

**“A Makerspace’s Rapid Response to the COVID-19 Pandemic:  
A Case Study of Open Works in Baltimore, Maryland”**

Literature Review

By Ron Williams, Will Holman, and Jeff Fuchs

“Institutional trust refers to expectations that rely on formal controls, including formalized policies and practices” (Shantz et. al., 2018, p.368). Those affected by formalized policies and practice develop confidence in delivery based on consistent adherence to controls. The resulting trust facilitates collaborative potential during projects. While it may be distinguished from relational or interpersonal trust, institutional or organizational trust is part of the currency that enables stakeholders to establish the openness required to optimize collaborative efforts when urgency is required. The sense of common mission reduces relational barriers that may exist in more threatening conditions. As we face the most significant public health crisis in a century and the most economically devastating crisis since the Great Depression, the pandemic enhances the potential for mission-driven collaboration between individuals, institutions, and community partners.

There is little doubt that social conditions resulting from shifting global economies, the decline of the manufacturing base in United States (U.S.) cities, and a lack of viable economic drivers to replace manufacturing create conditions likely to trigger social and institutional trust deficits. Several studies have emerged describing the decline in institutional trust, the loss of “social cohesion” and social collateral, and their relationship with innovation and entrepreneurship (Andrews, Jilke, and Van de Walle, 2014; Kwon, Heflin, and Ruefc, 2013; Audretsch, Seitz, and Rouch, 2017). The analysis appears to have implications for developing effective trust frameworks for institutions of all types (e.g., political, educational, religious, community, corporate, and others). For example, the study by Andrews et al. (2014) suggests that institutional trust has a significant effect on perceptions of social cohesion in European political systems, implying that institutional trust influences tensions between different social actors and reduces confidence in the performance and policies of government. On the other hand, Kwon et al. (2013) referenced a broader focus of analysis on the elements of social capital. Their findings question traditional assertions that social capital at an individual level, social trust, and membership in community organizations increase the probability that a community member is engaged in entrepreneurial or innovative activity. However, the relationship between entrepreneurial activities, innovation, and social trust is supported by other findings suggesting that “social trust is important” because in the tolerance-innovation relationship, “it seems that people who trust each other engage in knowledge spillover and innovation activity” (Audretsch et al. 2017).

The Ebola outbreak of 2014 ended with more than 28,600 cases and 11,325 deaths in Guinea, Liberia, and Sierra Leone, West Africa (Center for Disease Control and Prevention, 2020). While the spread and impact of the Ebola outbreak were significantly less than that of the current coronavirus pandemic, there are lessons to be learned from

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that experience, particularly regarding volunteerism. Turtle et al. described the responses of 3000 healthcare workers who considered going to West Africa to help with the Ebola outbreak (2015). The primary reason why they had not yet volunteered was a lack of information that would help them decide. In addition, concerns about what their role would be, and the attitudes of their employer also contributed. Fear of contracting Ebola also ranked high among the reasons for not yet volunteering, as well as the concerns of family members and significant others (Turtle, 2015, p.10). We may also add that potential volunteers may consider such support as outside the scope of personal responsibility and relegate emergency responses to the responsibility of governmental agencies (Cvetković, V. M., Milašinović, S., & Lazić, Ž., 2018). Volunteer mobilization and participation may be severely curtailed if such opinions are widespread.

In 2018, Strandh, V., & Eklund, N utilized the Disaster Research Center (DRC) typology as an analytical tool (Brouillette & Quarantelli, 1971; Dynes, 1970; Dynes & Quarantelli, 1968) to differentiate between types of responses to disasters and different kinds of voluntary action. Recognizing the pattern in decades of research that describes volunteers in such terms as “affiliated,” those associated with organizations, or “unaffiliated,” those who act spontaneously and are not associated with any recognized disaster response agency (p. 330), the researchers identified four categories of volunteers: 1. established organizations such as police, ambulance, fire services, or other first responders, 2. expanding organizations such as large relief firms (e.g., Red Cross or Salvation Army), 3. extending organizations whose members generally have limited experience of disaster response, and 4. emergent organizations that did not exist prior to the disaster. For purposes of this study and contributing to improving supply-chain agility through local production, the focus is on the continuum between extending and emergent organizations.

Prosocial behavior is defined as the act of helping someone in need. While researchers such as Latane and Darley (1970) identified decisions that an individual must go through in deciding to help a stranger in need. While others have also noted that assistance is more likely when actors personally know each other (Hortensius, 2018). The following are part of the thought process when volunteering to assist someone: 1. Notice what is happening, 2. Interpret the event as an emergency, 3. Experience feelings of responsibility, 4. Believe that they have the skills to help, and 5. Make a conscious choice to offer assistance. This decision-making process is consistent with other research showing that “connections to other people, in the form of psychological sense of community, are critical in predicting, if not spurring, volunteering and activism” (Omoto & Packard, 2016, p.287).

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There is also a moral element to volunteerism such as that discussed by Stukas et al. (2016). The researchers reveal that “Creating a community around a moral principle or on behalf of a group that deserves assistance on moral grounds may be one way to attract and reinforce those with similar beliefs” (p. 250). Values-based community involvement is important to “building a sense of community around important issues that are intrinsically motivating to people with prosocial values and relevant attitudes and providing them with behavioral pathways for expressing them may be a more viable way to promote community involvement” (p. 249).

Volunteers, small-scale manufacturers, suppliers, customers, and other stakeholders organically build a “sense of community” (McMillan & Chavis, 1986, p. 9) that facilitates a focus on crisis response. According to the researchers, sense of community is defined by four dimensions: “1. Membership—feeling of belongingness or relatedness to the organization or community, 2. Influence—the feeling of making a difference in the group and mattering as a member, 3. Needs fulfillment—the perception that members will meet one another’s needs, and resources will be shared through these relationships, and 4. Emotional connection—a shared emotional connection or experience, through history or common places” (Lardier et al., 2018, p. 1063). Omoto and Packard (2016) also explored psychological dynamics associated with “sense of community” and found that “a key driver of social action appears to be perceived connections to people who share a common interest, commitment, or concern” (p. 285). Perceived common relational identity with other actors was shown to have a more significant influence on volunteerism than other motivating factors. Cunha et al (2019) also noted that the results from the McMillan and Chavis (1986) model is no longer sufficient to define the sense of community. The researchers assert that McMillan’s 2011 model aligns more closely with relational complexities and dynamics between “the ecological principles underlying the communities” (p. 536). The notion that sustained prosocial behavior in the form of volunteerism is more likely when intrinsic motivation exists (Stukas et al., 2016) is important to building volunteer vibrancy.

The organic volunteer response to the COVID-19 pandemic resulted in the formation of a prosocial organizational community whose general goal was to produce PPE to mitigate a shortage and help bolster inadequacies in the supply chain. The application of Lean manufacturing principles potentially improves the ability of manufacturers to produce more goods while minimizing production costs. James Womack and Dan Jones, founders of the Lean Enterprise Institute and the Lean Enterprise Academy (UK), are the authors of *Lean Thinking: Banish Waste and Create Wealth in Your Corporation* which is recognized as the quintessential work on Lean manufacturing philosophy. While the original work offers a definition of Lean thinking, the definition has evolved since 1996. Contemporary researchers Chen et al. (2006) described Lean manufacturing systems as “doing more with less time, space, human effort while giving

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the customer what they want in a highly economical manner” (Chen et al., 2006, p.\_\_\_\_\_).

Womack and Jones identified five Lean manufacturing principles (i.e., value, value streams, flow, pull, and perfection) in their original work. In 2014, Herzog and Tonchia identified eight crucial areas associated with Lean thinking based on a synthesis of literature regarding assessment and measurement of the degree of Lean implementation within existing manufacturing systems. The eight areas include: “1. value concept and customers, 2. value stream mapping (VSM), 3. pull/kanban and flow (i.e., a process scheduling system that tells you what to produce, when to produce it, and how much to produce for the next phase of the production line), 4. waste elimination, 5. productive maintenance, 6. just-in-time (JIT), 7. employee involvement, and 8. the development of excellent Lean suppliers” (p. 798). With a similar emphasis on the implementation of Lean manufacturing methodologies, Anholon and Sano (2016) also identifies several critical processes during the implementation of Lean projects. Their findings include: 1. procurement, 2. stakeholder, 3. communication, 4. human resources, and 5. risk management as critical in the implementation of Lean procedures. Additional value may be found in the results of the Anholon and Sano study because of their use of the Project Management Institute, Project Management Body of (PMBok).

Acknowledging the limitations of Lean manufacturing, researchers have explored the value of “Quick Response Manufacturing” (Gomez & Filho, 2017; Filho & Saes, 2014; Suri, 2010). Suri 2010 described Quick Response Manufacturing (QRM) as a company-wide strategy in which the main focus is to reduce lead time. QRM encompasses four core concepts: 1. Power of time: Complete replacement of traditional cost-based goals of efficiency and utilization with QRM’s time-based goals, which is a relentless focus on lead-time reduction, 2. Organizational structure: The organizational structure of the company should be reviewed, focusing on the reduction of lead time; the main point of this change is the shift of the shop floor layout from process layout to a QRM cell, which is composed by multifunctional workers with ownership, 3. Understanding and exploiting system dynamics: Understand the relationship between the variables that have an effect on the lead time, and therefore give better guidance to the improvement efforts for these variables to maximize their effects on the reduction of lead time, and 4. Reduction of lead time globally at the company: QRM must be applied to the entire company, including the supply chain, office and sales operations, engineering and product development” (p. 1899). Techniques that are central in Lean methodology, such as takt times and kanbans, are for eliminating variability and creating flow. They work well for higher volumes or replacement products. However, Lean techniques may not be a suitable approach for low-volume, high-variety, or customized products.