The Impact of Scalability on Advisory and Service Delivery Efforts of Nonprofits

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1 Introduction

There are over 5000 nonprofit organizations (NPOs) in the United States that provide services related to mental health and crisis intervention, civil rights and advocacy, and employment search and training (National Center for Charitable Statistics, 2019). These mission-driven NPOs face a complex combination of challenges in serving their clients: First, since their clients often vary greatly in terms of their needs (Drucker, 1995; Hasenfeld, 2009), NPOs might be drawn to offer a variety of services that enable different pathways to wellness (Sawhill & Williamson, 2001; Ebrahim & Rangan, 2014). Second, since these NPOs are not revenue-generating and rely on external funding from government and private donors, they operate under a scarcity of resources (Feng & Shanthikumar, 2016). Finally, their clients are often unable to articulate their needs as they are unaware of the true causes of their situation (Holdsworth & Tiyce, 2013) or have endured traumatic experiences resulting in symptoms of PTSD, low self-esteem, or anxiety (Stewart et al., 2004). As such, clients may seek and receive services that are not best-suited to their needs. While mismatched clients continue to consume resources, an NPO's efforts to serve them produce limited social impact. As a result, many NPOs in this domain serve in an interpretive role by providing advisory support to their clients to help them receive the most appropriate services (Emanuel & Emanuel, 1992). However, because such guidance/advisory support does not create a direct impact and also requires resources (funds) that can also be used for other

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impact-creating activities, it creates a service design dilemma for these NPOs. Despite growing evidence documenting challenges faced by such NPOs, their operational issues have received limited attention from the academic community (Berenguer & Shen, 2019; Besiou & Van Wassenhove, 2020). In this study, we address the following questions: For NPOs that serve distressed individuals, *(i) what are the optimal investments in advisory and service delivery activities that creates the most social impact? and (ii) how does the degree of scalability of services affect these optimal investments?*

2 Related Literature

There are many distinctive objectives for design of services depending on the context. These objectives include reducing customer wait time and system congestion in call centers and hospitals (e.g., Shumsky & Pinker, 2003; Lee et al., 2012), optimizing the sequence of service encounter in entertainment industries (Das Gupta et al., 2015), and maximizing the quality of services delivered in healthcare and legal consulting (Anand et al., 2011; Tong & Rajagopalan, 2014). In this paper, we focus on the service design of NPOs toward maximizing service quality, which in our context is equivalent to generating a higher social impact.

Providers can directly control the perceived quality of their services by carefully choosing the level of resources (Green et al., 2013; Lu & Lu, 2017). However, unilaterally increasing efforts at a service step may not be optimal in some scenarios (Bellos & Kavadias, 2021). Specifically in customer-intensive services, Anand et al. (2011) show that there is a trade-off between offering a deep experience (requiring slowness) and offering a fast and congestion-free service (requiring speed). In for-profit settings, Soteriou and Hadjinicola (1999) and Soteriou and Chase (2000) study resource allocation toward improving service quality, but in the context where the stages of service provision are independent and their qualities are additive (e.g., patient satisfaction during visits to a medical clinic). An important distinction in the context that motivates our study is the interdependence between the provider's efforts in different service stages (i.e., advisory and service delivery efforts). That is, while the NPO's advisory and service delivery activities are complementary in generating social impact, one activity cannot be improved without adversely affecting other activities given the scarcity of resources. We therefore propose an optimal service design for NPOs whose activities are interdependent.

All NPOs must overcome several hurdles in their quest to serve important social needs, and the operational nature of these hurdles may vary from one context to another (see Feng and Shanthikumar (2016) for a detailed review of the challenges faced by NPOs). For NPOs, the complexity of service design and improving quality (impact) arises from the scarcity of resources (Lien et al., 2014) and scalability of their services (Bradach, 2003; Hurst, 2012). Some NPOs have resorted to managing these challenges by allocating a portion of their service capacity to revenue-generating consumers (de Véricourt & Lobo, 2009). We contribute to this literature

on non-profit service design by identifying another source of complexity for NPOs: the loss of social impact due to mismatches between the services clients receive and their true needs. We consider a new issue that has not received much attention in the literature: clients may be unable to identify services that suit their needs, which can lead to lower overall impact generated by the NPO's efforts.

3 Model

To answer our research questions, we develop an analytical model, in which an NPO that has a limited amount of resources, denoted by $S > 0$, has to decide on how to invest that in various client-facing activities (i.e., advisory and service delivery efforts) to maximize its overall social impact. In order to capture the differences between clients' needs and the services offered by the NPO, we consider a simple setting with two client types, denoted by $i \in \{a, b\}$, and two service types, denoted by $j \in \{a, b\}$. The A-type (B-type) service is best suited to the service needs of a-type (b-type) clients. However, clients may seek the services that are not best suited to their needs.

Clients We denote by $p \in (0, 1)$ the proportion of a-type clients and by $1 - p$ the proportion of b-type clients. The NPO might have a greater impact by investing the same amount of resources in serving one type of clients than the other; this, for example, may be due to differences in economic impact between the needs of clients. We define $I_i \in R^+$ as a measure for the social impact that the NPO creates by investing a unit of its resources in providing the best suited service to clients of type i for $i \in \{a, b\}$. Without loss of generality, we consider $I_a \geq I_b$. Consequently, we define $k \doteq I_a/I_b \geq 1$, which we refer to as the *impact factor*.

Mismatch Because clients might not be able to articulate the root causes of their needs, they may seek services that are not best suited to their needs. We denote by $\delta_{ij} \in [0, 1]$ the degree of loss of impact due to mismatches between clients' needs and services they receive for $i \in \{a, b\}$ and $j \in \{A, B\}$. For instance, when a-type clients receive the NPO's B-type service (which is not best-suited to their needs), the social impact that the NPO creates by investing a unit of its resources in such service encounters is δ_{aB}. $I_a \leq I_a$. For simplicity of exposition, we consider $\delta_{aB} = \delta_{bA} = \delta = [0, 1]$, and refer to it as the degree of *loss of impact* due to mismatches. When there is no mismatch, $\delta_{aA} = \delta_{bB} = 1$. The parameter δ can be interpreted as the degree of similarity in clients' needs. For example, if the two types of clients have similar needs (δ is high), the loss of impact due to mismatches is low.

Advisory Effort In order to reduce the loss of impact from service mismatches, the NPO can provide guidance to their clients on choosing the most appropriate services for their needs. This could be in the form of hiring and training employees to design and conduct extended in-take interviews and professional tests of skills, improving intake processes and technology (e.g., software, web-resources), or administering

health and behavioral examinations. We denote by $\theta(e_G)$ the proportion of clients who would receive correct services when the NPO invests e_G in its advisory effort, where $\theta(e_G)$ increases in e_G.

Service Delivery Efforts The NPO can increase its impact by investing more resources into the delivery of its services. We denote by $e_A \geq 0$ and $e_B \geq 0$ the NPO's efforts in providing the *A*- and *B*-type services, respectively. These efforts could be in the form of hiring and training employees for delivery of a particular type of service, contracting with specialists (e.g., lawyers and tutors), or investing in infrastructure for service delivery (e.g., shelters and temporary housing). We model the impact generated by the NPO when it exerts e_j towards the *j*-type service, $j \in \{A, B\}$, and delivers it to the *i*-type clients, $i \in \{a, b\}$, as $I_{ij} = \delta_{ij}.\, I_i \cdot (e_j)^{\gamma}$. We refer to $\gamma \in (0, 1]$ as the *scalability* level of the NPO's services, which we explain next.

Scalability The parameter γ captures returns to scale of the NPO's service delivery efforts. When $\gamma = 1$, the impact generated by the NPO rises at a constant rate with any increase in service delivery efforts. However, when $\gamma < 1$, the marginal impact created by the NPO decreases with an increase in service delivery efforts. The scalability of the NPO's services may be limited by several practical constraints (Bradach, 2003; Forti & Andrew, 2014). The NPO transforms effort into impact by connecting clients to several sources, such as partners, governments, and volunteers (Wong, 2015). Thus, any bottleneck in accessing these sources could limit the scalability of the NPO's services (Hurst, 2012). For instance, legal services might be provided to clients through a combination of in-house administrative work and pro-bono legal experts. While the NPO can increase in-house staffing by spending more resources, it gets progressively more difficult for it to enhance legal expertise.

Service Design Problem The NPO aims to maximize the total expected social impact generated through its activities. For a given level of advisory effort (e_G), the proportion of a-type clients that receive the *B*-type service is $(1 - \theta(e_G))\, p$, and the proportion of b-type clients that receive the *A*-type service is $(1 - \theta(e_G))(1 - p)$. Accordingly, we obtain the total expected impact (*TEI*) that the NPO delivers as follows:

$$\begin{aligned} TEI\ (eG, eA, eB) \doteq & p\ \theta\ (e_G)\ \ (kI_b \cdot (e_A)^{\gamma}\ ) + p\ \ (1 - \theta\ (e_G))\ \ (\delta k I_b \cdot (e_B)^{\gamma}) \\ & + (1 - p)\, \theta\ (e_G)\ (I_b \cdot (e_B)^{\gamma}\ ) + (1 - \theta\ (e_G))\ (1 - p)\ (\delta I_b \cdot (e_A)^{\gamma})\,. \end{aligned}$$

The first and third terms in equation above correspond to the NPO's impact for serving clients who receive the best-suited service for their needs. The second and fourth terms in equation above correspond to the NPO's reduced impact for the two cases of mismatch (accordingly, these terms contain δ). The NPO chooses the optimal investments for its advisory effort (e_G^*) and service delivery efforts (e_A^*, e_B^*) to maximize its total expected impact using its limited resources (*S*). The NPO's optimization problem captures the following key and central trade-off: While increasing advisory effort increases the likelihood of clients receiving the

appropriate services, it comes at the cost of limiting the NPO's service delivery efforts. Note that advisory and service delivery efforts are complementary in the objective function, but they are drawn from the same pool of resources.

4 Results

Our analysis generates the following first-order managerial insights for NPOs that serve clients in distress: *First*, although the NPO may have a tendency to provide several types of services to cater to different client types, we show that it can be sub-optimal. Specifically, when an NPO's services are scalable (i.e., $\gamma = 1$), the NPO should offer only the service type that generates a higher overall impact. However, when the NPO's services are non-scalable (i.e., $\gamma < 1$), the NPO can generate higher social impact if it balances its investments toward both types of services, as opposed to investing all resources in only one type of service. *Second*, we find that when the NPO (scalable or non-scalable) is severely resource-constrained, it is optimal to offer only basic guidance to its clients; instead, all its resources should be directed toward service delivery activities. In contrast, when the NPO has sufficient amount of resources, it is optimal to spread resources between both advisory and service delivery activities. Both these insights are illustrated in Fig. 1. In addition, our analysis reveals that the optimal advisory effort (when non-zero) should be higher when different types of clients are not evenly mixed in the population, or when mismatches lead to higher loss of impact.

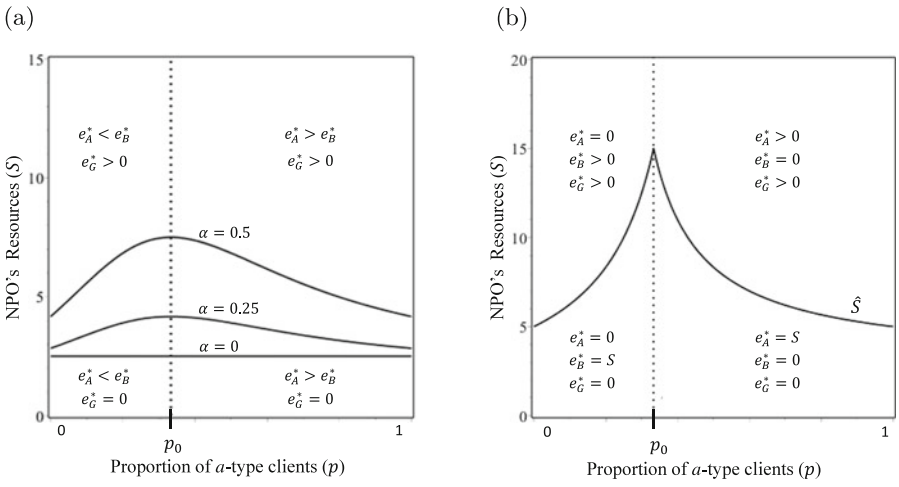

Fig. 1 NPO's Optimal Service Design. (**a**) Non-Scalable NPO (with $\gamma < 1$). (**b**) Scalable NPO (with $\gamma = 1$). *Note:* Parameters: $k = 2$, $\theta\ (eG) = 0.5 + 0.05\ e_G$, $S = 10$, $p = 0.35$, and $\delta \geq 0$ (left) and $\delta = 0.5$ (right)

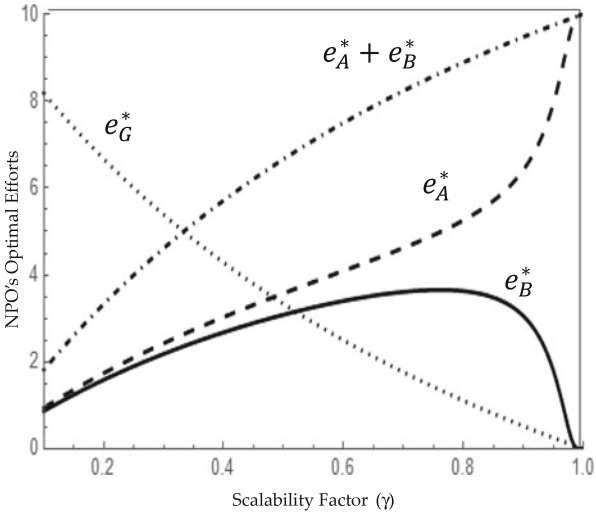

Fig. 2 Effect of Scalability Factor on the NPO's Optimal Efforts. *Note:* Parameters are the same as in Fig. 1 with $\delta = 0$

An important practical implication of these findings is as follows: When services are scalable, it is optimal for the NPO to specialize in only one type of service delivery. This implies that the NPO should not attempt to provide "everything for everyone;" instead, they should determine the type of a service to offer based on the impact factor (k) and the client mix (p). In particular, the NPO should focus on the service type that generates the greatest overall impact (depending on $pk \lessgtr 1 - p$). Further, irrespective of the salability of services, the NPO should invest in advisory effort only when it has sufficient amount of resources. However, it is important to note that this threshold amount of resources is smaller when the degree of scalability (γ) is lower. Naturally, the lack of scalability imposes a limit on the impact that the NPO can generate by its service delivery efforts. In such a scenario, the NPO can obtain a greater impact by increasing its advisory effort (which reduces mismatches), than through its service delivery efforts (which have decreasing marginal returns to scale).

Figure 2 illustrates our results on the impact of degree of scalability on the NPO's optimal service delivery efforts. We find that the optimal service delivery efforts toward each type of service are more balanced when services are less scalable (γ is small); however, as services become more scalable (γ increases), the ratio of efforts becomes more skewed and eventually the NPO offers only one type of service when $\gamma \to 1$. Another notable finding from this analysis is that, as the scalability of the NPO's services increases (i.e., $\gamma \to 1$), the NPO should reduce its delivery of the less impactful service. This prioritization primarily arises due to the scarcity of the resources. Moreover, as can be seen in the figure, when the scalability of services is lower than a threshold, the NPO should invest more in its advisory effort, and its advisory effort should even exceed its total service delivery effort.

Additionally, we use numerical examples to understand how our results may apply in practice for an NPO's service design decisions. To do so, we estimate model parameters based on practitioner reports on domestic violence in the U.S. and our conversation with managers at a Houston, Texas-based NPO that empowers survivors of domestic abuse. Summarily, our numerical illustrations show that in designing their services, NPOs should take into account the scalability of their services as well as the loss of impact from mismatches. Although obtaining exact estimates of these parameters may be difficult in practice, NPOs can benchmark themselves with respect to peer organizations, and also observe directional trends in these situational factors. For instance, as an NPO gets more mature, it may become more efficient in delivering its services and build improved access to external resources (via expanding its network and building trust), which implies higher scalability. Similarly, the loss of impact from mismatches may decline over time as the NPO implements client management routines and recovery procedures. As parameters such as scalability and loss of impact evolve, our findings can help NPOs decide on how to invest their resources in various activities, such as hiring employees, expanding infrastructure, and training volunteers.

5 Conclusion

This paper studies the optimal service design of non-profit organizations (NPOs) that serve distressed individuals. Based on our experience and involvement with several NPOs, we realized these organizations operate under a complex combination of challenges such as limited funding, heterogeneity in clients' needs, the limited scalability of their services, and mismatches between clients' needs and services provided. Our analysis has revealed two rules of thumb nonprofits should consider in designing their services by allocating funds between their advisory and service delivery activities. (i) Nonprofits can generate more social impact by offering a smaller subset of services. This is not a comfortable thought for mission-driven nonprofits that don't want to turn away a client in trouble. However, it's important to recognize that when an NPO's services are scalable, it is vital to focus on a few services in order to create a higher social impact. (ii) When more funds are available, the first investment should be in providing guidance to clients about the appropriate services rather than increasing the breadth of offered services.

Improvement in the operations of NPOs can significantly reduce economic and social burdens on the society. We hope that this paper opens new ways and further interests in studying operational complexities of nonprofit service providers.

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