1 Introduction

In recent years, not-for-profits and nonprofits have become more frequent topics in our teaching and research. This chapter is intended to summarize the existing research development in not-for-profit operations as well as providing directions for further contributions that can be made by operations management researchers. To define the scope of “not-for-profit operations management,” we should first articulate the distinction between not-for-profit and nonprofit.

The emergence and growth of the nonprofit sector in the last few decades have made it an important part of modern economy. By 2013, there were over 1.4 million nonprofit organizations in the United States (National Center for Charitable Statistics, n.d.). The nonprofit sector, consisting of private, voluntary, and nonprofit organizations and associations, is often referred to as the “third sector” after the public sector (i.e., government and its agencies) and the business sector (i.e., for-profit corporations). Today, nonprofit organizations span over local (e.g., community organizations), national (e.g., social, health, or educational services), and international (e.g., international nongovernmental organizations, global civil societies) levels, playing a crucial role in areas including welfare provisioning (e.g., disaster relief, humanitarian aid, and food stamps), education, community development, international relations, environment, and culture (Anheier 2014).

The objective of a nonprofit organization is not to benefit a narrow group of owners but a broader public, which is similar to that of a government. At the same time, a nonprofit must also ensure income and expense match over time, which is similar to business. However, nonprofits are distinct often because of their value (e.g., religious, political, humanitarian, moral, etc.), seeking nonmonetary returns such as faith, believers, adherents, or members rather than monetary returns (Young and Steinberg 1995). Economists have identified the primary roles of nonprofits as service-providers who provide various functions in delivering products and services to designated populations especially those with minority preferences, vanguards who experiment and pioneer new approaches, processes, or programs in service delivery, value guardians who foster and help express diverse values, and advocacies who give voice to the minority and particularistic interests and values for effecting changes and improvement in social and other policies (Kramer 1981). These roles allow nonprofit organizations to complement the public and business sectors. Thus, nonprofit organizations, forming a separate sector in an economy,
distinguish themselves from organizations in the public sector and those in the business sector with tax being the most noticeable distinction.

Naturally, the major operations of nonprofit organizations are not for profit. As we speak of not-for-profit operations in this chapter, however, we are not limited to those activities performed by nonprofit organizations. In fact, many not-for-profit activities, for example, funding, organizing, or facilitating the logistics for disaster reliefs, may involve government agencies and private firms. Moreover, a nonprofit organization may also perform for-profit operations (e.g., generating revenue by serving high-income customers to subsidize the service to the low-income ones), though making money is not the ultimate goal. Not-for-profit operations management refers to managing the process of product or service delivery that is not aiming toward (eventual) profitability but toward certain welfare, social, environmental, or cultural values.

Though the nonprofit sector is an extensively studied area in economics, sociology, and political science, only fairly recently have researchers in the operations management field begun to pay considerable attention to not-for-profit operations. Because not-for-profit operations cover a wide range of activities and concern a large number of products and services, which each reveal some unique operational characteristics, operations management research can contribute in many important dimensions. It would be overly ambitious to complete a comprehensive discussion of not-for-profit operations within this chapter. Our intention is to offer some understanding of the major operational issues and provide some guidance for future research. In particular, we focus on the management of fundraising (Section 2), revenue (Section 3), resource (Section 4), distribution (Section 5), and performance (Section 6).

2 Fundraising for Not-for-Profit Operations

Though profitability is not its ultimate goal, a not-for-profit operation, like any business activities, needs funds in order to realize its intended value. Foster et al. (2009) summarize ten funding models of the nonprofit organizations based on the donor’s value proposition and the recipient’s value proposition. Funds can come from two areas: donation and revenue. This depends on whether they are directly related to the product or service provided through the operation. Most donative or philanthropic resources (e.g., gifts, grants, and public subsidies) are not direct revenue from the product or service of the operation as the beneficiaries are different from the donors. In addition to these fund sources, many nonprofit organizations also generate revenue either by directly charging a fee or price for the product or service, or by collecting membership dues from the intended beneficiaries or other customers. In this section, we mostly focus on the first type of funds and the discussions on the second type is postponed to Section 3, as it is closely related to the research on revenue management.

As donative funds consist of the major support for not-for-profit operations, fundraising is an important function. There are five typical fundraising sources (Carpenter n.d.):

(i) Foundation support: An example is the Bill & Melinda Gates Foundation, the largest private foundation. The foundation aims at enhancing healthcare and reducing extreme poverty globally and, in America, expanding educational opportunities and access to information technology.

(ii) Corporate support: Many large corporations with specific giving departments regularly contribute to specific need in the community.

(iii) Individual support: Donations can come from individuals who may or may not be connected with the nonprofit organization.


(iv) **Government support**: Often in the form of grants from specific government agencies.

(v) **Planned giving**: Examples include a donor putting a nonprofit organization as a beneficiary in his/her will or when a donor makes a multi-year giving commitment.

There are several important aspects of the fundraising process that need to be understood for the success of the operation.

### 2.1 Funding Instability and Prediction

Due to their dependence on philanthropic resources, the incomes of not-for-profit operations are heavily affected by fluctuations in the economy. The chronic resource insufficiency is a constant challenge faced by most nonprofit organizations (Salamon 1995). Typically, a period of economic downturn is accompanied by a decrease in funding and an increase in demand for not-for-profit products and services. Such an economic environment, on the one hand, forces nonprofit organizations to seek alternative sources for income generation (e.g., charging for the products or services offered; see Section 3. On the other hand, these nonprofit organizations should plan their programs and spending based on the projected income flow (Section 4). For either purpose, the ability to understand philanthropy and forecast the future funds becomes crucial.

The literature on fundraising is vast. Bekkers and Wiepking (2011) provide a survey of over 500 research studies on philanthropy across many different disciplines. Many of the studies present predictive approaches to identify qualitatively significant attributes of the donors that are related to their giving. Demographics (e.g., donors versus nondonors, male donors versus female donors, income level), donor patronage (e.g., major contributors versus regular donors), and contribution frequency (e.g., consistent versus occasional donors) are among the most analyzed attributes to characterize the heterogeneity in donors. With identified attributes, statistical methods are used to estimate predictive models for giving. Segmentations of potential donors are identified using tools like logit analysis (e.g., Lindahl and Winship 1992), classification and regression tree (e.g., Weerts and Ronca 2008), and finite-mixture models (e.g., Durango-Cohen and Balasubramanian 2015). Studies also assume different donation behavior in each segment and use descriptive approach to explain. Bekkers and Wiepking (2011) summarize eight mechanisms as the most important forces that drive charitable giving: awareness of need, solicitation, costs and benefits, altruism, reputation, psychological benefits, values, and efficacy. A more recent paper by Durango-Cohen and Balasubramanian (2015) also gives examples of studies focusing on different reasons for philanthropy.

Though results obtained from this rich body of literature help to give a mostly qualitative guide for selecting fundraising sources, there are several open issues remaining unsolved where researchers in operations management can greatly contribute.

First of all, among the researchers there are debates on whether or not certain variables are significantly related to giving behavior. For example, Lindahl and Winship (1992, p. 54) underscore their findings by claiming that “the variables that were in question in past studies were not significant.” From the operational perspective, however, one would probably care less about who would give, rather how much funds would be available and when, because the answers to the former, though good to know, do not provide an immediate implication to resource and process planning toward realizing the intended value. Unfortunately, the prediction models in the existing studies mostly seek static estimates. Even the ones built in time-dimension do not offer the predictive ability to understand the future donative income flow.
The second aspect concerns how to directly translate the historical contribution data into a *prescriptive* solution for fundraisers and a *quantitative* description of the associated outcome. For example, a nonprofit organization can effectively select donors and generate funds by identifying means of building trust with potential donors (Sargeant and Lee 2004), understanding and inducing peer pressure among donors in giving (Meer 2011), making use of the tiered funding structure (McCardle et al. 2009), or leveraging conventional market variables like advertising and pricing (Weisbrod and Dominguez 1986). To be able to offer a prescriptive solution, one needs a data-driven model that links the data with the actions. Such a modeling approach should allow one to quantify the uncertainty associated with different funding sources so that one can then design appropriate resource planning strategies.

### 2.2 Funding Restrictions and Contingencies

Fundraising activities require effort and resources. However, excessive spending on fundraising can cause concerns from funders. It is typical that funders require reports on fund spending, not only tracking how effective the programs run but also monitoring the expense structures. For example, many foundations would not fund or renew funding if an organization’s administrative and fundraising expense is above a certain percentage of the total expense. A typically recommended expense structure consists of program expenses between 70%–85%, administrative expenses between 10%–15%, and fundraising expenses between 5%–10% of total expenditures (Carpenter n.d.). In other words, funders use the ratio of expenses directly toward the intended value to total expense as a measure of operational efficiency. At the operational level, this imposes a resource or effort constraint on optimizing effective fundraising activities. Moreover, funding or renewal contingent on spending structure suggests that the nonprofit organizations should take a dynamic view of their operations. There is a delicate balance in how much resources to allocate in the current period to generate potential current and future funds while not hurting the efficiency measured in the current period to reduce the funders’ giving incentive.

Other than expense structure, funders or donors may also impose other constraints or contingencies. One phenomenon is earmarking, which has become increasingly common in charitable giving. For example, the Donor Direct policy implemented by the Red Cross bounds it to spend donations only toward the donor-specified purposes. In particular, most of disaster response funding is earmarked (Pedraza-Martinez et al. 2011). Funders see earmarking as a way to ensure that the money goes to what they intend to support and not toward excessive overheads (e.g., upgrading office furniture or the lifestyle of an executive). Recipients, however, complain that such a policy often leads to insufficient funds for needs especially those with low media coverage and donor awareness, while having to use up excessive funds in designated areas to avoid reduced future contribution by the donor. For example, relief organizations, who cannot pay to build wells for clean drinking water, may receive plenty of support for a specific crisis that gets tremendous public attention; hospitals, having difficulty funding kidney research, may obtain generous funds for breast cancer research instead (Strom 2008).

Toyasaki and Wakolbinger (2014) set up an analytical model to understand the effect of earmarking on the interaction among an aid agency and multiple donors. They find that, for emergencies with strong media attention and donor interest, allowing for earmarking of donations is likely to reduce fundraising activities of organizations with low fundraising costs, and is likely to encourage fundraising activities among organizations with high fundraising costs. There are many open questions that need to be answered here. The most important one is the design of a mechanism to coordinate the aid agency and the donors. Though there is
a large literature on supply chain coordination, the focus is very different. The unique feature of coordinating fundraising activities lies in the nonmonetary objectives of the aid agency and the donors. Another aspect worth studying is the collaboration among agencies involved in related activities. For example, disaster relief is often a joint effort by many agencies. At different times, some may have more flexible funding sources while others may have more earmarked funds. A carefully designed fund pooling mechanism can help improve the overall operational efficiency.

For certain programs, funding can be staged. Donors may track the progress of the project to decide whether or not to continue the support. In many situations, recipients may find that multiple rounds of fundraising for small contributions can lead to a higher overall amount of funds (Vesterlund 2006). However, staged funding leads to uncertainty in available resources during the program implementation. In a related study, Devalkar and Sohoni (2015) suggest that endogeneity of funding stream can be created when the donors choose to fund projects showing early positive outcomes. To obtain funding, however, the program directors may sacrifice operational efficiency to start the project earlier than needed, leading to suboptimal program implementation and resource management. In fact, similar observations have been made in capacity investment for new product manufacturing. For example, Tanrisever et al. (2015) find companies looking for capacity financing would be better off by first building a small capacity to reduce the marginal cost, because production cost reduction allows the firm to reduce the cost of financing the full capacity expansion.

All the aforementioned considerations and alike impose constraints or inter-temporal dependency on fundraising activities. The existing models in the operations literature involving the dynamics of limited funds often assume exogenous uncertainty in fundraising (e.g., Natarajan and Swaminathan 2014; Taylor and Xiao 2014b; Devalkar et al. 2016) with Devalkar and Sohoni (2015) and Natarajan and Swaminathan (2016) as exceptions. There is certainly room for more development along these dimensions.

3 Revenue Management and Pricing

Though the major support of not-for-profit operations comes from donative funds, revenue raised by charging for the product or service offered is becoming increasingly a large portion of the budget. Obviously, fee-charging helps to mitigate the uncertainty in fundraising and supplement funding deficiency during economic downturn. Funds from revenue are also flexible in the sense that they are not subject to donors’ restrictions (e.g., earmarking). The advocates for fee-charging practice further suggest that such practice allows for accountability of the nonprofit organization in meeting the needs of the beneficiaries, instead of focusing on the requirement and satisfaction of the funders (Gary et al. 2004). Of course, charging may not be possible for certain not-for-profit operations, especially those intended to benefit the general population than a specific group of individuals (e.g., research institute, environmental advocates, human rights campaigns). From the perspective of the beneficiaries or customers, fee-charging can also have a positive impact. Paying a modest price for the product or service can create ownership or buy-in for the customers, increase the quality of the product or service perceived by the customers (Yoken and Berman 1984), and preserve the dignity of the customer.

There are several typical ways to charge the fees (see, e.g., http://strengtheningnonprofits.org/resources/guidebooks/Understanding_Fee-for-service_Models.pdf). A mandatory fee is a fixed price, lower than its market counterpart, predetermined based on specific criteria. Example organizations that charge mandatory fees include public universities and hospitals. Sometimes, a product or service can be offered at no cost while the customer is encouraged to make a
voluntary donation or pay a requested fee. The difference between the two is that the amount of payment is determined by the customer in the former, while it is specified to the customer in the latter. Some organizations charge a membership due for all products and services available to members for free or at a reduced cost.

To optimize the use of products and services, a portfolio of fee structures or prices can be used to segment the customers into specific characteristics, e.g., timing of concert ticket purchase (Tereyagloglu et al. 2016). Income level is the most commonly used criterion because it enables the customers to contribute to the not-for-profit operations based on their financial ability. de Vericourt and Lobo (2009) formulate a dynamic model to analyze such a practice by an eye surgery hospital in India, where revenue generated from high-income customers is used to subsidize and offer free service to low-income customers. They analyze how to price the service to revenue-generating customers and how much resources to reserve for mission-serving customers. Lu and Shen (2015) studied a similar practice but tackle the problem from a different angle. They allow uncertainty in the service time and focus on surgical time allocation between the two segments of customers with a chance constraint over time. The modeling framework set up by de Vericourt and Lobo (2009) and Lu and Shen (2015) can be extended to other fee-charging structures, for example, voluntary donation by revenue generating customers. Moreover, considerations of uncertain philanthropic funds, the cost of product or service, and the customers’ affordability can be included into the model to formulate a comprehensive revenue management strategy for the not-for-profit operations.

Many of the issues extensively studied in the context of profit-maximizing firms may have different representations in the context of not-for-profit operations. For example, like a for-profit firm, the nonprofit organization can use price as an instrument to signal the quality of its service or product, though the ultimate goal is not profit making. Quality can also influence the willingness of a revenue-generating customer to voluntarily support those who need the same service but cannot afford it.

As pricing schemes are often the central decision in revenue management, it is inevitable to take the market into consideration. Prices for similar or substitutable products or services available in the market can affect the price expectations of customers from different segments. Output, price, and quality are common levers in competition. Economists have developed analytical models in order to understand the competitive environment of nonprofit organizations. For example, Calem et al. (1999) analyze output competition between hospitals and thus the service prices are induced by the output decisions; Harrison and Lybeckecker (2005) study price competition between nonprofit and for-profit hospitals; and Liu and Weinberg (2004) analyze price competition between a for-profit firm and a nonprofit organization in a Stackelberg framework. Nevertheless, these analyses are done in static settings. There is a need for modeling work to understand the competition dynamics faced by nonprofit organizations and help these organizations effectively manage their operations to address the fluctuations in funding source and service need at different stages of an economic cycle.

4 Resource Management

Resource management for not-for-profit operations shares many similarities with its for-profit counterparts. Both aim at achieving a certain objective by efficiently utilizing and allocating resources involving budget and operating capacity (e.g., manpower, vehicles, equipment, and rooms). However, there are critical differences too. The most apparent one is the objective. Though cost minimization can be important for both, the not-for-profit operations often have their unique features that do not appear in most for-profit operations.
For example, during the fundraising process, a nonprofit organization attempts to obtain the largest donation without exceeding a certain spending percentage. At the same time, resource distribution must allow trust and relationship building with donors and funders (Sargeant and Lee 2004). When managing revenue from high-income customers, a nonprofit aims at maximizing the well-being of low income customers and thus has to carefully allocate the limited operating capacity between the two (de Vericourt and Lobo 2009; Lu and Shen 2015). When planning the material flow of the product to be distributed, a nonprofit organization may need to carefully distribute the limited, uncertain funds over the planned supporting period (Natarajan and Swaminathan 2014). When spending funds on different activities, a nonprofit may be constrained by how to use funds based on the donors’ request (Toyasaki and Wakolbinger 2014). When distributing insufficient resources to needy groups, the nonprofit organization must carefully evaluate the negative consequences of shortage induced by prioritizing allocation (Azhar and Lejeune 2016). Each of these aspects brings a new dimension to the conventional resource planning, where both analytical and empirical modeling can contribute.

We highlight one specific area, workforce management. A unique feature of workforce planning in not-for-profit operations is the heavy involvement of volunteers and members, in addition to the paid workforce. For example, organizations like the Girl Scouts and the Salvation Army rely mostly on their regular members and long term and episodic volunteers (Drucker 1989), and the Red Cross depends heavily on the contribution of spontaneous volunteers in disasters (Wolczynski et al. 2015). Unlike in the planning for a regular workforce, labor cost is not the major concern for assigning and scheduling volunteers, as they are provided none or very little monetary compensation. Volunteers reveal great heterogeneity in their incentives, skills, and capabilities, which are a priori uncertain to the planner. As many of them have a short working period, volunteers can only perform tasks with specific and limited focus, without legal liability (e.g., confidentiality of a rescued victim or of a rehabilitated young criminal), and not requiring extensive training. Operational methods can help in matching volunteer resources with the need and scheduling of volunteers’ time based on their arrival and availability. Examples of research in this area include Sampson (2006), Falasca and Zobel (2012), Lodree et al. (2015), Wolczynski et al. (2015), and Sonmez et al. (2016).

For regular or long-term staffing, task assignment or scheduling can often be separated from hiring, as the former concerns day-to-day operations, while the latter is a tactical or even strategic decision. With volunteers, however, resource allocation and acquisition have more intricate connections. In many practices, volunteer and task arrivals are parallel rather than sequential, and future arrivals of both are highly uncertain. Matching the volunteer resources with the needed tasks can be highly dynamic and it requires a careful coordination between recruiting and assignment decisions. On the one hand, an excessive number of volunteers can reduce efficiency because the volunteers’ unfamiliarity with the task and team members can lead to a great complexity in management, supervision, and coordination. Volunteers who are under-utilized or mismatched with tasks reveal reduced propensity to contribute in the future, which can have a profound impact on the reputation of the organization. On the other hand, insufficient volunteering hinders the operation to realize its intended purpose. Overly utilizing volunteer resources often leads to deterioration of quality, which can also result in reduced future commitment.

Moreover, purposive or missionary incentives are critically important for members and volunteers to contribute their time and effort. Volunteer motivation can be multifaceted along values, understanding, career, social, and prospective dimensions (Clary et al. 1996). Successful volunteer acquisition and task assignment require an appropriate assessment of the volunteering...
incentive. Thus, the process of volunteer acquisition must take into account the assignment of the volunteers that can fulfill their feelings of satisfaction, which, in turn, help to incentivize good performance and future participation. This gives rise to a new angle of study in resource management.

Volunteer evaluation is another dimension that can help in planning such a resource, where prescriptive empirical work can add value. Different angles can be taken to analyze historical data of programs and participating volunteers. At the recruiting stage, one can identify the appropriate attributes of volunteers, who are likely to efficiently perform the needed task. Identifying potential “fit” volunteers allows for effective design of acquisition strategy in terms of ways to approach and attract such resources. A deeper issue to explore is how task assignment and the interactions among team members affect the performance and satisfaction of a certain kind of volunteer. Prescriptive models addressing these issues can become very handy for managing volunteer resources.

5 Distribution of Product and Service

Like in any other operation, the process of distributing product and service in not-for-profit operations concerns what to offer, who supplies the materials, how to distribute the product, and who consumes it. We discuss these aspects in the following subsections.

5.1 The Choice of Product or Service Offering

The first question is: what product or service will the organization offer and in what forms? Answers to this question, however, may change over time. The means to achieve the mission of a nonprofit evolve with the economic and social environment which reshapes the need of the beneficiaries, the “customer” of the product or service offered. The growth of an organization may allow it to broaden its offerings to better achieve its mission as well as increase its efficiency in production and distribution with economies of scope. One example is the Girl Scouts’ expanded training program in business and science in addition to the traditional homemaking skills. In another vein, adapting computers for disabled people could not have been offered by any organization twenty years ago.

A new product or service to be introduced needs a thorough analysis to understand how it impacts all the stakeholders involved. Product or service proliferation management models can be developed.

One emerging phenomenon is the increased use of cash to replace in-kind provision, particularly in disaster relief. During the 2007–2008 food crisis in Swaziland, cash transfers were used in addition to regular food distribution to the drought-affected population (Devereux and Jere 2008). Cash transfer programs have been adopted in the Philippines to deliver assistance in humanitarian emergencies (Poisson 2011). Ethiopia, a country with a population of over eight million food insecure people, has implemented programs to facilitate predictable income transfer to replace part of the food ration (Kebede 2006). The decisions regarding whether or not to offer cash and what portion of the provision to be offered in cash involve many trade-offs that can be analyzed using operations models.

From the beneficiaries’ viewpoint, cash has its attraction compared with in-kind provision. With cash, the beneficiaries can purchase alternative food items to meet their specific dietary preference without being restricted by the offered ones. Alternatively, spending on food may be saved for essential nonfood items (e.g., health, clothing, and education) or investment in assets...
and livelihoods (e.g., fertilizers for farming, boats for fishing, and cookers for street food vending) to improve the living condition in the long run. However, there are drawbacks with cash as well. The market availability and price for food can be fluctuating, leading to uncertainties in buying power. Cash distribution can be impossible in remote areas where a banking system is not accessible or areas with little attraction for trade.

From the execution perspective, cash is often easier to distribute than physical goods, as the latter often involves sophisticated procurement and logistics planning. However, cash, as opposed to food, may not ensure that its intended purpose is served. Cash may be more vulnerable to corrupt diversion, looting, or theft than food. Additionally, cash can offer too much flexibility to the beneficiary as it may be used on anything including inappropriate purposes (e.g., alcohol and cigarettes). Thus, there is a risk that such an aid program may have negative side effects to the society.

The choice between cash and in-kind can have a significant impact on the local market, which cannot be ignored in assessing the temporal effect of the policy. Empirical evidence suggests that cash injection leads to price increase in the local market. For example, Devereux and Jere (2008) find that the food price inflation is much higher than predicted in regions where half the food ration is replaced by cash. Their study also finds that the stocks for both food and nonfood items increase as well, suggesting the market is responsive to the increased cash. Compared with food, cash transfers lead to very different dynamics of the supply chains for food and nonfood products during the disaster recovery periods.

5.2 The Supply Process and Inventory Management

Like business operations, a not-for-profit operation needs to source products and services in order to achieve its goals. While cost efficiency may not always be an objective and specific constraints need to be imposed, the developments in conventional procurement and inventory management can be borrowed to manage the material flow in not-for-profit operations. For example, Prastacos (1984) summarizes the research on procurement and inventory management for hospital blood banks. He presents statistical methods for demand and supply fitting as well as analytical models for determining procurement policies and inventory levels based on cost-minimization objectives, which are very similar to the conventional forecasting and perishable inventory models but with application to blood bank data. Duran et al. (2011) model the configuration of the supply network with stockpiling for emergency relief items. Their method allows for an evaluation of how stockpiling policies affect emergency response time, a critical determinant of human suffering and life loss in many disasters. Arifoglu et al. (2012) model the uncertain supply of vaccination as a stochastic proportional yield of production. Though the supplier is a profit maximizer, the social planner (i.e., the offering agency) focuses on the social welfare. Natarajan and Swaminathan (2014) apply periodic-review inventory model to analyze the effect of uncertain philanthropic funds on the procurement strategy over a finite horizon. Balcik and Ak (2014) analyze cost efficient selection of suppliers who differ in their commitment requirements, reserve capacities, pricing schedules, and geographic coverage when sourcing for humanitarian relief.

Many areas in the not-for-profit supply processes need to be analyzed and such analyses can add new dimensions to operations literature. We discuss two of those areas. One concerns subsidizing producers or suppliers and the other concerns collecting from supply networks.

The commercial markets for products and services offered by not-for-profit operations often give limited access to a low socioeconomic population, a certain minority population, or even the general population. Consumption of such products and services by inaccessible populations often
generate positive social benefit. Thus, governments and nonprofit organizations may offer subsidies to the producers or suppliers to reduce their costs and thus induce increased outputs and reduced prices. Governments in developing countries often subsidize food producers (e.g., cereal mills) in order to increase supply (Tuck and Lindert 1996). The distribution of health products to the poor is commonly subsidized by government or nonprofit organizations. Examples include ready-to-use therapeutic food (Natarajan and Swaminathan 2014), contraceptives (Behrman 1989; Kearney and Levine 2009), recommended malaria drugs (Sabot et al. 2009), vaccines (Chick et al. 2008; Whittington et al. 2012), and eyeglasses (Karnani et al. 2011).

Subsidy programs are also offered to suppliers to popularize products with improved social value even in developed countries. For example, subsidies are given to restaurants, both fast food and sit-down establishments, for offering vegetables, fruits, and healthy beverages to entice consumers reducing the high caloric intake that may contribute to obesity and other health problems (An 2012; Powell et al. 2013). Sometimes a subsidy may not be directly offered to the producer or supplier. Instead, it is given in forms of a price subsidy or rebate to the consumers to induce consumption. This is a typical way to encourage adoption of new technological products (Kalish and Lilien 1983) or environmentally friendly products (Hirte and Tscharaktschiew 2013; Cohen et al. 2016). Price subsidy to consumers, though not paid directly to the producers or suppliers, usually induces an increased supply of the product or service.

In the economics literature, government subsidy has been extensively researched and the focus is often given to its effect on social welfare and local economy. Recently, researchers in operations management started paying attention to subsidy programs. These studies touch on the effect of subsidies on the supplier’s output decisions (Taylor and Xiao 2014b; Berenguer et al. 2016) and technology investment (Krass et al. 2013), as well as coordination with the suppliers (Mamani et al. 2012; Chick et al. 2008; Raz and Ovchinnikov 2015). Subsidies can influence the supply process in many other dimensions. For example, a program subsidizing farmers can devise proper incentives to induce production of the appropriate mix of products for the target population.

Though many aid products are produced by designated suppliers, collection is a common means of sourcing for many not-for-profit operations. For example, food bank gleaner volunteers pick up donations from farmers, the Salvation Army collects donations at different locations through collection sites or pickup trucks, and organ procurement organizations acquire the deceased’s organs from donor families. Collection processes involve a great deal of uncertainty because the time, amount, type, and quality of the donated physical items are highly unpredictable. For example, the arrival of gleaning foods and the availability of pickup volunteers are both stochastic processes, leading to a high risk of food wastage (Sonmez et al. 2016). Different constraints exist in different collection processes. Items such as food and organs are highly perishable, while quality checks to ensure food safety and transfer requirements of organs take time. Many of the collection processes must comply with restrictions and regulations. For example, it is mandated that fresh frozen plasma be manufactured only from male blood donors (Williamson and Devine 2013). The existing studies on sourcing through collection often examine the supply processes at an aggregate level. For example, Prastacos (1984) presents models of blood collection based on estimated supply quantity at each collection location and develops heuristic policies by assuming perfect supply estimates. Sonmez et al. (2016)’s model gleaning foods and gleaner volunteers as two exogenous stochastic processes. In practice, however, the donors and donated items can reveal significant heterogeneity among one another. Matching collection with diverse need is an important consideration in these sourcing processes to reduce waste of the donations and increase the welfare of the beneficiaries. There has not been much analytical and empirical...
work developed to understand the supply network for such collection processes and quantify efficient and effective collection strategies. Arikan et al. (2015) is an example of an exception. They analyze the donor and recipient data for kidney transfer to understand the organ procurement process and evaluate alternative policies.

### 5.3 Allocation and Consumer Behavior

The product or service offered by a not-for-profit operation is eventually handed over to the needy people. Allocation of the product and service among the target beneficiaries or customers is a common decision to be made. Sometimes, allocation can be a consequence of a differentiated pricing scheme (recall our discussion in Section 3), while in other situations, the allocation is a direct result of decisions on logistics distribution and inventory rationing.

As in their for-profit counterpart, understanding the characteristics of the customer within different segments is the starting point for making product and service allocation decisions in not-for-profit operations. Heterogeneity among the customers can be often identified based on factors like demographics, the extent of need for aid, location, and social interaction. In aiding the drought-affected people suffering from food shortages, the amount of aid is distributed according to the need, and the form of distribution (i.e., food or cash) is determined based on accessibility to financial services and trade (Devereux and Jere 2008). Distribution by food banks often attempts to balance need, nutrition, and local preference. Mismatch in the amount and type can lead to waste or spoilage (Teron and Tarasuk 1999). Medical resource allocation decisions must consider the medical conditions of the patients (Atasu et al. 2016). Effective distribution of limited products like vaccines and antibiotics for contagious diseases must take into account factors like the population density, age mix, income level, and health conditions so that the medicine distribution can effectively reduce disease spreading and save lives. In all these examples, there are opportunities for developing models to understand the inherent trade-offs using operations management tools. For example, Natarajan and Swaminathan (2016) develop an analytical model to understand dynamic distribution to patients classified into different health states, aiming at minimizing the disease-adjusted life periods lost. Bravata et al. (2006) develop a simulation model to understand how the distribution of medical supplies between local and regional sites impact the mortality of a potential anthrax attack.

Different allocation policies may induce very different behaviors of the customers or beneficiaries, which in turn determines the effectiveness of the policy. For example, personal decisions on vaccination injection can lead to different risk evaluation of an epidemic (Arifoglu et al. 2012); individuals’ choices of clean energy cooking methods can affect the health of the entire population (Hatten 2009); consumers’ awareness can be influenced by the execution of a subsidy program and, in turn, affecting the adoption of a socially desirable product (Taylor and Xiao 2014a).

### 6 Performance Evaluation

Researchers from different disciplines have produced an extensive literature to evaluate the performance of nonprofits at the industrial or organizational level. For example, Steinberg (1986) attempts to evaluate the implicit objective underlying the behavior of nonprofits by estimating the marginal donative product of their fundraising. He concludes that welfare, education, and arts firms act as service maximizers, while health firms are budget maximizers. Calem et al. (1999) and Gaynor and Vogt (2003) suggest that output maximization is a common objective.
Accounting researchers have found expense misreporting is common among nonprofit organizations (e.g., Krishnan et al. 2006). Keating et al. (2008) conclude that many nonprofits misreport fundraising expenses by putting it as a component of net revenue rather than expenses. Privett and Erhun (2011) use an analytical model to explain that such a misreporting incentive is driven by the common practice that the funders use the ratio of program expense to total expense to evaluate the efficiency of the nonprofits. They conclude that fund allocation based on reported efficiency does not result in efficient funding allocation.

Aside from organizational level evaluations, the most commonly used form of evaluation in practice is program evaluation. It is a result based evaluation of the extent to which a program meets the specific needs (Fine et al. 2000). We take two examples from Anheier (2014): Performance indicators of a vocational rehabilitation and employment training program may include the number of participants placed in employment who retained their job for 150 days, average hourly wage, average work hours per week, the percentage of employers satisfied with the program, etc. An environmental program may be evaluated by the amount of material recovered, the amount of recycled material diverted from landfills, and percentage of citizens satisfied with the recycling program. Excellent performance on these indicators often attract funding on similar or related programs. However, there are concerns in focusing on program evaluations. As Campbell (2002) points out, overly focusing on program outcomes can induce program developers to overlook the social value in a longer horizon or in a larger scope. There is certainly a need for research that introduces system and dynamic views in evaluating not-for-profit operations and identify process improvement opportunities.

### 7 Implications for Managers

We have discussed several key aspects of not-for-profit operations management. While we focus on its unique features when compared with for-profit operations management, it is clear throughout this chapter that many of the methodologies and theories developed for for-profit operations can provide helpful guidance to managing the not-for-profit operations. We highlight four key messages to the leaders in not-for-profit operations:

- Integrating cash flow with operational planning and execution is particularly relevant and crucial to not-for-profit operations.
- Human resources may not be incentivized by monetary compensation schemes. Instead, task assignment and performance evaluation must take into account the heterogeneity in the motivations of the workforce.
- Not-for-profit operations management must deal with different constitutions with varying objectives. Coordination among different parties becomes more important and less straightforward compared to that among for-profit entities.
- Reaching out to beneficiaries through not-for-profit operations is less of a competitive act than a cooperative one. Resource sharing among different parties becomes particularly valuable for fulfilling their long-term mission.

### 8 Directions for Future Research

Not-for-profit operations cover a wide range of activities as well as diverse types of institutions and organizations. It is impossible to cover all the operational features or issues in a short chapter. This area, playing increasingly important roles in our economy and society, has gathered
increasing attention by operations management researchers. Our intention is to offer some thoughts on research opportunities for not-for-profit operations and guide the directions to expand the dimensions of operations management studies. We have discussed the following potential research areas:

- Prediction of funding levels, identification and classification of funding sources, quantification of fund raising strategies and integrating fundraising with operational design
- Dynamic revenue management and pricing scheme design that allows for coping with fluctuation in funding levels and competition for funds
- Product and service portfolio management to achieve the intended missions and to adapt to the changing needs of the beneficiaries
- Design of supply networks, inventory allocation, and incentive schemes for product and service offering
- Policy design for product and service distribution to heterogeneous needy beneficiaries to achieve the intended objectives and avoid negative social outcomes
- Systematic and dynamic approach to evaluate operational performance.

Many aspects, which can be important for specific context, are not highlighted in our discussion. Though we do not devote a separate section on coordination of decisions, it is crucial to achieve operational efficiency because not-for-profit operations involve many stakeholders and highly decentralized decision making. Coordination is needed for aligning the incentive of the funders or donors with the recipient in fundraising (Privett and Erhun 2011; Toyasaki and Wakolbinger 2014), synchronizing the material flow of product or service in logistic distribution (Dolinskaya et al. 2011), matching the procurement process with the consumption process in supply management (Arora and Subramanian 2016), and building partnership with government agencies (Salamon 1987).

Due to decentralized operations, information plays a pivotal role in many situations. When an agency attempts to increase consumption of a product with social benefit, one question to ask is whether to spend on subsidizing the producer or on providing appropriate information to customers (Ashraf et al. 2013). Designing a distribution policy can be challenging when aid may be offered to individuals whose type may not be verifiable (Blackorby and Donaldson 1988). For example, it is prohibitively expensive to distinguish an individual who would use cash aid for alcohol from one who would spend on food for kids, or an individual who is not a rape victim from one who is.

With the increasing influence of not-for-profit operations on our economy and society, the need for understanding such operations and formulating appropriate strategies and policies opens up many opportunities for operations researchers. It is our hope that this short chapter would generate interest among the operations community, and good research work with potential practical impact would follow.

References and Bibliography


Not-for-Profit Operations Management


