

REINVENTION AND ADAPTATION INTO U.S. COMMUNITIES OF FIVE GLOBAL
HEALTH INNOVATIONS

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ABSTRACT

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This thesis explores a distinction between types of changes made to innovations as they diffuse, based on the agents of those changes and the Diffusion of Innovations (DOI) framework: Reinvention by the designers of innovations and adaptations by the implementers of those same innovations. This research was conducted as part of a more extensive study of five global health innovations, conducted by researchers at the Department of Communication at Michigan State University and funded by the Robert Wood Johnson Foundation. A portion of the interview data from that project collected via interviews with innovation designers and researchers, on the one hand, and with community-based adopters and implementers, on the other, were transcribed and content analyzed to answer two compelling questions: What is the frequency of changes – counted as instances of reinvention and adaptation, as discussed by designers, on the one hand, and implementers, on the other? Which innovation attributes, and in what proportions, are discussed when designers and implementers address changes to innovations? Results suggest that both designers and implementers discuss reinvention and adaptation in the diffusion process. The changes discussed mostly concerned modifications made to the components of innovations, adjustments made in reaction to a different environmental context or target population, and the tailoring of content. Results suggest that interviewees referred mostly to the innovation attributes of compatibility (24.6% of the comments), relative advantage (12.1%) and observability (11.7%) when discussing changes. Achieving a fit with adopters' needs – compatibility – appears to be most important to innovation designers and the implementers of those global health innovations.

Dedicated to my dad, Dumaine Rumbold, to my mom, Jocelyne Aldajuste, the Rumbold in Haiti and the U.S.A., Haitian colleagues, and friends who never wavered in their support. And to all social entrepreneurs who dedicate their life to solve the most prominent social problems in our world.

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It takes a village to make a Spartan graduate student!

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KEY TO ABBREVIATIONS

OECD	Organization for Economic Cooperation and Development
DOI	Diffusion of innovations
U.S.	United States
MSU	Michigan State University
EBT	Evidence-based Treatment
CDC	Center for Disease Control
IRB	Institutional Review Board

INTRODUCTION

Prosocial health innovations are not static or rigid in their structure or content. They can and do evolve. These changes are not the product of unknown forces or amorphous factors. They are the result of interested actors who are engaged in the process of innovation diffusion, which includes the activities of creating an innovation, testing and refining it, and communicating it to potential adopters in other localities so that they may learn about it, consider it, adopt it, and implement it in their communities. During this sometimes lengthy and recursive process, *designers*, who are the originators, researchers and proponents of the innovation, may change it to better suit new sites of implementation. This I term *reinvention*. Also during this diffusion process, *implementers*, who are those persons who begin to use the innovation in those new sites may also change the innovation. This I term *adaptation*. Since the diffusion of innovation literature to-date has not clearly distinguished changes made to innovations by the agents who make those changes, this thesis explores this issue.

Using data on health care spending, performance and utilization collected by the Organization for Economic Cooperation and Development (OECD) for the 10 highest-income countries in the world, Papanicolas, and Jha (2018) found that the United States spends more on health care, has fewer insured citizens, and health inequities. When compared to other high-income countries, such as the 36 members of the OECD, the U.S. spending in health care is still high (Klein, Scheltens, & Brangan, 2017). This gap with other wealthy countries is in part due to the high prices the U.S. pays for health care services, especially for doctors, pharmaceuticals, and administration without accomplishing better health outcomes compared to the other wealthy countries (Papanicolas, Woskie, & Jha, 2018; Sanger-Katz, 2018). Thus, among several strategies to reduce cost, improve care, grant more access to better health, including new medical

bills from the legislative and executive branches of U.S. government, private and public institutions are perusing global health innovations validated abroad for implementation in the U.S. This phenomenon raises the question of the extent to which these innovations emerging in different cultural, economic, and social context can be replicated in the U.S. as originally implemented.

In 2018, the Robert Wood Johnson Foundation funded a one-year long research project at Michigan State University to devise a conceptual model that can explain the transfer of global ideas from abroad to the U.S., and their adoption by U.S. organizations and communities and their spread (Dearing, Lapinski, Shin, Hussain, Rumbold, Osoro and Shell, 2019). Applying the DOI research and practice paradigm, these researchers delved into five prosocial health innovations coming from five different countries (Mexico, Columbia, South Africa, Sweden, United Kingdom) to test their model. Building on a portion of the interview data collected in that research, this thesis scrutinizes the changes that happened in those innovations during their process of diffusion, crossing national cultures, and what attributes may account for those changes. Thus, the five innovations that are either in an early stage of diffusion into the U.S., or well established in U.S. communities, are the objects of study. The DOI research and practice paradigm, as explained by Rogers (2003), is the lens through which I will attempt to understand the concepts related to changes made to innovations.

While the prospect of implementing global innovations from other countries may help solve some of the challenges to help disadvantaged population improve their health, future stakeholders who want to implement new global ideas should be aware of potential changes and challenges that this process entails. The creation of innovations can be culturally specific. That cultural component may need adjustment during the diffusion (Bauman, Cabassa and Stirman,

2018). Additionally, in the diffusion tradition, there has been little attention to the spread of innovations from low and middle-income countries to high-income countries (Frost & Reich, 2008). Thus, looking at changes in innovations from that perspective fits in the context of diffusing global ideas to the U.S.

Changes made to innovations during diffusion have been interchangeably termed “reinvention” and “adaptation” for decades. Long before the recognition of the importance of these concepts in the diffusion process, the assumption was that “adoption of an innovation in organization A will look much like adoption of this same innovation in organization B” (Rogers, 1978, p.9). *Adoption* is the decision to use an innovation after gaining knowledge about it. Innovations were not thought to change as they spread throughout and among social systems such as organizations, towns, cities, provinces, and nations. Stated differently, changes made to innovations during the process of diffusion were considered to be “noise” in the analysis of the diffusion of innovations (Rogers, 1978), with the decision to adopt a binary decision (Karnowski, Pape and Wirth, 2011). One either adopts the innovation as developed or rejects it. Consequently, in opposition to changes, designers advocated for the importance of fidelity during subsequent implementation.

Fidelity refers to the degree to which a replicated innovation is similar to the original demonstration model as indicated by the designers (Mayer et al., 1986). Fidelity of implementation is often evaluated to corroborate an innovation’s effectiveness or the intended outcomes of evidence-based programs (Noonan, Emshoff, Moos, Armstrong, Weinberg, Ball, 2009). However, in the context of cross-country diffusion, despite the relationship between fidelity and effectiveness of evidence-based innovations (Blakely, Mayer, Gottschalk, Schmitt, Davidson et al., 1987; Dusenbury, Brannigan, Falco, & Hansen, 2003), it is expected that the

process will entail changes to the innovations since the contexts can be expected to vary more widely.

As many diffusion scholars demonstrated, diffusion without change was an unwarranted assumption. Archeologists have long noted modifications to tools as those objects spread through societies, just as anthropologists have documented how cultural meanings and languages are modified as they diffuse. Thus, during the implementation of an innovation, several factors will affect not only the innovation but also the users (Hall & Loucks, 1978; Rogers, 2003). Nevertheless, not all innovations can be modified depending on their nature (Rogers & Shoemaker, 1971). For instance, a smartphone, such as the American flagship *iPhone* designed in the U.S. will not change in its hardware when moving to China, but its configuration will include a language adaptation for worldwide adoption in our era of globalization.

According to Rogers (2003), the perceived attributes of an innovation are one of the explanations for its diffusion. His framework suggests that five characteristics - relative advantage, compatibility, complexity, trialability, and observability, combined with other factors, drive diffusion (Rogers, 1995). For him, it is during the trialability of the innovation that change may happen in that innovation. Many scholars have considered these five attributes in the study of adoption (Silk, Hurley, Pace, Maloney, & Lapinski, 2014; Aubert & Hamel, 2001; Mensch, Bagah, Clark & Binka, 1999; Dearing, Meyer, & Kazmierczak, 1994; Goldman, 1994; Tornatzky & Klein, 1982).

Additionally, as scholars used various terms to describe changes to innovations, I consider the main stakeholders – designers and implementers, in the diffusion process as the agents of change. I use the terms designers to refer to inventors, their advocates or partners, and implementers for people who adopt and implement innovations. I propose that reinvention is a

type of change performed by innovation designers, researchers, and proponents, whereas adaptation is performed by practice-based implementers whose organizations have adopted an innovation that they proceed to modify. Distinguishing reinvention and adaptation based on who is making a change raises interesting questions about the diffusion process generally, and dissemination and implementation more specifically. It is these questions that orient this study.

Besides the central questions of this thesis and their importance in the context of the adoption of health innovations for healthcare improvement and public health access in the U. S., there are other reasons to study reinvention and adaptation. Ansari, Fiss, and Zajac (2010) indicated that reinvention and adaptation are mostly intertwined in the early diffusion studies. Adaptation has been the object of more recent scholarly inquiry, particularly with the rise of implementation science (Brownson, Colditz & Proctor, 2018). Bauman et al. (2018) pointed out that the adaptation processes are “usually not documented, and consequently not evaluated and understood” (p.287) in the dissemination of practices or interventions.

Before proceeding with the description of this study and presenting my research questions, it is essential first to understand the components of the diffusion process, and especially the innovation attributes; then, I elucidate the conceptualization of changes in DOI and the understanding of fidelity; and finally, I discuss how reinvention and adaptation have been presented in previous studies.

CHAPTER 1

LITERATURE REVIEW

Diffusion of Innovations (DOI)

The Diffusion of Innovation (DOI) research and practice paradigm offers tenets for understanding the importance of the main factors in the adoption and the implementation of innovations, as well as the implication of potential adopters in the diffusion process (Rogers, 1962, 1995, 2003). Rogers (2003) defined *diffusion* as “the process by which an innovation is communicated through certain channels over time among the members of a social system” (p.5). *Innovation* refers to an idea, a practice, or an object that is perceived to be new by an individual or another unit of adoption (Rogers, 2003). Procedures, processes, products, services, technologies, and policies are all studied as innovations for individuals or organizations to consider adopting and implementing (Dearing, 2009). The members of the social system Rogers referred to can be individuals as well as organizations. For example, individual adopters of the Pokémon Go social media game that spread like wildfire in numerous countries, or all the third parties that are using the augmented reality platform of that game can be thought of as individual adopters within a social system.

At the gist of the diffusion of innovations lies a communication process. In the past, without mass media and mass communication means, individuals had little if any information about new products, ideas or practices until opinion leaders communicated those innovations to them by word-of-mouth (Katz and Lazarsfeld, 1955). Interpersonal communication, in the famous “two-step flow” model of communication, was critical to large majorities of people learning about innovations. With the popularization of computer-mediated communication tools, anyone can heretofore be informed about an innovation. Of course, they may still not adopt it

without first gaining a sense of how others are responding to the innovation. For those innovations that may be considered to be of low perceived consequence, impersonal and mediated influence in the form of the Internet, with chat rooms and online product reviews, can be sufficient to produce a change of attitude and thus the decision to adopt (Singhal, 2009). In the case of a prosocial innovation, for instance, a linking agent (individuals or organizations) may be at the origin of that connection to ignite dissemination and attract the attention of potential adopters. Hence, diffusion research and campaigns encompass innovation, communication channels, time, and social system as their main elements in the diffusion of new ideas (Rogers, 1995; Dearing, 2009).

However, all innovations do not spread to communities in the same way (Blakely et al., 1984; Havelock, 1979; Rogers, 1983; Tornatzky et al., 1983), neither do they get adopted analogously, that is, without changes depending on the types of innovation. It is necessary to have an overview of the key components in DOI in order to appreciate where those changes may occur in the dissemination process.

Key components

From the introduction of the innovation to potential adopters to the parties involved in spreading the news or influencing others' behaviors, one must comprehend these key components:

- The adopters' perceptions of the innovation attributes in terms of relative advantage, compatibility, simplicity, observability, and trialability (Rogers, 2003). They are characteristics of an innovation that can influence how potential adopters perceive this

innovation in relation to their context and needs. Adopting organizations may also generate changes to the innovation to make full use of it.

- The adopter's degree of innovativeness, that is, how early one adopts the innovation compared to others.
- The social system (all interrelated units such as the social and communication structure in place, the norms in that system, the opinion leaders and resulting social pressure) (Rogers, 2003; Dearing, Kee & Peng, 2018).
- The innovation-decision process, which includes five stages: knowledge, persuasion, decision, implementation, and continuation (Rogers, 1995, 2003).
- And the diffusion system, “especially an external change agency and its paid change agents who, if well trained, correctly seek out and intervene with the client system's opinion leaders and paraprofessional aides, and support the enthusiasm of unpaid emergent innovation champions.” (Dearing et al. 2018, p.50).

The combination of these components stands to understand the diffusion both from individual and organizational level perspectives. However, in considering the five prosocial innovations of interest that have already been trialed or established in the United States, I aim to discern the importance of these attributes when designers and implementers are discussing changes made to innovations during the diffusion process. While these attributes have been extensively studied to understand the *rate of adoption* of innovation – that is, “the speed with which an innovation is adopted by members of a social system” (Rogers, 2003, p.221), little attention has been given to the extent of change they may provoke should the potential adopters want to make use of that innovation in a cross-country diffusion context.

Innovation-decision process

The innovation-decision process model consists of five stages during which changes transpire in innovation for adoption. As modeled by Rogers (2003), the innovation-decision process encompasses when the decision-making unit (an individual or an organization) first appreciates the innovation, i.e. learns about it, is persuaded about it, decides to adopt or reject it based on the extent of persuasion or information-processing, confirms this decision and maintains the latter. These activities are designated as stages of knowledge, persuasion, decision, implementation, and confirmation. The changes that occur in the innovation are not overtly stated in that process. However, many scholars, such as Ray-Coquard et al. (1997), Blakely et al. (1984), Tornatzky et al., (1983), Berman and Pauly (1975), have demonstrated that innovations do not move straight from stage one to stage five intact. A decision-making unit may learn about an innovation, persuaded of its usefulness, but still rejects it when it comes to its full use; or makes some changes before deciding to adopt that innovation. Furthermore, the change is often necessary for its adoption to be continued (Rogers, 2003; Sikorski, Turnbull, Thorn, & Bull, 1976). Typically, decisions to adopt an innovation depend considerably on the potential adopter's perception of the characteristics or attributes of the innovation.

Innovation attributes

As mentioned earlier, the perceived attributes – or characteristics, of an innovation are often used to study its rate of adoption (Kapoor, Dwivedi, & Williams, 2014) alongside other variables such as the type of innovation-decision, the communication-channels involved, the nature of the social system in question and the extent of change agents' involvement (Rogers, 2003). However, in the context of cross-country diffusion, considering the movement of the five

prosocial innovations from abroad to the United States, one might wonder about the nature of the changes these attributes may also allow. Rogers' definitions of these attributes are as follows:

Relative advantage is the degree to which an innovation is perceived as better than available options of the same type. The relative advantage can also be expressed in terms of cost and benefits to the potential adopters, such as financial resources that can be lost or gained (Dearing et al., 2019). This attribute is sometimes stated in terms of the relative effectiveness of the innovation (Dearing, Meyer, & Kazmierczak, 1994). For example, Smith and Hasin (2016) found that relative advantage was one of the significant predictors for Illinois farmers to use an electronic system that allows them to benefit the Supplemental Nutrition Assistance Program of the United States Department of Agriculture. Silk, Hurley, Pace, Maloney, & Lapinski (2014) pinpoint the economic benefits discussed in focus group as factors that determine the relative advantage of renewable sources over nonrenewable sources for different stakeholders in Michigan. In a cross-country context, if potential adopters of an innovation find its cost a barrier for adoption, they may decide to select some components that would fit their context instead of adopting the entire idea, or they may not support at all the innovation for adoption.

Compatibility is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters. The more comfortable an innovation is to the adopters' needs and sociocultural beliefs, the less uncertain it is for adoption (Mensch, Bagah, Clark & Binka, 1999; Aubert & Hamel, 2001). For instance, the management of patients' information in the United States may differ from the modus operandi in South Africa, thus making it more difficult for an innovation dealing with patient information access to be adopted in the U.S.A without changes. For the innovation to be adopted in the U.S.A, the

implementers in the American side would have to secure a high level of compatibility between the idea and their context.

Complexity refers to the degree to which an innovation is perceived as difficult to understand and use. In other words, how easy it is for the potential adopters to comprehend and use that innovation; innovations that don't have this characteristic are more difficult to be adopted (Rogers, 2003; Grilli & Lomas, 1994; Tornatzky & Klein, 1982). *Simplicity* is another term used in research as the opposite of this attribute. For example, many technological innovations, such as home computers, smartphones, had to be user-friendly to enhance their adoption. In his investigation of the attributes of a Campaign for Healthier Babies, Goldman (1994) found that the perceived simplicity to understand and implement the campaign was identified as the most critical category of perceived attributes in predicting local implementation.

Trialability is the degree to which an innovation may be experimented with on a limited basis. The accessibility to an innovation and opportunity to use it can favor its adoption (Kapoor, Dwivedi, & Williams, 2014). According to Rogers (2003), "trying a new idea may involve re-inventing it so as to customize it more closely to the individual's conditions" (p.258). Thus, it is more likely for an innovation to be changed during its trial, that is, before permanent adoption. However, the other characteristics (relative advantage, compatibility, complexity, and observability) still may play a role in the extent of change happening in the innovation.

Observability refers to the degree to which the results of an innovation are visible to potential adopters; in other words, the extent to which this innovation can be examined before its adoption. For instance, when Goldman (1994) investigated the health education program innovation, the Campaign for Healthier Babies, observability along with perceived compatibility, and relative advantage were related to the degree of adoption and implementation of that

campaign. Observing an innovation from the country of origin before its transfer to another country may allow the potential adopters to reduce not only uncertainty but also evaluate its feasibility in their environment.

Since empirical pieces of evidence support these five innovation attributes as dependent variables in studies related to adoption of innovation (Dearing, Meyer, & Kazmierczak, 1994; Mensch, Bagah, Clark & Binka, 1999; Aubert & Hamel, 2001; Grilli & Lomas, 1994; Tornatzky & Klein, 1982; Goldman, 1994) and since other scholars acknowledge that change is necessary for further adoption (Rogers, 2003; Ray-Coquard et al. (1997), Blakely et al. (1984), Tornatzky et al., (1983), Berman and Pauly (1975), it is worth exploring their prominence or absence in discussions related to changes in innovation.

Changes in innovation

According to Rogers, it is during the implementation stage that modifications happen (Rogers labels changes made during implementation “reinvention”). These are changes made by those persons who adopt and implement an innovation. They may change an innovation for a variety of reasons. This type of change is defined in Rogers’ *Diffusion of Innovations* as “the degree to which an innovation is changed or modified by a user in the process of its adoption and implementation”(p.180). Early diffusion studies rarely acknowledged that innovations could also be changed early in the diffusion process, prior to the communication of an innovation to potential adopters. When scholars started to delve into reinvention investigations and found its occurrence in most diffusion programs, they did not acknowledge the agent of change, i.e., whether or not it was designers or implementers who were the change-makers. Their focus was on changes made after adoption and during implementation, in the local context where an

innovation was going to be deployed by, for example, a city department of public health.

Nevertheless, this first conceptualization of modifications (“reinvention” in Rogers’ writing) led Rogers (2003) to three main generalizations:

- Changes occur at the implementation stage for many innovations and many adopters.
- A higher degree of such changes leads to a faster rate of adoption of an innovation.
- A higher degree of such changes leads to a higher degree of sustainability of an innovation.

Independently of who are the agents of change, other terms have been used to refer to changes made to innovations, such as, adaptation, modification, or addition to innovations. The concept of adaptation is not overtly discussed in DOI since it is used alternatively with reinvention. Nevertheless, with the rise of implementation science whose foundation lies in DOI, scholars advocate for more documentation about adaptations made to innovation (Bauman et al., 2018) because actors engaged in disseminating innovations may alter their form or function to inspire more adoption. Furthermore, at the sites of adoption, those individuals responsible for adopting and implementing the innovation may routinely try to extract as much value as possible from the innovation which can involve making changes to it so that it best fits their local context or needs. Thus, adaptation can be seen as another type of change different from reinvention dependent on the agent of change event though they share the same basic definition.

Implementers may adapt an innovation for other reasons, too. They may believe that they are implementing an innovation as its designers intended, but be mistaken. Implementers may delay implementation, try the innovation a little at a time, combine it with another innovation both of which serve the same population group or they may decide to implement only one or a few components of the innovation. The implementer’s knowledge, organizational interests, and

resource constraints and the perceived needs of the sector of a community that they are hoping will benefit from the innovation all can produce these sorts of adaptations.

This can be expected in most instances of changes made to an innovation because of the actors involved: Innovation designers and proponents (“change agents” in the diffusion literature) often reinvent prior to disseminating information about an innovation to potential adopters, while implementers, having been presented with the innovation, adapt the innovations to their context after trial. This orientation to time is necessarily simplistic, since we can expect that sometimes innovation designers act dynamically and can continue to make changes to an innovation (i.e., versions 1.1, 1.2, 1.3, etc.), thus suggesting a recursivity to reinvention and adaptation. In some cases of innovation implementation, innovation designers pay regular and careful attention to what implementers do with an innovation and when an adaptation appears to be fidelity-consistent, the adaptation can be subjected to reinvention and test of the innovation.

In the debate concerning changes in innovation, fidelity is another concept that always surfaces. Rogers observes that fidelity is often used as the opposite of reinvention (2003). In what follows, we point out the fuzziness related to the intertwinement between reinvention and adaptation when it comes to discussing the concept of fidelity, and an understanding of the latter primarily for innovations crossing national cultures. With our particular type of data, an assessment of fidelity is unlikely, but it is worth noting since two of the innovations are evidence-based programs tried in multiple sites in South Africa and Wales before moving to the United States.

Reinvention and Adaptation “versus” Fidelity

The intellectual debate between proponents of modification to innovation and those who advocate for implementation as designed is not exempt from not making a clear distinction between reinvention and adaptation. In that debate, the origin of the change is not adequately discussed. It is instead a question of effectiveness and routinization. Although the concept of reinvention is used, it does not relate to changes made by designers.

For example, Baumann, Stein, & Ireys (1991) evoked the dichotomy reinvention-fidelity in terms of “fidelity camp,” scholars who believe that innovation should be implemented as the original idea, and a “reinvention camp,” those who believe innovation should be modified to meet the needs of the adopting units. According to Mayer and Davidson II (2000), several analysts have used the term “reinvention” in that debate to “capture the forces of interaction between innovation and organization that shape adaptation” (Rice & Rogers, 1979; Larsen & Argawala-Rogers, 1977; Brunk & Goepfinger, 1990; Paine-Andrews, Murray, Fawcett, & Campuzano, 1996). Other authors studied the “lack of uniform adoption” of technological innovations (Lewis & Seibold, 1983) to address the lack of fidelity. The tenets of fidelity recommend a steady implementation in multiple sites while the proponents of “reinvention” (the term used by Baumann, Stein, & Ireys, 1991) corroborate the on-site modification to meet the context of adoption. This latter perception is undifferentiated when it comes to adaptation. For instance, Mayer and Davidson II (2000) report, “proponents of adaptation suggest that differing the organizational environments and needs almost always demand local modification.”

Bopp, Saunders & Latimore (2013) refer to the “the tug-of-war between local adaptation and implementation fidelity” and expose the relative importance of fidelity versus adaptation, as well as the conditions under which adaptation is appropriate. In the dissemination science

perspective whose foundations lie in the diffusion practice and paradigm, fidelity refers to the extent to which an intervention is delivered as planned, and the quality and integrity of the intervention as conceived by the developers (Linnan & Steckler, 2010). The idea of core intervention elements is essential to that conceptualization. *Core intervention elements* are the components tested through meticulous research designs and linked with wanted results (Allen, Shelton, Emmons & Linnan, 2018). The perspective is on the outcomes of a program, not on whether or not the changes are from proponents of fidelity or adaptation.

In that regard, with extensive documentation on an innovation including replication guidance and implementation process, one would anticipate its reproduction with a high degree of fidelity. For instance, if it was the case for an evidence-based program such as Agewell (from South Africa) or the Cardiff Violence Prevention Model (from Wales), one would expect its implementation in other cities in South Africa and Wales as initially designed. In fidelity of intervention, the “key issues are whether the core materials, structures, and processes of the program are delivered as intended by the underlying program model” (p.61s). However, when they are crossing borders to move to the United States, it is unlikely that this fidelity of replication would be respected.

In the cultural tailoring literature, this lack of distinction between reinvention or adaptation and fidelity is somewhat resolved by acknowledging the necessary cultural adaptations. The latter has been defined as “the systematic modification of an evidence-based treatment (EBT) or intervention protocol to consider language, culture, and context in such a way that it is compatible with the client’s cultural patterns, meanings, and values” (Bernal, Jimenez-Chafey, & Domenech, Rodriguez, 2009, p. 362). For Barrera, Castro, Strycker, & Toobert (2013), the cultural adaptation of an innovation should include “observable aspects of a local

culture into treatment media and activities and should infuse cognitive aspects of that culture into intervention content” (p. 197). Thus, in the context of cross-country diffusion of the five innovations, it can be expected that the process will bear some changes due to the cultural, economic, and social context of different ethnic groups in the United States.

As we can see, the debate about adaptation “versus” fidelity proponents is not exhausted. High levels of fidelity have been indeed demonstrated as correlated with high levels of effectiveness (Blakely et al. Mayer, 1987; Dusenbury et al., 2003; Noonan et al., 2013). It should be underlined that the two terms - adaptation and reinvention - are used concomitantly in this debate, but the occurrences of changes from both designers and implementers are not always taken into consideration. Hence the importance of evaluating how they discuss changes in the implementation of innovations.

For this thesis, it is expected that, in addition to trialability, other attributes may explain the changes that happen to the innovations in moving them across cultural context. That is, designers may advocate for or perform reinvention, and implementers may refer to adapt the innovations and still refer to other innovations’ characteristics.

To support the proposed distinction between reinvention and adaptation, I shall discuss further their conceptualizations in prior literature.

Modifications to Innovations

Historically, the empirical reality of reinvention started to be of interest in the mid-1970s. Scholars, such as Charters and Pellegrin (1972) and Havelock (1974) pointed out the manifestation of reinvention without naming it per se (Rogers, 1978) until a study conducted by Rogers and others in 1977 about the diffusion of an encoding scheme developed by the U.S. Bureau of the Census for storing geographical data; and another study about the diffusion of four

teaching/counseling innovations among university professors (Argawala-Rogers et al., 1977). In these and subsequent studies, local implementers made the changes that the researchers are describing. Although changes made by designers, researchers and proponents can be frequent, especially for prosocial innovations that originate in practice, not research, previous studies have tended to disregard reinvention activity and focus on adaptation activity. The aforementioned studies focusing on “reinvention” were in fact studies of adaptation by adopters and implementers.

Rogers and his colleagues coined the term “user” to refer to the nature of active change processes occurring in communities and organizations (Mayer, Blakely & Davidson II, 1986). More recent studies fully acknowledge the active participation of adopters in this process by conceiving of adopters and especially implementers as inventors because of the considerable consequences that can result from such practice-based changes (Dearing & Meyer, 2011). This engaged presence of adopters and implementers gives rise to the idea of a co-production of changes both from designers, on the one hand, and implementers, on the other, but at different times in the diffusion process and as a function of different actors. Inventors themselves or their collaborating advocates (including innovation funders) and other supportive partners (including representatives from organizations that will help in the communication of an innovation to a targeted set of potential adopters) can and do also change innovations prior to their communication. Studies such as Blakely et al. (1987) do not distinguish between reinvention and adaptation; i.e., they consider changes by adopters and implementers to be the only source of change.

In the present study, when designers make changes to an innovation, we term this stakeholder agency *reinvention*. However, prior work and use of terminology muddy this

distinction. For instance, reinvention has also been conceptualized as what I am here labeling adaptation, to wit: as “the degree to which an individual's use of a new idea departs from the core or "mainline" version of the innovation promoted by a change agency” (Eveland et al., 1977 as cited by Rogers, 2003). However, not all innovation can be reinvented since the innovation's core nature may hinder its recipients from making any change (Rogers, 2003), thus, the reluctance of designers toward changes made by others.

Two other conceptualizations of “reinvention” that did not consider the type of actor of changes comes from Roitman and Mayer (1986) who support two alternative definitions of “reinvention” distinguishable from “lack-of-fidelity” based on Larsen and Argawala-Rogers (1977). They wrote, "It is useful to contrast program changes which are relatively creative (adding something new to the program) with relatively uncreative changes” (p.5). They argue that this conceptualization is based on the assumption that the innovation is sufficiently disseminated and consists of an array of components that can be adopted separately without significant changes, and if not, “creative adaptation” would follow. This distinction is very dependent on the idea of creativity, that is, it does not denote the types of changes, but rather the perceptual quality of that change, hence very subjective with questionable considerations. In the other conceptualization, reinvention is explained as “instances where changes in the program were made in a deliberate or obvious effort to defend the innovation against the “Not invented here” syndrome, by giving the program a character unique to the adopting organization” (Roitman and Mayer, 1986, p.5).

When Bruce Ryan and Neil Gross (1943) first studied the diffusion of hybrid seed corn among Iowa farmers, setting much of the paradigm for contemporary diffusion research, reinvention and adaptation were not of utmost concern because most early diffusion studies

focused on individuals as the units of adoption. When individuals are the units of adoption, implementation can be expected to occur because the “choosers are the users.” Users could still adapt the innovation they had adopted, but they could be expected to use it because as with seed corn, they had personally paid for the corn; thus, it would be planted. With the evolution of diffusion studies, the diffusion approach has moved past rural sociology and into other academic fields including marketing, political science, education, geography, public health, and economics (Singhal, 2009).

To be sure, it has been demonstrated that organizations and communities do not always accept a multi-component innovation as a package, or a new practice or intervention without careful revision for compatibility. They may make changes to an innovation so that it better fits their organization and or community (Blakely et al., 1987). Although researchers acknowledge these changes, they do not distinctly label them according to who made the changes. For instance, Dearing, Larson, Randall, and Pope (1998) found that changes made to an innovative community planning process designed by the Center for Disease Control (CDC) ensued through the reactions of regional and statewide stakeholders in Michigan. The authors called on the innovation designer, the CDC, to make changes to the HIV community planning guidance, so that what the designer disseminated to the states better aligned with what implementers in the states were doing with the innovation (which was to adapt it to their preferences and needs). The CDC, as the innovation designer, was being called on to reinvent the community planning guidance based on adaptations made by community implementers.

In a policy-related study – the diffusion of Living Will laws among the American States, Glick and Hays (1991) explored the change process and stressed that changes do happen over time and that later adoption and amendment are essential parts of a continuous innovation

process. California was one of the first states to adopt a restrictive living will in 1976. However, Montana's law, enacted in 1985, was more facilitative. Changes occurred among early and later adopters when they liberalized existing provisions and added new ones to the laws. Policy positions and priorities of interest groups, patterns of emulation among the states, and social experience with technology are all causes supporting the likelihood of changes in an innovation by a state.

What was called reinvention of innovations in these example prior studies is what I am terming *adaptation* since adopters and implementers were making the changes to innovations. The changes were made to the local use of innovations and often to the local context (i.e., "mutual adaptation"), by local implementers. As Ansari, Fiss, and Zajac (2010) remind us, many researchers used the term reinvention to refer to adaptations enacted by adopters and implementers. For example, in his study of changes in classroom practice innovation, Sansom (2017) reported that ESL Chinese teachers "adapt innovations to their local context" and that "reinvention is an indicator of an active way to use the innovations" after their participation in educational programs.

These studies about what was called reinvention document the frequent changes made by adopters and implementers to innovations of many types. The vast majority of these studies concerned diffusion in the U.S., and a lesser number of them concern diffusion from the U.S. to middle-income and lower-income countries. One can wonder if reinvention and adaptation behave in the same way when innovations diffuse from middle and lower-income countries to higher income countries.

Adaptation

Although Rogers and other classical diffusion scholars do not distinguish reinvention from adaptation, the evolution of the diffusion paradigm does consider adaptation as a singular concept of change, especially with the diffusion of innovations into complex organizations and social systems. Additionally, as discussed earlier, adaptation of innovations is duly studied in the dissemination science perspective, as well as indicated in the cultural tailoring literature.

In light with several researchers work, Ansari, Fiss and Zajac (2010) observe that the term adaptation alludes to the process by which adopters of an innovation endeavor to make a better fit between the new idea or practice and their specific needs (Lewis & Seibold, 1993; Radnor, Feller, & Rogers, 1978); this adjustment process may include change in how the innovation is framed (Fiss & Zajac, 2006; Green, 2004; Hirsch, 1986; Ansari et al., 2010) or it might include change during its execution as well as when various variants of the innovation are adopted in the diffusion process (Kennedy & Fiss, 2009; Lewis & Seibold, 1993; Westphal, Gulati & Shortel, 1997).

Adaptations in an innovation are not limited to the context or culture. They can go beyond cultural elements, as Baumann et al. (2018) highlighted, to refer to the modifications made to interventions to fit provider characteristics, organizational contexts, and service settings (e.g., historical, political, and economic contexts).

The concept of adaptation also relates to the dissemination science perspective that relies on the premises of diffusion theory. Dearing (2008) explains, “Classical diffusion theory has evolved in several important aspects that bear on the creation and operation of dissemination science interventions” (p.103). Therefore, we must also consider diffusion and dissemination practice and research paradigm to situate the concept of adaptation.

Dearing et al. (2018) acknowledge the interdependency of innovation designers with those who implement innovations. They emphasized that innovations are progressively adaptable and co-produced by researchers, practitioners, and adopters. Thus, a user does not solely make changes in the process of adoption and implementation of an innovation. For instance, Baumann, Cabassa, and Stirman (2018) indicate that adaptation frequently occurs with the diffusion of interventions from one setting to another. An intervention can be an evidence-based program that is implemented in multiple locations.

Many scholars view adaptation as a “negative outcome that is inconsistent with fidelity” (p.287). Likewise, for adherents of adaptation, the latter is an essential aspect of implementation, without which “interventions are unlikely to be successfully transported to routine settings” (p.287). For Dearing (2008), adaptation and fidelity can be positively and not negatively related if they are conceptualized in a conceptualization of implementation in which “adaptation [is] a property of implementation process and fidelity [is] a property of outcomes” (p.106).

Indeed, several researchers advanced the idea of the coexistence of fidelity and adaptation in the sense that a program’s core components can be “implemented with high fidelity while still making adaptations in response to or to enhance fit with local community needs or context” (Allen, Shelton, Emmons, & Linnan, 2018, p.274). Consequently, adaptations can be fidelity-consistent or fidelity-inconsistent. However, we will not be able to assess this aspect of adaptation with the available data for this study.

In light of Rogers’ list of factors supporting the idea that changes made by implementers are positively related to diffusion, Fedorowicz and Gogan (2010) studied the changes made to Biosense, a public health interorganizational system to detect bio-terror attack. They observed that fidelity in the system’s mission was not prominent, but after adopter’s feedback (nurses,

physicians, administrators), the Biosense designer (the CDC) reinvented the system's mission in response to changes in the environment. The adopters of that system were able to adapt it to be more effective. Although Fedorowics and Gogan used the concepts of reinvention and adaptation, they did not specify the agents of reinvention and adaptation.

Since the selected innovations for this study have been already tried in the U.S., we will consider several cases of interventions in the implementation literature that address the fidelity and adaptation issue.

In a research study about a training workshop intended for cosmetologists adapted for African-American barbers to address beard-trimming risk for men, Linnan and colleagues identified core elements of the initial intervention (Allen et al., 2018). Although they found that their shift from stylists training to barber training satisfied a particular set of fidelity expectations, they noted several elements in the process of change. Changes related to population target and their differences, the setting of the intervention and the way of delivering messages about health. The African-American barbers had to adapt the messages to their clients. The changes were made by implementers – the barbers who know their clients best, to diffuse effective health messages.

Another research study concerned the changes in a trauma treatment developed in the U.S. to be transferred to Iraq (Kaysen, Lindgren, Zangana, Murray, Bass, & Bolton, 2013). The changes found involved contextual and content-level modifications (tailoring and substituting-cultural components) as well as training, supervision, and evaluation strategy. All aspect of changes they made followed a collaborative process that involved both U.S. and Iraqi implementers. The necessity to adapt was presumed due to substantial cultural differences.

At the policy level, the diffusion of Silicon Valley-style venture capital is another example of the adaptation of an American innovation when implemented in other countries. Klingler-Vidra (2016) indicated that the government adopters of the Silicon Valley model in 41 countries did not deploy the core elements of Silicon Valley's market-enabling environment, such as regulatory or tax changes (low tax rate). Governments of these states designed different legal structures, and they offered tax credits and non-financial incentives. Although the model was adopted and adapted, their similarity does not cover all of the original core components of the venture capital model. Governments changed the model to their environmental and contextual needs.

Additionally, considering the different conceptualizations of adaptation processes, one can highlight four scenarios of change based on Ansari et al.'s (2010) work:

“(1) Little or no change in the innovation or the implementing organization, leading to essentially "as is" adoption; (2) change in the innovation but not in the organization, leading to the adaptation of the innovation to the implementing organization; (3) change in the organization but not in practice, leading to adaptation of the organization to the innovation; and (4) change in both organization and the innovation, leading to coevolution or mutual adaptation” (p.69).

Furthermore, the assessment of the adaptations may be seen as contextual modifications (changes in the format, the setting, and the personnel) or content-level (tailoring of components, removing or adding components) (Bauman et al., 2018). Among other types of adaptations to an intervention, Chambers and Norton proposed multiple sources such as service setting adaptation, target audience adaptation, mode of delivery adaptation, and cultural adaptation (Allen et al., 2018).

The gathered data will allow identifying in each unit of analysis, which type of change, where the latter occurred, and its frequency. In studying adaptation in the five selected cases, we put the process at the heart of diffusion to examine how adopters shape the innovations to ensure fit with their organizational and social context and needs.

Research Questions

According to the list of Rogers' factors affecting reinvention - as he originally defined the term, reinvention occurs chiefly because of the complexity of the innovation, a lack of knowledge, different applications intended for the innovation, the adaptation to the structure of adoption, lessons learned from previous adopter's experiences (Rogers, 2003). Other factors include the fact that outsiders to a system introduce the innovation, and the lack of detail knowledge about the innovation (Dearing et al., 1998). With this thesis exploring the conceptualization of changes to innovations, it is expected that the factors related to changes being made to innovations will differ depending on the types of agents involved. Thus, we can further understand other potential explanations for the reinvention process as I propose it, especially in the context of cross-country diffusion of prosocial innovations. The rationale of implementers who adapt innovations and designers who reinvent them can differ or be mutually dependent. For example, when we buy a product and use it for a different purpose than intended, we did not reinvent that product – which would sound expansive but adapt it to our specific need – as we often do. If this behavior becomes prominent among the buyers, the designers of that product may reinvent a second version of the same product.

The forefather of diffusion research, the French sociologist, Gabriel Tarde, suggested that innovations might be altered when they reach new users or in contact with other innovations

(Karnowski, Pape and Wirth, 2011). Tarde's approach of change did not consider the distinction between reinvention and adaptation but was a plausible explanation to why a change in the innovation itself may occur.

The relevance of the distinctiveness between reinvention and adaptation based on the agents of changes can be practical. As can be seen in the previous literature, reinvention and adaptation have been either considered as modification, addition to, or changes in an innovation. However, the types of changes are not discussed from both implementers and creators when they are in communication with each other.

For this research, *reinvention* and *adaptation* share the same basis, as they are both instances of changes. Nevertheless, we consider *reinvention* as changes made to an innovation by designers, researchers and proponents of innovation to increase the likelihood that it will be a good fit with potential adopting systems such as organizations or communities. *Adaptation* represents changes made to an innovation by adopters and implementers of those innovations once the innovations have been adopted in their communities or by their organizations to make it fit to their context.

When we consider the previous findings and development of reinvention and adaptation in the implementation of innovation, we can thus advance the following research questions:

- 1- What is the frequency of changes – counted as instances of reinvention and adaptation, as discussed by designers, on the one hand, and implementers, on the other?
- 2- Which innovation attributes, and in what proportions, are discussed when designers and implementers address changes to innovations?

This thesis will address these questions by reporting on the five global health innovations. These cases are five pro-social innovations coming from five developing and developed countries (Mexico, South Africa, Colombia, United Kingdom, and Sweden), trialed or established in the United States. First, I will assess the occurrences of reinvention and adaptation in designers and implementers interviews. Second, I will assess the innovation attributes being discussed after the changes are mentioned or in relation to the movement of the innovation in the new context of adoption.

CHAPTER 2

METHODOLOGY

This thesis uses data collected as part of a more extensive, earlier study. This author was a member of that original research team, the Michigan State University Diffusion Research Team, funded by the Global Ideas for U.S. Solutions team at the Robert Wood Johnson Foundation.

Sample of Innovation Cases

The MSU project selected innovations to study for their comparative case study after a lengthy process. First, the principal investigators worked with study team members to decide on case selection criteria after searching peer-reviewed journals and practitioner journals, the gray literature about innovations, and using keywords to search databases to find potential social innovations for inclusion (Appendix A). Then, the team convened a project advisory group from the fields of healthcare and public health to augment the previously identified global health innovations. Lastly, the study team met with the Robert Wood Johnson Foundation global team for their suggestions about possible innovations to further augment the set of potential innovations for study. The research team combined all these sources to then apply the following inclusion/exclusion criteria:

1. The innovation was of international origin with spread to multiple international sites;
2. The innovation could be accurately characterized as prosocial;
3. The innovation was from a low-resource setting, including low-resource settings in non-low-income countries);
4. The innovation had spread to the U.S.
5. Process or outcome data appeared to exist about the innovation.

Prosocial innovations are new practices, programs, or technologies that have a primary purpose of improving social, health, or economic conditions of people instead of a primary objective of financial profit. The 39 innovations (Appendix B) found to meet at least four of the above five criteria were entered in a sheet created through the Qualtrics platform, including the criterion met and details related to the key organizations involved and contact organization. Further selection considerations narrowed this set to five global health innovations for study, described in Table 1. It is these five global health innovations about which interviews were conducted and digital recordings transcribed, serving as the data for the present thesis.

*Table 1. Description of the five selected innovations and partnering organizations**

Innovation description	Organizations involved	Location
1. Cardiff Model Originating in the United Kingdom, the Cardiff Violence Prevention Model provides a way for communities to gain more information as to where violence occurs and how to prevent it by forming partnerships between hospitals and law enforcement and others interested in violence prevention.	U.S. Centers for Disease Control and Prevention	Atlanta, Georgia
	Dekalb County Police Department	Decatur, Georgia
	Froedtert Children’s Hospital	Milwaukee, Wisconsin
	Comprehensive Injury Center	Milwaukee, Wisconsin
2. Ciclovía Originating in Columbia, a free community-based and recreational program in which certain streets are closed momentarily to automobiles for cyclists, rollerbladers and pedestrians.	CicLAvia	Los Angeles, California
	RAND Corporation	Santa Monica, California
	University of California Los Angeles	Westwood, California
	Wayne County Parks and Recreation	Westland, Michigan
	Portland Bureau of Transportation	Portland, Oregon
	880 Cities	Toronto (Canada)

Table 1 (cont'd)

<p>3. ConsejoSano Originating in Mexico, ConsejoSano is a private small company that contracts with health insurers and community clinics in the U.S. to help clinics convince poor and disadvantaged community members to come to the clinics for health services.</p>	<p>Healthcare providers in California Texas Illinois New York</p>	<p>Hollywood, California</p>
<p>4. Swedish Disease Registry Originating in Sweden, the Swedish Disease Registry enables both patients as well as health care providers to input information about a patient's progress in care.</p>	<p>Dartmouth Institute Cystic Fibrosis Foundation</p>	<p>Hanover, New Hampshire Bethesda, Maryland</p>
<p>5. AgeWell Global Originating in South Africa, AgeWell Global is a new model of elder care coordination combining peer-based social engagement and mobile technology to improve health outcomes and drive down medical costs.</p>	<p>Henry Street Settlement Fair Health Partners Holy Cross Hospital Trinity Health</p>	<p>New York, New York Cleveland, Ohio Fort Lauderdale, Florida North Dakota</p>

*Descriptions of each innovation from MSU Diffusion Research Team

Procedures

The MSU team conducted on-site, telephone and video conference semi-structured interviews (Appendix C) using a single instrument. The team interviewed designers of each of the innovations, which included researchers and proponents in or from countries of origin of each innovation, as well as implementers in U.S. cities where those same innovations had been adopted. For each innovation, each initial interviewee was asked to suggest new interviewees who were knowledgeable about the related innovation. A semi-private setting allowed interview

administration on the telephone and over Zoom, an enterprise video communication. Two members of the team organized follow-up in-person meetings in U.S. cities. Each interviewee gave consent before answering questions as required by the IRB-approved interview protocol. Interviews lasted between 30 minutes and 2 hours. In total, 27 interviews were recorded and transcribed, which constitutes the source of data for this thesis.

Participants

Participants in those interviews were 45 people (23 women, 22 men) identified as creators, employees of implementing organizations in U.S. cities, partners involved in collaboration for implementation, and researchers engaged in assessing innovation effectiveness or scaling partnerships.

Present Study

According to Crano, Brewer, and Lac (2015), information collected through interviews, in-person, and over the telephone or videoconference, can be used in content analysis to make sense of findings. Content analysis is defined as:

“...the systematic and replicable examination of symbols of communication, which have been assigned numeric values according to valid measurement rules and the analysis of relationships involving those values using statistical methods, to describe the communication, draw inferences about its meaning, or infer from the communication to its context, both of production and consumption” (Riffe, Lacy & Fico, 2005, p.20).

For the present thesis, responses to four of the questions in the semi-structured interviews (Appendix C) were identified as producing responses that were most related to the

present author's thesis purpose; thus, the answers to these questions across the 27 transcripts were chosen for analysis:

1. As _____ has moved from community to community, has the innovation changed? For example, have later-generation implementers targeted different types of people as beneficiaries? Or maybe partnered with community organizations that you hadn't originally tried to partner with?
2. Sometimes innovations like _____ are changed to better suit a new community. Has this happened with _____? How so? Why were changes made?
3. What do you see as the big challenges for keeping the innovation running? Funding, staffing? Training? Are there things that you or your team do to keep _____ operating correctly?
4. Let's turn to things that you can't control, but that may affect how well _____ rolls out or is done in communities. Are there social, environmental, or political factors outside of your team and partnerships that affect what you can do and how quickly you can scale up _____?

The answers to these four questions were used as the data-sources for unitization and the assessment of changes made to the five innovations. In that process, the author identified thought-units or coherent text that refers to changes to the innovations when being implemented in the United States, and the innovation attributes discussed following those mentions of changes. A *thought-unit* is a portion of coherent text that refers, explicitly or implicitly, to the constructs of interest in a study. A thought-unit may be one or more sentences, one or more paragraphs, or text that spans such grammatical elements. Each identified thought-unit was then coded as either representing reinvention, adaptation, or one of the five DOI innovation attributes.

Coding procedure: unitization and categorization

The coding procedure involved two stages:

- The expert coding stage, and
- The lay coding stage.

The first stage of expert coding was conducted by the author to (1) identify the thought-units in the responses to the four questions listed previously, and (2) to determine which of those thought-units represented reinvention or adaptation. The second stage of lay coding involved the author training two volunteer students to be lay coders. Their task was to categorize those thought-units not representing reinvention or adaptation into one of six innovation attribute categories. The lay coders were trained by the author to recognize and distinguish each innovation attribute and to reliably code them into the appropriate category, as well as to resolve differences in interpretation.

Identification stage and expert coding

To qualify as an expert coder, the present author read literature about the diffusion of innovations, intervention fidelity, innovation reinvention, innovation adaptation and global health, and discussed those readings with his academic advisor who is a specialist in these topical areas. The present author also: (1) participated from the beginning of the larger, funded study from which the transcripts derived; (2) was fully involved in background reading and developing the conceptual model for that study with the rest of the team; (3) was present and active in many of the interviews when data were collected including multiple site visits; and (4) focused during that larger study on reinvention, adaptation, fidelity and innovation attributes as constructs of interest. He then identified thought-units that contained information pertinent to this thesis, in the

transcripts, but also to resolve potential unitization and inter-coder agreement problems. The thought-units identified were related to reinvention, adaptation, the five innovation attributes and an “other” category. The two coders (an undergraduate and a graduate student) coded only for innovation attributes, and not for instances of reinvention and adaptation. The two other coders were also involved in the project, but they did not participate in all of the above activities.

The author expected that the coders would unitize, i.e., convert a portion of coherent text, the thought-units in different ways because of dissimilar backgrounds. Hence, it would be difficult to compare their codings and determine inter-coder reliability agreement with the available sample. To solve this evident problem of unitization, the author followed the procedure devised by Campbell, Quincy, Osserman, and Pedersen (2013), in which an expert coder coded transcripts and compared with the two other coders coded transcripts:

“ This involved marking a segment of text in the margin with a bracket and then placing the appropriate code/codes alongside the bracket. Once the text had been fully coded, he saved it on his computer. Then on a copy he removed all the codes but not the brackets. He then gave the bracketed—but no longer coded—version to his research assistant who then coded the already bracketed sections. In this way, both coders coded exactly the same units of text. Then, they compared their coded transcripts to see whether there were discrepancies in their coding. The reason for having the PI do the unitizing is straightforward. Unitizing and coding text in this situation require subjective interpretation, contextualization, and especially a thorough understanding of the theoretically motivated questions guiding the study. Recall Krippendorff’s advice now. The ability to see meaningful conceptual breaks depends very much on the qualifications of the coder and his ability to discern not only obvious meanings, such as specific words, phrases, or organizational names, but also more subtle meanings of a respondent’s statements.” (p.304)

Categorization Stage

The two lay coders had been instructed to categorize each thought-unit into one of the DOI innovation attributes or a sixth “other” category. Categories were mutually exclusive. Coders were provided a codebook with definition of each of the constructs of interest, with

example text, so that they could understand the meanings of and distinctions between innovation attributes and sub-attributes. Lay coders had been trained to interpret thought-units in the context of surrounding text, including questions posed by interviewers, to make sure that they best understand the meaning identified in each thought-unit. The training, initially scheduled for one week, was extended over three weeks. During that time, four of the transcripts used for the training had been coded two times to assess intra-coder and intercoder reliability. In training, differences of opinion were resolved through discussion between lay coders. In cases when differences were not resolved, the expert coder decided how the thought-unit in question should be coded, and explained why to the lay coders.

Sampling

In the 27 transcribed interviews comprised of 436 single-spaced pages of text, the author selected the answers to the four questions in the semi-structured interviews and corresponding follow-up questions. Those excerpts were first coded into 568 thought-units. One transcript was discarded because no discussion of change was found. The final sample used in the results comprised of 562 thoughts-units.

Identification of variables

Reinvention and adaptation. – Reinvention and adaptation were identified by the expert coder following specific criteria. Since the interviewees are both designers of innovations and implementers, on the one hand, I considered the designers' interviews (11 interviews) to identify the instances of reinvention, and on the other hand, the implementers' interviews (15 interviews) for instances of adaptation. However, when designers specifically refer to adaptations made by

implementers using the words “adapt” or “adaptation” in their responses, the corresponding thought-units are coded as instances of adaptation. When implementers refer to changes made by designers, the corresponding thought-units are coded as instances of reinvention. For each innovation, the expert coder reviewed reports and journal articles to understand how the innovation is implemented in the country of origin and in the United States on top of information given in the interviews (Appendix D).

As can be seen in the literature review, both adaptations and reinvention are either modifications or additions to the developed innovation or the adopting unit. That is, with the coding of interviews providing information on changes in innovation, any departure from the original idea from those interviews have been counted as instances of reinvention or adaptation based on the agents of change. Our difference with previous ways of assessing these two variables lies in demarcating designers and implementers in the content analysis as the source of the change.

Designers and implementers were not coded, but divided in two unidentified groups for the lay coders. Additionally, based on the previous literature, five qualifiers were used to identify the presence or absence of sub-changes discussed:

- Change in the format or the components of the innovation
- Change in the content or the target
- Change in the partnership
- Change due to the context of the adopter or other
- Change in the mission or the personnel

The sub-changes were coded by the expert coder following the descriptions in Appendix E for preliminary results. Additionally, all the thought-units coded as instances of reinvention and

adaptation for each innovation were combined in one document per innovation to double check which sub-changes were discussed.

DOI attributes. – Coders were instructed to code thoughts-units based on the descriptions of Roger’s innovation attributes as explained in Chapter 2. The codebook (Appendix F), adapted from a study about DOI conducted by Silk, Hurley, Pace, Maloney, & Lapinski (2014), contained operational and contextual definitions with examples for each innovation attribute. Our adaptation consisted of adding two sub-attributes for each DOI attribute, and replacing complexity by simplicity. Coders had to decide on their presence or absence when an attribute is identified, namely:

- Relative advantage: economic benefits, and other benefits
- Compatibility: past experience, and needs of potential users
- Simplicity: understandability, and usability
- Trialability: usage a little at a time, and usage without loss of resources
- Observability: visibility of process and visibility of results or outcomes.

During the training, coders were given instructions to code the transcripts following an order. The latter was set so that they could alternatively code a designer interview and an implementer interview.

Reliability

After identifying the thought-units in the transcripts, the author coded all the transcripts first. Lay coders were trained using four different examples of text and four (15%) of the transcripts and repeatedly tested until they achieve acceptable intercoder and intra-coder reliability in two points in time. During the training, the coders were able to compare coded

transcripts between them and between expert coding transcripts. The inter-coder reliability coefficient α rose from .51 on the first day of training to .76 in the last day. In parallel, the intra-coder coefficient α rose from .54 to .78 (for Coder 1) and .67 to .89 (for Coder 2). The Krippendorffs' alpha (2003) was calculated with IBM SPSS Statistics 24 using KALPHA macro for computing Krippendorff's alpha reliability estimate for judgments. The Krippendorffs' alpha was used because it is general in that "it can be used regardless of the number of observers, levels of measurement, sample sizes, and presence or absence of missing data" (p.77). This level of interrater reliability was expected because our coders were of different backgrounds and knowledge levels, which warrants for the use of this procedure (Campbell et al., 2013). Once the acceptable level of inter-coder reliability was achieved, the remaining transcripts not used for training (22) were given to each coder. A subsequent reliability check with five (22%) of the transcripts during the independent coding period indicated that coders were starting to diverge ($\alpha = .74$). The simple agreement after the independent coding, i.e. before discussion to resolve disagreements, was 73.75% and the coefficient $\alpha = .68$. Thus, after completion of the independent coding, coders convened to resolve disagreements for each thought-unit. In disagreement resolution, the expert coder participated in 29 decisions (27.88 %) out of the 104 thought-units coded differently.

In the following results section, preliminary results across the five innovations are described qualitatively, and the DOI attributes are analyzed by frequency distribution across agents of change (i.e. designers versus implementers).

CHAPTER 3

RESULTS

Due to the small sample size of 562 thought-units from interviews with designers (n=11) and implementers (n=15), results are presented in a descriptive manner, both qualitatively and quantitatively. Qualitative results illustrate how interviewees talked about their innovations in relation to DOI attributes, and the changes addressed. Quantitative results are presented as frequency distributions of DOI attributes. The results of the first research question are presented qualitatively because the expert coder was the sole coder. Thus, they constitute a form of preliminary descriptive information.

Of the overall set of thought-units, 356 of them were coded as DOI attributes (63.34%), 162 concerned changes addressed (28.83%) and 44 were coded as “other” (7.83%).

Research question 1

Research question 1 (*What is the frequency of changes – counted as instances of reinvention and adaptation, as discussed by designers, on the one hand, and implementers, on the other?*) sought to identify the occurrences of instances of change discussed by innovation designers and implementers in the process of diffusion of the five prosocial innovations. Of the overall set of 162 thought-units, 57 comments concerned reinvention (10.1%), and 105, adaptation (18.7%). When comparing mentions of change on the basis of the agents, in designers’ interviews, 46 comments concerned reinvention, and 24, mentions of adaptations done by the implementers. In parallel, an analysis of the interviews with implementers showed that 81 (88.04%) of their coded comments concerned adaptations, while the remaining, 11 (11.96%) concerned reinvention.

As indicated in the identification of variables section, instances of reinvention and adaptation were further researched to assess the nature of changes they represent. As a result, in the overall set of thought-units about changes, a change in the format or a component of an innovation represented 47 occurrences, followed respectively by the three other types of changes researched : change in partnership (32 occurrences), change due to context (30 occurrences) , and change in the mission or personnel (22 occurrences). Designers tended to refer to more instances of change in the delivering of the innovation that depart from the way it was implemented in the country of origin, and acknowledged adaptations that implementers had made as well.

For instance, when asked how their innovation had changed in spreading from one community to another (Question 9 in Appendix C), one designer involved in implementing Ciclovía, which originated in Colombia, said:

“I think with Ciclovía, it changes depending on where we go; the participation’s numbers obviously change, because sometimes it’s closer to public transit than others, sometimes it’s right there with multiple public transit. I think that sometimes it’s more local and sometimes it’s more “destinational;” folks are coming because it is at the beach.”

In Columbia, Ciclovía is running on the same 75 miles every Sunday and holiday (Hipp, Bird, van Bakergem, & Yarnall, 2016, Montero, 2017; Sarmiento, 2017; Sarmiento, Torres, Jacoby, Pratt, Schmid, & Stierling, G., 2010). The length of the route to implement Ciclovía and the number of programs per year remained important aspects for this innovation over the years.

The main designer of Consejo Sano, which moved from Mexico to the U.S., said, “So, we shifted our model a bit to focus more on S.M.S. text messaging [...] There are certain people for whom it doesn't work and as we start to do some Medicare Advantage and we can talk about that, there's an older population for some of them, the text

messaging is not their preferred way to communicate. So, we have a team of folks who come from the communities that we're trying to reach so they understand the culture and the language and they do live outbound calls.”

In Mexico and in the early version of Consejo Sano, clients had to call the company to take advantage of the services. In its new reinvented version, the company reaches out to the clients mainly through short message service (SMS) and follow-up phone calls.

The change in the format is also addressed in terms of selection of component. That is, instead of giving the full range of services of the innovation, one component may be selected to offer a particular service. A designer of Agewell said: “We are also now spinning off another business line, which is technology only. So we’ve created Agewell Tech as a separate business interest. [...] There is a lot of interest expressed in our technology standing alone from our programs”. An implementer in a site of trial of Agewell confirmed, “I don’t believe that I shared yet we are still working with Agewell to potentially license their 2020 tool as a software, as a service approach.”

Implementers, on the other hand, mostly refer to instances of adaptations in the format (23 occurrences), the partnership (20 occurrences), changes due to the context (19 occurrences) or in the content or target (16 occurrences). They refer to what the implementation teams had to execute, try or change as they faced challenges and tried to get the innovations successfully adapted.

When asked about changes that the team has made and those implementers are making, one implementer of the Swedish Quality Registry model said, “In some senses, it [the model] gets adapted to different populations in different places so it may be thought of as a platform for starting to do the work. And, or as a way of organizing your planning, implementation and

evaluation.” Another respondent said, “I think this has changed, it is different across the different programs”.

The change in content is addressed as modifications in the questions of the technological tool of Agewell, the Cardiff short survey questions to include new types of injuries, the text messages of Consejo Sano to fit a different ethnic population, the different set of activities that constitute Ciclovía on a route to attract a diverse population, or patient engagement/patient education for the Swedish Quality Registry. One implementer of Consejo Sano said: “So, the three slides that I’m going to show you are a good example of how we modify our messages to be more culturally appropriate for the population that we’re reaching out to.” An implementer of Cardiff said:

“We found that there was a population of assaults that were known to EMS in Milwaukee that were not known to Milwaukee police and not known to our Children’s ED. These are pediatric assaults. So that was another adaptation that we are including with our translation moving forward.”

As reported by interviewees, most of the changes were either modifications of the configuration of delivering the innovation, a modification of a component followed by its selection for potential adoption (47 occurrences), a change in the type of partnership for better implementation, dissemination or scale (32 occurrences), a tailoring of content to fit target population (31 occurrences), or the use of social and cultural contexts to enhance participation and adoption. A non-exhaustive list of these changes for each of the innovation are presented in Appendix G.

Although, all interviewees discussed different types of changes, only one designer insisted on the fidelity of replication of the innovation: “Now the challenge is not to re-invent the

wheel or re-evaluate this. It is to implement this with fidelity. By all means, measure violence in your city. Don't think you are going to do another trial".

Research question 2

Research question 2 (*Which innovation attributes, and in what proportions, are discussed when designers and implementers address changes to innovations?*) focused on the identification of DOI attributes in the context of changes discussed by designers and implementers of the five innovations. Thought-units referring to innovation attributes were coded by trained lay coders. A frequency distribution of coding results (Table 2) shows that compatibility, relative advantage and observability has the highest mentions. Table 3 and Table 4 demonstrate which sub-attributes and in what proportion they were mentioned by designers and implementers.

Compatibility. As can be seen in Table 2, 24.6% of the overall comments were related to compatibility (138 occurrences). Designers and implementers made comments coded as compatibility in about equal numbers (Table 3). In discussing the compatibility of the innovation to the communities where they are implemented, participants often referred to the needs of adopters (118 occurrences), which represent 85.5% of all instances of compatibility. For instance, in one of the interviews, a designer said, "Our strategy still highly depending on what the needs of that community is, and that's how we talk about and we conduct outreach with others". In another one, an implementer stated, " I think we've been trying to keep the importance of each stakeholder in mind in terms of this isn't being designed just to fill patients' needs, not being designed just to fill clinicians' needs. There's going to be a lot of different folks who interact with this."

Table 2. Frequency distribution of DOI attributes in the overall set of thought-units (N=562)

	Frequency	Percent
Relative advantage	68	12.1
Compatibility	138	24.6
Simplicity	44	7.8
Trialability	40	7.1
Observability	66	11.7
Other	44	7.8
Total	400	71.2

Table 3. Summary of frequency distribution of DOI attributes by agents of change

	Designers		Implementers		Total
	Frequency	Percent	Frequency	Percent	
Relative advantage	43	23.37	25	14.54	68
Compatibility	67	36.41	71	41.28	138
Simplicity	25	13.59	19	11.04	44
Trialability	15	8.15	25	14.54	40
Observability	34	18.48	32	18.6	66
Total	184	100.0	172	100.0	356

Relative advantage. – References to relative advantage represented 12.1% of all thought-units about innovation attributes (Table 2). When comparing frequency by designers and implementers, designers (in 23.4% of instances) talked more about the benefits of their innovation than did implementers (14.5%) (Table 3). When discussing the relative advantage of their innovation, the economic benefits (35 occurrences) about equal discussion of the other types of benefits (33 occurrences). Designers refer more to economic benefits (39.7% of mentions; Table 4). The benefits are either advantageous or disadvantageous for the adopters or

the implementing organizations. The benefits discussed encompassed cost-saving opportunities for individuals, for the organizations concerned or the U.S. healthcare system. For example, one designer said,

“It’s important to keep looking forward to these international examples though cuz there’s cost savings to having it be the same route every time, if you’re going to do it regularly but there’s also population, the benefit to the people who maybe live along that route but also the burden. Maybe businesses who every Sunday are like this isn’t helping my mattress business. So, yeah. Being forward looking.”

For another innovation, a designer said, “So it is really nice that even in addition of all the benefits that take place during the program itself, the process of getting it done is also a major benefit.”

Table 4. Frequency distribution of sub-attributes discussed among agents of change

		Designers		Implementers		Total
		Frequency	Percent	Frequency	Percent	
Relative advantage	Economic benefits	27	39.7	8	11.77	35
	Other benefit	16	23.53	17	25	33
Compatibility	Past experience	10	7.25	10	7.25	20
	Needs	57	41.13	61	44.2	118
Simplicity	Understandability	5	4.54	1	2.72	6
	Usability	20	45.45	18	47.29	38
Trialability	Usage a little at a time	11	27.5	16	40	27
	Usage without loss of resources	4	10	9	22.5	13
Observability	Visibility of process	18	27.28	15	22.72	33
	Visibility of results	16	24.24	17	25.76	33
Total		184		172		356

Observability. For all thought-units referring to attributes, 11.7% were related to observability (Table 2). Designers (in 18.5 % of the comments) and implementers (18.6 %) equally emphasized the ability of seeing their innovation or its results (Table 3). As indicated in Table 4, the process (33 occurrences) and the results (33 occurrences) of the innovations were equally mentioned by all participants. In four of the innovations, implementers have been able to see examples of the innovations in another context outside of their environment. They have either traveled to the country of origin, or went to another U.S. state. For instance, one designer said, “We had a small team that went over to Sweden, they went to Stockholm, Gävle and Örebro, and visited care teams there and met patients. And really tried to learn and think through what are all the elements that are happening here.” In another interview, a designer said, “She went to Bogotá with the Commissioner of Planning. The two of them went there on a Friday night. Saturday, talks, talks, talk; Sunday, ups and downs on bicycles, and Sunday night, they went back to New York.” For another innovation, an implementer said, “Yeah, you know, I knew about *Saturdays in the park* when I was with the City of Detroit, but just to see how it functions, operates has really been different.”

Simplicity. Of all thought-units referring to attributes, 7.8% were related to simplicity (Table 2). Most of these (25 occurrences) were mentioned by designers, and 19 by implementers. The issue of usability was as important to designers (45.45 %) and implementers (47.29%) when compared with whether the innovation was easily understood (Table 4). For one designer, the innovation was “doable and this is doable as taking out your Xbox and playing game, and so we introduced that; but it also had different resonance when we did go to those neighborhoods”. Another

implementer said, “I think on a scale of simple to complex, this is definitely one of the simpler things.”

Trialability. Of all thought-units referring to innovation attributes, 7.1 were coded as trialability (Table 2). Comments echoed the possibility to try a portion of, or the entire innovation, which was relevant for implementers whose comments refer to that sub-attribute in 25 occurrences (40%) (Tables 3 & 4). For example, an implementer said:

“So this dashboard notion and this very focused project, it’s just part of a bigger story that they’re building, if that makes sense to you, right? It was sort of a test and a trial and for lots of reasons.”

For another innovation, an implementer said:

“That was primarily because of the time it took and we found that the tool was too sensitive, we wanted to test it. We didn't want to have too many calls. We really wanted to manage the calls that were going to go to the physicians’ offices and the alerts that would be coming to us as well.”

Other. Coders were trained to categorize thought-units as “other” when none of the five attributes captured the meaning of the thought-unit. This category represents 7.8 % of all comments ($N=44$; Table 2). Most of the cases in that category were related to the context of implementation of the innovations. After mentioning a change to an innovation, participants also described either the social, economic, policy or political environment in which adopters and the innovation exist, or introduced another subject. For instance, one designer explained after mentioning a change:

“When you’re thinking about downtown, of course, it is businesses, less residential as they would like it to be, but it is growing and becoming even denser. New Jersey, as a whole, is the most densely populated state in the nation. So, of course, we identify New Brunswick as being very urban, but compared to New York, or some of the cities up North is not as urban.”

Another interviewee said, “Yeah, it’s different in a really densely populated area, with a lot of concerns and liability. People are sued...there is a lot of lawyers in California!”

CHAPTER 4

DISCUSSION

This study began by raising two questions exploring a distinction between changes made to innovations as they diffuse : What is the frequency of changes – counted as instances of reinvention and adaptation, as discussed by designers, on the one hand, and implementers, on the other? Which innovation attributes, and in what proportions, are discussed when designers and implementers address changes to innovations? The aim was to analyze the changes that occurred as five global health innovations from developing and developed countries spread to the U.S., the innovation attributes discussed in the context of those changes, and whether it was the designers or implementers of those innovations that discussed these changes.

After content analyzing a portion of interview data collected from a larger study about the diffusion of innovations, three main results stand out in this exploratory study : (1) when talking about changes related to innovations crossing national boundaries, implementers emphasized adaptations they make while the designers of those innovations emphasized their own changes made to the same innovations; (2) the changes discussed mostly concerned modifications made to the component parts of innovations, adjustments made in reaction to a different context or target population, and the tailoring of content; and (3) achieving a fit with the needs of community-based delivery organizations and their intended beneficiaries appears to be most important to both designers and implementers when they discuss the reasons for changes made to global health innovations.

These results suggest the importance on paying attention to the agents of change in reinventing and adapting innovations. The distinction between innovation designers and implementers appears to be worthwhile since both types of global health innovation stakeholders

make reference to changes that they and their teams make to innovations before those innovations arrive in the U.S. and after U.S. communities adopt them. All designers except one were flexible in considering the making of changes to their innovations. They appeared to be flexible in considering changes to innovation components, the partnerships required to deliver and support innovations, and complying with existing regulations to be able to operate in new locations in a foreign country.

In the U.S., promising global health innovations meet formidable barriers. Reinvention and adaptation are, in many cases, responses to those barriers by both designers and implementers. The mention by interviewees of the context was prominent in explaining the reasons why interviewees had to comply with regulations, for example. This context sometimes added to levels of complexity (difficulty). With the case of Cardiff, for example, strict laws about handling patients' data in the U.S. dictate the types of partnership necessary; or with Ciclovía, where in some locations, the environment hinders the use of routes of a longer distance; or, if you go to cities like New Jersey or San Jose, one must take into account ethnic diversity.

The findings to the first research question may be of interest to social entrepreneurs interested in moving innovations across countries, and public health advocates who want to move health innovations from abroad. The sub-changes identified under reinvention and adaptation are examples of what designers and implementers of health innovations may expect to change in diffusing innovations to and then from location to location in the U.S. Of course, these findings need to be assessed with a larger pool of innovations to have more confidence in findings of this type.

In this era of accelerating changes in technology, health, workplaces and education, failure to adapt innovations can dampen acceptance. Innovations regularly cross borders as part

of a global system in which, on top of observed changes in each society, innovations are often adapted to the needs of adopters in countries to which they are new. Forty years ago, Rice and Rogers (1980) explained that components of an innovation “may be prohibited by, or be competitive with, local or preexisting organizational components, necessitating reinvention of these components; reinvention may often be an accommodation between opposing forces.” (p.503). For instance, during Agewell’s trial implementation in the U.S., one hospital already had a Community Healthcare Team that effectively competed with Agewell for political support within the hospital. As a result, rather than being adopted and implemented as a whole, it is possible that just the mobile app component of AgeWell will retain and sustain in the hospital.

Since the diffusion of innovation literature to-date has not clearly distinguished changes made to innovations by the agents who make those changes, this study contributes to the field of diffusion by exploring this issue and suggesting future research. Changes made to innovations have been demonstrated in multiple studies although in the early years of the diffusion of innovation paradigm their presence was not much acknowledged. Such changes have been given various labels but researchers have largely overlooked who was making those changes and whether different types of agents made different sorts of changes. Rogers (2003) argued that a higher degree of reinvention would propel the rate of adoption of an innovation and its sustainability, since the implementers making those changes would become more committed to the innovations in question (this claim has largely been validated by subsequent research). Advocates of adaptation insist on the importance of on-site modifications, as well as the importance of variants of innovations in the diffusion process (Bauman et al., 2018; Kennedy & Fiss, 2009; Lewis & Seibold, 1993; Westphal, Gulati & Shortel, 1997).

The second part of this study assessed which attributes of innovations were discussed by designers and implementers when talking about the changes made. Innovation attributes have been showed to play an important role in the adoption of innovations (Mensch, Bagah, Clark & Binka, 1999; Dearing, Meyer, & Kazmierczak, 1994; Rogers, 2003; Silk et al., 2014). The present coding of interview transcripts and analysis suggest that when making a change, both types of agents – designers and implementers – considered innovation attributes primarily in the sense of meeting the needs of potential adopters and demonstrating the benefits of adopting.

The present findings suggest that when social entrepreneurs and health advocates want their health innovations to be adopted in the U.S., they may have to demonstrate their ideas' compatibility with the U.S. context, their relative advantage and their observability. This should not surprise designers or implementers since both types of agents seem to believe, and maybe even assume, that a new community warrants changes and demonstration of benefits. Although these attributes may not be the real causes behind the changes discussed here, their occurrences show how much both designers and implementers valued their importance.

The mention of the importance of fidelity in one interview was in stark contrast with the designers and implementers who emphasized reinvention by designers and adaptation by implementers. One interviewee said, “So I’m onboard as the let’s adapt Cardiff to make it more public health prevention model and more formal than they were doing it.” A researcher said, “and so the adaptation piece was for all of our emergency departments, all four, they decided to put it in the electronic health record instead of it being paper and pencil and that the nursing staff would collect it versus the registration staff in Wales.” Local changes to innovative programs have been demonstrated to heighten effectiveness when the changes appeared as additions rather

than subtractions to the model, although higher fidelity versions of innovations tended to be more effective (Blakely et al., 1987).

As can be seen in the prior results chapter, designers do appear to emphasize reinvention of their innovations, while implementers overwhelmingly emphasize adaptation. Both designers and implementers want their ideas to work, they want their innovations to be successful and, in some cases economically profitable, thus their disposition to adapt their ideas if that will serve the cause of diffusion and sustained use. The examples of successful adaptations suggest that the health system in the U.S. may be able to benefit from social innovations from abroad, but not without first taking into account the needs of communities, demonstrating the benefits to them, and gaining the support and guidance of different partners.

Limitations and Future Research

This thesis is the result of a small number of interviews (27) and a modest range of innovations (5 cases). The findings are hardly generalizable. This is the situation for many studies of innovations. A larger number of innovations crossing boundaries could increase confidence in generalizability. A second limitation relates to the relative early time of adoption of these innovations, such that they may not yet show all of the changes that will characterize these innovations if studied at times later in their diffusion trajectory. For example, in the case of the Swedish Quality Registry, the project is at its beginning stage, thus, more changes will probably follow, as a sort of trial and error to learn lessons and move forward. A third limitation of this study is the bias of the expert coder in the process of unitization, he acted as a lone coder in analyzing the instances of change. His knowledge of the projects may have influenced the

coders during the discussion to resolve disagreements between coders. A third coder to check the unitization reliability would have precluded this limitation. Additionally, the intercoder reliability is somewhat low ($\alpha=.68$). Even though Krippendorff (2004a) suggests that reliabilities as low as .67 could be acceptable in exploratory studies (Lacy, Watson, Riffe & Lovejoy, 2013), a higher reliability would be desired.

The findings of this study do not elaborate the level of innovation attributes identified; only presence or absence in discussions related to changes in innovation was coded. Future research could improve upon this limitation by demarcating the level of compatibility, relative advantage, complexity, observability and trialability as high or low and explaining how these levels facilitate or hinder the overcoming of barriers for designers or implementers in diffusing innovations, as well as the valence associated with mention of those attributes (i.e., was compatibility being mentioned as good, or bad). The results do not detail either the cultural adaptations or content tailoring in cases when changes in the content happened. Future research can delve into these processes in the context of innovations moving from abroad to the U.S. Lastly, a larger pool of designers and implementers paired with a more rigorous quantitative analysis would allow for an examination of the degree of attribute emphasis related to changes made to innovations, and the achievement of fidelity of outcomes and health outcomes in the cases of health innovations.

APPENDICES

APPENDIX A

List of databases, books and websites used to search for social innovations

- Ashoka Foundation | www.ashoka.org
- Center for Health Market Innovations (CHMI) | <https://healthmarketinnovations.org>
- Crisp, N. (2010). Turning the world upside down: The search for global health in the twenty-first century. London: RSM.
- Global Social Benefit Incubator (GSBI) | <https://www.scu-social-entrepreneurship.org/gsbi>
- Information Technology and Innovation Foundation | <https://www.itif.org>
- Innovation in Healthcare at Duke University | <https://www.innovationsinhealthcare.org>
- Institute for Healthcare Improvement | <http://www.ihl.org>
- London School of Hygiene and Tropical Medicine at Imperial College London | <https://www.lshtm.ac.uk>
- Mental Health Innovation Network | www.mhinnovation.net
- Skoll Foundation | www.skoll.org
- The Commonwealth Fund | <https://www.commonwealthfund.org>
- World Innovation Summit for Health (WISH) | <http://wish-qatar.org> |

APPENDIX B

List of 39 innovations found to meet at least one of the four criteria

Combined list of innovations from RWJF-Project Advisory Group and Team Search	Countries of origin
1. 3Nethra	India
2. Access Mobile International	Uganda
3. Aflatoon	Netherlands
4. AgeWell	South Africa
5. Apopo	Mozambique
6. Aravind Eye Care Model	India
7. BasicNeeds Model for Mental Health	Kenya
8. Big White Wall (BWW)	United Kingdom
9. Buurtzorg Model (Dutch for neighborhood care)	United Kingdom
10. Call & Check Visit Program	United Kingdom
11. Cardiff Violence Prevention Model	United Kingdom
12. Ciclovía	Colombia
13. Ciudad Saludable	Peru
14. Community Aging in Place Advancing Better Living for Elders (CAPABLE)	United States
15. ConsejoSano	Mexico/United States
16. Cuba's Health Record	Cuba
17. DaVita In-center dialysis	Sweden
18. eRanger Motorbike Ambulance	United Kingdom
19. Esther Model of Elderly Care	Sweden
20. Forest Bathing	Japan
21. Girls not brides	Bangladesh
22. iKure Techsoft	India
23. Maori practices that facilitate healing from historical trauma.	New Zealand
24. MedicalHome	Mexico
25. MedicallyHome	United States
26. Microclinic International	Palestine
27. Namati	United States/Sierra Leone
28. Naryana Health	India
29. Nepal's Female Community Health Volunteer Program	Nepal
30. Noora Health	India
31. Preventing crime in cooperation with the mental healthcare profession	Netherlands
32. Slum Dwellers International	South Africa
33. Sproxil	Nigeria
34. Swedish Rheumatology Quality Registry	Sweden
35. The Afghan Institute of Learning	Afghanistan

36. Together for Mental Wellbeing	United Kingdom
37. UNIMED	Brazil
38. Universal Basic Income program	United Kingdom
39. Upstream Health Innovations	United States

APPENDIX C

Semi-structured interview protocol

Global Ideas for U.S. Solutions
SOCIAL INNOVATION LEADERSHIP
TELEPHONE INTERVIEW PROTOCOL

Interviewee's Name:

Date:

Organization:

Interviewers:

Thanks again for agreeing to talk with us today about _____.
[Introduce ourselves]

The information that we are collecting is being done with funding from the Robert Wood Johnson Foundation. Our team involves researchers at Michigan State University, the University of Hawaii and Arizona State University. Our meeting will last roughly 1 hour or a little longer. Do you have any questions for me before we begin?

Personal Information

First of all, can you tell us about your own background and current professional responsibilities?

Questions about Resilient Innovations

1. Let's begin by telling me the story of _____. How did this all come about?
 - a. Where did this begin?
 - b. Why did _____ take the form that it did?
 - c. Can you tell us more about the international origins of _____? How did it move to the US?
 - d. Were there some stops & starts along the way? Can you tell us about those?
2. When you describe _____ to people, what do you say? What, for example, are its pros & cons? What are the positive aspects to _____? What are the challenges that people encounter when trying to understand and implement it?
3. Do you find that the origin of _____ is sometimes perceived as a negative by others who may want to adopt the model? Who has responded most negatively, and why?
4. Did you have any professional training in (the program) area, or did you learn on the way?

Questions about Linking Agents

4. I want to ask you about how people learn about _____. Not so much those community members or patients or clients who can benefit from the program or the service personnel who deliver the program to them, but rather those leaders—elected officials, health system decision makers, nonprofit CEOs, maybe researchers or social activists or media personnel, and others—who may want to try this model in their own community. How do they tend to learn about it?
 - a. In the case of _____, have there been special individuals—perhaps including yourself—who are particularly effective at spreading the word about _____?
 - b. Has _____ spread from community to community, and if so, how did that happen?

c. How do individuals like this convince others to take _____ seriously as something that works that they might want to try?

Questions about Partnerships

5. Now let's discuss organizational partnerships and what kind of a collaboration it takes to bring an innovation like _____ to a new country to benefit a new population. What international or national organizations are behind _____? Have you worked together directly with them? And then, what about organizations locally that you work together with? By *working together*, I mean the ways that you got work done, in terms of leadership, management, communication, and the coordination of resources.

Probe if necessary: Do you have partnerships at different levels? For example, nationally and locally? If so, how does communication and coordination occur between those levels?

6. Okay, thanks. Now tell me how the partnerships work.

- a. What are the roles of the partners? What is each organization responsible for?
- b. Which organizations have played lead roles in this partnership? Was there any particular person/organization that played a connecting role?
- c. How important is the partnership for spreading _____?
- d. Have you been directly contacted by people interested in replicating the _____ model?

Questions about Scale Up Strategies

7. How did _____ try to grow or spread to new communities? Or, how would you describe the scale up strategy of _____? What are the reasons for your approach to growing?

8. How well has this strategy worked so far for scaling up _____? Has this strategy been combined with other strategies? Have you moved on from one strategy to another? If so, why?

Questions about Adopting Communities

9. As _____ has moved from community to community, has the innovation changed? For example, have later-generation implementers targeted different types of people as beneficiaries? Or maybe partnered with community organizations that you hadn't originally tried to partner with?

10. Sometimes innovations like _____ are changed to better suit a new community. Has this happened with _____? How so?
Why were changes made?

This is great, thank you.

11. What do you see as the big challenges for keeping _____ running? Funding, staffing? Training? Are there things that you or your team do to keep _____ operating correctly?

12. Do you collect process or outcome data about _____? Do you monitor things? I am really interested in what you pay attention to. Could you tell me about it?

Probe if necessary: Process data can involve, for example, the number of adopters. Outcome data can include, for example, the number of patients who suffer from a disease.

Are there new reports or slide decks that you can send me about results?

Questions about Environment

Okay, we're getting close to being done!

13. Let's turn to things that you can't control but that may affect how well _____ rolls out or is done in communities. Are there social, environmental, or political factors outside of your team and partnerships that affect what you are able to do and how quickly you can scale up _____?

Probe if necessary about budgetary allocations, framing of the issue and solution, timing, policies, and aspects of the community into which the innovation moved.

14. Looking back, what was the greatest challenge in your effort for the success of _____? How did this influence the work of _____? Would you do things differently now? How so?

That is all the questions that I have for now, but do you have any other comments about the scale up of _____ that you would like to add?

I want to thank you again very much.

Would you be willing to review a draft of our report where we describe your program to ensure it's accurate?

Also, would you like a copy of the report that we produce for RWJF?

Lastly, I wanted to ask you about the possibility of a site visit, so that we could see what _____ is like in person. Is there one or more implementation site that we could visit and arrange to talk with those in charge? Who would be the best person to talk with?

Names, titles, city, email

Thanks again!

APPENDIX D

List of journal articles, reports, and blog posts consulted for each innovation

1. Cardiff Violence Prevention Model

- Florence, C., Shepherd, J., Brennan, I., Simon, T. (2011). Effectiveness of anonymised information sharing and use in health service, police, and local government partnership for preventing violence related injury: experimental study and time series analysis. *BMJ*, 342, d3313. doi: <https://doi-org.proxy2.cl.msu.edu/10.1136/bmj.d3313>
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APPENDIX E

Criteria for sub-changes

Sub-changes	Operational definition	Examples
Change in format or component	Comments related to a change in the configuration or the delivery of the innovation, a modification in the design of a component, or the selection of a component.	<p>“When we were in Mexico, we delivered messages by mail, but now we use telephone. Everyone has a telephone now.”</p> <p>“and so the adaptation piece was for all of our emergency departments, all four, they decided to put it in the electronic health record instead of it being paper and pencil and that the nursing staff would collect it versus the registration staff in Wales.”</p>
Change in content or target	Comments about a change in the wording of a component, a type of activity, or finding a new population target for the innovation.	<p>“We've been using that conceptual model as a way of adapting and planning forward with different populations.”</p> <p>“We have been able to adapt our programs for whatever communities we're in. Some of that is about: revising the questions, changing languages from English to Xhosa; in Ireland, different words; in New York, different words.”</p>
Change in partnership	Comments indicating that the implementation of the innovation does not involve the same type of partnerships than in the original innovation.	<p>“So, we had to find another foundation who is going to put up money to essentially fill that gap. It took us another 6-9 months to find a foundation to fill that gap.”</p> <p>“SS has put together a violence prevention board or group, which does not include precisely the same agencies as we have in our group [...]. So, there are business representatives through the business community, community groups, and church groups for example.”</p>
Change due to context or other	Comments surrounding a change mentioned, but related to specific rules, laws, cultural,	“Since you know, the policies in the US differ from Mexico, we had to comply with American regulations.”

	social or political environment of the adopter.	“No, in fact today we don’t offer any care navigation from a physician directly to the patient. All services, because of the requirement of the Medicaid and Medicare government program, all services have to be provided by onshore US based providers. ”
Change in mission or personnel	Comments about an addition of a new purpose to the innovation, or the implication of new personnel for the implementation.	<p>“They have about one third of the people from Asian decent, one third is Hispanic and one third is White, but they don’t mix a lot. For example, when they were deciding their routes, something that was very important for them was to mix all the different groups and the different ethnicities, so they had that very much in mind.”</p> <p>“It was the vision and the understanding of the advisory committee as well as the partners knowing that history, explaining and discussing that history on a very unapologetic way, and using the Open Street model as a way to sort of heal all wounds and bring memories of the community together around as one thing that they all can call their own. ”</p>

APPENDIX F

Changes in innovation study protocol

Introduction

This *change in innovation* protocol is aimed at assessing the types of changes made to an innovation as it diffused from a country to another and the DOI attributes discussed when changes have been made. It examines designers, researchers, proponents, implementers, partners and adopters interviews about innovations in their communities and what factors may explain the changes.

In the Diffusion of Innovations (DOI) research and practice paradigm, the terms “reinvention” and “adaptation” have been used for decades interchangeably to refer to purposive changes made to innovations during the process of diffusion. The goal of this study is to present a clear distinction of the types of changes that can be made to innovations on the basis of the agents of change.

Five prosocial innovations that are either in an early stage of diffusion into the U.S., or well established in U.S. communities, are the objects of study. Twenty-seven (27) transcribed interviews, comprised of 436 single-spaced pages, with designers and implementers involved in these five pro social innovations are considered. Only text that reflects comments on changes by interviewees and initially coded by an expert coder are being examined.

Definitions

The following four definitions are important in selecting and analyzing the content under study.

Types of changes

Both reinvention and adaptation are considered as changes made to innovation. For this study, we include the source of the change as part of a broad definition :

- Reinvention: Reinvention represents changes made to an innovation by designers, researchers and proponents of innovation to increase the likelihood that it will be a good fit with potential adopting systems such as organizations or communities.
- Adaptation: Adaptation represents changes made to an innovation by adopters and implementers of those innovations once the innovations have been adopted in their communities or by their organizations to make it fit to their context.

These changes can be organizational, cultural or contextual. There can be several types of changes of different natures. In those five innovations, we expect to find mentions or iteration of:

- Change in the format of delivering the innovation or some components of the innovation
- Change in the content or the target
- Change in the partnership
- Change due to the context of the adopter or other
- Change in the mission or the personnel

Reasons for changes:

Innovation attributes

We want to understand why designers or implementers made the changes to the initial idea. They may perform changes because the innovation is too complex for adoption, or because during the trial, they find it incompatible with their needs or past experiences. In other words, the reasons may be the innovation characteristics or attributes.

The innovation characteristics are defined as:

- 1- *Relative advantage*: This is the degree to which an innovation is perceived as better than available options of the same type. The relative advantage can be expressed in terms of cost and benefits to the potential adopters, such as financial resources that can be lost or gained.
- 2- *Compatibility*: This is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters.
- 3- *Complexity*: Complexity refers to the degree to which an innovation is perceived as difficult to understand and use. *Simplicity* is the opposite of complexity, it is the degree to which an innovation is perceived as simple to understand and use.
- 4- *Trialability*: Trialability is the degree to which an innovation may be experimented with on a limited basis.
- 5- *Observability*: Observability refers to the degree to which the results of an innovation are clearly visible to potential adopters.

The Context of diffusion

Context - The cultural, social, and political environment in which adopting systems and the innovation exist.

Descriptions of the five innovations

The five innovations under study are defined as follows:

- 1- Cardiff Model: Originating in the United Kingdom, the Cardiff Violence Prevention Model provides a way for communities to gain more information as to where violence occurs and how to prevent it by forming partnerships between hospitals and law enforcement and others interested in violence prevention.
- 2- Ciclovía: Originating in Columbia, a free community-based and recreational program in which certain streets are closed momentarily to automobiles for cyclists, roller-bladers and pedestrians.
- 3- ConsejoSano: Originating in Mexico, ConsejoSano is a private small company that contracts with health insurers and community clinics in the U.S. to help clinics convince poor and disadvantaged community members to come to the clinics for health services.
- 4- Swedish Disease Registry: Originating in Sweden, the Swedish Disease Registry enables both patients as well as health care providers to input information about a patient's progress in care.
- 5- AgeWell Global: Originating in South Africa, AgeWell Global is a new model of elder care coordination combining peer-based social engagement and mobile technology to improve health outcomes and drive down medical costs.

The original innovations

- 1- Cardiff Violence Prevention Model (United Kingdom)
 - Collection, anonymization and sharing of the data by the hospital. The IT department anonymizes the data, strips out all the personal identifiers and shares the data with the law enforcement in the city.
 - Analysis and summary of those data by an analyst who combines the Emergency Department data with what the police knows about violence.
 - Using the violence hotspot maps, implementation of prevention measures by the Violence Prevention Board.

- 2- Ciclovía (Colombia)
 - Day of the week and duration of program: every Sunday and holiday, from 7 am to 2 pm
 - Program dates per year in most recent year: 72 events per year
 - Length of route (km): 121 kilometers/75 miles
 - Connectivity to parks and/or places of cultural interest:
 - Public transportation access to route even when the program is running
 - Complementary programs and activities:
 - Special events: Bicycle Day (every 2nd Sunday of the month); Ciclovía by night (2 times a year)
 - Volunteer Engagement Program: Guardians of Ciclovía
 - Availability of safety and first aid at program.
 - Promotion and marketing strategies.
 - Government is the main sponsorship.

- 3- ConsejoSano (Mexico):
 - The idea of Consejo Sano comes from a health advisory service established in Mexico called Workplace Wellness Council.
 - The Council provides wellness programs to American companies for their employees in Mexico.
 - With the presence of a huge Spanish-speaking population in the U.S., the creators of the Wellness program started to offer services for Spanish-speaking population in the U.S.
 - They partnered with a telephone company in Mexico to provide healthy advice to this Spanish-speaking population both in Mexico and at the beginning in the U.S.

- 4- Swedish Rheumatology Quality Registry (Sweden) (cf. Batalden et al.):
 - Patients report to a registry their own symptoms, health and quality of life prior to visit.
 - Clinicians add examination and laboratory data to the registry in which patients can check their test results and report their symptoms on a frequent basis.
 - Synthesis and graphic display of the patients health status and a longitudinal

image showing their personal health and treatment over time.

- A clinical decision support tool (or dashboard) allows discussion, joint decision-making about the patient's care, and the subsequent tracking of outcomes by the patient, the patient's family and clinicians.
- The data from each visit is exported to a national registry.
- Clinicians and care teams in the country can work together to ameliorate patient population health.
- The network of patient allows information sharing and support.

5- AgeWell Global (South Africa)

- Able older adults (Agewells) are trained and employed as companions to visit less able older adults in their home to provide health content and social content services.
- Health content: early warning system, monitoring of chronic conditions, referral to doctors and social service
- Social content: companionship (home visits/calls), connect to community activities relief for worried families
- Agewells use smart phones loaded with a mobile application to identify evolving health problems and initiate appropriate services: 1. Survey 2. Embedded analytic program based on responses to 1 3. Decision on referrals or not.
- Connection between Agewells and elders through: hospital discharge program and community-based program

Coding Scheme for the attributes of innovation

Code Name	Code	Conceptual Definition	Operational Definition	Decision/Coding Rules	Examples
DOI – Relative Advantage	1	The degree to which an innovation is perceived as better than the already existing idea. The innovation is presenting some advantages to both the adopting unit and the organization implementing it.	Comments regarding individual perceptions that the innovation is either advantageous or disadvantageous or presents lower cost and good benefits when compared to a previous idea. The benefits may be for the adopters and the implementers of the innovation. Include comments that refer to evidence of effect.	Also code how the relative advantages are discussed in terms of 11. Economic benefits 12. Other benefits	<p>“ Let’s say it is a special event, by deciding to organize it, you get 30% reduction in your fees if you do this. I think, really, I think, there are so many ways you can put together a very reasonable and viable cost estimate to do it.” (111)</p> <p>“...like you know this service was a fraction of what we are used to in the country. This would be a great opportunity to reduce the burden in the hospitals...” (112)</p>
DOI – Compatibility	2	The degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters. The innovation can be	Comments regarding individual perceptions that the innovation is either consistent or inconsistent with their needs or community system. Comments may refer to the past experience of the adopters justifying the	Also code in terms of how the innovation is consistent with: 21.Past experience 22. Needs of potential users	<p>“It breaks tradition and that’s scary to some of us, although that does not change how they felt about it.” (221)</p> <p>“I mean this was convenient for the</p>

Code Name	Code	Conceptual Definition	Operational Definition	Decision/Coding Rules	Examples
		implemented because the adopters need that type of service, or before its introduction, they needed an idea like that.	adoption of that innovation, or the existing needs before and after the innovation has been introduced.		hospital. That was something they wanted to look at upstairs for some time now” (222)
DOI – Simplicity	3	The degree to which an innovation is perceived as simple to understand and use.	Comments regarding individual perceptions that the innovation is either easy or difficult to understand, simple or uncomplicated.	Also code in terms of how easy it is to use or implement the innovation: 31. Understandability 32. Usability	<p>“And I think in essence a lot of these issues are fairly simple and if they’re broken down to the simplest denominator....”(331)</p> <p>“They have an intellectual appreciation for the idea, but they don’t know a lot about how it run, how it works, and what they had to do to install it in the ER...” (332)</p>
DOI – Trialability	4	The degree to which an innovation may be experimented with on a limited basis.	Comments made indicating the degree to which they had the opportunity to try the innovation in the community or with stakeholders. The ability to try the innovation a little at a time even though it will or will not be adopted; or the ability to try it without	Also code in terms of extent of trialability: 40. Little at a time 41. Without loss of resources	<p>“I gave it a five on it’d be easy to try to use, because there are different sizes and whatever, you know, for whatever your budget would allow you to try it.” (441)</p> <p>“I don’t know enough about how many nurses it</p>

Code Name	Code	Conceptual Definition	Operational Definition	Decision/Coding Rules	Examples
			loss of resources, thus getting lessons from it.		would take to integrate the questions. When we did it, it did not take a lot of our time.” (442)
DOI – Observability	5	The degree to which the results of the innovation are visible to other, or its process is visible, or the innovation is working.	Comments made about results of the initiative either highly visible or not visible to the adopters or participants. Includes any comments about partners or other people using the same idea, examples of initiatives that are occurring outside of their communities, comments noting that participants had been exposed to these initiatives, or that they can see the innovation in action or the results of the innovation in action.	Also code in terms of extent of observability 51. Visibility of process 52. Visibility of results or outcomes	<p>“We had a team that went over there, and visited care teams there and met patients. And really tried to learn and think through what are all the elements that are happening here? What would it take to implement it back in the US? (551)</p> <p>“In only 11 months, we turned it into a major event in the city, thousands of people participate! Every week, we open up and people come out to walk, bike, skate, and run.” (552)</p>
Other	6		Comments that do not relate to any of the DOI attributes.		

Decision rules

- When deciding between the innovation attributes
 - Read the selected thought-unit and decide whether or not it is one of the five attributes. For each case, you insert the corresponding value in the coding sheet. Look for words that convey the general sense of the definitions.

- When deciding between sub-attributes
 - 1: Relative Advantage - Comments regarding individual perceptions that the innovation is either advantageous or disadvantageous or presents lower cost and good benefits when compared to a previous idea.
 - 11: economic benefits – the innovation is more or less cost effective for the adopting unit or the implementing organization
 - 12: other benefit – the innovation offers advantages related to health or other advantages for the implementing organization
 - 2: Compatibility – comments regarding individual perceptions that the innovation is either consistent or inconsistent with their needs or community system.
 - 21: Past experience – the innovation activities or components are either consistent or non consistent with the adopters past experiences
 - 22: Needs of potential user – the innovation activities or components are either attuned and compatible or not compatible with the needs of the potential users (individuals or communities)
 - 3: Simplicity – comments related to whether or not it was easy or difficult for the interviewees to use or implement the innovation, whether or not the innovation was simple or uncomplicated.
 - 31 Understandability: Comments stating how easy, simple, not difficult, it is to understand the innovation or some essential components of the innovation.
 - 32 Usability: Comments stating how difficult it is to implement, or use the innovation.
 - 4: Trialability – comments made indicating that the interviewees or people involved in the implementation of the innovation perceive it can be tried on a limited basis without loss of resources for adoption or not.
 - 41 Little at a time – the innovation has been tested or a piece of it has been tried, and the adopters were able to go back to it and make changes.
 - 42 Without loss of resources – the innovation has been tested or tried without loss of resources, thus getting lessons from it for further improvement.
 - 5: Observability – comments made indicating that the results of using an innovation or the process of implementing it are perceived to be visible.
 - 51 Visibility of process – the adopters or implementers have been able to experience it and see the process of implementing the innovation
 - 52 Visibility of results or outcomes – the adopters or implementers have been able to see the results or the innovation in action.
 - 6: Other – Comments that are not related to any of the above.

Before each coding session

- Read the codebook first to refresh your mind about the concepts.
- Understand how the innovation is implemented in the country of origin. This is very important. Always make sure to read the descriptions of the innovation from the country of origin.
- During the coding:
 - Please follow this order when coding the transcripts:

1- A and I (one)	8- D and IV (four)
2- G and VIII (eight)	9- V-VI (five-six)
3- F and VII (seven)	10- E and IX (nine)
4- i and X (ten)	11- J and XI (eleven)
5- K and XIV (twelve)	12- H and XII-XIII (thirteen)
6- B and II (two)	13- XV-XVI (Twelve and Fifteen)
7- C and III (three)	

List of codes

Code Names	Codes	Qualifiers
DOI – Relative Advantage	1	11. Economic benefits 12. Other benefits
DOI – Compatibility	2	21. Past experience 22. Needs of potential users
DOI – Simplicity	3	31. Understandability 32. Usability
DOI – Triability	4	41. Usage a little at a time 42. Usage without loss of resources
DOI – Observability	5	51. Visibility of process 52. Visibility of results or outcomes
Other	6	

Coding sheet

Coder's Name :

Date :

Source Title:

Comment Number	Code for main attributes	Code for qualifiers

Agreement sheet

Source title:

Comment Number	Coder 1	Coder 2	Agreement before Discussion	Agreement after discussion	Expert Coder Decision

Appendix G

Examples of changes in the U.S. compared to country of origin for five innovations

	Some attributes of the innovation in the country of origin	Changes in U.S. side
Ciclovía	<ul style="list-style-type: none"> • Duration of program: every Sunday and Holiday, from 7 am to 2 pm. • Program dates per year in most recent year: 72 events per year. • Length of route: 75 miles (121 kilometers). • Complementary programs and activities: Special events - Bicycle Day (every 2nd Sunday of the month) and Ciclovía by night (2 times a year); Volunteer Engagement Program: Guardians of Ciclovía. <p><i>Source : Hipp, Bird, van Bakergem, & Yarnall, 2016; Montero, 2017; Sarmiento, 2017; Sarmiento, Torres, Jacoby, Pratt, Schmid, & Stierling, 2010; Torres, Sarmiento, Stauber, & Zarama, R., 2013.</i></p>	<ul style="list-style-type: none"> • Duration and dates of program varies depending on geographic locations; none goes from 7 to 2 pm or during 72 times per year. • Length of the routes varies between 2 to 26 miles. • Activities vary depending on locations and partnering organizations.
Agewell	<ul style="list-style-type: none"> • Partnership with community service organizations • Able older adults (Agewells) trained and employed as companions to visit less able older adults in their home to provide health content and social content services such as companionship (home visits/calls), connection to community activities • Agewells use smart phones loaded with a mobile application (called 20/20 Health Screening Tool) to identify evolving health problems and initiate appropriate services : 1. Survey 2. Embedded analytic program based on responses to survey 3. Decision on referrals to doctor or not. • Connection between Agewells and elders through: hospital discharge program and community-based 	<ul style="list-style-type: none"> • Partnership with community organizations serving seniors and health care delivery systems. • Customization of content in the 20/20 tool (review of the questions, the rating and the ranking of answers to the survey). • Prospective selection of the mobile application as a service approach instead of the entire set of activities.

	<p>program. <i>Source : Flaspohler, P., Straker, J., Nelson, M., Hannah, G., 2018; Agewell Global Presentation, PDF Document shared with the MSU Diffusion Research Team.</i></p>	
Consejo Sano	<ul style="list-style-type: none"> • Partnership with a telephone company in Mexico to provide healthy advice to Spanish-speaking employees of American companies both in Mexico and at the beginning in the U.S. • Care navigation from a physician directly: the employees had to make the call to be connected to a doctor <i>Source: Mason, A., 2019; Taylor, Escobar, & Udayakumar, 2017.</i> 	<ul style="list-style-type: none"> • Partnership with health insurance companies, clinics and Federal health centers offering government programs to reach low-income population. • The company sends tailored content SMS or calls the target population for reminders or appointments. • Tailoring of content to specific ethnic population.
Cardiff Violence Prevention Model	<ul style="list-style-type: none"> • Collection of data by nurses with paper and pencil using simple Cardiff questions to • Anonymization and sharing of data by the hospital: hospital IT department anonymizes the data, strips out all the personal identifiers and shares the data with the crime analyst in the city. • Analysis and summary of those data by an analyst who combines the Emergency Department data with police data about violence. • Using the violence hotspot maps, implementation of prevention measures by the Violence Prevention Board. <p><i>Source: Florence, Shepherd, Brennan, Simon, 2011; Hobor, G. & Leviton, 2018; Mercer-Kollar, Jacoby, Ridgeway, Kurnit, Sumner, 2017; Warburton, Shepherd, 2004; Yarbrough, 2018.</i></p>	<ul style="list-style-type: none"> • Collection of data by nurses through an electronic health record . • Treatment of data by a research institution, the hospital or the police depending on the location. • Expansion of the Cardiff questions to add other types of injuries.

<p>Swedish Quality Registry</p>	<ul style="list-style-type: none"> • Three modules (patient, clinical and national) consistent with information technology for data storage. • Reporting of patients' own symptoms, health and quality of life prior to visit in a registry. • Clinicians add examination and laboratory data to the registry in which patients can check their test results and report their symptoms on a frequent basis. • Synthesis and graphic display of the patients' health status and a longitudinal image showing their wellbeing and treatment over time. • Export of the data from each visit to a national registry, forming a large database suitable for research to improve patient population health. <p><i>Source: Batalden, et al. (n.d.); Eriksson, Askling, & Arkema, (2014) ; Nelson et al. (2016)</i></p>	<ul style="list-style-type: none"> • Partnership with national disease-specific foundations to apply the SRQ model to different chronic disease populations. • Redesign of the technology component during trial.

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