexts in which they operate, warranting further exploration, especially in marginalized contexts.

The findings underscore the necessity for a more granular exploration of the interplay between crowdfunding models, goal-setting strategies, and the economic viability across varied contexts. The current research suggests a compelling argument for not treating crowdfunding models as monolithic structures but rather as subtle mechanisms that can deliver significant success under appropriate conditions. Hence, while the internet model appears marginally better, the potential for success offered by the SMS model, particularly in marginalized communities, cannot be overlooked.

6.1. Contributions to theory and practice

This study constitutes a significant contribution to the scholarly discourse surrounding crowdfunding, the digital divide, and fit-viability dynamics influencing project success. Particularly, it positions the SMS crowdfunding model as a viable alternative to the more prevalent online models although the internet donation crowdfunding provides higher crowdfunding success. This implication holds significant relevance in addressing the digital divide and ameliorating digital inequality, especially in marginalized societies where access to robust internet platforms may be limited. As such, research into factors that influence donation crowdfunding economic viability is crucial to addressing digital divide.

The findings underscore the potential of the SMS model as a potent instrument for bridging the digital divide. By providing an alternative pathway to raising capital, this model empowers those in marginalized communities, often excluded from mainstream financial systems, to access critical resources. Consequently, this leads to a democratization of opportunities and a reduction in digital inequality, broadening the possibilities for economic development and empowerment within these communities.

From a practical perspective, the findings illuminate the need for circumspect goal-setting strategies, irrespective of the crowdfunding model adopted. We urge project founders to establish realistic goals for their initiatives, as our data suggests that the quantity of backers or the magnitude of their financial contributions do not necessarily influence project success positively. Interestingly, backer contributions appear not to be solely driven by project goals, highlighting the multi-faceted motivations of crowdfunding backers.

In a critical observation, the research highlights that despite their differences, both the SMS and internet models offer distinct yet supportive viability mechanisms. As such, they offer projects an equal opportunity for success. This finding encourages the continued use and development of both models, particularly in marginalized societies. By broadening access to funding, these models could play an instrumental role in leveling the playing field and fostering digital inclusion, thus paving the way for a more equitable global financial landscape.

7. Conclusion, Limitations, and Future Directions

This study utilized the digital divide and fit-viability framework to delve into the appropriateness and feasibility of two contrasting crowdfunding models within a marginalized context. By focusing on the often-overlooked SMS model alongside the more common internet model, this research not only broadens the scope of inquiry but also invites greater inclusivity in understanding the dynamics of donation crowdfunding. Importantly, it also foregrounds the potential of these crowdfunding mechanisms in fostering financial inclusion and empowerment, particularly within marginalized communities that have traditionally been on the wrong side of the digital divide. This perspective allows for a nuanced understanding of how the intersection of technology and socio-economic realities shape the landscape of crowdfunding in developing nations, a subject of vital relevance in today's interconnected and digital-first world.

Future studies could categorize crowdfunding projects following (Mollick, 2014) to provide further granularity to this study's findings. In this study, we omitted the project description features because there are no descriptions for SMS-powered crowdfunding projects. Future studies may adopt a text simulation mechanism or use topic modeling via project titles in instances where there are no project descriptions to assess the broader impact of textual description in theoretically comparing these models. Besides exploration of predictors that may improve the models analyzed, future work could analyze alternative measures of crowdfunding success.

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Table A1. Matrix of correlations – SMS model

Variables	(1)	(2)	(3)	(4)
(1) lnAmountRaised	1.000			
(2) lnMeanAmountPledgedPerBacker	0.004	1.000		
(3) lnBackers	0.731	-0.316	1.000	
(4) lnFundingDuration	-0.333	0.202	-0.261	1.000

Notes: ProjectDescriptionDummy omitted

Table A2. Matrix of correlations – Internet model

Variables	(1)	(2)	(3)	(4)
(1) lnAmountRaised	1.000			
(2) lnMeanAmountPledgedPerBacker	-0.162	1.000		
(3) lnBackers	0.765	-0.539	1.000	
(4) lnFundingDurat~t	0.003	-0.069	0.046	1.000

Notes: ProjectDescriptionDummy omitted

Table A3. Matrix of correlations – full sample

Variables	(1)	(2)	(3)	(4)	(5)
(1) lnAmountRaised	1.000				
(2) lnMeanAmountPledgedPerBa	-0.061	1.000			
(3) lnBackers	0.747	-0.394	1.000		
(4) lnFundingDuration	-0.199	0.121	-0.148	1.000	
(5) ProjectDescriptionDummy	0.136	-0.040	0.081	0.090	1.000

Table B1. Variance inflation factor – SMS model

	VIF	1/VIF
lnMeanAmountPledgedPerBacker	1.131	.884
lnBackers	1.164	.859
lnFundingDuration	1.092	.916
Mean VIF	**1.129**	.

Notes: ProjectDescriptionDummy omitted

Table B2. Variance inflation factor – Internet model

	VIF	1/VIF
lnMeanAmountPledgedPerBacker	1.413	.707
lnBackers	1.410	.709
lnFundingDuration	1.005	.995
Mean VIF	**1.276**	

Notes: ProjectDescriptionDummy omitted

Table B3. Variance inflation factor – full sample

	VIF	1/VIF
lnMeanAmountPledgedPerBacker	1.190	.840
lnBackers	1.207	.829
lnFundingDuration	1.038	.963
ProjectDescriptionDummy	1.018	.983
Mean VIF	**1.113**	

Table C1. Wald tests for invariance of error terms in both models for each predictor based on SEM estimation.

Wald	$\chi 2$	df	$p>\chi 2$
Variance components			
LnAvgAmountPledgedPerBacker	63.97	1	0.00
LnBackers	0.30	1	0.59
LnFundingDuration	64.78	1	0.00