COMPARATIVE ANALYSIS OF HEALTHCARE INNOVATION IN
ISRAEL, IRELAND, AND SWITZERLAND:
A SYSTEMATIC LITERATURE REVIEW

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My manuscript is dedicated to the entire Elefant Family Herd! They say, *It takes a village to raise a child!* Thank you for the unconditional love and support of my Adorable Mama and Adorable Papa. Always standing by my side 100% of the time. And, in memory of my handsome pitbull, Zeus, "God of the Skies." We rescued each other; and now he is my angel. (10/8/2017).

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ABSTRACT

COMPARATIVE ANALYSIS OF HEALTHCARE INNOVATION IN
ISRAEL, IRELAND, AND SWITZERLAND:
A SYSTEMATIC LITERATURE REVIEW

by Sharon R. Elefant

Objective. To systematically evaluate and compare healthcare innovations in three geographically small nations, Ireland, Israel, and Switzerland, and to explore the factors that contribute to both innovations and diffusions of innovations.

Design. Systematic review of published articles.

Data Survey. CINAHL, ProQuest, PubMed Central, Google Scholar and Citation Lists. All articles published 2017 and earlier will be included in the search.

Review Method. Articles describing innovation in healthcare, diffusion in innovation, and/or innovation indicators in Israel, Switzerland, and Ireland were selected for review. Only scholarly journals were accepted.

Results. The data analysis for this systematic review followed the PRISMA guidelines that encapsulated the basic eight steps for systematic review process. Academic search engines were used to identify studies relevant to the topic under study. The CASP checklist was used to evaluate the quality of the study, along with determining whether the study met the eligibility criteria for this systematic review. Eighty-nine full text sources were included in the final assessment, and 57 of these were excluded from the final review because, while some appeared in scholarly journals, these were either webpages, conference papers, commentaries, interviews, or news related. The 32 remaining full text articles were included in the review.

In addition to the systematic literature review, six Subject Matter Experts were interviewed. Participants' responses showed clear perspectives on the critical success factors

necessary for healthcare innovation to thrive within a country and an organization. Their responses overlapped in answering each of the research questions. The principal areas of concern included committed leadership, collaborative cultures, cost effectiveness, planning, and future-oriented thinking. These areas were the top critical success factors for healthcare innovation. However, these also represented concerns about and barriers to it. The absence of these factors potentially stalled innovation in a country. This stall occurred if that country lacked openness to new ideas or was extremely risk adverse. These various factors required further study to understand the overall effect on healthcare innovation in different contexts.

   Conclusion. Small nations that innovate in healthcare benefit the most from government subsidies of research and development. Additionally, benefits accrue exponentially with strong global partnerships. The development of national and international partnerships occurred when existing internal information was shared at the beginning of the innovation process. Connecting healthcare stakeholders is necessary for improving innovation experts. Developing new methods of measuring innovation will significantly aid in understanding the influence of adaption and diffusion of innovations in healthcare systems. The implications of this study suggest that our understanding of innovation and innovation diffusions have the potential to lead to adaptations. However, we don't yet fully understand the most efficacious way to measure innovation and its impact on society.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

MANUSCRIPT

INTRODUCTION

"The best antidote to stagnation is innovation, the creation of products and services that make life better—whether it's air conditioning, vaccines, or text messaging" (Coy, 2017, para. 2). In an economy, innovation is widely recognized as a "central driver of economic growth and development" (Dutta, Lanvin, & Wunsch-Vincent, 2017, p. 5). Healthcare innovations not only improve the quality of life for those who are ill or injured, but also improve daily health, economic growth, and national prosperity. The purpose of this study was to explore the factors that contributed to the ability of geographically small nations to be healthcare innovators and to discover if there is a "broad formula for innovation" that can be replicated (Coy, 2017, para. 3). The intent was to review innovation factors in innovative nations of a comparable size, so that other small nations may find innovation practices and critical success factors to leverage for a benefit. The nations of Ireland, Israel, and Switzerland are known innovators and are roughly comparable in size. This study explored the extent to which all three nations were innovators and the extent to which the innovations diffused on a global level varies.

What factors, such as economic, political, social, or cultural, may contribute to the innovation drive? What forces will contribute to a successful global diffusion of innovation? What factors contribute to innovation in the healthcare field? In what ways does a strong government partnership with the healthcare systems encourage or discourage innovative research and practices? In what ways do core cultural values contribute to the innovation drive?

The purpose of this study was to compare healthcare innovations in geographically small nations and to explore the factors that contribute to both innovations and diffusions of innovations. The Organization for Economic Co-operation and Development (OECD) works

with multiple nations to improve economic relations and quality of life. In part, the OECD (2016b) mission stated the purpose was to

> (P)romote policies that will improve the economic and social well-being of people around the world. The OECD provides a forum in which governments can work together to share experiences and seek solutions to common problems. We work with governments to understand what drives economic, social and environmental change. (para. 2)

Additionally, at the 50-year mark, the OECD (2016b) stated that a key focus was to "foster and support new sources of growth through innovation, environmentally friendly 'green growth' strategies and the development of emerging economies" (para. 5).

The OECD (2016b) presented a wealth of innovation and healthcare information about 35 countries, including emerging, developing, and developed countries. Ireland, Israel, and Switzerland have all experienced rapid growth, and these offer stories of "successful rapid innovation-based industrial growth in the time span of one generation" (Breznitz, 2007, p. 3). In addition, Israel, Switzerland, and Ireland are members of the OECD.

Indicators, such as health expenditures per capita and gross spending on research and development, have been useful in exploring healthcare innovations. For example, according to the OECD (2016b), Switzerland has the highest health expenditure and one of the lower expenditures on research and development (Table 1 and 2). Israel has the highest expenditure on research and development but one of the lower health expenditures. Ireland has the lowest expenditure on research and development but one of the higher health expenditures. Although these data do not reflect the quality of healthcare, the metrics have been used to show what value a country puts on research and development in relationship to healthcare expenditures to understand innovations in a country.

Table 1. Health and R&D Expenditure

Country*	R&D Expenditure (Total of GDP)	Health Expenditure (% Share of GDP)
Ireland	1.512	9.40
Israel	4.253	7.40
Switzerland	2.968	11.50

Note. *Information on Ireland, Israel, and Switzerland from OECD, 2016a.

Innovation measurements are changing, as social scientists realized, "The challenge is to render statistical systems more flexible and responsive to the introduction of new and fast-evolving concepts" (OECD, 2016b, para. 12). Innovation researchers are asking new questions and seeking new data. Perhaps a more telling measurement of innovation may be the identification of the number of intellectual property rights applications in a country. Figure 1 shows the number of resident applications from 2013 to 2015 in Switzerland, Israel, and Ireland.
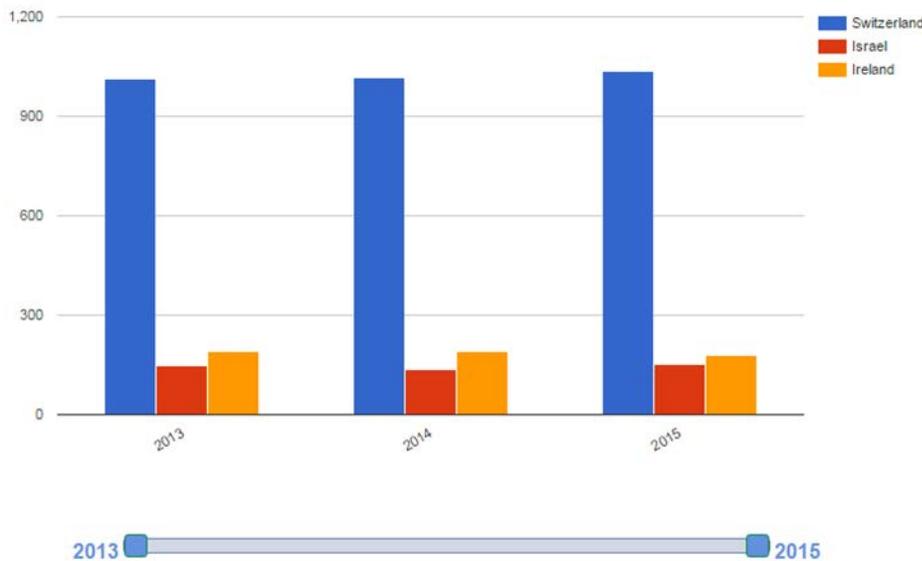

Figure 1. 2013-2015 Intellectual Property Rights Applications: Switzerland, Israel, and Ireland

Switzerland has significantly more applicants for intellectual property rights patents compared to Israel or Ireland. Ireland stayed static for 3 years, but Israel and Switzerland both experienced some slight increases in 2015. A measure of the number of patent applications in

comparison to other countries and a measurement of growth or decline of those applications within a country over time may offer researchers new ways to examine innovation dynamics. The implication of looking at an indicator, such as patent applications, may inform ways in which manufacturers in countries look for ways to sustain and grow the economy to encourage creative thinking. At the same time, one must be cautious. A country may be the leader in the number of patent applications. However, that does not inform researchers about the extent to which innovations are diffused and adapted. Currently, more questions exist than do answers. Researchers need linked and integrated measurements because "research on innovation in the broad sense is currently fragmented" (OECD, 2016b, para. 12).

Each of the three nations – Ireland, Israel, and Switzerland– are innovation nations. Each nation presents a unique environment that both nurtures and encourages innovation practices and procedures. The innovation nations serve as both lessons and caveats to other nations that seek to grow the economy.

MATERIALS AND METHODS

Introduction

The purpose of this study was to discern a better understanding of what makes a culture of healthcare innovation allowed for the identification and potential replication of best practices. Understanding these areas aided other nations in achieving a culture of innovation. The perceptions, experiences, and opinions of subject matter experts provided insight into the factors supporting the creation of a culture of innovation and for determining any relevant critical success factors.

This chapter shows the results of the systematic review and the data collected from interviews with subject matter experts. The final data collection and data analysis are discussed. A summary of the results concludes the chapter.

Research Questions

The main research question of the study stated the following: What are the critical success factors for healthcare innovation in small nations? There were four sub-questions explored in the study:

1.   What are the critical success factors in health care innovation?

2.   How do healthcare innovations differ from one country to another? What are the environmental factors that affect the development of healthcare innovation in a specific country?

3.   How do personal beliefs and culture of a country affect the success of healthcare innovation?

4.   What are the barriers in the development and success of healthcare innovation?

Do these barriers differ from one country to another?

Research Sample

Two distinct research samples comprised the study: the group of subject matter experts and the three countries (i.e., Israel, Ireland, and Switzerland). These countries were compared regarding healthcare innovation. In this research study, each expert panelist was selected according to his or her knowledge about health innovation, his or her willingness to be on the panel, his or her involvement in healthcare innovation/research, and his or her familiarity with the country and its culture. Purposive sampling was used, and four panelists participated in the study. They were asked to answer questions and review the summary of findings from the systematic review, as well as to provide their general reactions, opinions, and experiences in healthcare innovation. The second sample consisted of a comparison of three health systems in Israel, Ireland, and Switzerland. These four countries were selected based on the following criteria: They were small nations; they have a history of innovation; and they allocated a portion of their GDP spending to Research and Development (R&D).

Data Collection Method

This study used two types of data collection methods: systematic review of relevant literature and expert panel interview. The systematic review of relevant literature was conducted for two reasons: (a) to identify and define small nations and (b) to identify CSFs for healthcare innovations. The expert panel interview was conducted to identify barriers, experiences, and opinions of ways in which healthcare innovations could be more readily adapted by small nations from the perspectives of selected subject matter experts.

Systematic Review

The design of this systematic review was a qualitative analysis of the definition of small nations and identification of CSFs for healthcare innovation. The systematic review study design used the Critical Appraisal Skills Programme (CASP) checklist (ppendix A) and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Appendix B).

Information sources and search strategy. The information sources used in this study included the use of four multidisciplinary databases: CINAHL, ProQuest, PubMed Central, and Google Scholar. Keywords were used to determine the relevant studies. Keywords included *innovation OR diffusion of innovation AND healthcare innovation AND innovation indicators.* Only scholarly or peer-reviewed articles were included in the search. Reference lists of all eligible articles were manually examined to identify additional relevant studies. All articles published 2017 and earlier were included in the search.

Study selection. The selection of studies included in the systematic review was completed in accordance to the inclusion, exclusion criteria set for the study using the CASP checklist and the guidelines set forth by PRISMA. The PRISMA flow diagram (Appendix A) showed the results of the evaluation and analysis of empirical literature of the systematic review. The diagram reported the number of studies screened and kept or omitted from the review based on the inclusion and exclusion criteria.

The first part of the search selection process identified sources for potential studies related to the study. The second part screened abstracts of the potential studies using the inclusion and exclusion criteria established. The third part, which was the eligibility process, included thoroughly screening the studies using the full text of the study. The last part of the

inclusion process was to finalize which of the studies were included for further analysis. The

inclusion and exclusion criteria in Table 2 was used to determine which of the studies were

included or excluded.

Table 2. Inclusion and Exclusion Criteria for Systematic Review

Inclusion criteria	Exclusion criteria
Key responders: Subject matter experts	Language: Not in English
Time frame: Oldest on record to June 2017	Originality of Work: Not original
Industry focus: Healthcare sector	Type of article: Commentary, editorial, paper conference, non-peer-reviewed articles
Research method: Quantitative, qualitative or mixed methods	
Features: Innovation systems, critical success factors, innovation protocols	

Data Collection Process

Data collection started by searching for research studies that were eligible for the

systematic review. The retrieved research studies were appraised to ensure eligibility and quality

for the systematic review. The screening process mainly focused on reviewing the abstract first,

and then the full text of the research studies. Once all research studies were reviewed and

appraised for eligibility and quality, the researcher finalized the list of included research studies

for the systematic review. The final list of research studies was then subjected to a thorough full-

text analysis, and information related to the objective of the study was retrieved individually.

Data Extraction Forms/Instruments

Two data collection instruments were used in this study. The CASP, based on the

Cochrane method, was used to evaluate the quality of each study regarding worthiness to be

included in the study. The 10 screening questions on the CASP checklist were used to help the

researcher think systematically about research issues. If the first two questions were answered

with a *no*, then the study was automatically rejected from further consideration. Each study was evaluated for bias and validity for inclusion or exclusion by answers to the 10 questions on the CASP. In order to be included in the study, the report or study needed a *yes* response to nine or 10 of the CASP questions.

The second data extraction instrument was the data extraction form (Appendix C), which was used to summarize data from the individual studies related to the data needed to answer the research questions and other pertinent information about the study. This extraction form was designed to provide information about the database searched, type of research/source (journal article, report, and database), purpose of the study, duration of the study, key interventions used, data analysis methods, data collection procedures, timing of intervention strategies, and outcomes of the study reviewed.

Expert Panel Interview

The expert panel interview was conducted to identify barriers, experiences, and the opinions of selected subject matter experts on ways in which small nations could adapt healthcare innovations. Interviews were conducted in a semi-structured way; meaning, the interview protocol served as the guide in asking questions (Allwood, 2012). Panel interviews were conducted via email. In addition to the questions used in the interview protocol, the interviewer asked panel members to review the findings, provide their general reaction, discuss CSFs, and offer their own insights from their professional experiences with healthcare innovation. Subject matter experts were asked to comment on CSFs relevant to a culture of innovation.

RESULTS

Systematic Review of Results

The data analysis for this systematic review followed the PRISMA guidelines that encapsulated the basic eight steps for systematic review process. Academic search engines were used to identify studies relevant to the topic under study. The CASP checklist was used to evaluate the quality of the study, along with determining whether the study met the eligibility criteria for this systematic review. Two types of screening were used to determine the final list of studies included in the systematic review – abstract screening and full-text screening. The abstract screening was conducted to screen out studies that had immediate characteristics not suitable for the systematic review, for example, irrelevant topic or absence of prevention programs. The full-text screening was conducted to further screen out studies that had characteristics not readily identifiable when the abstract was used, such as missing acceptable explanation on the assumptions used and incomplete data presentation. The results from the data selection process were displayed using the PRISMA flowchart diagram (Figure 2), which showed the specific number of studies identified, screened, and found eligible for the study and the number of records ultimately included in the study.
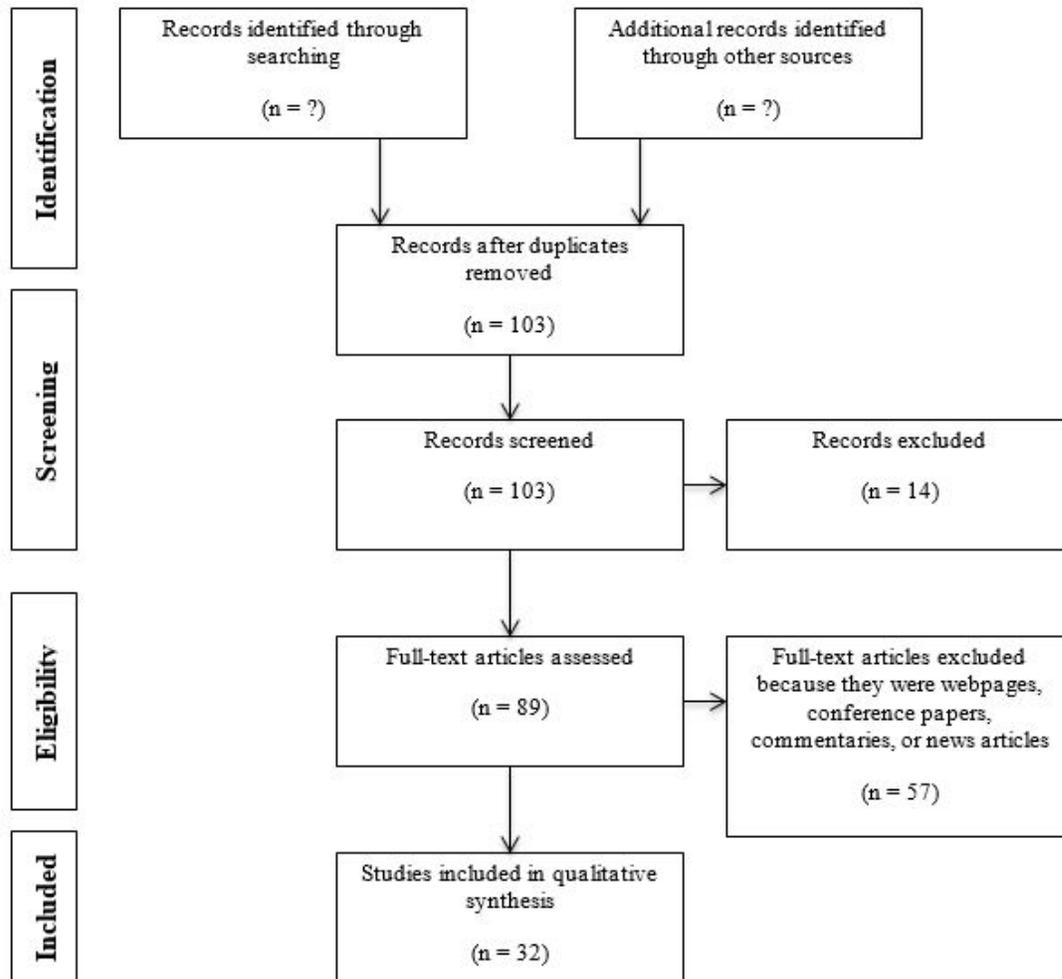
Figure 2. PRISMA Flow Chart

Eighty-nine full text sources were included in the final assessment, and 57 of these were excluded from the final review because, while some appeared in scholarly journals, these were either webpages, conference papers, commentaries, interviews, or news related. The 32 remaining full text articles were included in the review. Appendix D shows a complete summary and classification of these 32 articles organized alphabetically by author. The summary includes the author and year, database, features, purpose of the study, duration, data collection procedures, data analysis methods, and conclusions.

Content analysis of the 32 studies was conducted by summarizing the focus and methods of the studies. The analysis examined different focus areas of the studies. This examination included determining the level of analysis of the study, whether it was individual, group, organizational, or multilevel. The analysis included defining the focus of the innovation in the article, including adoption, generation, or diffusion of innovation. The examination regarded the types of innovation where the focus was organizational practices, structures, technologies, or roles. Analysis included whether the focus of the article was on healthcare innovation or innovation alone. In addition, the analysis examined if the article focused on revealing content about innovation development and practices or the focus was on modeling processes and practices. Lastly, the analysis determined the country or global perspective of the article.

The methods used in the majority of the studies were qualitative in nature ($n = 28$ or 88%). Of the qualitative studies, the most common methods used included literature searches and secondary data analyzed with content analysis ($n = 20$, 72%). There were four case studies (14%), including those conducting program evaluations, analyzing mini cases with a business model framework, and analyzing a historical case study with comparative analysis. The remaining four qualitative studies (14%) used various methods for collecting in-person qualitative data. These methods included semi-structured interviews, workshops, key information interviews, online forums, and questionnaires. Analysis methods included cross-sectional content and descriptive data analysis. The three quantitative studies (9%) included two by using secondary data analyzed with structural equation modelling and regression analysis. Another study analyzed data collected by telephone, email, and surveys. The mixed methods study (3%) combined questionnaire data and semi-structured interviews. The quantitative data were analyzed with principal components analysis.

A majority of the studies focused on a multilevel perspective about innovation ($n = 19$, 60%). While an organizational perspective accounted for nine studies (28%). The remaining studies focused on group level and individual innovation perspectives (12%). The majority of studies focused on either innovation generation ($n = 13$, 41%) or diffusion of innovation ($n = 14$, 44%). Only five focused on the adoption of innovations (15%). The type of innovation most focused on was practices with 17 studies (53%). Eight focused on technology (25%). Five focused on structures (16%) and two on roles (6%).

The articles were split equally (50% each) among those focused on healthcare innovation and innovation alone. Twenty articles (63%) focused on revealing content providing descriptions of issues and environments supporting or inhibiting the adoption, diffusion, or generation of innovation. While 12 articles (37%) discussed general and specific processes and methods for supporting innovation development and diffusion.

The analysis also focused on culture, critical success factors, and environment. These three areas regularly overlapped in the review, as most articles touched on at least two of these. Eleven of the articles discussed culture (34%); 24 examined or at least touched on critical success factors (75%); and 20 included elements of environment, as these influenced innovation processes (63%). Twenty-three of the articles (72%) provided a country specific focus; six articles included more than three countries; and four were from Ireland; however, 2 of the 4 examined Ireland with India and the United States. Five were from Switzerland, five from Israel, and one from the United Kingdom. One article included the United Kingdom, United States, and Italy.

Summary of Findings

This section provides a summary of some of the most relevant findings from the results. These were organized by topics that could be related directly back to the study's research questions. These included critical success factors and barriers to innovation, differences existing across countries, and the influence of personal beliefs and culture.

Critical Success Factors and Barriers to Innovation

The results indicated that critical success factors were directly in line with barriers to innovation. The existence of a critical success factors contributed to successful innovation development. However, that same missing critical success factor became a barrier to it. Critical success factors ranged from adequate funding, well-developed policies, collaboration, communication, open environments, planning, to diverse perspectives (Akenroye, 2012; Azarmina, Prestwich, Rosenquist, & Singh, 2008; Baregheh, Rowley, & Sambrook, 2009; Brady & Saranga, 2013; Bullinger et al., 2012; Daniel, 1961; Green, Fortin, Maclure, Macgregor, & Robinson, 2006; Kenny & Reedy, 2006; Parston et al., 2015; Sackman & Kuchenreuther, 2013; Srinivasan, 2013; Von Bremen et al. 2005; Wass & Vimarlund, 2016; Yaya & Danhoundo, 2015).

A critical point made in the literature related to developing a solid definition of innovation that integrated the diverse perspectives, beliefs, and experiences about the concept (Baregheh et al., 2009). Developing such a definition had the potential to contribute a better understanding of the success factors and barriers to innovation. In another case, a conceptual framework was created to improve the definition and identify the range of barriers to innovation that needed to change to critical success factors (Akenroye, 2012). The conceptual framework

14

showed social concerns, sustainability problems, unstable operating environments, funding problems, technology developments, and environmental changes. Critical success factors to overcome these barriers meant introducing innovation drivers by addressing cost challenges, supply chain issues, and sustainability problems.

Innovation occurred within individual and organizational settings with four enablers in place, including vision and strategy, promoting diffusion, specific funding, and transparency through communication networks (Sackman & Kuchenreuther, 2013). A company dedicated to innovation had adequate funding, supportive management, competent staff, and an open environment (Daniel, 1961; Kenny & Reedy, 2006). The company also spent time planning and improving data management, and planning required incorporation of environmental, competitive, and internal information (Daniel, 1961). These factors appeared especially necessary for healthcare innovation, as this advanced with the presences of two critical factors, education advancement, and money for research and development (Parston et al., 2015; Sackman & Kuchenreuther, 2013). Overcoming barriers occurred when implementing planning and creating a culture adapted to change.

Information sharing and the development of national and international partnerships were also major points. This sharing occurred when external information integrated with existing internal information at the beginning of the innovation process. Countries attempted to improve innovation by implementing reforms by including such steps and by introducing public contracts, provider competition, and international partnership development (Yaya & Danhoundo, 2015). In one example for healthcare innovation, results showed the necessity for implementing evidence-based practices by learning through different country's experiences in this manner (Azarmina et al., 2008). Successful implementation depended on the development of relationships among

15

payers, practitioners, and patients. Findings from another study also showed the necessity for determining new methods of connecting healthcare stakeholders to improve innovative efforts, especially in response to growing costs and decreased availability of funding (Von Bremen et al., 2005).

Many researchers did not point out a single critical success factors. Critical success factors appeared to work in conjunction to overcome barriers to implementation. These factors included the discussed range of factors including funding, partnerships, collaboration, openness, communication, planning, and more. The results of one study clearly showed this point (Green et al., 2006). The study showed that a comprehensive quality improvement model for developing innovation only worked correctly when including the complete set of critical success factors for the translation.

Differences in Healthcare Innovations Across Countries

Critical success factors and barriers were also embedded in the differences and similarities in innovation development across countries. Results showed countries all facing similar concerns and needs in healthcare (Biller-Andorno & Zeltner, 2015; Foray & Hollanders, 2015; Gemen et al., 2015; Kartner, 2016; Parston et al., 2015; Yaya & Danhoundo, 2015). The identification of new environmental concerns was increasing, such as aging populations, disease outbreaks, and healthcare gaps contributing to the need for medical advancements. Countries' leadership attempted to improve innovation by implementing reforms, including introducing public contracts, provider competition, and international partnership development. However, many reform efforts remained inadequate to handle the underlying problems. Suggestions for improvement included implementation of new technology, such as telehealth and decentralized

healthcare delivery models. However, assessment of these changes was limited, and no countries have yet achieved sustainable changes.

In Switzerland, the literature identified both strengths and areas of improvement in the Swiss healthcare system (Biller-Andorno & Zeltner, 2015). Concerns included changing demographics (aging population), increased costs, and shortages of trained professionals, overtreatment, and a need for a learning-based healthcare system. Implementation of these plans centered on publicly funded health-centered research and development, creation of a national network for healthcare quality geared toward transparency and service quality, and increasing focus on the development of technology (e-health tools and electronic data management; Biller-Andorno & Zeltner, 2015; Foray & Hollanders, 2015). The process of innovation was developed through a focus on future-oriented thinking, a continued successful track-record, focus on technology development, strong academics, spending on health, and expanding international presence (Von Bremen et al., 2005; Whyte, 2005). In one example, the Swiss government sought to improve innovation by implementing changes to an adapted national innovation system framework based on nine recommendations (Marxt & Brunner, 2013). These included promoting knowledge transfer, increasing the budget, and creating regional innovation centers.

In Ireland, conditions for innovation were similar. When implementing innovation, various aspects of company culture and commitment to innovation in Ireland influenced innovation (Bullinger, Rass, Adamczyk, Moeslein, & Sohn, 2012; Kenny & Reedy, 2006). These included having sufficient funding and resources, supportive management, competent staff, an organized and well-developed plan, and an open environment. The development of new healthcare technology also required stakeholder support and information exchange (Bullinger et al., 2012). The open communication provided support for using open innovation methods to

17

incorporate stakeholders into healthcare research to improve and foster innovation. Optimal environment conditions were necessary to attract international companies, which contributed the most to innovation.

Israel also developed healthcare innovation and technology by advancing education and spending money on research and development (Sackman & Kuchenreuther, 2013). The country's leadership implemented the process by focusing on innovation and being reliant on research-intensive industries. Israel had a rich history of innovation and growth, in particular by growing its educated and diverse population, having high quality healthcare, focusing on strategies to overcome global crises, and investing strong international partnerships (Becker, 2005; Sackman & Kuchenreuther, 2013). One example showed ways in which Israel used cluster innovation to build these partnerships and improve innovation networks among Israel and the Silicon Valley (Engel & del-Palacio, 2011). In addition, and like Switzerland, Israel's leadership spends time examining the strength of innovation in the country to determine potential areas of improvement (Ben-Nahum & Erez, 2012; Brand, 1988). The "Israel 2028" policy report identified gaps in innovative activity occurring between hi-tech and low-tech industries (Ben-Nahum & Erez, 2012). To address the gaps, the country continued to support industrial R&D, encourage start-ups, leverage scientific and technological labor force, facilitate the academic-industrial interface for scientific, and increase technology knowledge transfer. Support for an innovative culture derived from high autonomy, risk taking, tolerance of mistakes, and limited bureaucracy.

While differences existed between countries, these countries also had many similarities, which was a critical point in the results, as countries attempted to find different approaches to sharing innovation (Brady & Saranga, 2013; Harris, 2010; Ramasamy & Yeung, 2016). An example, derived from comparing India and Ireland, showed existing business models used in

hospital settings (Brady & Saranga, 2013). Differences were found in vertical integration and labor force flexibility. However, the study pointed out that different approaches to innovation could be shared. Ireland's hospitals had fully integrated systems with diagnostics and accommodation. Whereas, India had low-cost operations and high cost equipment, essentially avoiding expensive professionals and outsource diagnostics.

Results showed ideas and innovations regarding healthcare can be shared equally between developed and emerging countries. Implementation only needed to include policy planning and buy-in from the people. In an example focusing on the innovation process in both the American and Irish contexts, the results showed the United States could learn from the Irish experience (Harris, 2010). Ireland focused on international partnerships, directed policymaking, and including experts and the public on goal setting to improve quality of life. America practiced varied policy making between elections contributing to costly and ineffective policies. States lacked focused research and development that contributed to scattered innovation efforts. This finding appeared to limit innovation due to cost. Conclusions showed the United States should follow Ireland's lead by focusing more cultivating talent, investing strategically in research and development, and developing targeted legislation to take advantage of the intellectual capital existing in the country. The results, regarding the differences seen across countries, also overlapped with the questions about the influence of beliefs and cultures on innovation development.

Influence of Personal Beliefs and Culture of Country on Innovation

Personal beliefs and culture in different countries and organizations influenced innovation development in diverse ways. Some of these influences involved the makeup of the

country and beliefs about openness and communication (Parston et al., 2015; Ramasamy & Yeung, 2016; Shane, 1992). In one example, incorporating diversity showed support for innovation (Ramasamy & Yeung, 2016). Ethnic diversity and diverse values were separate issues, with ethnic diversity negatively influencing innovation. However, diverse values support innovation. Countries had both types. Ethnically homogenous countries with diversity in values appeared as the most successful at innovation. Being open to partnerships and collaboration introduced critical success factors and successful implementation, which occurred during the adaptation of a U.S. disease management and health promotion program for use in Italy and the United Kingdom (Azarmina, 2008).

Shane (1992) found that innovation was best implemented in individualistic societies with open and outward looking views. These societies possessed openness, information sharing, and small firms that were more innovative. Innovators required compensation, and senior leaders had to be supportive. Characteristics, supportive of innovation, included independence, achievement, and non-conformity. Results implied two areas of concern for managers. Certain societies had comparative advantage in inventiveness. Essentially, if true, this meant such nations made the best locations for research and development for multinational corporations. Another key point of Shane's (1992) findings showed that cultural values operating at the national level also operated at the organizational level.

Country and organizations with culture adaptive and willing to handle change aided in overcoming barriers to innovation development (Becker, 2005; Parston et al., 2015). Some of these changes occurred by investing in intellectual capital and continued international partnerships (Becker, 2005). Results indicated such a culture supported the capacity to innovate. Support came from a culture supportive of autonomy, risk taking, tolerance of failure, and

20

limited bureaucracy (Ben-Nahum & Erez, 2012; Harris, 2010). Countries and organizations needed access to increased knowledge and the ability to use that knowledge to improve. Policies and practices required synchronization to disseminate knowledge and promote innovation. This support for access also appeared to result in countries gaining the ability to share innovation efforts. Brady and Saranga (2013) found that ideas and innovations about healthcare could be shared equally between developed and emerging countries if the culture was open. Leadership using implementation had to consider policy development and buy-in from the people.

Again, culture played a vital role in innovation development because most cultural considerations showed long-standing influence on a nation's tendency to practice innovation at the national level (Efrat, 2014). This point showed that a culture not open to collaboration or sharing might demonstrate barriers to implementation. Hsiao and Hsiao's (2014) findings showed what occurred if a culture was open to collaboration. Their findings indicated that in context, the most emphasis was placed on cultural innovation, then cultural development, and lastly theoretical development. The major identified evaluation indicators included current trends, national spirit, cultural integration, management, and cultural restructuring. The results showed improved construction of a culturally innovative society and state policies. However, other findings indicated that that while it was possible to share innovation across countries, little information existed on the incorporation of innovations in different contexts. This knowledge was necessary to understand the adoption processes, financing mechanisms, and delivery methods, without which inhibited development (Harris, Bhatti, & Darzi, 2016).

This section provided a summary of some of the most relevant findings from the results of the systematic review. The results showed the research pointed to critical success factors existing in alignment with barriers to innovation and that no single critical success was

identified. Differences and similarities seemed to exist across countries either contributing to or inhibiting successful collaboration. Finally, results indicated positive and negative aspects of personal beliefs and culture that also either contributed to or inhibited innovation.

Expert Panel Interview Results

Content analysis was used to analyze the data gathered from the panel interviews with the six subject matter experts. Content analysis gave the researcher the opportunity to develop descriptions and make sense of the opinions, perceptions, and experiences reported by the participants during interviews (Mitchell & Jolley, 2012). These descriptions were formed through the identification of emerging themes, concepts, and ideas from across all participant responses (Krippendorff, 2013). Thus, content analysis investigated the repetitive ideas, themes, and patterns in the interviews and tried to combine and integrate the thematic pieces together into an integrated whole. After completion of the interviews with all participants, each of the participant's email interviews were transcribed verbatim and uploaded into NVivo 10 software.

Qualitative software called NVivo 10 was used to assist in analyzing the transcribed data collected from email interviews. NVivo 10 was designed to support individuals performing qualitative data analysis by systematically evaluating and interpreting texts or audio files. NVivo 10 is a software program that helps the decision maker to sort and provide emerging themes, concepts, and categories from qualitative information, such as the data gathered from personal interviews. Once the codes were established, overarching and recurring codes were reduced to major themes. Once the themes emerged and categories were provided, the researcher interpreted the themes to provide insight regarding the CSFs, as well as the barriers, to healthcare innovation from the perspective of subject matter experts. The results of the content analysis were organized

22

in a corresponding manner to the research questions. The findings provided information regarding the participants' background experience, critical success factors necessary for healthcare innovation, barriers to innovation, the influence of culture and personal beliefs on innovation, and the type of environment necessary for innovation to occur.

Questions asked were as follows:

1. Background

   a) What is your current position?

   b) What previous positions have you held relevant to healthcare innovation or innovation in general?

   c) Do you have direct experience with Ireland, Israel and/or Switzerland?

2. What would you say are the top 3 critical success factors for health care innovation?

3. What kinds of environmental factors affect the healthcare field in the development of innovation?

4. In your observations and experiences, in what ways might personal beliefs and culture of a country affect the success of healthcare innovation?

5. What barriers or challenges have you observed in the development and success of innovation/healthcare innovation?

6. In your professional opinion, can you please describe the kind of work environment that nurtures and encourages innovation in healthcare?

Participants' Background Information

Six participants provided information regarding their current position, direct experience in the countries of interest, and any previous relevant experience. Their positions included a chairman of a management group, a hospital CEO, a chief executive officer, compliance officer, the director of a large health management association in Europe, and a faculty member in the healthcare leadership department of a university. Previous experience showed expertise from the fields of consulting, education, and training in life sciences and health care. Their experiences also indicated years of experience from new technology examination and assimilation. They worked in the research and development field for academic institutes and in the public sector. Positions included quality management director and information officer. Combined experiences spanned more than 30 years in public, private, and non-profit groups. The four participants also brought direct experience working in Switzerland, Israel, and Ireland. Their expertise provided information regarding the factors and barriers to successful healthcare innovation in different contexts.

Critical Success Factors in Healthcare Innovation

Participants' responses revealed their top recognized critical success factors in healthcare innovation. These factors showed the need for committed leadership, collaboration, cost effective plans, organization, and forward-thinking ideas. These factors combined contributed to success in innovation.

Committed and collaborative leadership. P5 stated, "An encouraging environment" was necessary. While, P3 noted the necessity of "senior leadership buy-in [and] commitment to innovation efforts." Leadership was a necessity for guiding and building support for innovative

ideas. In the healthcare context, P1 noted that critical a critical success factor was "that they are patient led doctor driven," pointing to a collaborative style of leadership necessary for success in innovation. This type of collaborative leadership was also connected to "an open and blame free organisational culture" (P4). The commitment and collaborative efforts of leadership laid the foundation for an organization open to new ideas. P2 stated, "Improvisation & adjustment capabilities [were critical factors because] many times when materializing a new idea, things are not as they seemed when you started, be ready to adjust, change and improvise on the fly." Improvisation did not seem to occur easily without supportive leadership committed to innovation.

Cost effective and solid organizational plan. In addition to supportive leadership, responses noted that success connected to cost effectiveness and having a solid plan for developing innovation. P1 and P2 stated funding was a concern for policymakers and organizations. Policymakers considered, "Legislative and other costs and patient safety are in balance not excessive" (P1). Essentially, innovations required a solid organizational plan to consider the cost, while still meeting patient needs. Having a solid organizational plan was also a consideration as part of "an organisational framework for improvement" (P4). Having a plan in place aided in directly innovation efforts, especially because new ideas came constantly and not always with success. P2 stated, "Fail fast, learn fast, improve fast - time is one of the scarcest resources available, learning iterations must be fast and efficient, if not, the runway of the company will run out before reaching a valid product market fit." These statements showed that innovation happened quickly, and cost was a constant concern for organizations and governments. With those under consideration, cost effectiveness and planning might make the difference between success and failure in successful innovation.

25

Innovative and forward thinking. In conjunction with supportive leadership, collaboration, and cost-effective planning, success depended on actual innovative and forward-thinking behavior. All six participants noted success connected to a forward thinking and innovative approach. P5 stated, "Understanding the need, creative mind 'out of the box way of thinking" promoted innovation. P3 mentioned systems thinking, and P4 pointed to leadership connections. Part of those forward-thinking approaches meant understanding that innovation sometimes included failure. P2 stated, "Understanding and accepting that failure is an option, and a valid one at that. Cultures which do not accept failures are afraid to try new approaches, thus lacking in innovation." Organizations and cultures required this way of thinking to find real success and innovation. In addition, P1 noted a forward-thinking approach also meant rewarding innovative thinking "that real innovations that help deliver patient value are rewarded and not the incremental no value added." The old methods for approaching health care delivery would not support continued growth. P6 also indicated that innovation and forward thinking was important to a country's growth, and innovation sometimes required risk. P6 indicated, "A culture's attitude toward risk and reward might influence the approach toward innovation. A risk-averse culture or environment might take a more measured approach to developing alternatives."

Environmental Factors Affecting the Development of Healthcare Innovation

Participants pointed out both positive and negative factors within the overall environment influencing healthcare innovation within different contexts. These factors included environmental health changes occurring in the population. In addition to overlapping with described critical success factors were funding considerations, increased wealth, and information

issues. Finally, the introduction of new technologies and industry rivalries influenced innovation development.

Environmental and health changes. Responses pointed to the "aging of populations" (P1) as a new environmental and health consideration for healthcare industries in these nations. Participants introduced the need for increased innovation and ideas for types of care centered on these groups. P2 noted health concerns, such as "outbreaks of diseases and viruses, will trigger a large investment in funds regarding innovation in healthcare." Increased funding would be a positive influence on innovation, but outbreaks created cause for concern.

Healthcare innovation also lacked stronger connections between environmental and health concerns. This point showed a need for innovation in these areas. For example, P4 stated that while "the link between environmental issues and health are not as strong as they should be (e.g., carbon neutral hospitals), things are improving." This statement implied that perhaps the current environment might not have strong linkages between research and healthcare concerns that the environment was moving toward support for developing healthcare innovation. P6 indicated that the environment could have an effect on the population's health. P6 used the example of bicycle lane creation to indicate that the environment could influence population health. According to P6,

> Fifty-seven percent of commuters in Copenhagen bicycle to work. The infrastructure of separated bike lanes promotes safe commuting. This is augmented by trains and buses that can carry bicycles, adequate bicycle parking at the train stations, facilities to wash at the workplace, flexible childcare situations to allow for drop-off and pick-up of children around the work schedule. The outcome is a healthy, non-obese population. But, the environmental infrastructure contributes to that outcome.

Funding, increased wealth, and information issues. Noted as a critical success factor, funding appeared as an ongoing concern for the participants (P1, P3). This concern was in addition to increased wealth and better-informed patients influencing the healthcare system. P1 noted the existence of "more wealth and more informed patients." The existence of these two points indicated a shift in priorities, as funding needed to increase to support the necessary innovation in healthcare. The increased funding and patient concerns also pointed to the need for better accountability and examination of incentives and information sharing between stakeholders. P5 pointed out the environment should be one of "openness, a system that encourages critical thinking and willingness for change." P1 noted an example of this need for increased accountability was the existence of the "wrong incentives in the health care system for different parties." These factors combined showed the potential for creating an environment either favorable to or potentially hostile to the development of good healthcare innovation.

Multiple new technologies and rivalries. The current environment for healthcare innovation in these nations was one of new technologies and industry rivalries. Each participant noted technology changing the environment for healthcare. P1 stated, "Convergence of new technologies from different fields" pointed to innovation and development. However, "hostility in consumer-based innovation (by industry rivals) [existed]" (P3). New technology appeared as a positive environmental factor contributing to better development of healthcare innovation. Rivalries had the potential to either support better innovation or disrupt the development in healthcare technology.

Work Environment that Nurtures and Encourages Innovation

Participants also described the type of work environment contributing to successful innovation. Some of these descriptions overlapped with described critical success factors. Responses included a work environment that was collaborative and focused on learning. In addition, the work environment needed established leadership and government support for innovation. Lastly, success was contingent on the presence of an innovative and focused mission.

Collaborative and learning focused. A healthcare environment needed everyone to be collaborative and focused on advancement. For participants, this meant "patient involvement early on (not patient reps)…and hav[ing] project mgmt.. skills available…, involvement of stakeholders. Careful participation of industry and insurance firms" (P1). P3, P4, and P6 emphasized the necessity of a learning culture. P4 said, "You need an organisation that demonstratively values learning." P3 stated, "Learning culture is the most appropriate environment for the development. Learning cultures focus on improvement, diagnose why errors occur, break past previous performance levels, learn from patients (or customers), monitor, and adjust their plans/operations." Therefore, the consensus appeared that the combination of a collaborative and learning focused environment laid the foundation for successful innovation. P6 indicated that creativity and the ability to learn from other healthcare systems was important to lasting cultural change. P6 indicated, "Creativity and the ability to learn from other health care systems. This is linked to cultural change in making a commitment to make some of those changes."

Established leadership and government support. Part of the collaborative effort also depended on the established leadership and support from the government. In a healthcare environment, medical staff needed to take the lead and guide the discussion. P1 noted, "[They]

have lead doctors and teams in the lead." Staff would be working together to support innovation. In addition, as noted by P2, "Government support regarding funding and tax reliefs help encourage any innovation, healthcare included."

Innovative and focused mission. Along with the collaboration, leadership, and support, the ideal environment required an innovative and focused mission. These conditions seemingly depended on the existence of a focused plan. P1 stated these plans needed "clear definition of innovation at hand and focus on patients, fun and learning not on reducing costs and saving one's job." Having the mission focused on innovation meant that stagnation did not occur and priorities were in alignment. This focus was important because a good plan "draws upon the knowledge and experience within the organisation and which makes time to review and evaluate what it does" (P4). These statements showed innovation thriving in such an environment and contributed to "implementation and sustainment of innovation" (P3).

Personal Beliefs and Culture Effect on Healthcare Innovation

Participants noted several ways in which personal beliefs and culture influenced healthcare innovation. These also overlapped with the other responses. Themes included collaboration considerations, government and policymaker decisions, and technology and innovation concerns.

Collaboration considerations. Collaboration had the potential to be problematic or a positive point in cultures that had beliefs for or against working together across groups. P1 noted, "Doctors believe being able to lead teams, [however some] believe that doctors and health administrators cannot work together." This statement pointed to the consideration of the different roles existing within an organization and culture and the development of partnerships to improve

development. In Israel, an open environment invited collaboration: "Israel is famous for the culture of innovation" (P5).

Government and policymaker decisions. Given the earlier points about the importance of government support and funding, these parties played a role in effecting healthcare innovation. P1 stated the "belief of policy makers that health care is a cost and must be reduced on a budget level." This belief had the potential to influence funding for healthcare innovation. Policymakers had the potential to improve or inhibit innovation.

Technology and innovation concerns. Beliefs within a country or specific culture also contributed to the success or failure of healthcare innovation. P3 stated the following:

> Some cultures may find certain innovations to run contrary to their personal beliefs (e.g. – religious organizations against stem-cell research). By contrast, the openness of other cultures may provide advantages to innovation efforts (e.g. – Television ads for pharmaceuticals are allowed only in the United States and New Zealand – no other countries allow this opportunity for innovation in healthcare marketing.).

Those cultures supportive of certain innovations would contribute to the development of healthcare technology. However, others with less flexibility might inhibit development.

Barriers to Development and Success of Healthcare Innovation

The previous section showed the ways in which personal beliefs and cultural considerations influenced healthcare innovation. How open or closed a culture was contributed to success or failure. Several of those and previous points overlapped with the responses regarding barriers to successful healthcare innovation. These points included fear of or

unfocused innovation, funding problems, poor collaboration and leadership support, and unclear

or inefficient policies and procedures

Fear of or unfocused innovation. Fear or unfocused innovation seemed to contribute to

stalling innovation efforts. These problems came in the form of "innovation for its sake (vice

innovation for improvement" (P3). In addition, there was the mentality that organizations might

see innovation as separate from regular work. P4 noted, "Not least because innovation is often

seen as taking time away from doing the 'day job', when in fact innovation should be seen to be

part of doing the day job." This way of thinking could stymy innovation.

Participants also described the fear of the outcome of a new idea or having unclear ideas

moving forward. P1 stated, "People scared for outcome measures instead of being scared for not

learning or innovating. Unclear definitions of what innovation means in a certain situation.

Innovation is too vague and unpractical as concept." Such beliefs had the potential to stop

development from taking place.

Funding problems. Responses continued reporting funding and financial issues as a main

concern for innovation. P5 noted, "Funding for development" was a concern, while P1 noted an

existing "financial payment system does hinder innovation" represented a concern. P3 noted a

lack of funding existing or made available for innovation. Given that funding was a critical

success factor, the lack of funding indicated a barrier to successful development of healthcare

innovation.

Poor collaboration and leadership support. Participants reiterated that poor collaboration

and leadership support hindered development of healthcare innovation. P4 stated, "The

importance of support from the top that stays the course is crucial." However, the poor support

seemed to develop from "people just not wanting or being able to work together" (P1). Without

collaboration, ideas were left unshared. Other problems with collaboration stemmed from stakeholder support and "user or customer/patient acceptance [and] lack of accountability" (P3). Any lack of acceptance and accountability indicated poor levels of trust contributing to the poor collaboration and support. In addition, government presented problems with support due to "long governmental approval cycles regarding newly introduced technologies" (P2). These long cycles meant new technology remained out of reach, which halted growth.

Unclear or inefficient policies and procedures. Early responses also showed that having a solid plan contributed to successful innovation. However, within the industry "contradicting policies and hostility from health industry rivals" (P3) potentially impeded progress. P1 provided examples of what occurred when policies were unclear or inefficient:

> If something can be done cheaper the doctors and hospitals reward is that they must work harder and do not get any compensation. Existing protocols which are used as a fixed must follow instead of guidance. Poor data and it systems which are only focused on claim data and admin not on patient delivery.

These policies appeared to cause problems with communication between doctors and administration. Policies focused rigidly without room for improvement. Poor data and systems meant little innovation taking place in that environment. Each of these areas presented barriers to the development of healthcare innovation.

Summary

Participants' responses showed clear perspectives on the critical success factors necessary for healthcare innovation to thrive within a country and an organization. Their responses overlapped in answering each of the research questions. The principal areas of concern included

committed leadership, collaborative cultures, cost effectiveness, planning, and future-oriented thinking. These areas were the top critical success factors for healthcare innovation. However, these also represented concerns about and barriers to it. The absence of these factors potentially stalled innovation in a country. This stall occurred in particular if that country lacked openness to new ideas or the potential for failure. These various factors required further study to understand the overall effect on healthcare innovation in different contexts.

<center>Ethical Considerations</center>

Ethical norms for this study complied with the university's Institutional Review Board (IRB). Informed consent forms were given to all potential participants. The informed consent form included a brief discussion of the study background and its purpose. The tasks involved for a participant, as well as ways in which the data collection commenced and progressed, were delineated in the form. The possible risks, consequences, and procedures on withdrawal from the study were presented. The researcher specifically noted in the informed consent that participation in the study remained voluntary, and withdrawal at any time was possible without any financial, emotional, or physical consequences to the participants. In case of withdrawal, the participant had to inform the researcher about the intention to withdraw, and all information from the requesting participant was excluded for further analysis.

Confidentiality of information and anonymity of each participant's identification were ensured at all times during the course of the study. To ensure confidentiality, all information gathered from the participants was only accessible to the researcher, her supervisor, and her thesis committee members (upon request). Hard copies of the data were securely placed in a locked cabinet inside the researcher's office. Soft copies of the data were securely saved in a

<center>34</center>

password-protected flash drive and laptop, which were only accessible to the researcher. To ensure anonymity of participants' personal identification, a pseudo-code was used to tag each participant. For instance, Participant 1 was tagged as P01 instead of his or her personal name.

All hard copies and soft copies of the data are stored for 5 years, after which, these will be disposed. Hard copies will be shredded, while soft copies will be deleted from the flash drive and laptop. Dissemination and presentation of the data or the dissertation itself shall only include de-identified participants and data.

<div align="center">Trustworthiness</div>

Within qualitative methods, validity related to checking for the accuracy of the qualitative findings by applying certain methods and procedures (Thomas & Magilvy, 2011). However, the term *trustworthiness* was preferable to use for expressing the qualitative validity (Onwuegbuzie & Johnson, 2006). Trustworthiness also associated with the reliability of the research findings (Brinkmann & Kvale, 2015). Qualitative methodologists and researchers favored terms, such as credibility, dependability, and transferability over other terms, such as validity, reliability, and generalizability, to describe deferent aspects of trustworthiness (Denzin & Lincoln, 2011).

Credibility referred to the degree of confidence that data and data analysis processes were aligned with the research focus (Graneheim & Lundman, 2004). The issue of credibility was achieved through the design and plan of the research. Researchers should carefully select the method of collecting data that can best answer the research questions (Graneheim & Lundman, 2004). In this study, the researcher decided to use the interviews and systematic reviews as data collection methods because these had the potential to provide rich and in-depth information from

the participants and on the subject under consideration. Furthermore, developing interview protocol, conducting systematic review, and applying a well-planned process for coding and analyzing data were other ways to enhance the credibility of the results (Graneheim & Lundman, 2004).

Dependability dealt with "the coherence of internal process and the way the researcher accounts for changing conditions in the phenomena" (Bradley, 1993, p. 437). In other words, dependability was about satiability of data and the ways in which any changes in data might have influenced the researcher's decision-making (Graneheim & Lundman, 2004). Dependability was determined by the careful and continuous checking of the study processes to ensure their consistency (Zhang & Wildemuth, 2009). In this study, the researcher returned the interview transcripts to the participants for accuracy checking and revised the transcripts according to their feedback (if there was any).

Transferability related to the ability of "the researcher's working hypothesis to be applied to another context" (Zhang & Wildemuth, 2009, p. 314). Judgment about the transferability of the research findings was not one of the researchers' responsibilities. However, the researcher needed to facilitate transferability by clearly and comprehensively describing the culture and context of the research, the participants, the research procedures, and the findings (Graneheim & Lundman, 2004; Zhang & Wildemuth, 2009). The researcher considered these issues while designing the interview questions, interviewing subject matter experts, and analyzing the data. The researcher collected and presented detailed descriptive data and quotes from participants. All data collected, audiotapes (if permitted by the participants), field notes, and interview transcripts were kept in their original form.

Summary

A systematic review was conducted to compare successes in and barriers to innovative practices in Israel, Ireland, and Switzerland. The study identified and reviewed trends and practices in innovations, diffusion, and adaption via country studies. PRISMA was used to conduct the systematic review.

In addition, subject matter experts were selected to participate for panel interviews. These subject matter experts were selected based on their knowledge, experiences, and qualifications to assess innovation, diffusion, and adaptation in countries and their culture and/or in the healthcare industry. The qualitative methodology for interviewing subject matter experts included gathering relevant professional demographic data, as well as asking open-ended questions in a semi-structured interview that elicited meaningful information. Content analysis was conducted to analyze the information gathered from the interviews. NVivo software was used to aid in the conducting the content analysis.

DISCUSSION

Policy Implications

Why innovate? The benefits of supporting innovation in a small nation with strong global partnerships can mean the difference between economic sustainability or impoverishment during a severe world economic downturn. Additionally, nations that might lack natural resources could possibly improve the economy by exporting research and development in the form of innovations. Different nations have different comparative advantages. One nation might excel in research, while another might excel in marketing and distribution. Nations must collaborate to not only innovate, but also to diffuse innovations to the benefit of all. Moreover, government support of innovative processes has the potential to prevent "brain drain," which means providing an academic and entrepreneurial environment within which the brightest people can flourish, and the nation can be the beneficiary of research.

Problems and changes in the world can influence innovations. Conversely, "the diffusion of innovations explains social change" (Rogers, 2003, p. xviii). An outbreak of Ebola in an age of global transportation or an epidemic, such as AIDS, can influence the funding and rate of medical research and treatment innovations. World terrorism can affect the diffusion of innovation.

"Interactive communication technologies" (Rogers, 2003, p. xix) and the Internet have "spread more rapidly than any other innovation in the history of humankind" (Rogers, 2003, p. xix). With the onset of communication technologies and the interest, medical technologies, and health information (spurious or otherwise) have been a springboard for the circulation of innovative ideas, diverse treatments, and health innovations. Rogers (2003) suggested, "Such

38

interactive communication technologies may be changing the diffusion process in certain

fundamental ways, such as by removing, or at least greatly diminishing, the role of spatial

distance in who talks to whom about a new idea" (p. xix). With that circulation is the potential

for an increase in health innovation networks and the possible diffusion of innovations through

newly discovered partnership potential. However, along with the advent of technology's

potential to increase global partnerships and diffuse innovations is the caveat about the *digital*

divide. Not all nations have a robust technology infrastructure, nor do all health care facilities.

Other nations might be able to replicate some of the innovation successes experienced in

Ireland, Israel and Switzerland. Nations must identify the Critical Success Factors relative to

their culture and societal structure to help grow their own economy and infrastructure through a

robust and strategically built innovation program. Policy development can have a significant

impact on innovations. Key considerations include budget allocations for education, healthcare,

and investment in innovation through government resources. Designated research and

development funding, innovation incentives, the development and cultivation of global

partnerships are crucial factors in growing an innovation and innovation diffusion economy.

Nations must be strategically prepared to grow, to support the economy, and to ensure the health

of their communities.

Future Research

There are few studies on the consequences of innovation. Change agencies assume that

"the consequences of innovation-decisions will be positive" (Rogers, 2003, p. 440). This

assumption might be invalid. Researchers studying diffusion often used quantitative data when

they might be conducting long-term observations and doing case studies. Additionally,

innovation was difficult to measure and so were consequences. Those who adapted innovations might not even be aware of consequences. Indeed, long-term consequences would be difficult to predict, and predictions of such might be judgement-driven. Furthermore, cultural relativism, the notion that each culture should be judged against its own cultural norms, showed a distinct barrier to measuring or predicting universal consequences of an innovation. Rogers (2003) stated, "Consequences should be judged as to their functionality in terms of their user's culture, without imposing outsiders' normative beliefs about the needs of the client system" (p. 441). Unanticipated consequences could have a positive or negative effect on a system, depending on the social variables present.

Further research is needed regarding the equality in the consequences of innovations. The socio-economic gap might tend to widen, depending on the rate and location of an innovation's adoption and diffusion. For example, in the healthcare system those who have access to potentially life-saving treatments might be in the clinical trial stage or might be on the market, yet these were deemed *experimental* by insurance companies who will not cover their costs. Will early adopters get richer by experiencing windfall profits; thus, "the later adopters' gain is comparatively less" (Rogers, 2003, p. 457). How can socio-economic gaps be narrowed? What strategies can be employed to ensure that the benefit of an innovation reaches the most recipients? Studies that focus on the consequences of innovation and diffusion are needed so that early planning stages can better predict and manage the long-term effects of innovations on both individuals and cultures. The United Nations' Sustainable Development Knowledge Platform offers an opportunity to further the case of innovation and diffusion in the future.

A significant question remains. How do politics affect a nation's stance toward innovation? The current political climate of a country could possibly be a contributing factor to

the support of research and development or the cultivation of global partnerships. An additional future study area could include the role of internal or external strife and conflict in a nation or in that region. How could politics, strife, and the culture of foreign or native workers be a stimulus or a barrier for innovation?

A separate, but equally interesting aspect of understanding innovation could be studying the nature of innovation workers in a particular country. For example, are innovators and researchers mostly from other countries or are they indigenous citizens of that country, which leads to the next question. Are the countries themselves naturally and intrinsically innovative? In other words, is the innovation culture of a nation indigenous or imported?

We need to exert caution that we attend to evidence that innovation has a means to improve the health and the well-being of patients as well as that of the community. We need to know that developing a wonderful drug, for example, is going to be available to most patients and accessible, and that access to that drug will not be denied due to finances.

The implications of this study suggest that our understanding of innovation and innovation diffusions have the potential to lead to adaptations. However, we don't yet fully understand the most efficacious way to measure innovation and its impact on society.

LIMITATIONS

This research study focused on understanding a human cultural phenomenon through personal interviews with an expert panel and a systematic review of literature. Interviews, though having significant value, presented limitations. The interviewees' willingness to cooperate and their ability to articulate were not necessarily equal, nor were all people equally perceptive. Secondly, eliciting stories required questioning and listening skills that were not always consistent. Lastly and significantly, "Interviews are not neutral tools of data gathering; they are the result of the interaction between the interviewer and the interviewee in the context in which they take place" (Bloomberg & Volpe, 2008, p. 121). The interactions and contexts varied from one interview to the next, which introduced a subtext of questionable reliability.

CONCLUSION

Small nations that innovate in healthcare benefit the most from government subsidies of research and development. Additionally, benefits accrue exponentially with strong global partnerships. The development of national and international partnerships occurred when existing internal information was shared at the beginning of the innovation process. Connecting healthcare stakeholders is necessary for improving innovation experts. Developing new methods of measuring innovation will significantly aid in understanding the influence of adaption and diffusion of innovations in healthcare systems.

APPENDICES

APPENDIX A

LITERATURE REVIEW

Defining Innovation

Ted Levitt stated, "Just as energy is the basis of life itself, and ideas the source of innovation, so is innovation the vital spark of all human change, improvement and progress" (as cited in Sutevski, 2017, p. 11). Innovation and culture are large topics that have various aspects, applications, and levels of impact on a community. To define innovation with one definition is impossible. The variety and diversity of definitions and applications of the term *innovation* make it that much more exciting, as Bill Gates stated, "Never before in history has innovation offered promise of so much to so many in so short a time" (as cited in "TIBCO Innovates in Real Time," 2012, para. 1). Many authors, researchers, and journals offered multiple definitions and interpretations of innovation. In 1965, Victor Thompson defined innovation as "the generation, acceptance and implementation of new ideas, processes products or services" (as cited in Glor, 1999, para. 3). Defining innovation did not start or end in 1965. Throughout the years, the definition of innovation has evolved and has many more applications.

Toward a multidisciplinary definition of innovation, the aim was to define innovation. Three authors from two different universities, through research and collaboration, investigated the years of defining innovation and the application of innovation. Their research identified many stages of innovation. Kimberly (1981) stated, "There are three stages of innovation: innovation as a process, innovation as a discrete item including, products, programs or services; and innovation as an attribute of organizations" (as cited in in Baregheh et al., 2009, p. 1325). Van Du Ven et al. (1986) defined innovation as a matter of perception: "As long as the idea is

perceived as new to the people involved, it is an 'innovation' even though it may appear to others to be an 'imitation' of something that exists elsewhere" (as cited in Baregheh et al., 2009).

The definition of innovation is also defined by the application and the industry in which the term is applied. For example, specific to information management, there are different perspectives of the definition and use of innovation, such as "innovation as the creation of new knowledge and ideas to facilitate new business outcomes, aimed at improving internal business processes and structures and to create market driven products and services. Innovation encompasses both radical and incremental innovation" (Baregheh et al., 2016, p. 1326). In an industry, such as technology, for example, "The main focus is on innovation being a product related to new technology" (Baregheh et al., 2016, p. 1326). Innovation has many interpretations and applications. Innovation can mean growth, innovation can be a new object or new application, or innovation can be simply a new redefined process. Innovation can be as small as one item or as large as an integrated system. Baregheh et al. (2016) defined innovation as the following:

> Innovation is conceived as a means of changing an organization, either as a response to changes in the external environment or as a pre-emptive action to influence the environment. Hence, innovation is here broadly defined to encompass a range of types, including new product or service, new process technology, new organization structure or administrative systems, or new plans or program pertaining to organization members. (p. 1326)

History of Innovation Diffusion

Historically, researching the diffusion of innovations occurred in academia; however, researchers worked primarily within their own institutions. A network of scholars exchanged information, even if they were in different geographic areas. This network expanded in the 1960s toward a more collaborative, cohesive cross-disciplinary approach that continues today. Early researchers influenced the development of innovation-diffusion research today. Of interest is the viewpoint of Gabriel Tarde, a sociologist and social psychologist around 1900, who considered the diffusion of innovations as a "basic and fundamental explanation of human behavior change" (as cited in Rogers, 2003, p. 41).

Also influential is Georg Stimmel. His concept of the stranger postulated that a "member of the system but who is not strongly attached to the system" (as cited in Rogers, 2003, p. 42) could provide unique insight into that system. With respect to the diffusion of innovations, "The innovator, as a type of stranger, can more easily deviate from the norms of the system by being the first to adopt new ideas" (Rogers, 2003, p. 42). Can a stranger effect change in a society through innovations? Will innovations (inventions) alone effect societal change? The prevailing viewpoint today is that two factors – invention and diffusion -- cause change in a society. In other words, a new product or process is created that can, if adapted, lead to social change.

The rate of diffusion is dependent on many factors, most notably the relationship of culture to the rate of the innovation's adoption. Anthropological studies focus on the respondent's viewpoint: "Conveying their perceptions of the innovation and the change agency" (Rogers, 2003, p. 49). This approach reduced pro-innovation bias.

Public health and medical sociology research focusing on diffusions of innovations has experienced a significant growth starting in the 1950s and continuing today. Current studies in

the United States focus primarily on "(1) new drugs or other medical ideas… (2) family planning methods, (and) HIV/AIDS preventions" (Rogers, 2003, p. 64). Consequently, there have been significant improvements in public health in the United States. Significant innovations include mammography campaigns, stop-smoking campaigns, and addiction intervention, resulting in identifiable public health improvements. For example, in the stop-smoking campaign, a critical mass ceased smoking, which "triggered a big change in the rate of adoption of smoking cessation in a large system" (Rogers, 2003, p. 65).

Patterns of diffusion seem not to be content specific. Separate groups may have diffusion patterns in common. A Columbia University Drug Diffusion Study discovered patterns of diffusion of innovation common among such disparate groups as farmers and physicians (as cited in Rogers, 2003, p. 65). Most notable is that this study oriented "future diffusion research toward investigating the interpersonal networks through which subjective evaluations of an innovation are exchanged" (Rogers, 2003, p. 65). The study found similar patterns, such as interpersonal connections outside of their local system, attending meetings outside of their geographic locality, and had access to financial resources or were themselves, wealthy. The diffusion of an innovation occurred because the early adopters, those with the means, could influence others to do the same. Doctors in the Columbia University system were in a particularly influential position to "create awareness-knowledge of the innovation in the medical community" of a new antibiotic (Rogers, 2003, p. 68), just as farmers with larger incomes and larger farms could influence other farmers. An interpersonal communications network was key to innovation diffusions. Interpersonal communications networks can be based on age, religious affiliation, or professional connections. However, "More than anything else, it was the social

power of peers talking to peers about the innovations that led to adoption of the new idea"
(Rogers, 2003, p. 68).

Since about 1990, diffusion of research has exploded with the availability of
communications technology. Communication research on diffusion, especially as this field
grows, focuses on the role that technology plays in diffusion of innovations. Rogers (2003)
stated, "There are no limitations" (p. 82) in that any kind of innovation can be researched.
Rogers (2003) clarified that "this lack of message content orientation frees the communication
researcher to concentrate on the process of diffusion" (p. 82). Social marketing campaigns
contribute to the diffusion process.

Innovation and Diffusion Process

The extensive process of innovation does not just begin with research, it begins with the
pulse of an idea, which then compels a larger process, from "the decisions to begin research on a
recognized problem to the consequences of innovation" (Rogers, 2003, p. 136). From the
moment of a perceived idea, be it in response to a problem or a generation of a new way of doing
something, decisions must be made about funding, research, personnel, and the inevitable
marketing to potential users. The breadth of the development process includes six main steps that
identify a continuum of the innovation develop process (Figure A1). The recognition of a
problem, need, or even the anticipation of such, can stimulate research, as can sheer serendipity.
From solution to prototype, often the lead users bring an innovation to market. Lead users are the
highest percentage of innovators; for example, "Lead users had developed 77 percent of the
innovations in the scientific instruments field" (Rogers, 2003, p. 143). Innovators in the research
and development processes must be comfortable with risk-taking and uncertainty.
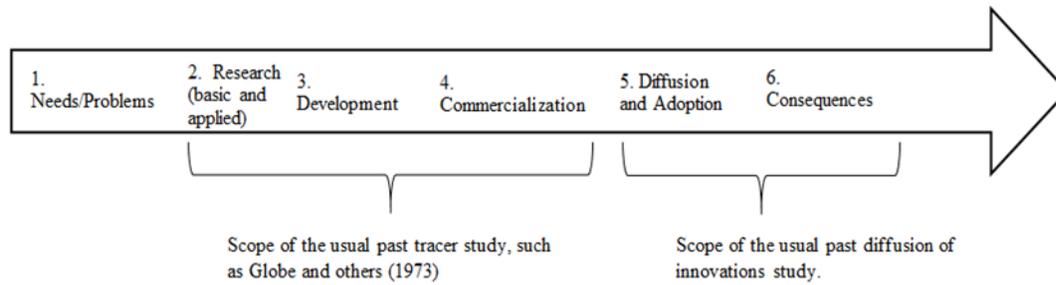
Figure A1. Six Main Steps that Identify a Continuum of the Innovation Development Process (Rogers, 2003, p. 138)

Multiple factors can drive the innovation process. The "innovation-development process is, most of all, driven by the exchange of technical information in the face of a high degree of uncertainty" (Rogers, 2003, p. 147). Economic factors, such as profitability, can drive an innovation's commercialization and diffusion. The military shapes many innovations, such as "nuclear power, jet aircraft, and the Internet" (Rogers, 2003, p. 148). The development of technology can be shaped by influences by the government, such as "regulations on health and safety, environmental pollution, and antitrust" (Rogers, 2003, p. 148). Corporations can influence innovation developments. Sometimes special work environments, often called skunkworks, can influence innovation by providing special resources, such as talent, funding, and facilities, outside of the regular corporate/work environment. Researchers in *skunkwords* are "usually highly selected, given special resources, and work on a crash basis to create an innovation" (Rogers, 2003, p. 148). The Apple Macintosh is the product of a skunkworks environment. The question is, why work outside of a corporate environment to innovate? Rogers (2003) suggested, "Bureaucracies (are)…structured to provide stability and continuity, but not flexible enough to nurture innovation" (p. 149). Yet, as in the case of Apple, it is often the corporate environment that will provide the special skunkworks environment.

Not all of Roger's (2003) six stages occur, and when these do, these are not always in a sequential process. The final stage of the innovation-diffusion process, consequences, might remain unknown for a long time or might have an immediate impact on an individual or a social system. For example, the introduction of the smart phone disrupted the way traditional telephone companies did business. As another example, when the capacity of the Apple's iPhone increased by allowing individuals to access electronic medical records via a mobile system, chat with medical personnel via a mobile chat application, or access medical information via the Internet, physicians grew to expect that patients had instant access to information or even to the medical system in which they were participants. The consequences, somewhat unanticipated, influenced ways in which providers and patients communicated and often ways in which providers would serve their patients.

Long-term research, tracer studies, on the innovation-diffusion process show that "a lengthy period, often as much as twenty years, occurs between an invention in basic research, and its application in a weaponry or medical innovation" (Rogers, 2003, pp. 162-163). Retroactive studies can inform decision making, not only about particular innovations, but also about the research and development state of innovation diffusion. Tracer studies also show that "Research is often conducted without a practical application to a social problem in mind" (Rogers, 2003, p. 163). For example, tracer studies report that of the early research in cardiopulmonary medicine "41% … had no relationship whatsoever" to the studied disease (Rogers, 2003, p. 163). Tracer studies do have some shortcomings, such as publication availability, a limitation regarding the diffusion of the innovation, and an assumption that ideas are planned and intentional, when in fact, ideas are often spontaneous and quite unanticipated.

Clusters of Innovation

Clusters of innovation (COI) accelerate when businesses are in close proximity. Chief characteristics include "heightened mobility of resources, including people, capital, and information" (Engel & del-Palacio, 2011, p. 27). Networks of clusters of innovation (NCOI) often include geographically distant COI. The key message is that COI are presented in a global context. Global COI encourage innovations worldwide, including the potential for providing guidelines and setting new policies. Engel and del-Palacio (2011) summarized, "The Global Clusters of Innovation Framework [The Framework] integrates critical concepts such as clusters of innovation, entrepreneurial process, and global connections and illustrates their interaction in a global context" (p. 32). The framework links data from literature reviews and interviews to identify the main characteristics of the Israel/Silicon Valley COI and guides businesses to identify and enhance COI and global connections.

Engle used case studies to illustrate ways in which "focusing internally on a region can neglect the importance of situating an emerging cluster in a global context" (Engel & del-Palacio, 2011, pp. 27-28). The framework marks potential and emerging COI. Israel and Israeli connections with Silicon Valley are the key case studies. Interviews were conducted between November 2008 and January 2009. Literature reviews and interview data are linked to the framework. The framework is used to explore and illustrate Israel/Silicon Valley super-COI as follows: the underlying elements of COI and differentiate these from the pure agglomeration of interconnected companies of an industrial cluster:

- The process in which some COI get connected to other geographically distant COI;

- the nature of the connections established among them, which we have

  characterized as weak ties, durable bonds, and covalent bonds; and

- how the resulting structures (NCOI and Super-COI) are articulated and how they

  operate in a mutually beneficial and interdependent fashion. (Engel & del-Palacio,

  2011, p. 28)

The framework shows global COI develop rapid globalization and innovation patterns.

Data cite Israel as sixth in the ranking of Europe's biotech industry, which makes it "a

technological powerhouse in the fields of biotechnology and medical devices" (Engel & del-

Palacio, 2011, p. 38). The framework indicates that Israel's COI are strong, citing a strong

educational system, a large scientific community, and a government program that integrates

highly educated Soviet immigrants into both the business and scientific sectors. Israel has

maintained both business and academic ventures with the United States. Israelis tend to focus on

research and development; Americans focus on marketing and sales.

Critical Success Factors Model

To understand the principles or parts that identify why a culture is innovative or more

innovative than another, it might be helpful to identify categories for benchmarking and/or

factors that might make a culture the way it is and help us to identify what standards can be

applicable in other countries. Standards and identified elements as critical success factors were

introduced as early as 1961 by R. D. Daniel to provide decision support:

Critical success factors (CSFs) are those few things that must go well to ensure success

for a manager or an organization, and, therefore, they represent those managerial or

enterprise areas that must be given special and continual attention to bring about high

53

performance. CSFs include issues vital to an organization's current operating activities and to its future success. (as cited in Friesen & Johnson, 1995, p. 2)

Critical success factors can be applied to any organization or industry. For example, a more recent article, published in January 2015, discussed the application of the critical success factor model with Facebook and relationship development. Abedin and Jafarzadeh (2015) stated, "Researchers have intensively used the CSF approach to systematically identify key factors that have to be properly managed by an organization to be able to successfully achieve business objectives" (p. 1890). In this study of social media relationships and the increased use of social media, Abedin and Jafarzadeh (2015) identified that CSFs "emphasize that organizations need to develop a strategic plan … which clearly identifies objectives and regularly measures and monitors the expected outcomes" (p. 1896). Another example showed a case study conducted to identify CSFs. These CSFs were used to qualify "the translation of clinical and operational knowledge about effective and efficient chronic care management into primary care practice" (Green, Fortin, Maclure, Macgregor, & Robinson, 2006, para. 2).

Although CFSs differ in every industry and in every application, these still demonstrate a common goal. Critical success factors can provide standards for an organization, industry, and/or project. Critical success factors can establish guidelines for a model, such as a culture of innovation. Friesen and Johnson (1995) suggested that CSFs were determined by an organization's strategy. In building a case for a culture of innovation, what determines those CSFs? The following might be CSFs in a culture of innovation: government, gross domestic product (GDP) spending in research, culture, and global partnerships.

Identifying the CSFs in building a culture of innovation will help countries understand what it takes to have a culture of innovation, why innovation is significant to a sustainable

economy, and provide a framework within which to focus on factors for innovation success. Using CSFs provides a process that enables all stakeholders to understand what is important for success. Creating a culture of innovation by using and identifying clear CSFs helps establish standards. Furthermore, these CSFs will evolve as the culture of innovation evolves.

Measurements of Innovation

Because research about innovation, diffusion, and adaptations is a relatively new field, a couple of measurements exist that are specific to the topic of innovation itself. For example, the Bloomberg Innovation Index "ranks economies annually by analyzing seven contributing factors such as research and development spending and the concentration of public hi-tech companies in each country" (Udasin, 2017, para. 3). The Bloomberg Index originally ranked more than 200 economies; now, however, due to lack of reporting from some countries, the Bloomberg index reports data from 50 countries. Switzerland, Israel, and Ireland are listed in the top 20 of the 50 most innovative countries (Figure A2).

Bloomberg 2017 Innovation Index

2017 rank	2016 rank	YoY change	Economy	Total score	R&D intensity	Manufacturing value-added	Productivity	High-tech density	Tertiary efficiency	Researcher concentration	Patent activity
1	1	0	S. Korea	89.00	1	1	32	4	2	4	1
2	3	+1	Sweden	83.98	5	11	15	7	18	5	6
3	2	-1	Germany	83.92	9	3	16	5	12	16	9
4	5	+1	Switzerland	83.64	8	6	2	11	16	14	4
5	7	+2	Finland	83.26	4	13	20	15	5	3	5
6	6	0	Singapore	83.22	14	5	12	17	1	6	12
7	4	-3	Japan	82.64	3	9	28	8	27	9	3
8	9	+1	Denmark	81.93	6	17	5	13	22	2	11
9	8	-1	U.S.	81.44	10	22	10	1	34	20	2
10	11	+1	Israel	81.23	2	30	30	3	20	1	18
11	10	-1	France	80.99	12	34	18	2	10	18	10
12	13	+1	Austria	80.46	7	7	11	23	6	10	17
13	16	+3	Belgium	77.18	11	21	9	10	19	19	25
14	14	0	Norway	76.89	19	36	3	12	25	8	15
15	18	+3	Netherlands	75.23	17	24	19	6	44	15	19
16	15	-1	Ireland	74.94	22	2	6	16	13	22	31
17	17	0	U.K.	74.52	20	38	21	14	7	17	14
18	20	+2	Australia	73.33	13	44	1	20	21	12	21
19	22	+3	New Zealand	71.63	32	37	8	19	24	21	7
20	19	-1	Canada	71.58	21	32	14	26	30	13	20

Figure A2. Bloomberg 2017 Innovation Index
(Jamrisko & Lu, 2017, para. 13)

From 2016 to 2017, Switzerland moved up a ranking, as did Israel; Ireland moved down one ranking. However, it is notable that in 2017, Ireland is currently the second highest ranking in manufacturing value-added, which is measured as a % of GDP and per capita ($PPP) (Jamrisko & Lu, 2017, para. 13). Switzerland, which ranked second in productivity and fourth in patent activity, outranks both Ireland and Israel in the country rankings. Israel is ranked first in researcher concentration, second in research and development intensity, and third in high-tech density. The countries' rankings on the indicators reflect their status as high innovation nations, nations whose government, society, and economy see the value and benefit of market place innovation activities. One of the innovation measurements in the Bloomberg Index, the researcher concentration category, reflects "the number of professionals – including postgraduate

PhD students – engaged in R&D per million people in the country" (Udasin, 2017, para. 13). In this category, Israel ranks first; Switzerland ranks fourteenth; and Ireland is twenty-second. The difficulty arises when trying to draw comparative conclusions between a metric and the extent of its impact on innovations in each country.

The Global Innovation Index is yet another source for measuring innovation. The goal of the Global Innovation Index is "to capture the multi-dimensional facets of innovation by providing a rich database of detailed metrics for 128 economies, which represent 92.8% of the world's population and 97.9% of global GDP" (Dutta et al., 2017a, p. 5). In this index, along with the indicators, a general analysis of innovation is presented in which countries are ranked according to an average of the Input and Output Sub-Index scores. The input sub-index and the innovation output sub-index are based on the same five key pillars that

> Capture elements of the national economy that enable innovative activities: (1)
> Institutions, (2) Human capital and research, (3) Infrastructure, (4) Market sophistication, and (5) Business sophistication. Two output pillars capture actual evidence of innovation outputs: (6) Knowledge and technology outputs and (7) Creative outputs. (Dutta et al., 2017b, para. 2)

In this analysis, Switzerland is ranked first; Ireland is ranked seventh; and Israel is ranked twenty-first out of the 128 countries reported.

Not only are partnerships and the Global Innovation Index measurements of innovation, but so are metrics, such as the gross domestic spending on research and development (R&D), which includes government researchers and non-governmental researchers. Gross domestic spending on R&D vary throughout the nations being compared. The OECD (2016a) collects data on researchers (Figure A3) and defines researchers as "professionals engaged in the conception

57

or creation of new knowledge, products, processes, methods and systems, as well as in the

management of the projects concerned" (para. 2).
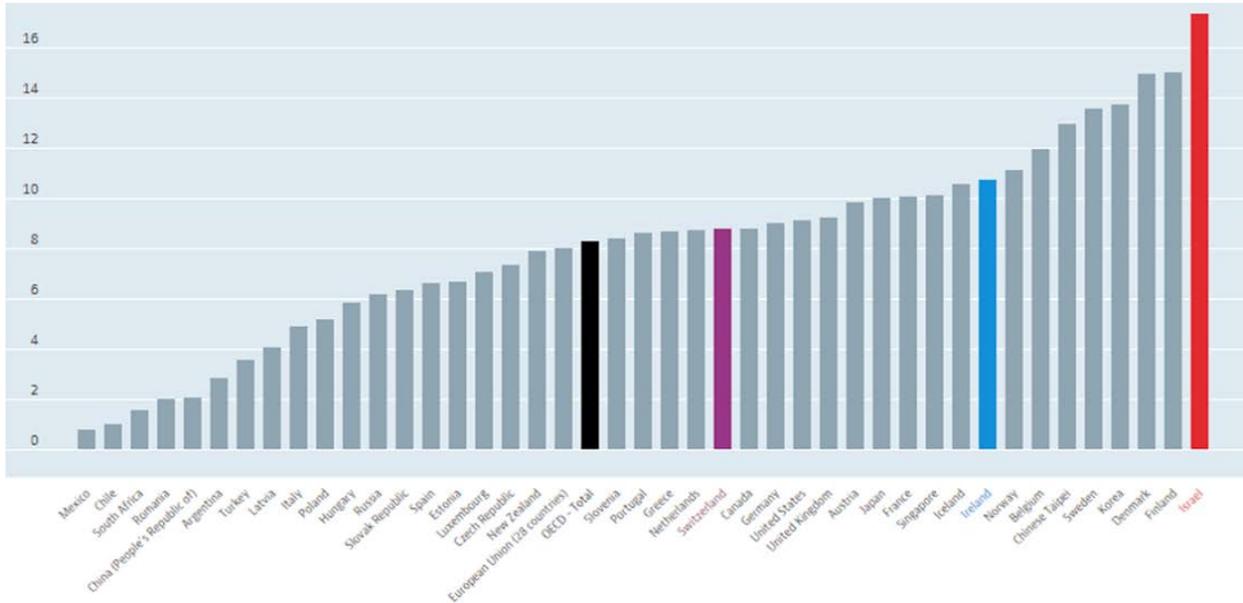
Figure A3. Researchers Total, Per 1000 Employed, 2015 or Latest Available
(OECD, 2016a, data sourced from
https://data.oecd.org/searchresults/?q=research+and+development)

As seen in Figure A4, Israel has the highest number of researchers, followed by Ireland,

and then Switzerland. Israel also spends the most on Research and Development (Figure A4),

and Ireland spends the least out of the three nations.
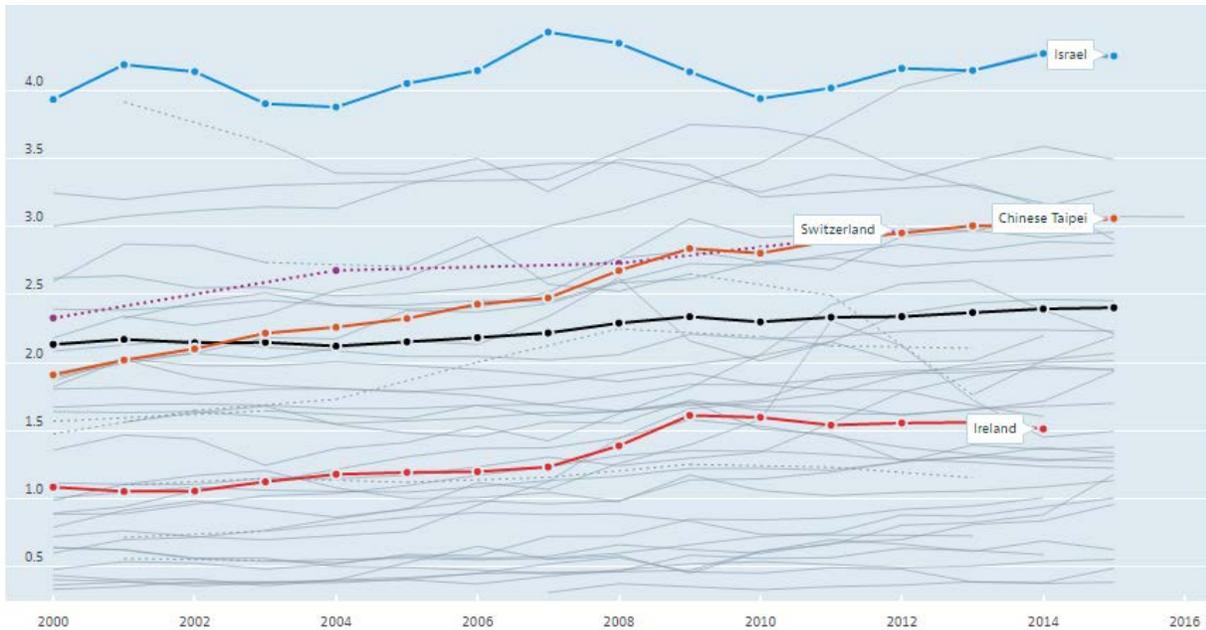
Figure A4. Gross Domestic Spending on R & D
(OECD, 2016a, Data Sourced from
https://data.oecd.org/searchresults/?q=research+and+development).

Measuring innovation is subjective. It comes with proper use of definitions,

interpretations, and use of innovation. Measurements used and the process for measuring

innovation is non-standard. Therefore, for the purpose of this research study, indicators and

definitions were used from the OECD (2010; worldwide ranking system). The OECD (2010) has

presented new ways to measure innovation, which go beyond R&D to broader areas. Proposing

measurements for new areas, like policy, "capture the nature, direction and intent of policy

actions for innovation," (OECD, 2010, p. 15). The OECD (2010) not only provides a new

description of innovation, but also new methods that "are interdisciplinary in nature and [are]

necessary to understand innovative behavior" (p. 16). The proposed new measures of innovation

also analyze the role that an education system plays in contributing to a country's knowledge and

research capacities. Adaptation and diffusion of innovation are also addressed. The

measurements consider how industries use knowledge and research to understand how public

59

and private innovation investments provide a return on investment. Evidence-based measurements can be used to inform policy decisions regarding innovations. Much more remains to be done, and the measurement challenges need to be addressed by all stakeholders.

The Success Paradigm

The identification and understanding of CFS to establish a culture of innovation will help us to understand the success paradigm needed. Success paradigm is defined as the following:

> A shared mental model of the way an organization envisions its world including resources, customers, values, and organizational leadership … a shared and prevailing view of what is required for it to succeed … a way of thinking and doing to accomplish goals and assure viability. (Friesen & Johnson, 1995, p. 3)

Common goals and a common vision allow people to "band together to achieve that purpose. We call this awareness the success paradigm" (Friesen & Johnson, 1995, p. 3). The success paradigm provides us a process to adapt to a rapid changing environment. For example, health care in Israel has undergone rapid change. To do so successfully, it needs to understand the relationship between resources and a hoped-for success.

The studied small nations are experiencing a healthcare impact on growth of their GDP and need to prepare, plan, and implement a strategy to handle this growth without a negative impact on their small nation. The literature review validated that innovative practices and processes are occurring to varying degrees in Israel, Ireland, and Switzerland. The extent to which a government supports innovation is crucial to success. Politics can hinder or aid R&D, as well as innovation, along with its diffusion and adaptation in a country.

60

The Cultural Innovation Society

Factors present in a society have the potential to determine the environment within which innovation will experience success in that society. The cultural innovation society may be defined as "the social life commonly expected by various thinkers with political ideals in the history" (Hsiao & Hsiao, 2014, p. 53). According to Hsiao and Hsiao (2014), the following CSFs in a cultural innovation society were measured: "Content Innovation, weighted 0.347, is mostly emphasized, about 34.7% of overall weight, in the evaluation dimensions, followed by Cultural Development (weighted 0.276), Mechanism Innovation (weighted 0.219), and Theoretical Innovation (weighted 0.158)" (p. 59). The research framework (Figure A5) shows the indicators studied.
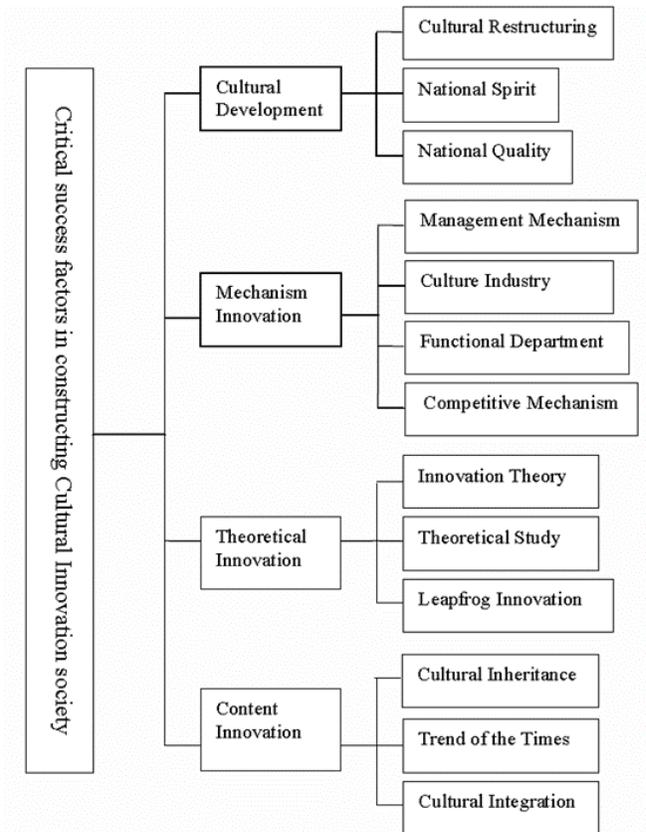

Figure A5. Research Framework
(Hsiao & Hsiao, p. 59)

In their research framework, Hsiao and Hsiao (2014) described the top five evaluation indicators as, "Trend of the Times, National Spirit, Cultural Integration, Management Mechanism, and Cultural Restructuring" (p. 59). Of interest is the study's suggestion that the presence of the Internet has a strong impact on a nation's culture, "When the Internet is rapidly developed, the development of national culture is inevitably impacted by foreign culture" (Hsiao & Hsiao, 2014, p. 61). One could surmise that global partnerships in innovation, which are essential in today's international market, have an impact on national culture.

Can a case be made for a culture of innovation? Fons-Boronat (1922) stated that a culture of innovation as an "innovation-oriented culture … as the need for the maximum number of innovative ideas to appear within a certain period" (as cited in Kenny & Reedy, 2006, p. 123) Eshponde et al (1992) linked "culture types to innovativeness" (as cited in Kenny & Reedy, 2006, p. 121). The Asociación Española de Contabilidad y Administración de Empresas (AECA) proposed a more specific definition of an innovative culture:

> A way of thinking and behaving that creates, develops and establishes values and attitudes within a firm, which may in turn raise, accept and support ideas and changes involving an improvement in the functioning and efficiency of the firm, even though such changes may mean a conflict with conventional and traditional behavior. (as cited in Kenny & Reedy, 2006, p. 123)

The success of an innovative culture depends on "four kinds of attitudes: corporate management is willing to take risks, the participation of all members of the firm is requested, creativity is stimulated and there is shared responsibility" (Kenny & Reedy, 2006, p. 123). To be a society that values innovation means that its culture, including organizational culture, must be ambitious, not risk-adverse, creative, and have an ardent desire to compete in the global market.

A Case for Comparing Three Innovation Nations: Ireland, Israel, and Switzerland

Ireland

Ireland, recovering from civil strife, has surfaced as a prime global partner for United States technology firms. Ireland's strong presence as a partner with such well-known technology firms as Microsoft and Google places it among the top technology partners with the United States and firmly as a contender for innovation in global networks. The 2017 Conference for Research and Innovation, *Positioning Ireland as a Global Innovation Hub in 2020,* will feature Ireland. According to their website (https://www.innovateireland.ie/), in 2015, the first Innovate Ireland conference included over 600 senior management and technical experts from the most innovative Irish and global companies involved in cutting-edge research and innovation. The conference included industries, such as pharmacies, biotech, life sciences, health, government, and academia, with a focus on placing Ireland at the heart of research and innovation. Ireland is a complex economy, one that is strong and growing.

Ireland, slightly larger than West Virginia, has a population just under five million (Central Intelligence Agency [CIA], 2016). English is the predominately spoken language; however, there are several dialects of the Irish language still spoken in different regions of Ireland. Historically, Ireland was not always a peaceful nation nor was it part of the European Union (EU) partnership. Ireland, now part of the EU, has established itself as a local and global partner. Due to Ireland's high birth rate, it is considered one of the youngest populations in the EU (CIA, 2016). Ireland has been involved in a civil war sporadically for over 50 years, sometimes based on religion, and sometimes based on arguments religious arguments. Additionally, there were unification issues related to Ireland's relationship to England.

During the late 1990s, Ireland's government, along with the United Kingdom and U.S.

government, worked to establish and repair the relationship their nation had with each other and

the full European community. After the 1998 agreement of cooperation,

The economic boom years of the Celtic Tiger (1995-2007) saw rapid economic growth,

which came to an abrupt end in 2008 with the meltdown of the Irish banking system.

Today the economy is recovering, fueled by large and growing foreign direct investment,

especially from U.S. multi-nationals. (CIA, 2016, para. 1)

Ireland, like many countries, is dealing with a constant change in demographics due to

the baby boomer generation, specifically, to health needs of all individuals and a constant

changing environment. Ireland, historically, did not always put healthcare efficiency first until

the Healthcare Act of 1970, which organized Ireland into "eight regional health boards with

similar governing structures. Each board had three program areas (hospital services, special or

psychiatric hospitals, and community care), each under a manager with broad authority"

(Johnson & Stoskopf, 2010, p. 254). Ireland, now thriving, remains ranked lower on GDP in

R&D in comparison with Israel, Switzerland, and overall OECD data on GDP in R&D; however,

the government, global partnerships, culture, and growing GDP show that Ireland is on the rise.

Ireland is seeking ways in which to be even more innovative to serve the needs of their

nation. In 2004, Ireland noted an increase in obesity,

More reliance on cars and fast food in a busy economy changes eating patterns among

both adults and young people. About 10% of 15-year-old Irish boys are preobese … [and]

about 11% of 15-year-old Irish girls were preobese … a rate that is among the highest in

the European area. (Johnson & Stoskopf, 2010, p. 119)

As the needs of the people of Ireland change, so do the needs of innovation in healthcare. The strength of a country's culture, global partnerships, government, and GPD in health-related research helps their economy and their ability to become a leader in innovation. Ireland, filled with a constant ambition to succeed, is home to three of the world's top infant formula manufacturers, nine of the top 10 Global ICT Companies, nine of the top 10 global pharmaceutical companies, and 17 of the top 25 global medical devices companies (Kenny, Bruton, & English, 2015). Ireland's people are proud of where they have come from and where they are headed. According to their Prime Minister, Enda Kenny, "Innovation investment plays a central role in driving productivity growth and fostering competitiveness in a global world where knowledge and innovation are critical factors for the advanced economies" (as cited in Kenny et al., 2015, p. 16).

People and culture. In Ireland, a Democratic Republic, politics and culture are almost interchangeable, as it is in Israel. What one believes, who one supports, and how one votes, are all part of the Irish culture and frequently discussed among family, friends, and strangers. In those discussions, participants are expected to be well informed. The same is true in a business setting. Cheap, boastful talk is not appreciated. The Irish "value facts and empirical evidence" (Passport to Trade, 2014, para. 13). Skillful, tough negotiators, the Irish can "find out a large amount of information about strangers while revealing little themselves" (Passport to Change, 2014, para. 13). The best strategy for persuasion is to use as many facts as possible.

The Irish people are strong individualists and neither countenance nor appreciate what they perceive as *group speak* or proffering a company line: "Outwardly, the Irish accept authority but inwardly have strong displeasure in accepting it. They also dislike bureaucracy" ("Ireland - Cultural Etiquette - e Diplomat," 2017, para. 3). In Ireland, the extended family is the

"dominant social structure" (Commisceo Global, 2017, para. 4). Family time gets top priority among the Irish; conversation, debate, partying, and spontaneous gatherings define both business and fun in Ireland, and the conversation may be about an extraordinarily creative idea or an innovative plan.

A key part of family is religion. The Catholic Church "still very much has a say in society's view of family, marriage, and abortion" (Commisceo Global, 2017, para. 3). Though Ireland is not a homogenous society, the Catholic Church is dominant. Contrarily, the Protestant Church is most dominant in Southern Ireland. Ireland does have a significant, mostly Orthodox Jewish Community, with Jewish secularism gaining popularity among the youth and young professionals. There seems to be a generational divide, with "people over 50 still being quite observant and conservative in their views" (Commisceo Global, 2017, para. 3).

One cannot mention Ireland without mentioning two key cultural components: humor and storytelling. Even dark humor has a prominent place in Irish culture. One need only read the Irish poets or James Joyce to understand the roll of storytelling in Ireland or visit a family dinner hour to have a rollicking, humorous evening. Yet, behind the humor is a seriousness almost unfathomable to the foreigner, who does not understand the roles of wit, a bitter modern history, and joy in a creative and ambitious country full of national pride.

Innovation and organizational culture. Innovation in Ireland has firmly placed it on the map as a world contender. Many international firms have a strong presence there because of Ireland's success in "building a strong research capacity … [which] has earned an international reputation" (Kenny et al., 2015, p. 8). Because Ireland has made research-based activities and innovations a priority, their "investment in research and innovation has been instrumental in securing, diversifying and growing foreign direct investment, in licensing new technologies, in

66

creating new companies, and in providing the highly-educated workforce needed to grow the economy and contribute to society" (Kenny et al., 2015, p. 8). As the ministers in Ireland partner with community agencies and develop focused plans for the future of Ireland, they strategically work together to prioritize funding in order to "yield greatest economic and societal impact" (Kenny et al., 2015, p. 8). Ireland's industries will continue to build on an infrastructure that already has a strong partnership and innovation strategy with the government by "developing Ireland's research and innovation system, [and] by continuing to support excellent research across the full continuum and across all disciplines" (Kenny et al., 2015, p. 8).

The Ireland Department of Jobs, Enterprise, and Innovation (DJEI) has set the standard for a culture of innovation not only in healthcare, but also all industries in their community. The DJEI has printed a publication titled *Innovation 2020,* Ireland's strategy for R&D, science, and technology. The DJEI's mission, led by the ministers and secretary general, with specific leadership from Ireland's Taoiseach (Prime Minister of the Republic of Ireland), is to

> Develop, promote and co-ordinate innovation, research and development policy. We influence the European and International research agenda to allow research and enterprise in Ireland avail of opportunities arising through research programmes. We fund Enterprise Ireland, SFI and the Programme for Research in Third Level Institution. We develop intellectual property policy, prepare legislation and provide an intellectual property regime which reflects the international law environment and best practice. (Kenny et al., 2015, p. 9)

The DJEI's mission has experienced some significant successes, in that many U.S. technology firms, such as Google, Microsoft, and Intel, have a strong and visible presence in Ireland.

Barriers to innovation sometimes exist within small and medium sized entrepreneurial companies in Northern Ireland. Those barriers presented considerable challenges in that "the barriers or weaknesses were culturally-based issues that required substantial effort and time to overcome" (Kenny et al., 2015, p. 218). The culturally based issues were not related to Irish culture, per se, but to a long-standing tradition of independence and hierarchical relationships in the organizational culture of companies in Northern Ireland.

A report of the second European Innovation Partnership on Active and Healthy Ageing Conference noted,

> Northern Ireland is now seen as a forerunner in Europe in bringing about a higher quality of health and social care … [in addition] The conference … aims to foster a high level debate about how best to scale up innovation in response to demographic challenges, and how to create the associated opportunities for new growth and jobs. ("United Kingdom," 2013, para. 2)

Health Minister Edwin Poots is fully supportive of culture of innovation in Ireland and strives to improve the innovations in Ireland. Minister Poots stated,

> Northern Ireland is now recognised as a leader in healthcare innovation. Despite the fact that we are a small reign within the EU it is commendable that we are recognised for our excellence in this area of active and healthy ageing. ("United Kingdom," 2013, para. 4)

Innovation is the center of Ireland's strategy to improve healthcare and their economy, as demonstrated in their *Innovation 2020* strategic plan.

Global partnerships and government. Ireland strives to be a global leader in innovation, and as such, they want to be attractive to global investors and participants. To be competitive as a foreign direct investment (FDI) recognized nation, Ireland has increased its research,

68

development, and innovation investment and it is now "60% of IDA's total grant-aid budget" (Kenny et al., 2015, p. 16). By being more FDI attractive, Ireland can develop global partnerships, including partnerships within its own EU.

Global partnerships for Ireland start with their strong relationship within the EU. Increasingly, Ireland is viewed as "the place to undertake substantial R&D activity and is ranked as 8th most innovative UE [sic] country. In 2016 IDA clients spent €1.5bn €on in-house R&D annually and employ 14,000 R&D staff" (IDA Ireland, 2016, para. 3). As all areas in the EU are acknowledging a change in their healthcare needs and the challenges for their communities, the European Innovative Partnership on Active and Healthy Ageing (EIP-AHA) is one of their best partnerships to share best practices and challenges throughout all the EU. The EIP-AHA has "enabled regions to gain a deeper understanding of each other's needs and actions to meet these challenges. Cooperation will enable us to access best practice from other regions … by sharing our good practice" ("United Kingdom," 2013, para. 5). Minister Poots discussed that strong partnerships can further strengthen innovative solutions throughout the EU and other regions. Partnerships are critical to the success of their culture of innovation. Poots stated, "Working through the European Innovation Partnership provides the opportunity to deliver better health and social care services … through more innovative products and services gleaned from sharing and spreading good practice" (as cited in "United Kingdom," 2013, para. 8).

Partnerships are critical to the success of many innovations throughout the world, but what, specifically, about global partnerships helps advance healthcare innovation, and what success or improvement does it bring to each nation alone? In Ireland, partnerships are the basis for success in innovation and have been for years. Partnerships in Ireland have helped to address the needs throughout the entire country. For example, Ireland has been recognized for several of

their nationwide campaigns to improve healthcare across the country, focusing on eye care, a healthier individual, and cancer screening, all thanks to their partnership with worldwide known pharmaceutical companies. Although a partnership with a pharmaceutical company could lead to bias, it is an effective way for a small nation to develop and widely spread healthcare improvement campaigns. In one such campaign, *Know Pneumo,*

> 122,000 leaflets were distributed nationwide to consumers at events, including the National Poughing [plowing] Championships and Aer Rianta National Safety week. Leaflets were also distributed through GP surgeries. The judges praised the campaign for providing direct channels to those at risk and noted the 91 per cent increase in sales of the pneumococcal vaccine following the campaign. ("Partnership in Healthcare," 2006, p. 32)

Ireland's partnerships with worldwide pharmaceutical industries has helped the country improve access to healthcare for all those in need. Furthermore, Ireland offers partnerships that address the needs of Ireland and the developing countries around the world. Ireland developed an international training program for healthcare providers, offering international training programs and partnerships. One example includes the following:

> Dr. Muhammad Umair, from Pakistan, came to Ireland for his fellowship in general surgery through a new international training programme: 'I'm looking forward to returning to my hometown and applying what I've learned in Ireland at the University Care Hospital in Lahore, Pakistan.' (World Health Organization [WHO], 2014, para. 1)

As Ireland builds programs and international partnerships, she has a strong partnership with WHO that is still young and thriving. Ireland knows that building global partnerships strengthens the people and the economy of Ireland. As many as 35% of the physicians in Ireland

are foreign-trained and from developing countries that need health care workers. Ireland

participated in the WHO Global Code of Practice on the International Recruitment of Health

Personnel in which:

> Governments agreed [to] these principles in 2010 as part of the effort to address the
>
> global shortage of health workers and find ethical solutions to health worker migration, in
>
> order to balance the health systems needs of high- and low-income countries, so they can
>
> all run effectively. (WHO, 2014, para. 4)

After completing the international training program in Ireland, clinicians are required to

"return home after their training, sending qualified doctors back into health systems that

desperately need them" (WHO, 2014, para. 7). During one year of operation in the program,

from 2013 to 2014, the program increased by 85 participants, while "the Irish government plans

to expand the programme next year to extend to other countries facing significant health worker

shortages" (WHO, 2014, para. 7). The partnership between the healthcare industry and the

government is helping the strength of Ireland as a nation, its economy, and its partnering

communities.

The Irish government is heavily involved in the strategic planning of innovation growth

and success. Ireland looked to consolidate and streamline its healthcare system to include more

accountability and responsibility of its leadership and to deliver enhanced quality of care

integration of services. The focus on an innovation strategy grew, and "In 2004, the Parliament

approved a major reorganization in the administration of healthcare" (Johnson & Stoskopf, 2010,

p. 120), and "In 2008, the Irish government authorized a €490 million budget for Internet

technology to improve access to timely health information … [and] to improve coordination of

inpatient and outpatient records and for sustaining patient history" (Johnson & Stoskopf, 2010, p.

121). Ireland has established itself as one of the wealthiest nations, a nation that is no longer considered or compared to a third world country. Ireland remains focused on finding the right balance between healthcare costs and access for its people. As Ireland grows, so does its population and its need to access healthcare.

Like many other countries, the state manages Ireland's low-cost hospitals, which struggle with long wait times for treatment. The private sector manages *premium hospitals* in Ireland, but they are still impacted to some extent by wait times. To improve the premium hospital, a new system would need to be developed, and "the cost of hiring hospital consultants in Ireland is very high [which] is the primary obstacle toward adopting a low-cost approach; and a large percentage of the population has access to private healthcare and therefore expects premium and not low-cost treatment" (Brady & Saranga, 2013, p. 349). Gerry McWeeney, WHO Programme Manager for Strategic Relations with Countries, discussed the importance of Ireland participating in and supporting the WHO:

> Ireland has taken strides to improve universal health coverage by committing to the
> WHO Code not just through words but by actions too. In 2013 Ireland was awarded for
> its progress in health workforce development by the Health Worker Migration Policy
> Council. (WHO, 2014, para. 9)

In Ireland's *Innovation 2020* strategic plan, the prime minister emphasized the importance of government support and involvement in a culture of innovation. *Innovation 2020* provides a rational for the Irish government to invest in innovation. They suggest that the government should "develop a competitive knowledge-based economy and society and to drive innovation in enterprise, develop talent, and maximise the return on our investment for economic and social progress" (Kenny et al., 2015, p. 15). The government needs to address factors that are

barriers to innovation. Research and development investment "increases economic productivity and competitiveness, and improves quality of life, health, and social and environmental outcomes" (Kenny et al., 2015, p. 15). The government has a high stakes economic interest in "supporting an innovative and enterprising economy, [because] innovation investment is crucial to creating and maintaining high-value jobs and attracting, developing and nurturing business, scientists and talented people, ensuring Ireland is connected and respected internationally" (Kenny et al., 2015, p. 15). The OECD supports public investment in science and innovation: "Cutting back public investment in support of innovation may provide short-term fiscal relief, but will damage the foundations of long-term growth" (Kenny et al., 2015, p. 15).

GDP spending in health research. The Irish Times published an article in November 2014 discussing Ireland's expenditure on research and development, stating that the government has increased R&D spending from "E1.8 billion in 2004, to E2.7 billion last year" (Newenham, 2014, para. 1). The OECD defines gross domestic spending on R&D as the following:

The total expenditure (current and capital) on R&D carried out by all resident companies, research institutes, university and government laboratories, etc., in a country. It includes R&D funded from abroad, but excludes domestic funds for R&D performed outside the domestic economy. This indicator is measured in million USD as percentage of GDP. (OECD, 2016a, para. 1)

In 2014, Ireland's percent of GDP was 1.492%, compared to the overall OECD GDP of 2.377% (IDA Ireland, 2016).

Israel

Israel is a culture of innovation and creativity. Innovation is "about successfully implementing creative ideas" (Ben-Nahum & Erez, 2012, para. 3). Since the late 1970s, Israel's economy has shifted from an agriculture based to a science and technology based economy, with a strong entrepreneurial base. It has

> more companies on the tech-oriented NASDAQ stock exchange than any country outside the U.S. …Not only is it world known for computers, security and communications innovation, but it is also a strong player in clean tech, biotech and medical devices. And that's a country of 7.1 million people, 63 years old, surrounded by enemies, in a constant state of ware since its founding, with little natural resources. (Ben-Nahum & Erez, 2012, para. 3)

Furthermore, Israeli innovations in medical devices, biotech, and medical research are diffused worldwide, significantly improving the lives of others.

A key question is, why Israel? Perhaps it is because Israelis excel at "of all things—teamwork and innovation" (Senor & Singer, 2009, p. 22). An American executive from eBay said, "The best -kept [sic] secret is that we all live and die by the work of our Israeli teams" (Senor & Singer, 2009, p.22). Talent, diverse ideas, and government funding available for R&D projects are all key, but in Israel, it is more than talent and funding. At play are fundamental factors embedded deep in Israel, such as, "tenacity… insatiable questioning of authority [and] determined informality, combined with a unique attitude toward failure, teamwork, mission, risk, and cross-disciplinary creativity" (Senor & Singer, 2009, p. 22). Israelis try repeatedly; failure is not the end, it is the beginning. Dr. Demetrius Karrusis, a Greece-born physician and groundbreaking researcher at Hadassah Hospital, suggested the following:

I definitely think that this thirst for doing new things and having no limits [is an Israeli characteristic] …. The Europeans and Americans have for many years had a kind of taboo in working with stem cells because they thought it may be dangerous. They are a little conservative. Fortunately, this conservatism about stem cells didn't exist here in Israel, and there is a better spirit for research and an unlimited ability to investigate. (as cited in Alster, 2016, p. 46)

Dissent is encouraged and persistence is the path by which Israelis know that "assertiveness is the norm, reticence something that risks your being left behind" (Senor & Singer, 2009, p. 30). Challenging authority is a cultural norm; in broader terms, it is a type of perseverance that runs deep in Israeli culture.

The freedom to innovate requires a tolerance for a high degree of uncertainty, and an environment of creativity must tolerate some failures, for "without tolerating a large number of these failures, it is impossible to achieve true innovation" (Senor & Singer, 2009, p. 31). Israel benefits from a tradition of critical thinking that is "undergirded by a doctrine of experimentation … wide enough to have a national and even a global impact" (Senor & Singer, 2009, p. 76). The cultural foundation for critical thinking is a key contributor to an environment of innovation. Senor and Singer (2009) posed that it is not merely curiosity or intellectual drive that engenders creative thinking, "It is a cultural mark that lies at the heart of what makes Israel so innovative" (p. 135) Additionally, it is the close connections in Israel that nurture innovation. There is an Israeli saying that one frequently hears with a chuckle and a shrug of the shoulders: connexia, protexia. Connections do count in Israel, and the protection is in the form of loyalty and extended networks of communication and work that raises the level of creativity for all.

Israel is constantly under crisis, either through conflict with neighboring countries, politics, or economics. Many suggest that it is this constant crisis environment that drives the Israel culture. Efrat (2014) stated, "In times of economic crisis nations constantly seek new ways and ideas to facilitate their economic rejuvenation" (p. 120). Therefore, in Israel it is possible that a culture of innovation exists, in part, because the constant state of crisis pushes Israelis to research and develop innovative technology, be it for military use, medical needs, or communications devices. Does this constant environment drive the culture to inspire Israel to innovate and invest in innovation?

Professor Scott Shane (1992) studied the impact culture had on the innovativeness of a community. Shane (1992) stated that academic research showed "cultural forces influence the strategies and structures that firms use. However, one aspect of this cross-cultural research that has gotten little academic research attention is the relationship between cultural values and the innovativeness and inventiveness of a society" (p. 1). He further went on to investigate the direct cultural values. Based on the research by Shane (1992), there is "strong evidence for the impact of cultural dimensions on nations' tendency to innovate" (p. 1). Hofstede (1980) concluded that nations that were inventive would remain so: "Cultural dimensions, namely power distance, individualism, masculinity, and uncertainty avoidance, overall, conceptualizing for the ability of each dimension for predicting the level of a nation's innovativeness" (as cited in Shane, 1992, p. 30).

Israel is pushed toward being a culture of innovation. It's a circular notion: adversity enhances communication which, in turn, breeds innovation because "people's inventive activity requires input from others.… [and] Innovation requires decentralized authority…Inventiveness is hard work … [that] often cause[s] radical social change" (Shane, 1992, p. 1). Ambition and

drive, characteristics necessary for innovators, can be taught. The role of the family can play a role in nurturing the creative spirit and encouraging hard work "in Israel may start early in life… thus setting a high bar that encourages young people to work hard" (Shapiro, 2013, para. 8).

Many believe that the culture in Israel and the environment of industry success is mostly due to "the Israeli desire to innovate.… Much of Israel's high-tech success can be attributed to chutzpah" (Shams, 2016, para. 2). Furthermore, "Questioning authority, improvising, taking calculated risks, and not fearing failure are an integral part of Israeli society" (Shams, 2016, para. 2). Israel allows for and promotes an environment that enables success, thought, creativity, and innovation.

Global partnerships. Israel has numerous multinational partnerships. Whether global partnerships occur through centers of innovation or through on-the-ground work and aid in other countries, Israel's passion is to serve its community and the communities in need around the world. Daniel Carmon, former Head of MASHAV, Israel's Agency for International Development Cooperation, believes that necessity is the mother of invention. He stated, "Out of necessity, Israel transformed itself by harnessing the power of innovation, science and education" (Carmon, 2012, para. 8). Israeli technology advancements stand to benefit other countries. Israel's partnerships with developed countries portends

> an exciting future for international development – a future in which like-minded countries
> can collaborate and share expertise and innovation …with the developing world and
> bring about a lasting, sustainable improvement in health, education, gender equality,
> economy, and society as a whole. (Carmon, 2012, para. 8)

Furthermore, as Israel continues to develop its software enterprise and market penetration, "Israel's software industry seeks entry into the international software market by

winning overseas partners to market its expertise and innovative talents" (Brand, 1988, para. 1).

Although this is an old publication, it still holds true that Israel seeks to strengthen its global

partnerships to further penetrate the market and build strong international relationships.

Additionally, partnerships help strengthen the global economy. Zur, the head of the

Israeli software group, "thinks these team-ups are the 'one way' for Israel to overcome its

marketing problems" (Brand, 1988, para. 32). These partnerships allow companies to use

resources off each other to build a full comprehensive item. One company might have what the

other company needs to further innovation, research, and development, and as this example

states, the marketing dollar powers.

The United States and Israel maintain an important, long-lasting partnership. United

States companies seek Israeli partners. Paul Smith of Philips Medical stated, "In two days in

Israel, I saw more opportunities than in a year in the rest of the world" (as cited in Senor &

Singer, 2009, p. 21). Israel is a nation of innovation; as chaotic as it is, production of new

products is a function of both energy and necessity in a tiny nation only 68 years old.

Partnerships, locally and globally, help build a culture of innovation—one that motivates

its community to research, to build new systems, and to partner for the betterment of the world.

Through the U.S.-Israel Science and Technology Foundation (USISTF), just that occurs. The

USISTF operates as a charitable foundation with a focus to:

> Promote the advancement of science and technology for the benefit of the general public
>
> of the United States and Israel and to lessen the burdens of the governments of the U.S.
>
> and Israel in providing economic assistance to their economies, in coordination with the
>
> Unites States – Israel Science and Technology Commission … established on January 18,
>
> 1994 by agreement of the U.S. and Israeli governments. (USISTF, 2016, para. 1)

Not only does the USISTF promote education and leadership in a partnership through the United States and Israel, but also:

1. To encourage scientific exchanges between research institutions in U.S. and Israel.

2. To provide information and education materials to private and governmental organizations in the U.S. and Israel on the opportunities for mutually beneficial scientific and technical collaboration.

3. To reduce barriers to bi-national cooperation and promote the exchange of information on scientific and technical matters between the W.W. and Israel by conducting outreach and matchmaking activities, establishing electronic databases and sponsoring events such as seminars and conferences.

4. To foster the growth of competitive high-technology industries in U.S. and Israel, so as to lessen the burdens of the U.S. government and the government of Israel.

5. To receive funding from governmental and non-governmental organizations, including, but not limited to the U.S. Department of Commerce and the Israeli Ministry of Economy, so as to support activities designed to achieve the purposes set forth.

6. To support and cooperate with the Commission and other organizations engaged in promoting scientific and technical collaboration between the U.S. and Israel. (USISTF, 2016a, para. 2-7)

Through the USISTF partnership, the team has developed the Israel Innovation Index, which uses a "set of 20 quantitative indicators covering government, industry, human capital, and research and development activities to comparatively measure the intensity of the United

79

States – Israel relationship in science and technology collaboration against that of the United States and 16 other countries" (USISTF, 2016b, para. 2). This intensity index allows for a discussion of innovation and benchmarking across countries and years to allow for trending and discovering relationships in innovation related activities.

Medical research is another cornerstone of Israeli innovation. In 2010, an Israeli device to kill breast tumors was given FDA approval in the United States (Klein Leichman, 2012). Since 2011/2012, this Israeli medical device has American doctors changing the way they treat and remove breast tumors. Developed in Israel, IceSense3 made its way to the United States and now is gaining international recognition. A Japanese surgeon will be testing IceSense3 to remove and destroy tumors. A global partnership was created between Israel and Japan. Israel has an extensive array of global partners, especially in the field of stem cell research: "Israeli stem cell research ranks as one of the highest, collaborating with other countries' scientists" (Lui, 2016, para. 5).

Government and military. Mandatory military service in Israel not only creates strong connections that last lifelong, but also establishes foundations for excellence as well as a value for hard work. Shapiro (2013) suggested, "Others point out the mandatory military serve most young Israelis are required to fulfill when they turn 18 as a driver of high achievement" (para. 5). As Shapiro (2013) continued to moderate a panel of Israeli entrepreneurs and innovators with a primary focus on why Israelis are so entrepreneurial, they discussed further that with the "military service… cultivate[s] a seriousness of purpose and a cultural willingness to accept economic risks…[and] required ongoing innovation" (para. 5). Because Israel is also a leader in innovation for technologies of modern warfare, it is "an important source of innovation for

80

American defense contractors and troops" (Eisenstadt & Pollock, 2016, p. 1). The U.S.-Israel partnership is a two-way street.

The military has a significant impact on the culture and environment in Israel, because it is such a huge part of the Israeli culture and is a requirement for all Israeli citizens. However, the military has a unique cultural impact on the culture of innovation in Israel. The Israeli military "is a lean, adaptive organization – and one where citizens serve during early, formative years" (Trumbull, 2010, p. 16). Assertiveness and critical and independent thinking, "collectively describe the typical Israeli entrepreneur" (Senor & Singer, 2009, p. 46). The military has been the starting point for many start-ups in Israel, the groundwork for Israeli innovation.

The critical role of politicians significantly influenced industrial development and innovation. Research and development has been critical to Israel's success, especially in information technology industries. Political choices and government policies positively impacted the rapid innovation in Israel in an unprecedented length of time, a mere 67 years. Choices nurtured and allowed Israel to become a global force in technology advances.

Israel has a flexible and yet complex relationship with the government with respect to the government's role in industry. The Ministry of Economy and Industry (2016) plays a significant role in encouraging "Israel's economic growth, human capital development and promotion of international trade" (para. 2), including providing support for R & D and innovation.

The role between the state and industry in Israel is both flexible and porous, which benefits the high-technology industry in that scientists can move among the state to the private sectors, which allows for the greatest opportunities in networking and exchanging ideas. The Israeli government is also key in giving R&D grants. Additionally, the government is instrumental in luring foreign firms to Israel. Many manufacturers from the United States have

R&D centers in Israel, including Microsoft, IBM, Google, and Apple. These U.S. companies have "technology incubators in Israel, where they conduct research at about one-half to two-thirds of the cost in the U.S. (thanks to lower labor, rent and regulative costs, plus public investment and tax incentives)" (Eisenstadt & Pollock, 2016, p. 1).

The Israel facilities focus primarily on R&D, while their U.S.-based partners focus on sales and marketing (Breznitz, 2007). Not only is Israel motivated to innovate, but also Israel has been motivated to be listed on foreign exchanges, which attracts venture capitalists, "making Israel … the state with the largest number of companies listed on NASDAQ other than the United States and Canada" (Breznitz, 2007, p. 37).

Historically, technology advances in the State of Israel began in 1947 at the Weizmann Institute in Rehovot, Israel, with a series of computers called the Golems (Bretnitz, 2007). In Jewish legend, the Golem was a creature created out of mud to protect the Jewish people from pogroms. The Golem computers were part of the defense structure for the State. The first Israeli defense sector to use them was RAFAEL, the armament R&D division of the defense system. In the ensuing decades, RAFAEL acted more like a university, with scientists who had (and still have) a full staff of researchers. RAFAEL thus became an "incubation center to 'infect' other defense and civilian companies and organizations with IT and R&D capabilities" (Bretnitz, 2007, p. 48). In the early 1980s through the 1990s, many RAFAEL scientists went on sabbaticals to universities in the United States. For example, during that period, on any given year, approximately 20 to 30 scientists went to Oregon State University, a university known for engineering and computing technology research, to conduct research.

The relationship between Israeli high-tech companies and the government developed from the beginning of the State; thus, that relationship "gave the impetus to critical policy

decisions, including the idea of 'financing industrial R&D ventures'" (Breznitz, 2007, p. 49), influencing the esteemed status today of Israel's high-technology industry, which is crucial to medical innovations, particularly in the field of medical devices.

Research and development. Research and development in Israel is a priority, and Israel was an early adopter of R&D technology. Much of early research comes from investigators at the Hebrew University-Hadassah Medical Center at Ein Karem (Elliman, 2016). Hadassah Medical Organization (HMO) is a notable example of an environment that fosters research and innovation. At HMO, research and education is a standard in clinical excellence. Eyal Mishani, Ph.D., professor of nuclear medicine at Hadassah's medical school and the medical center's R&D director stated, "We believe that cutting-edge medicine is practiced when physicians are actively involved in research" (as cited in Elliman, 2016, para. 3).

The HMO thrives on research and innovation. For example, in over 15 years of research, Hadassah has shown that the use of stem cells has significantly reduced the healing time of bone fractures. Breakthrough trials are a constant, ongoing process in Israel. In his groundbreaking work to find a treatment for ALS, Professor Demitrius Karussis's of the HMO in Jerusalem "appears to have brought about a stunning recovery of movement, as well as a marked general improvement in his [anonymous patient] all-around health" (Alster, 2016, para. 28). Dr. Karussis is not from Israel; he is an immigrant. He decided to conduct his research in Israel at HMO because

> The patients in Israel trust the researchers and physicians, are very open to new
> approaches, and are not conservative. This has helped us proceed, this mentality that
> people in Israel believe in the future, they believe in novelties. I think this is something
> that makes the country so progressive in the field of research. (Alster, 2016, para. 35)

Research and Development are a top priority for Israel.

The USISTF is a Washington, DC based 501c3 nonprofit organization that conducts joint research and scientific exchanges. They promote R& D between Israel and the United States that "could lead to cooperative commercial activities, enable the development of emerging technology sectors, and assist in the adaptation of military technology for commercial use" (USISTF, 2014c, para. 1).

Figure A6 shows the top 12 R&D partners, with the United States/Israel as the number one partner in high-tech collaboration. This collaboration suggests the intensity and the importance of the United States/Israel relationship. Perhaps, the United States places a higher value on its high-tech relationship with Israel than it does with other countries (USISTF, 2014).

Benchmarking U.S.- Israel Hi-tech Collaboration
Aggregate R&D Metrics

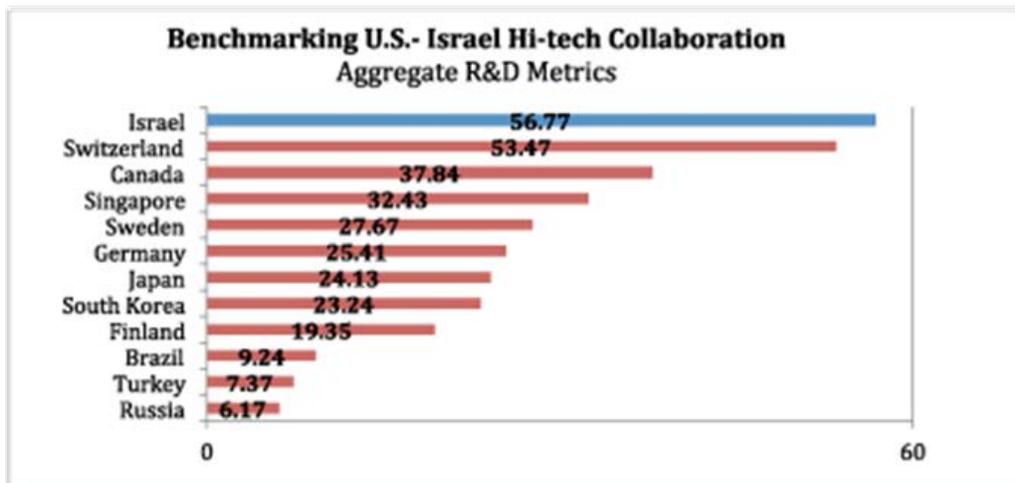| Country	Value
Israel	56.77
Switzerland	53.47
Canada	37.84
Singapore	32.43
Sweden	27.67
Germany	25.41
Japan	24.13
South Korea	23.24
Finland	19.35
Brazil	9.24
Turkey	7.37
Russia	6.17

Figure A6. Benchmarking U.S.-Israel High-Tech Collaboration

People may wonder why R&D excels in Israel. The community, the workforce, and the culture encourage Israelis to be part of advancement and improvements of quality of life. The Israeli government grants R&D low risk loans for Israeli firms:

in case of a technological and commercial success … [the firm is] subject to paying royalties of 3-5 percent of sales; in case of non-commercialization, no repayment is required … the royalties received will, in turn, be returned to the R&D Fund … to encourage and support industrial R&D. (Ben-Nahum & Erez, 2012, para. 8)

The HMO in Israel is a leader in healthcare research and innovation, with "cutting-edge research in such fields as stem cell therapy, complex surgeries, intrauterine procedures, organ transplants, orthopedic surgery and ophthalmology" (Dr. Zeev Rotstein, as cited in Robinson, 2016, para. 10). Dr. Zeev Rotstein, the new director general of the HMO, dreams about improving future global health systems: "I find myself dreaming big dreams and crossing oceans and big seas, being involved in the development of future health system of other countries" (as cited in Robinson, 2016, para. 10).

The HMO has been recognized for decades of leadership in stem cell research and for immunotherapies that marshal the body's own resources to fight disease. The results of HMO's clinical trials for potential treatments of ALS and other neurodegenerative diseases have riveted the worldwide medical community. The HMO physicians are researchers, as well as clinical physicians. Their "sophisticated, visionary medical research is leading the way to a better quality of life for people around the globe" (Hadassah, 2016, para. 3).

United States President Obama visited Israel in mid-September 2016, because "Israel is helping the U.S. meet the economic, environmental, and non-military security challenges of the future" (Eisenstadt & Pollock, 2016, p. 1). Through instant messaging, voice over protocol, and data mining, Israeli experts partner regularly with U.S. firms. An Intel executive stated, "Many of his company's major innovations over the past three decades started in Israel" (Eisenstadt & Pollock, 2016, p. 1). Microsoft's founder Bill Gates said in 2006 that Israeli innovation is critical

to technology advances. Dr. E. William Colglazier, a U.S. State Department science and technology advisor, called Israel "'a world leader and a model not only for small countries, but all countries' " (Eisenstadt & Pollock, 2016, p. 1).

Israelis are creative and inventors and have been "top finishers in recent GE Ecomagination competitions" (Eisenstadt & Pollock, 2016, p. 2). Israelis conduct R&D; the United States does marketing and distribution for many advanced products. U.S. Senator Marco Rubio visited Israel in the summer of 2016, and stated, "Israel is a great place to start up a company or … to partner with a bigger company – a Johnson & Johnson or an IBM" (Eisenstadt & Pollock, 2016, p. 2). U.S. President Obama stated, "Innovation is just as important to the relationship between the U.S. and Israel as our security cooperation" (as cited in Eisenstadt & Pollock, 2016, p. 2).

Switzerland

Switzerland, a small, land-locked nation, is centered at the financial and trade crossroads of Europe. Politically neutral Switzerland is "a prosperous and modern market economy with low unemployment, a highly skilled labor force, and a per capita GDP among the highest in the world" (CIA, 2017, para. 2). The service sector, financial services, and "a manufacturing industry that specializes in high-technology, knowledge-based production" make Switzerland one of the world's most competitive economies (CIA, 2017, para. 2). As a major international finance center, Switzerland is well-known for its secrecy regulations in the banking industry, which, despite legislation, affords some unmonitored trading since "nonresidents are permitted to conduct business through offshore entities and various intermediaries" (CIA, 2017, para. 2). However, Switzerland has leveraged its neutrality, trade opportunities, and geographical location

to become one of the most innovative nations in the world. With both private and public support, in Switzerland, "innovative initiatives have the rare opportunity… to become national projects" (von Bremen et al., 2005, p.21).

Government. Switzerland, a centralized federal government, has long been "honored by the major European powers, and the country was not involved in either of the two world wars" (CIA, 2017). It did not become a member of the United Nations until 2002. Switzerland is not a member of the EU. Swiss neutrality "has come at the cost of it having to accept decisions made by the European Union (the acquis communautaire) without having a seat at the table" (Guo & Woo, 2016, p. 286). Switzerland tries to balance its relationship with the EU. Even without a seat at the table, "it remains strongly connected to the EU and part of the EU internal market" (Guo & Woo, 2016, p. xii).

Often characterized as a liberal state, Switzerland has a constitution, within which are the principles of federalism. Citizens may use popular initiatives to make important decisions. Because the constitution empowers the state to legislate, the state has somewhat "limited power … over the health care system" (von Bremen et al., 2005, p. 15).

Historically, entrepreneurial families "flourished since the 18th to 19th centuries, and contributed to a rather dynamic private sector" (Guo & Woo, 2016, p. 162). The Swiss pharmaceutical conglomerate, Novartis, stems from one of those families. The preponderance of entrepreneurial families "explains the early adoption of a pragmatic mode of confederal governance, and the subsidiary role played by government in the nation-building process and in the construction of a vibrant market economy" (Guo and Woo, 2017, p. 162). The government does play a significant role in innovation activities. "In 2003 Switzerland was still the only

country in Europe which could give full but temporary reimbursement for new and emerging technologies" (von Bremen et al., 2005, p. 16).

Economy and challenges. Switzerland's historically robust economy has been driven by "the dizzying rise of the Swiss financial centre" (Guo and Woo, 2017, p. xli). Because Switzerland lacks enough natural resources to sustain an economy, it is depending on imports and its economy is based largely on exports. Swiss innovation is both a success and a challenge, "Small states such as … Switzerland owe their survival and success to constant learning and innovation in the face of significant environmental and resource constraints…. they have much to offer their counterparts from all over the world" (Guo & Woo, 2016, p. 289).

Switzerland, like other European countries, is in the middle of a refugee crisis, providing challenges to healthcare, housing, employment, and integration. The Swiss have always had on asylum process that is in alignment with the Geneva Accords. However, in June 2016 an asylum reform policy was passed, allowing Parliament to address funding issues. Integration of refugees, particularly in the south of Switzerland, is an economic challenge. Those given refugee status may be given agricultural land or funds to start of business. However, funding is controversial because "many in the Swiss Parliament want to finance the rising cost of caring for asylum seekers here in Switzerland by cutting development aid funding" (Herkenrath, 2016, para. 9). The Swiss economy, successful and diverse, relies heavily on innovation both to sustain its top place in global innovation markets as well to sustain and grow its economy.

Culture and innovation. Switzerland understands the need for "integration of all partners in the field of innovation" (von Bremen et al., 2005, p. 15). To that end, the Swiss have created a web platform, called Swiss MedTech, "in which all players involved in the business of medical technologies are involved" (von Bremen et al., 2005, p. 15). Patients, insurers, industry,

universities, and professional organizations join activities that "include agreements on intellectual property and the integrated patient care chain" (von Bremen et al., 2005, p. 15). The Swiss place a high value on teamwork and collaboration combined with a high sense of responsibility to innovate with the goal of creating product for marketing and export.

Switzerland's high scores on top indicators confirm a foundation of national strengths for innovation. The Innovation Union Scoreboard (IUS) studies "national innovation capacities … and clarifies what a statistical framework can offer in terms of information and insights on strengths and weaknesses of a given country relative to the other countries" (Foray & Hollanders, 2015, p. 213). Switzerland is "a country that is leading the IUS ranking for many years" (Foray & Hollanders, 2015, p. 1). Switzerland has many strengths on the IUS ratings. A notable strength is R&D expenditures in the business sector (Figure A7). Sales of new-to-mark innovations, patent applications, and new doctorate graduated are additional strengths, along with employment in knowledge-intensive activities and product or process innovations for small and medium enterprises.
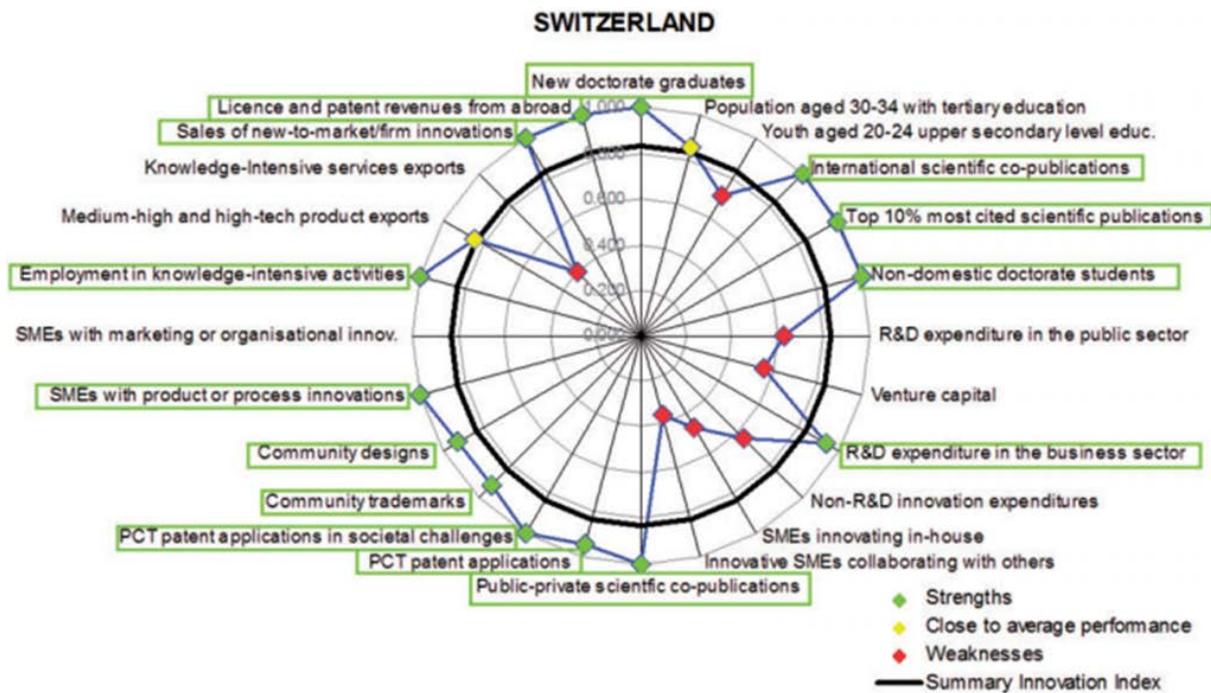
Figure A7. Strong Indicators: Switzerland
(Foray & Hollanders, 2015, p. 218)

A strength, weaknesses, opportunities, and threats (SWOT) analysis presents a broad picture of Switzerland's multi-faceted innovation system (Figure A8).

Strength	Weaknesses
• Top ranks in research • Top ranks in innovative performance • High R&D spendings of private sector • High number of employees in knowledge intensive services • Very good infrastructure	• No coherent innovations policy and according instruments for the implementation • Commercial implementation of results of scientific research in products • Societal climate for innovation and implementation • Data quality • Surrounding conditions and opportunities for financing of start-ups and spin-offs • Amounts of funding for innovation
Opportunities	Threats
• Simplify and strenghten collaboration of universities and business • Establishment of centers for innovation • Promotion of non-technical innovation • Further development of (continuing) education • Sustainable and coordinated communication of Switzerland as place for innovation • Export of knowledge intensive services	• Changes in the macroeconomic surrounding (e.g. economic cycle; global competition) • Intensification of competitive regulation (e.g. worsening of fiscal situation for business)

Figure A8. Switzerland: SWOT Analysis
(Marxt & Brunner, 2013, p. 1041)

The opportunities for strengthening an already strong innovation nation offer steps to counteract policy and implementation weaknesses. For example, establishing centers for innovation could offer opportunities for improving financial support for start-ups and spin-offs by providing models of success and networking forums, thus increasing conditions for improvement and further support for innovation.

Culturally, the good of the whole is factored into important decisions to the extent that "the perspective of informed laypersons can be included in the evaluation of controversial technologies, so that the evaluation of new technologies is not left up to technicians, sociologists and political scientists" (von Bremen et al., 2005, p. 16). The Swiss consider the impact of innovations and new technologies on their society by using "various forms of participatory

procedures (for example, consensus conferences, public forums, or focus groups) to gather the

opinions of those affected qualitatively" (von Bremen et al., 2005, p. 16).

Additional factors are cited to explain the economic successes in Switzerland, such as

social mobility; high education levels; and "the presence of an innovative class of entrepreneurs,

managers, engineers, and a laissez-faire, free trade economic structure" (Guo & Woo, 2016, p.

xli). The Swiss will likely retain their leading position in innovation: "Currently there are no

signs that the Swiss leading position is under threat. On the contrary, Switzerland has managed

to improve its performance relative to the other IUS innovation leaders" (Foray & Hollanders,

2015, p. 227).

Healthcare system. The healthcare system in Switzerland is universal and provides access

to care for all, but does not provide free care, nor is it expected. The government believes,

"Increased cost sharing will improve cost awareness and containment" (Biller-Andorno &

Zeltner, 2015, p. 2195). Health laws mandate that residents "under the 1996 Federal Health

Insurance Law [are required] to purchase statutory health insurance (SHI) from competing

insurers. There are virtually no uninsured residents" (The Commonwealth Fund, 2017, para. 1).

The government regulates health insurance, defining "the package of health care services

covered, and [approving] the payment mechanism (mostly fee-for-service in ambulatory care and

case-based payments" (Biller-Andorno & Zeltner, 2015, p. 2193). The system is not cheap;

however, the OECD reported, "High levels of patient satisfaction and a life expectancy that's

among the highest in the world" (in Biller-Andorno & Zeltner, 2015, p. 2193). Insurers are

nonprofit and premiums are kept at a minimum, which are "not supposed to exceed 8 to 10% of

household income and are subsidized by tax money in order to achieve this goal" (Biller-

Andorno & Zeltner, 2015, p. 2195). Furthermore, any surplus is returned to the insured people.

The core value is equal access to good healthcare: "The Swiss health care system reflects an

egalitarian sentiment that everyone should have access to the same good care" (Biller-Andorno

& Zeltner, 2015, p. 2195).

    Innovation in healthcare. Switzerland exceeds in innovations in healthcare.

Technological innovation has a history in Switzerland: "Already in the early 80's a fully

dedicated Medical Technology Unit (MTU) was founded within the former Federal Social

Insurance Office reporting directly to the Minister of Home and Social Affairs" (Von Bremen et

al., 2005). The chemicals, pharmaceuticals, and biotech industries' exports alone far exceed

those of any other industries, suggesting a strong investment R&D investment in these to sustain

their marketability in a global economy. Furthermore, with government support of medical

innovations, Switzerland has an encouraging environment for healthcare innovations (Figure
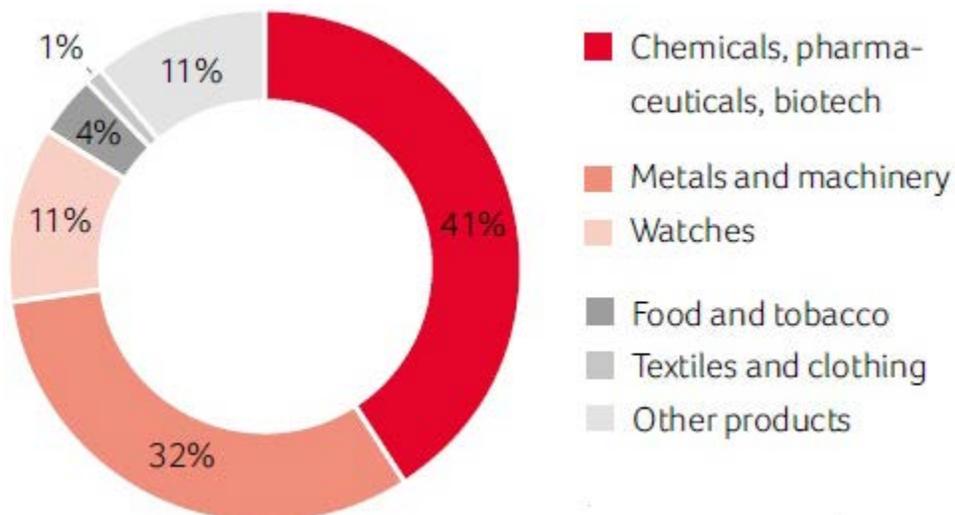
A9).

Figure A9. Proportion of Total Swiss Exports 2014
(Swiss Biotech, 2015, p. 5)

Global partnerships. Switzerland is ranked first on the Global Competitive Index (Schwab, 2017). The pharmaceuticals industry alone has strong international partnerships. A prime example is the international corporation, Novartis, headquartered in Switzerland. Novartis also has offices in Ireland and Israel. It has additional research facilities in China, India, Singapore, and the United States, to name just a few. Novartis cites their key strategy as using "science-based innovation to deliver better patient outcomes" (Novartis, 2017b, para. 2).

The strongest base of Switzerland's economy is exports not of raw products. Therefore, as a knowledge-based economy, Switzerland focuses on goods and services. As an interesting comparison, Singapore also does not export raw products and has a knowledge-based economy. To sustain a knowledge-based economy, Singapore, in 2006, established with Switzerland *Swissnex*, a Swiss governmental platform for science and education, which has "recently been integrated in the Embassy as a Science and Technology Office [and] played … a pioneering role to promote exchanges on Swiss and Singaporean education and research" (Guo & Woo, 2016, p. xii).

Switzerland is known worldwide for promoting global partnerships and international networks, which benefit not only the Swiss, but also the international community. The World Economic Forum (WEC) was established in 1971 as a nonprofit foundation headquartered in Geneva, Switzerland. The WEC is "committed to improving the state of the world [and] is the International Organization for Public-Private Cooperation" (The World Economic Forum, 2017, para. 1). Through the WEC's agreement with the Federal Council of Switzerland, in January 2015, Switzerland was established as its headquarters. In WEC projects, forums, networks, and activities, private industry representatives and public entities have opportunities to network and forge partnership projects. Through the WEC, stakeholders may receive support through

94

academic and professional networks. Additionally, participants engage in varies projects, initiatives, and opportunities organized and presented through the WEC. It is no surprise, the WEC was formed in Switzerland. As a nation depending on global partners and exports, the WEC offers multiple nations to form alliances and partnerships, as well. The international partners in health and healthcare alone include the Swiss conglomerate Novartis, as well as the following partners from around the world, such as Duke University Health System (U.S.A.), Fortis Healthcare India, Johnson & Johnson (U.S.A.), Royal Philips (The Netherlands), Sanofi (France), and Takeda Pharmaceutical (Japan).

Summary

A thorough literature review showed that information on what established a culture of innovation existed, but the specific information about what cultural components created an environment that nurtured innovation was scant because the amount of available information pertinent to the studied nations was inconsistent. However, certain cultural components, such as cultural tradition and a history of valuing creativity, challenging assumptions, flexibility, resilience, and collaboration, all nurture an environment of innovation. Key to flourishing and sustaining a presence as an innovative nation is the high value its society places on education, as well as on R&D.

Research indicates that when a country's government partners with organizations for the purpose of creating and sustaining innovation, the potential for innovating in that country increases. High government interest in innovation practices are reflected by its financial contributions to innovation development, as well as its collaboration with innovators in terms of bringing a product to market, both domestically and internationally. Global partnerships play a

95

crucial role in a country's success in the international innovation adaptation and diffusion market. Critical success factors provide indicators that the researcher may use to identify the efficacy and success of innovation practices in the three studied countries.

CASP SCREENING QUESTIONS FOR SYSTEMATIC REVIEW

CASP Question	Yes	Can't Tell	No

1. Did the review address a clearly focused question?
HINT: An issue can be 'focused' In terms of
    • The population studied
    • The innovation given
    • The outcome considered			

2. Did the review include the right type of study/papers?
HINT: 'The best sort of studies' would
    • Address the reviews question
    • Have an appropriate study design			

3. Do you think all the important, relevant studies were included?
Hint: Look for
    • Which bibliographic databases were used
    • Follow up from reference lists
    • Personal contact with experts
    • Search for unpublished as well as published studies
    • Search for non-English language studies			

4. Did the reviewers assess the quality of the included studies? HINT: The considered the rigor of the studies they have identified			

5. If the results of the studies have been combined, was it reasonable to do so?
HINT: Consider whether
    • The results were similar from study to study
    • The results of all the included studies are clearly displayed
    • The results of the different studies are similar
    • The reasons for any variations in results are discussed			

6. What are the overall results of the review?
HINT: Consider
    • If you are clear about the review's 'bottom line' results
    • What these are (numerically if appropriate)
    • How were the results expressed (NNT, odds ratio etc)			

7. How precise are these results? HINT: Look at the confidence intervals, if given			

8. Can the results be applied to the local population?
Consider whether:
    • The population covered by the review could be sufficiently different to your population to cause concern
    • Your local setting is likely to differ much from that of the review			

9. Were all important outcomes considered?
    HINT: Consider whether
     • Is there other information you would like to have seen			

10. Are the benefits worth the harms and costs?
    Consider:
     • Even if this is not addressed by the review, what do you think?			

APPENDIX C

PRISMA FLOW DIAGRAM

Identification	Records identified through searching (n = ?)

Additional records identified through other sources (n = ?)

Records after duplicates removed (n = ?)

Screening

Records screened (n = ?)

Records excluded (n = ?)

Eligibility

Full-text articles assessed (n = ?)

Full-text articles excluded with reasons (n = ?)

Included

Studies included in qualitative synthesis (n = ?)
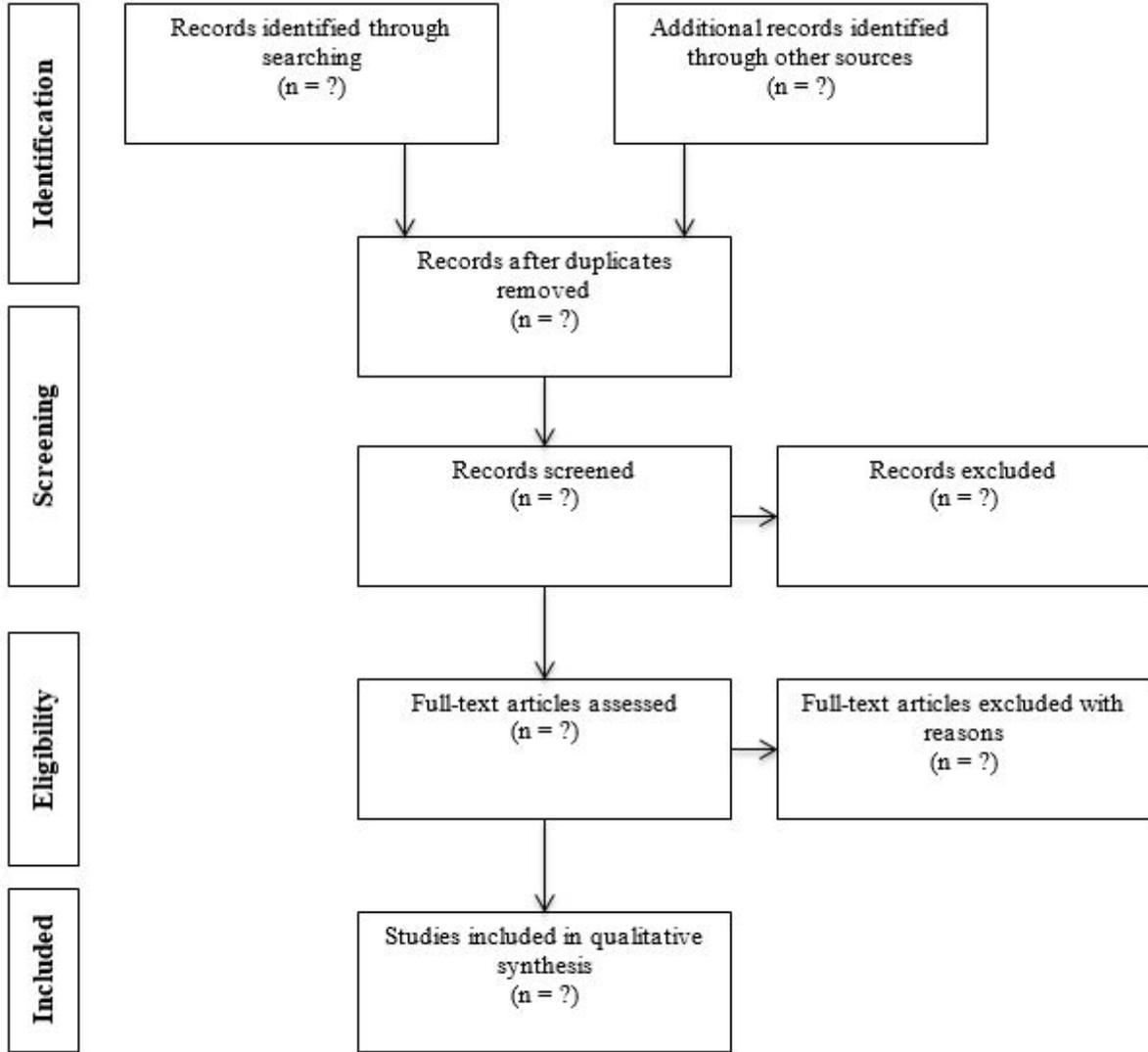
APPENDIX D

DATA EXTRACTION FORM

Database Search Key	Data Source Key	Countries
1 = CINAHL	1 = Journal Article	1 = Israel
2 = ProQuest	2 = Government/Company Report	
3 = PubMed	3 = Database	3 = Ireland
4 = Google Scholar	4 = Other	4 = Switzerland

Study #	Database Searched	Data Source	Author & Year Title	Critical Success Factors: Innovation:
Purpose of the study				
Duration of the study				
Data collection procedures				
Data analysis methods				
Identification/Development process of healthcare innovation				
Implementation of healthcare innovation				
Outcome/Conclusions				

APPENDIX E

CLASSIFICATION SHEET

Table E1. Summary Classification of Articles in Systematic Review

Author, Year	Database Search Key	Features	Purpose of the Study	Duration of the Study	Data Collection Procedures	Data Analysis Methods	Outcome/ Conclusions
Akenroye, T. d. (2012).	CINAHL by EBSCO HOST	Global	The purpose of this study was to investigate the drivers of innovation in the National Health Service in the United Kingdom.	Unknown	Literature search on drivers and secondary data from NHS publications on healthcare innovation	Literature review and secondary data analysis	Results showed a variety of innovation drivers. Innovation was driven by addressing cost challenges, supply chain issues, and sustainability problems. Implications were non-medical issues might influence the necessity for innovation in healthcare. Developed a conceptual framework describing the drivers affecting the need for innovation.
Azarmina, P., Prestwich, G., Rosenquist, J., & Singh, D. (2008).	ProQuest	Innovation Diffusion/ Dissemination, Criteria & Measurements	The purpose of this study was to provide a summary of the critical success factors for the adaptation of a US disease management and health promotion program for use in Italy and the United Kingdom.	London, UK program from 2003-2005; Birmingham, UK program from 2006-2007; Italy program over 18 months between 2006 and 2007	Case studies	Program evaluation	The conclusions showed the necessity for implementing evidence-based practices by learning through different country's experiences. Successful implementation depended upon the payers, practitioners, and patients.

				A literature search for definitions of organizational innovation, including those from economics, innovation and entrepreneurship, business and management, and technology, and science and engineering.		
Baregheh, A., Rowley, J., & Sambrook, S. (2009).	Emerald	Innovation Diffusion/Dissemination, Criteria & Measurements	The purpose of this paper was to analyze existing definitions of innovation with the idea of determining a comprehensive definition for organizations to use.	Unknown		Content analysis	Results contributed to providing a solid definition of innovation that integrates the diverse perspective and beliefs about the concept creating a definition usable for a variety of disciplines.
Becker, C. (2005).	CINAHL by EBSCO HOST	Israel	The purpose of this paper was to examine the way in which Israel developed into a modern innovator of medical technologies.	Unknown	Literature and data review	Qualitative	Having the available intellectual capital and the continued international partnerships supported ongoing innovation.
Ben-Nahum, Y., & Erez, M. (2012).	ProQuest	Israel	The purpose of this article was to examining Israel's strength in developing innovation and government's support in the process.	Unknown	Literature and data review	Qualitative	Organizational culture supported the capacity to innovate. Support for an innovative culture stemmed from high auto my, risk taking, tolerance of mistakes, and limited bureaucracy. Need access to increased knowledge and the ability to use that knowledge. Policies needed synchronization to disseminate knowledge and promote innovation.

							The review showed the Swiss health care system was expensive and needed improved accountability for quality and cost purposes. Overall, the system worked while respecting individual health choices and working within an existing budget.
Biller-Andorno, N., & Zeltner, T. (2015).	NEJM	Switzerland	The purpose of this paper was to examine the Swiss Healthcare system and the potential for its replication in other systems.	Unknown	Literature and data review	Content analysis	
Brady, M., & Saranga, H. (2013).	ProQuest	Ireland	The purpose of this paper was to develop knowledge about hospitals as international businesses within the Irish and Indian contexts.	Unknown	Cross-country comparative study using mini case studies	Business model framework to analyze cases	Results showed ideas and innovations regarding healthcare can be shared equally between developed and emerging countries. Implementation needed to consider policy planning and buy-in from the people. Experiences showed the advantage of having intellectual capital and funding for research and
Brand, E. (1988).	Gale Academic One File	Israel	This paper examined Israel's software industry journey into incorporating international partners and expanding innovation.	Unknown	Literature and data review	Qualitative	development from the government. These assets attracted international partners to Israel contributing to innovation where their firms created products and outsourced marketing.

103

Bullinger, A., Rass, M., Adamczyk, S., Moeslein, K., & Sohn, S. (2012).	CINAHL by EBSCO HOST	Ireland	The purpose of this study was to expand research about open innovation by investigating the adoption of an open health platform by patients, care givers, physicians, family members, and the interested public in Ireland.	Started March to June 2011	Personal messages exchanged between participants and comments on problems and solutions collected through an open health platform	Content and descriptive data analysis	Conclusions showed the development of empathic support and information exchange as important aspects of communication when using the open platform. This provided support for using open innovation methods to incorporate stakeholders into healthcare research to improve and foster innovation.
Daniel, R. D. (1961).	CINAHL by EBSCO HOST	Innovation Diffusion/Disse mination, Criteria & Measurements	This paper examined the changed structures in businesses following WWII including the systems changes, jobs, responsibilitie s, and decision-making that created a demand for innovation.	Unknown	Literature and data review	Qualitative	Planning required incorporation of environmental, competitive, and internal information. Developments in data management improved innovation efforts and promoted how well they accomplished them.
Efrat, K. (2014).	Science Direct	Innovation Diffusion/Disse mination, Criteria & Measurements	The purpose of this study was to investigate the direct and indirect influence of culture on motivation to practice innovation at the national level over time.	Unknown	Secondary data from 1998, 2003, and2007 in 35 countries	Structural equation modeling	The results indicated that most cultural considerations showed long standing influence on a nation's tendency to practice innovation at the national level.

104

Engel, J. S., & del-Palacio, I. (2011).	Sage Journals	Israel	The purpose of this was to use the case study of Israel and the Silicon Valley to show the way that national level focus can harm innovation efforts by neglecting the importance of international resources and expertise might improve innovation and clusters of innovation.	November 2008 to January 2009	Secondary data from existing literature and key informant interviews	Content analysis	Results showed the Global Clusters of Innovation Framework was a unified tool identifying core constructs for the ways to operate in a cluster of innovation and demonstrating the ways to successful international collaboration. Provided information for business practices, informed policy, and provided guidance for developing innovation.
Foray, D., & Hollanders, H. (2015).	CINAHL by EBSCO HOST	Switzerland	The purpose of this study was to clarify what the IUS statistical framework provided regarding data and reflections on strengths and weaknesses of the NIC for a specific country as related to other countries involved in the exercise.	Unknown	Qualitative Case Study	Case study analysis of IUS results for Switzerland	They concluded "if the IUS can be considered as an important tool to inform innovation policies, it should not be applied in an isolated manner or without relying on other types of indicators and information on the system considered."

Gemen, R., Breda, J., Coutinho, D., Fernández Celemín, L., Khan, S., Kugelberg, S., & ... Hadwiger, K. (2015).	CINAHL by EBSCO HOST	Global	The purpose of this paper was to describe the INPROFOOD program carried out by the European Union to develop partnerships and mutual learning between the scientific community and civil society to promote innovation in research and development	2011-2014	Workshops, conferencing, work plan development	Qualitative	Reflections on the program showed research programming remained limited with further research needed in many nations. Findings showed certain barriers to public participation linked to fatigue with participation, structural and organizational barriers, and developing legitimate participating in policy development. Pointed to the need for a better development plan, inclusive involvement, and identification of tangible actions in priority areas.
Green, C., Fortin, P., Maclure, M., Macgregor, A., & Robinson, S. (2006).	Science Direct	Innovation Diffusion/ Dissemination, Criteria & Measurements	The purpose of this study was to determine critical success factors supporting the translation of clinical and operational knowledge regarding best practices in managing chronic care for primary care.	Began in fall 2003	Key informant interviews, process observation, and document review	Content analysis of the best methods for translating information to practice	The results showed the necessity of having a comprehensive quality improvement model including the complete set of critical success factors for the translation to be successful. In the primary care setting, doctors had low adoption of electronic tools for care, but the comprehensive framework may improve uptake.

106

Harris, M., Bhatti, Y., & Darzi, A. (2016).	ProQuest	Innovation Diffusion/ Dissemination, Criteria & Measurements	This paper examined if the nation of origin for a healthcare innovation matters for implementation into another country.	Unknown	Literature and data review	Qualitative	Little information existed on the incorporation of innovations in different contexts. This knowledge was necessary to understand the adoption processes, financing mechanisms, and delivery methods. Research should focus on interactions between consumers and the products delivered during the translation process. Conclusions showed the United States should focus more cultivating talent, investing strategically in research and development, and develop focused legislation to take advantage of the intellectual capital existing in the country.
Harris, W. C. (2010).	CINAHL by EBSCO HOST	Ireland	The purpose of this paper was to examine innovation in the United States and Ireland.	Unknown	Literature and data review	Qualitative	
Hsiao, S., & Hsiao, L. (2014).	RCIS	Innovation Diffusion/ Dissemination, Criteria & Measurements	This study discussed the development of a cultural innovative society in the context of public and private universities in southern Taiwan.	Unknown	Delphi method, Random sampling, questionnaires	Empirical analysis	The results showed the need to continue research and analysis of the developed theories to use them in a larger context. The analyses promoted improved construction of a cultural innovative society and state policies.

Kartner, F. (2016).	CINAHL by EBSCO HOST	Global	This article described the extent of European Union merger control practices account specifics inherent in different sectors as they assess the effects of innovation within the context of application of remedies.	Unknown	Literature and data review	Qualitative	The examination showed the European commission created better methodology for assessment. However, it was unknown if the current merger approach provides incentives to invest and innovate. Information needed constant sharing and in pharmaceutical markets products divestiture was necessary.
Kenny, B., & Reedy, E. (2006).	ProQuest	Ireland	The purpose of this study was to examine issues surrounding current innovation strategies, the difference between product and process innovation, drivers, constraints, and sources of innovation within the context of small to medium enterprises.	Unknown	Questionnaires and semi-structured interviews	Mixed Methods, Principal Components Analysis	This study showed a defined relationship with several aspects of company culture and commitment to innovation. These included sufficient funding and resources, supportive management, competent staff, organized and well-developed plan, and an open environment.

Marxt, C., & Brunner, C. (2013).	Science Direct	Switzerland	The purpose of the study was to determine the way the country might retain its lead by expanding and reinforcing the national innovation system in a sustainable manner.	9 months, 2 years post follow up	Series of interviews and workshops with major stakeholders in the innovation field in Switzerland and secondary data collection.	Comprehensive literature review and secondary data analysis	Optimal environment conditions were necessary to attract international companies, which contributed the most to innovation. Needed more balance between foreign companies and local businesses and encouragement toward innovation? Needed to attract more foreign expertise. Recognize the conditions might not be applicable to other contexts. No single critical success factor was identified. Further research was necessary.
Parston, G., McQueen, J., Patel, H., Keown, O., Fontana, G., Al Kuwari, H., & Darzi, A. (2015).	PubMed	Global	This article described the results of multiple case studies designed to assess the role of stakeholders and organizations facilitating the rapid implementation of innovation.	Unknown	Historical qualitative case study methodology, literature review and mail survey	Comparative analysis	The results demonstrated policymakers should implement a phased approach for changing the climate to one more open to change, willing to partner and engage with the entire organization, and geared toward sustainable implementation.

Pilkington, K., Loef, M., & Polley, M. (2017).	PubMed	Global	The purpose of the study was to describe and analyze existing data from the evaluation of social prescribing methods for Type 2 diabetes in Ireland and the UK to compare information available to the public and within the published literature.	Unknown	Literature search	Literature review	The results showed that the scope of the study did not verify proof that prescribing acted as an effective method for those with Type 2 diabetes in the UK. However, the results might inform future evaluation and contribute to the development of other healthcare innovation.
Ramasamy, B., & Yeung, M.C.H. (2016).	Taylor & Francis Online	Global	The purpose of this study was to analyze aspects of diversity, ethnicity and values, to determine their influence on national innovation outcomes.	Unknown	Secondary Data from the *Global Innovation Index*	Regression Analysis	Ethnic diversity and diverse values were separate issues with ethnic diversity negatively influencing innovation. However, diverse values support innovation. Countries had both types. Ethnically homogenous countries with diversity in values appeared as the most successful at innovation.
Sackman, J. E., & Kuchenreuther, M. (2013, December).	Gale Academic One File	Israel	The purpose of this paper was to examine Israel's role in continuing innovation within healthcare.	Unknown	Literature and data review	Qualitative	Israel continued its history of biotechnology innovation and growth, growing its educated and diverse population, high quality healthcare, and focusing on strategies to overcome global crises.

110

Shane, S. (1992).	Science Direct	Innovation Diffusion/ Dissemination, Criteria & Measurements	This purpose of this study was to investigate the way in which culture influenced innovation across societies.	Unknown	Literature and secondary data review	Cross-sectional analysis	Results implied two areas of concern for managers. Certain societies have comparative advantage in inventiveness. Essentially, if true, this means such nations make the best locations for research and development for multinational corporations. Finally, the findings implied cultural values operating at the national level also operate at the organizational level.
Srinivasan, M. (2013).	PubMed	Innovation Diffusion/ Dissemination, Criteria & Measurements	This paper explored the meaning of innovation in healthcare.	Unknown	Literature search	Qualitative	The discussion was determining the lure of this type of disruptive or new innovation versus deliberate innovation. Deliberate innovations expanded the areas of existing care, alignment, and financing.

Thompson, V. (1965).	Jstor	Innovation Diffusion/ Dissemination, Criteria & Measurements	This paper examined the relationship existing between bureaucracy and innovative behavior through a comparison of the conditions existing within that environment and those conditions contributory to innovative behavior.	Unknown	Literature and data review	Qualitative	Innovation would improve in bureaucratic structures once they removed rigid constructs and introduced openness.
Von Bremen, K., Zullig, M., von Below, G., Gurtner, F., Kunzlie, C., Bellucci, S., & Koch, P. (2005).	ProQuest	Switzerland	The purpose of the study was the promotion and implementation of Health Technology Assessment projects in Switzerland by offering a neutral platform to inventory common interests.	Unknown	Telephone and mail surveys	Quantitative analysis	Findings supported the necessity for determining new methods of connecting healthcare stakeholders to improve innovative efforts, especially in response to growing costs and decreased availability of funding.
Wass, S., Vimarlund, V. (2016).	Sage Journals	Innovation Diffusion/ Dissemination, Criteria & Measurements	The purpose of this study was to review the literature surrounding the healthcare sector's engagement in open innovation as constraining factors and positive outcomes of open innovation in healthcare.	1 week in December 2014	Systemic Database Literature	Literature review	The healthcare sector demonstrated limited involvement with open innovation. Further research was necessary focusing the way open innovation might be handled in healthcare.

112

Whyte, B. (2005).	Science Direct	Switzerland	The purpose of this paper was to examine the innovative methods supporting successful outcomes in Switzerland's biotech industry.	Unknown	Literature and data review	Qualitative	Switzerland continued to move forward in their efforts to continue healthcare innovation development. They are providing further investment including more medical technology and research and development.
Yaya, S. s., & Danhoundo, G. g. (2015).	CINAHL by EBSCO HOST	Global	The purpose of this paper was to examine existing innovations in healthcare systems and reforms occurring in OECD countries.	Unknown	Literature and data review	Qualitative	Reform efforts remained inadequate to handle the underlying problems. Suggestions for improvement included implementation of new technology such as telehealth and decentralized healthcare delivery models. However, assessment of these changes was limited and no countries have yet achieved sustainable changes.

APPENDIX F

IRELAND, ISRAEL & SWITZERLAND COUNTRY PROFILES
IRELAND

https://www.cia.gov/library/publications/the-world-factbook/geos/ei.html

Capitol	DUBLIN
Nationality	**noun:** Irishman(men), Irishwoman(women), Irish (collective plural) **adjective:** Irish
Ethnic Group	Irish 84.5%, other white 9.8%, Asian 1.9%, black 1.4%, mixed and other 0.9%, unspecified 1.6% (2011 est.)
Religions	Roman Catholic 84.7%, Church of Ireland 2.7%, other Christian 2.7%, Muslim 1.1%, other 1.7%, unspecified 1.5%, none 5.7% (2011 est.)
Language	English (official, the language generally used), Irish (Gaelic or Gaeilge) (official, spoken by approximately 38.7% of the population as a first or second language in 2011; mainly spoken in areas along the western coast)
Literacy	Definition: Age 15 and over can read and write. Total population: 99% Male: 99% Female: 99% (2003 est.)
Government Type	parliamentary republic
Date of Independence	6 December 1921 (from the UK by treaty)
Gross Domestic Product (GDP) per capita	$69,200 (2016 est.) $66,300 (2015 est.) $52,900 (2014 est.) **note:** data are in 2016 dollars **country comparison to the world:** 12
Unemployment Rate	8% (2016 est.)
Natural Hazards	rare extreme weather events
Environment: current issues	water pollution, especially of lakes, from agricultural runoff
Environment: international agreements	**party to:** Air Pollution, Air Pollution-Nitrogen Oxides, Air Pollution-Sulfur 94, Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Environmental Modification, Hazardous Wastes, Law of the Sea, Marine Dumping, Ozone Layer Protection, Ship Pollution, Tropical Timber 83, Tropical Timber 94, Wetlands, Whaling **signed, but not ratified:** Air Pollution-Persistent Organic Pollutants, Marine Life Conservation
Population	5,011,102 (July 2017 est.)
Age Structure	**0-14 years:** 21.46% (male 549,864/female 525,608) **15-24 years:** 11.84% (male 301,114/female 292,055) **25-54 years:** 43.2% (male 1,087,587/female 1,077,383) **55-64 years:** 10.42% (male 261,650/female 260,737) **65 years and over:** 13.07% (male 303,078/female 352,026) (2017 est.)

Median age	total: 36.4 years
	male: 36.1 years
	female: 36.8 years (2016 est.)
Population growth rate	1.2% (2017 est.)
Birth rate	14.1 births/1,000 population (2017 est.)
Death rate	6.6 deaths/1,000 population (2017 est.)
Net migration rate	4 migrant(s)/1,000 population (2017 est.)
Gender ratio	at birth: 1.06 male(s)/female
	0-14 years: 1.05 male(s)/female
	15-24 years: 1.03 male(s)/female
	25-54 years: 1.01 male(s)/female
	55-64 years: 1 male(s)/female
	65 years and over: 0.86 male(s)/female
	total population: 1 male(s)/female (2016 est.)
Infant mortality rate	total: 3.7 deaths/1,000 live births
	male: 4 deaths/1,000 live births
	female: 3.3 deaths/1,000 live births (2016 est.)
Life expectancy at birth	total population: 80.8 years
	male: 78.5 years
	female: 83.2 years (2016 est.)
Total fertility rate	1.97 children born/woman (2017 est.)
HIVE/AIDS adult prevalence rate	0.2% (2016 est.)
Number of people living with HIV/AIDS	6,200 (2016 est.)
HIV/AIDS deaths	N/A

ISRAEL

https://www.cia.gov/library/publications/the-world-factbook/geos/is.html

Capitol	Jerusalem: note - Israel was proclaimed Jerusalem as its capital in 1950, but due to political conflict with the Palestinians, most countries maintain their embassy in Tel Aviv – Yafo, with the exception of Italy, that maintains a consulate in Jerusalem.
Nationality	Israeli
Ethnic Group	Jewish 75% (of which Israel-born 74.4%, Europe/America/Oceania-born 17.4%, Africa-born 5.1%, Asia-born 3.1%), non-Jewish 25% (mostly Arab) (2013 est.)
Religions	Jewish 75%, Muslim 17.5%, Christian 2%, Druze 1.6%, other 3.9% (2013 est.)
Language	Hebrew (official), Arabic (used officially for Arab minority), English (most commonly used foreign language)
Literacy	definition: age 15 and over can read and write
	total population: 97.8%
	male: 98.7%
	female: 96.8% (2011 est.)
Government Type	parliamentary democracy
Date of Independence	14 May 1948 (from League of Nations mandate under British administration)

Gross Domestic Product (GDP) per capita	$34,300 (2015 est.) $33,500 (2014 est.) $32,600 (2013 est.) **note:** data are in 2015 US dollars **country comparison to the world:** 53
Unemployment Rate	**total:** 10.5% **male:** 10.4% **female:** 10.7% (2013 est.) **country comparison to the world:** 90 **Unemployment rate:** ▣ 5.6% (2015 est.) 5.9% (2014 est.) **country comparison to the world:** 63
Natural Hazards	sandstorms may occur during spring and summer; droughts; periodic earthquakes
Environment: current issues	limited arable land and natural freshwater resources pose serious constraints; desertification; air pollution from industrial and vehicle emissions; groundwater pollution from industrial and domestic waste, chemical fertilizers, and pesticides
Environment: international agreements	**party to:** Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Hazardous Wastes, Ozone Layer Protection, Ship Pollution, Wetlands, Whaling **signed, but not ratified:** Marine Life Conservation
Population	8,049,314 (includes populations of the Golan Heights of Golan Sub-District and also East Jerusalem, which was annexed by Israel after 1967) (July 2015 est.) **note:** approximately 20,500 Israelis live in the Golan Heights; approximately 211,640 Israeli settlers live in East Jerusalem (2014)* **country comparison to the world:** 99
Age Structure	**0-14 years:** 27.95% (male 1,151,247/female 1,098,632) **15-24 years:** 15.5% (male 637,758/female 609,597) **25-54 years:** 37.13% (male 1,528,271/female 1,460,772) **55-64 years:** 8.57% (male 336,662/female 353,352) **65 years and over:** 10.85% (male 389,401/female 483,622) (2015 est.)
Median age	**total:** 29.6 years **male:** 28.9 years **Female:** 30.2 years (2015 est.) **country comparison to the world:** 115
Population growth rate	1.56% (2015 est.) **country comparison to the world:** 78
Birth rate	18.48 births/1,000 population (2015 est.) **country comparison to the world:** 96
Death rate	5.15 deaths/1,000 population (2015 est.) **country comparison to the world:** 183
Net migration rate	2.24 migrant(s)/1,000 population (2015 est.) **country comparison to the world:** 46

Gender ratio	**at birth:** 1.05 male(s)/female **0-14 years:** 1.05 male(s)/female **15-24 years:** 1.05 male(s)/female **25-54 years:** 1.05 male(s)/female **55-64 years:** 0.95 male(s)/female **65 years and over:** 0.81 male(s)/female **total population:** 1.01 male(s)/female (2015 est.)
Infant mortality rate	**total:** 3.55 deaths/1,000 live births **male:** 3.51 deaths/1,000 live births **female:** 3.58 deaths/1,000 live births (2015 est.) **country comparison to the world:** 204
Life expectancy at birth	**total population:** 82.27 years **male:** 80.43 years **female:** 84.21 years (2015 est.) **country comparison to the world:** 11
Total fertility rate	2.68 children born/woman (2015 est.) **country comparison to the world:** 72
HIVE/AIDS adult prevalence rate	N/A
Number of people living with HIV/AIDS	N/A
HIV/AIDS deaths	N/A

* East Jerusalem has been annexed by Israel, unlike the West Bank and Gaza. Though this annexation hasn't necessarily been recognized by the rest of the world, Israelis in East Jerusalem are not view as settlers.

SWITZERLAND

https://www.cia.gov/library/publications/the-world-factbook/geos/sz.html

Capitol	BERN
Nationality	**noun:** Swiss (singular and plural) **adjective:** Swiss
Ethnic Group	German 65%, French 18%, Italian 10%, Romansch 1%, other 6%
Religions	Roman Catholic 37.3%, Protestant 24.9%, other Christian 5.8%, Muslim 5.1%, other 1.4%, Jewish 0.2%, none 23.9%, unspecified 1.3% (2015 est.)
Language	German (or Swiss German) (official) 63%, French (official) 22.7%, Italian (official) 8.1%, English 4.9%, Portuguese 3.7%, Albanian 3%, Serbo-Croatian 2.4%, Spanish 2.2%, Romansch (official) 0.5%, other 7.1% **note:** German, French, Italian, and Romansch are all national and official languages; totals more than 100% because some respondents indicated more than one main language (2015 est.)
Government Type	federal republic (formally a confederation)
Date of Independence	1 August 1291 (founding of the Swiss Confederation)
Gross Domestic Product (GDP) per capita	$59,600 (2016 est.) $59,400 (2015 est.) $59,700 (2014 est.) **note:** data are in 2016 dollars **country comparison to the world:** 17

Unemployment Rate	3.3% (2016 est.) 3.2% (2015 est.) **country comparison to the world:** 28
Natural Hazards	avalanches, landslides; flash floods
Environment: current issues	air pollution from vehicle emissions and open-air burning; acid rain; water pollution from increased use of agricultural fertilizers; loss of biodiversity
Environment: **international agreements**	**party to:** Air Pollution, Air Pollution-Nitrogen Oxides, Air Pollution-Persistent Organic Pollutants, Air Pollution-Sulfur 85, Air Pollution-Sulfur 94, Air Pollution-Volatile Organic Compounds, Antarctic Treaty, Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Environmental Modification, Hazardous Wastes, Marine Dumping, Marine Life Conservation, Ozone Layer Protection, Ship Pollution, Tropical Timber 83, Tropical Timber 94, Wetlands, Whaling **signed, but not ratified:** Law of the Sea
Population	8,236,303 (July 2017 est.)
Age Structure	**0-14 years:** 15.16% (male 642,814/female 605,689) **15-24 years:** 10.88% (male 458,044/female 438,373) **25-54 years:** 43.21% (male 1,784,051/female 1,774,494) **55-64 years:** 12.6% (male 519,709/female 518,421) **65 years and over:** 18.15% (male 658,673/female 836,035) (2017 est.)
Median age	**total:** 42.2 years **male:** 41.3 years **female:** 43.2 years (2016 est.)
Population growth rate	0.7% (2017 est.)
Birth rate	10.5 births/1,000 population (2017 est.)
Death rate	8.3 deaths/1,000 population (2017 est.)
Net migration rate	4.7 migrant(s)/1,000 population (2017 est.)
Gender ratio	**at birth:** 1.06 male(s)/female **0-14 years:** 1.06 male(s)/female **15-24 years:** 1.04 male(s)/female **25-54 years:** 1.01 male(s)/female **55-64 years:** 1 male(s)/female **65 years and over:** 0.78 male(s)/female **total population:** 0.97 male(s)/female (2016 est.)
Infant mortality rate	**total:** 3.6 deaths/1,000 live births **male:** 4 deaths/1,000 live births **female:** 3.3 deaths/1,000 live births (2016 est.) **country comparison to the world:** 199
Life expectancy at birth	**total population:** 82.6 years **male:** 80.3 years **female:** 85 years (2016 est.) **country comparison to the world:** 9
Total fertility rate	1.56 children born/woman (2017 est.) **country comparison to the world:** 190
HIVE/AIDS adult prevalence rate	N/A
Number of people living **with HIV/AIDS**	N/A
HIV/AIDS deaths	N/A

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