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Thucydides' contributions to politics and international affairs are significant. He may be considered the father of political realism in international relations. His work has inspired and influenced many political and international affairs scholars.

September 2025

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Gregory T. Papanikos
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- Submission of Paper: **18 May 2026**

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- Abstract Submission: **16 September 2025**
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Athens Journal of Politics & International Affairs - Volume 1, Issue 3,
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K-pop Idols as Diplomats: South Korean Celebrities and Soft Power

By Tara Shafie[*]

This study explores how South Korea has expanded its soft power through a strategy of using K-pop music idols as diplomats. It demonstrates how the South Korean government effectively employs K-pop to increase its soft power and uses K-pop idols as public diplomats, in five case studies from 2018–2022. Using global media discourse as an indicator of soft power, it provides an analysis of the effects of this strategy and shows how it has been advantageous for South Korea. The K-pop industry's combined economic and cultural power make it a prime example of soft power today. With broader implications, this study suggests a more comprehensive definition of soft power.

Keywords: *K-pop, soft power, South Korea, public diplomacy, international relations*

Introduction

In recent years, the popularity of Korean pop music, or K-pop, has expanded exponentially around the world. This trend, known as the Hallyu Wave, or Korean Wave, began in the 1990s, rising every year (Park 2023a). The K-pop music industry and overall entertainment industry is a significant part of South Korea's economy, with the music group BTS alone contributing over $3.5 billion annually (Young 2022). K-pop artists and merchandise generated over nine billion dollars in 2023 in the US alone, for example. The international K-pop phenomenon is still growing rapidly and continuing to generate revenue worldwide.

This study explores how the South Korean government intentionally uses K-pop idols as public diplomats for the purpose of expanding its soft power. I examine how the South Korean government successfully used K-pop idols as public diplomats from 2018–2022, and analyze some of the recent effects of this strategy. This endeavor has been advantageous for South Korea as a whole because it has helped increase its soft power and revenue; it has in turn expanded the K-pop industry itself. I argue that the K-pop industry's combined economic and cultural power make it one effective element of South Korea's current soft power.

As defined in Joseph Nye's well-known work, soft power grows when a country gains international influence through non-militaristic means (Nye 1990). For Nye, soft power is more about attraction or persuasion, whereas hard power is more about coercion, force, or the threat of force (of course, we must recognize that there is some overlap between hard and soft power). Since the end of the Cold War, countries have been attempting to gain influence through non-traditional and non-militaristic means, such as cultural and economic influence. K-pop rests at the

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intersection of the cultural and the economic, as it is a cultural industry unique to South Korea that also has a tangible impact on the economy.

On a theoretical level, my findings offer a useful new perspective on South Korean soft power, and my analysis will push against traditional theories of diplomacy by emphasizing the role of non-state actors in the field of international relations, following the Nascent School of Diplomacy. Though I rely on Nye's theory of soft power for the theoretical framework, I explore how both hard power and soft power go together, thereby combining elements from the realist and constructivist schools. Simply put, realism tends to emphasize monetary gains of tangible influence, which constructivism does not tend to account for. With this analysis, I will also offer a more comprehensive definition of soft power that, as observed by scholars, the field of international relations sorely lacks (Yun 2018). Scholars continue to disagree on the nuances of what constitutes soft power. I suggest that varied existing definitions tend to ignore the monetary impact of non-militaristic influence. By incorporating some aspects of hard power and traditional soft power into a more comprehensive definition, I suggest a broader definition of soft power in looking at K-pop and South Korea.

Of course, from one perspective, music, film, television, new media, and other creative industries all represent manifestations of material power, in a sense. Because music and shows related to K-pop rely on technology for monetary gain; I acknowledge that material power and the products of material culture and intellectual property (such as K-pop music, K-pop competition shows, related group merchandise, and even K-drama shows) are material aspects of soft power. Thus, the South Korean government established the Ministry of Sports, Culture and Tourism to federally and financially support this intellectual property and cultural production (Ministry of Culture, Sports and Tourism, South Korea).

I present five case studies of the South Korean government's use of K-pop idols as public diplomats that have never been analyzed before in an international relations setting. The five cases I have selected because they are the most representative include:

1. K-pop group EXO performing at the 2018 Winter Olympics closing ceremony.
2. K-pop group Red Velvet performing for Kim Jong-un and members of the North Korean government on a diplomatic trip to North Korea.
3. EXO meeting US President Donald Trump during a presidential visit to South Korea.
4. K-pop group BTS meeting US President Joe Biden at the White House.
5. BTS giving a speech at the United Nations.

As part of my analyses, I provide figures for strategies of quantifying soft power. One indicator of soft power I use is worldwide media coverage, showing how a case has more impact on South Korea's soft power if it has more media coverage. Second, I use the monthly K-pop group Brand Reputation Index to quantify a given group's popularity at a particular time. This measure of popularity can be used to explain variation in soft power gains, as groups that are more popular engaging in public diplomacy will result in higher soft power gains. I also provide approval ratings of the current president of South Korea at the time of each given case, and the approval rating of the other party involved (if any) to further explain variation in soft power gains. This can also help illustrate if the case had any effect on a particular politician's approval rating. The South Korean president's approval ratings are taken from domestic Gallup polls in South Korea, and the American presidents' approval ratings are taken from domestic American Gallup polls. The United Nations' approval rating is also taken from domestic American Gallup polls. These data are a mix of primary and secondary sources.

Literature Review

I offer a synthesis of the common debates in the field of International Relations relating to soft power and public diplomacy. I first discuss discourse on soft power, also with a section analyzing existing soft power indexes and data. I then look briefly at the existing literature on schools of diplomacy, challenging the Traditional School, and affirming the Nascent School. I push against notions of "soft power resources" versus actual examples of soft power, explaining how it is applicable to the South Korean K-pop project (as well as looking at broader implications of soft power, specifically found in Japan's case, to provide further context).

Soft Power

Before we can analyze how *soft power* is applied to South Korean celebrities, we must first understand the concept as a whole. Soft power was originally coined by Joseph Nye in his 1990 work, in which he examines the state of great powers' international influence in a post-Cold War era where the power game itself has fundamentally changed. Prior to the Cold War, power was gained primarily through hard power, or militaristic force. Nye argues that international influence can also be considered power, and when it is gained through non-militaristic means, it is known as soft power. This may be achieved in many ways, the most common being diplomacy and trade. As an example, Nye explores Japan's growing economy (at the time of its industrialization and rapid growth) as another source of soft power. Since Japan was able to manufacture and export in-demand goods so efficiently, it allowed for their companies to take root abroad, thereby expanding its international influence, or soft power. Operationally, we can understand that Nye conceptualizes soft power as ideological influence, or economic influence, as long as it is not gained through traditionally militaristic means or coercion (Nye 1990, p. 153). As I will argue later in this paper, in a sense, money is soft power. Influence can be bought. This statement seems to challenge Nye, as he states that payment is a form of hard power in *Public Diplomacy and Soft Power* (2008). However, later in the same article, he suggests that advertising is a viable way of expanding and promoting influence (Nye 2008). Advertising money is key, because when a country is attempting to sell a product (in the example of South Korea, itself) to an international audience, which requires money to do so. In addition, the very implication of a country's "interests" that they are attempting to get through diplomacy tends to refer to monetary gains.

There are many ways in which scholars have measured and operationally defined soft power. Nye's original definition of the term allows for revision and debate. According to Yun (2018), some ways scholars operationalize soft power include a country's reputation, a nation's brand, and national image. Yun identifies another group of scholars who measure soft power through various indicators, such as "a country's attribute, behavior, and performance", yet there is disagreement even within this camp. Nye views the movement of people, such as tourists, students, and immigrants as an example of soft power, but some scholars disagree with Nye himself on this particular indicator (Yun 2018). Such scholars include Olivé and Molina (2011), and Trunkos (2013), who view these as *manifestations* of soft power, as opposed to *resources* (Olivé and Molina 2011).

Indexes

There are multiple indexes that seek to measure and visually map out soft power. The Soft Power 30 index, acknowledged by Nye, operationalizes and quantifies the soft power of 30 countries. It was advertised as the first project of its kind in 2011, and remains the soft power index that scholars consult the most. Yun analyzes the Soft Power 30's validity, stating that issues arise with the inclusion of instrumental resources, which Yun claims "require a nuanced understanding of their relationship with basic resources" (Yun 2018, p. 11). Basic resources are operationalized by several indicators (such as the UN's index of gender inequality, quality of universities, foreign aid, and more). Instrumental resources, Yun defines, are ways in which basic resources are highlighted, and tend to be intangible. Contact with these basic resources results in various types of beliefs, which increases a country's soft power. These beliefs that people gain are instrumental resources, and they help to increase a country's appeal. This is where the debate about the movement of people, students, and tourists as soft power indicators arises again. It is difficult to theoretically classify and practically measure the movement of people. Yun specifically uses students as an example, as an instrumental resource. She states that since the instrumental resource effect of the movement of people is so hard to quantify, the Soft Power 30 including it as a marker of soft power is problematic.

The Soft Power 30 uses six indicators for the operationalization of soft power: diplomacy, culture, education, government, business, and digital resources. Yun observes that the Soft Power 30 is lacking in any indicators involving military power. A first-glance response to this is that soft power is defined as non-militaristic power, which is why it is entirely excluded. However, Yun makes a valid point; a powerful military can induce fear from other countries as well as improve a country's reputation, which would be soft power. As stated in my introduction, I am interested in how hard and soft power intersect. By strictly separating them, as Yun points out, we are not accounting for very tangible forms of power. Soft power can still be related to the military while not yet being hard power, and conversely, hard power can have very real effects on soft power.

In addition to the Soft Power 30, the Lowy Institute offers a soft power index specific to Asia.[1] The main measures of soft power in this particular index are: economic capability, military capability, resilience, future resources, economic relationships, defense networks, diplomatic influence, and cultural influence.[2] Already, the Lowy Institute is accounting for one of Yun's critiques on the Soft Power 30. Yun's paper was published in 2018, and the Lowy Institute began its research in 2018, addressing gaps in existing research (Yun 2018, pp. 11–14). The Soft Power 30 also has not been updated since 2019, making its data outdated, specifically that of East Asian countries. South Korea has gained immense soft power with the K-pop industry in the past few years, and the Soft Power 30 does not yet account for these recent developments. As of 2019, however, South Korea has risen in the overall rankings, and if the Soft Power 30 updates again, we might safely assume that it would likely rank even higher, thanks in part to further cultural gains. Since the Soft Power 30 is outdated, the Lowy Institute helps to account for the East Asian data. Though the measurement tools are different, it nevertheless helps to visualize the rise in soft power for Asian countries (Lowy Institute).

Public Diplomacy

Soft power is an important feature of public diplomacy.[3] Since international relations itself is a relatively new field, it is constantly developing, as seen from the theory of soft power itself (coined in 1990 and now an integral part of the field). As international relations continue to develop, traditional notions of diplomacy are also challenged. The Traditional School of diplomacy focuses entirely on states, and views diplomacy as interactions between states. The Nascent School of diplomacy, however, focuses on the role of *non-state* actors in diplomacy. The Traditional School does not acknowledge actors outside of states, which entirely ignores powerful actors such as NGOs, IGOs, multinational corporations, and public figures, that may all significantly impact foreign policy. Scholars view the Nascent School as twenty-first-century diplomacy; the international stage has fundamentally changed since the pre-Cold War era, and traditional diplomacy is no longer as effective (Lee and Ayhan 2015). Nascent scholars believe that non-state actors are faster than and just as effective as state actors, and that diplomacy does not reside exclusively within states and government personnel. The Nascent School calls for a shift in emphasis from

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[1]It also includes the US, Russia, Australia, and New Zealand, but does not include Middle Eastern countries.

[2]Sub Indicators: size, international leverage, technology, connectivity, defense spending, armed forces, weapons and platforms, signature capabilities, Asian military posture, internal stability, resource security, geoeconomic security, geopolitical security, nuclear deterrence, economic resources (2030), defense resources (2030), broad resources (2030), demographic resources (2030), regional trade relations, regional investment ties, economic diplomacy, regional alliance network, regional defense diplomacy, global defense partnerships, diplomatic network, multilateral power, foreign policy, cultural projection, international influence, and people exchanges.

[3]It is outside of the scope of this paper to analyze every aspect of public diplomacy, thus I simply focus on its relationship with soft power.

traditional state-based diplomacy to that of non-state actors, who must be acknowledged for their influence on the contemporary world stage. A question that the Nascent School poses, however, is:

> "Do nonstate actors have readily definable diplomatic practices and procedures for the realization of policy goals? If so, why are they effective, and how do they differ from the traditional means and methods of diplomacy?" (Murray 2008)

Lee and Ayhan (2015) help answer this question, reminding us that "public diplomacy can have various objectives from advocacy to promotion of universal values", which non-state actors can easily accomplish. They also add, that by virtue of being a *non*-state actor, non-state actors can contribute to unintentional consequences from their public diplomacy. Citing Leonard et al., Lee and Ayhan, they observe that effective public diplomacy requires years-long relationship building so that a certain level of trust is maintained between the actors and the public (Lee and Ayhan 2015, p. 61).

Non-state actors have an advantage over state actors, as they are not limited by term limits. For example, the presidential term limit in South Korea is five years. Compare that to the example of a K-Pop music group singer, such as EXO's Suho, who has been a public figure since 2012, and will continue to be a public figure for the duration of EXO's career. The non-state actor has a clear advantage over the state actor in this scenario, as the non-state actor has spent over a decade building up a large fanbase who trusts him and his opinions. Though a president may have had a long political career prior to becoming president, their standing with the general public always depends on their current performance as president, whereas non-state actors are not held to the same standard. State actors simply do not have the same type of relationship with the public as non-state actors do, which makes them ideal for public diplomacy. In addition, non-state actors are useful in scenarios in which a given state itself "lacks credibility". In these situations, non-state actors have more social capital, and are more effective than state actors, with appeals to a wider population. One way the state can lack credibility is when public diplomacy is seen by public opinion as a state's self-interest. A way non-state actors can combat this is that they can show "goodwill and adherence to universal values" (Lee and Ayhan 2015, p. 63). Due to the nature of the K-pop industry and the standards to which it holds its many idols, they are often believed to be exhibiting "goodwill" and are therefore effective non-state actors for public diplomacy.[4] In short, celebrity diplomats are an effective way to brand the state, and increase influence with both their domestic, and international audience by associating the government with their good image.

[4]Beyond the scope of the present study, there are of course limitations to using celebrities as cultural ambassadors; for instance, they might exhibit behaviors that reflect badly on the country (such as a BTS member being fined for a DUI), see: Frater (2024).

The South Korean Case

The K-pop industry's success is an example of soft power. With the Hallyu Wave, South Korea's pop culture has grown exponentially in popularity over the last few decades (Park 2023a). The South Korean pop culture industry is also seen as a way to define a Korean identity after thousands of years of oppression, according to South Korean nationalists. Amidst the rising Japanese pop culture industry with anime and manga globally, South Korea sought to establish its own unique pop culture, which is K-pop (Huat 2012). In addition to national identity, the K-pop industry also accounts for a significant amount of revenue for South Korea's economy, with its estimated contribution in 2021 being $8.1 billion (Allied Market Research 2021). As suggested earlier, *money is soft power*. The more money South Korea gains from K-pop, the more money it has to accomplish other policy goals, and to invest in furthering its influence worldwide.

The K-pop industry is inherently linked to the South Korean government, as K-pop idols are often employed as public diplomats, or are specifically promoted by the government for the purpose of gaining soft power (Proctor 2021). The Ministry of Sports, Culture, and Tourism was specifically created during the Hallyu Wave to capitalize on the industry's growing popularity (Park 2023a). Since the government knows how important K-pop is for its economy and soft power, it has attempted to lessen roadblocks that popular K-pop groups face, one being mandatory military service. All male South Korean citizens must enlist in the military for around two years by the age of 28. This obviously affects all K-pop boy groups, whose careers are halted during military service. South Korea did not want to lose the revenue and soft power that BTS were bringing it, so the government passed a law in 2020 called "The BTS Law," in which entertainers can defer their military service until they are 30 years old if they have been awarded a medal of cultural merit (Sang-hun 2015).

Proctor (2021) observes how the Hallyu Wave is a strong example of soft power and cultural diplomacy; however, Vuving's (2009) earlier study disagrees:

> "Cultural events, exchange programs, broadcasting, or teaching a country's language… do not produce soft power directly. They provide a first but important step in the translation of benignity, beauty, and brilliance into soft power." (Vuving 2009)

On the contrary, I would emphasize that international influence *is* soft power—in fact, language popularity is one of the metrics used by the Soft Power 30. As of 2023, Korean is the second most popular Asian language in the United States, and enrollment in Korean language courses at American universities increased by 78% from 2009 to 2016, with K-pop's popularity growing more since that statistic was published (Kim 2023, Miller 2023). Vuving has "attraction" that leads to soft power split up into these three categories (benignity, beauty, and brilliance), which Yun suggests as a possible framework for future scholarship. Alliteration notwithstanding, this categorization muddies the concept instead of clarifying it. Vuving each of these categories as:

Benignity: a country having good intentions
Beauty: shared values
Brilliance: admiration

In practice, these categories are not really that different from each other. In addition, he is claiming that these three categories are just *preludes* to soft power, not soft power itself. He claims that the aforementioned cultural events and programs only lead to "understanding," and eventually work to help his three categories turn into soft power. I suggest that positive sentiment, the increasing popularity of a language, and cultural events and exchanges are all soft power, as seen with the Soft Power 30.

If I were to follow Vuving's framework, K-pop would not be soft power at all, but *"brilliance"* or a soft power *resource*. This framework would also disagree that Japanese pop culture equals soft power, which has been widely acknowledged by scholars.[5] Japan's pop culture industry is backed by the government, and has been built into Japan's foreign policy since 2007, with the establishment of the "Cool Japan Strategy". Japan has also started many projects in order to further its soft power through pop culture, such as the International Manga Award, which is an example of a "cultural event", which Vuving claims is not an example of soft power.

K-pop is soft power. Vuving invents these categories because, according to Nye, soft power gets confused with its resources. I disagree with this unnecessary complication. Something is either influence or it is not—not a beginning stage of soft power. This framework would ignore the very real soft power gains that South Korea has gotten through the K-pop industry by chalking them up as "soft power resources". The field is always changing, and with this change comes clarifying and updating terms. K-pop is a very real case of soft power, and should be viewed as such, not as containing "resources" of soft power.

Argument

The use of non-state actors in public diplomacy, in addition to being a relatively new phenomenon, is overlooked within the literature. I argue that the intentional use of non-state actors (in this case, K-pop idols), is an effective way to increase a country's soft power. I use constructivism broadly speaking for my theoretical framework, as the constructivist approach can account for factors (such as ideology and influence) that the other schools do not. As discussed in the brief literature review above, measuring and defining soft power remains contentious among scholars. Due to the rising popularity of K-pop, and the desire to distinctly define itself in terms of pop culture from its neighbors, the South Korean government has capitalized on its celebrities by employing them as public diplomats. K-pop is unique to South Korea; thus K-pop idols are seen worldwide as representatives of South Korea. A government using celebrities as public diplomats is nothing new, but it tends to mostly occur domestically. South Korea is unique, as these K-pop idols are frequently sent specifically on international diplomatic trips as representatives of South Korea.

I argue that the more South Korea employs K-pop idols as public diplomats, South Korea's soft power grows, resulting in a positive relationship. These initiatives put K-pop celebrities at the front and center of the world stage, thereby increasing

[5]See also my analysis of the "Cool Japan" strategy: Shafie 2024. Other studies exploring Japan's pop culture in relation to its soft power are numerous, including: Daliot-Bul 2009, Lam 2007, Green 2015, Ministry of Foreign Affairs Japan 2007, Otmazgin 2014.

South Korea's soft power. As outlined by Nye, "information is power", and due to globalization and technological developments, soft power as a whole has been growing increasingly more important (Nye and Kim 2019). Since information (including both positive and negative press coverage) is key, the more diplomatic trips K-pop idols go on, the more they will be covered in the press, and the more they will be discussed internationally. Though South Korea's soft power will continue to grow with the K-pop industry, employing K-pop idols as public diplomats and representatives of South Korea helps link the idols to the country, and also the government, thereby raising positive attitudes about South Korea worldwide, and ultimately increasing soft power.

However, the Traditional School of Diplomacy would disagree with this view, as it sees diplomacy as interactions between states, and does not acknowledge non-state actors. The Traditional School would argue that the use of K-pop idols as diplomats is not real diplomacy, seeing as they are non-state actors, and not the state itself. Other scholars would also see indicators of soft power that fit in my definition as "resources" of soft power, and not tangible examples of soft power itself. These scholars would disagree with my definition, claiming instead that common soft power gains from the Hallyu Wave, such as increasing language popularity and tourism, are not an indicator of soft power (Vuving 2009). However, the Traditional School of Diplomacy is not sufficient by itself in explaining all contemporary diplomatic interactions and soft power gains. This is why the Nascent School of Diplomacy point of view is necessary to bridge the gap between state and non-state actors in diplomatic theory, as it focuses on the role of non-state actors. The Nascent School of Diplomacy is contemporary diplomacy, acknowledging advancements in technology, globalization, and the role of non-state actors in public diplomacy. In addition, scholars who disagree with the movement of people and language popularity as indicators of soft power disagree with Nye himself, and are ignoring very large and real soft power gains (Yun 2018, p. 11). Using these scholars' framework, tourists visiting South Korea because of K-pop idols advertising it would not be seen as a case of soft power, which I argue against. My argument includes a concise definition of soft power, and accounts for contemporary forms of diplomacy that the Traditional School does not account for.

Methodology

While the Hallyu Wave began in the 1990s, the time period of my selected cases ranges from 2018–2022[6]. My analysis and framework could also apply to more recent years of K-pop idols as public diplomats and non-state actors in contemporary diplomacy in future studies; however, here I have specifically chosen my cases based on international impact and cultural significance.

I use qualitative case studies of the South Korean government employing K-pop idols as public diplomats. My data sources are a mix of primary Korean sources and secondary American and international sources. I use mixed methods, measuring each case's impact on soft power by corresponding worldwide media coverage, accessed

[6]The cases are from 2018-2022, but press coverage about EXO performing at the Olympics began in 2017, so the search accounts for early press coverage.

from the ProQuest Global Newsstream database. With "information is power" in mind, I count the number of articles in the database that mention each case to determine how it has impacted South Korea's soft power. The ProQuest Global NewsStream includes newspapers, wire feeds, blogs, podcasts, websites, magazines, reports, and "other sources", which are primarily news broadcast transcripts. It is important to note that one limitation to this database is that the keyword search only results in news sources that use Latin characters (but there is nevertheless worldwide coverage, because many countries' news sources either write in English or use Latin characters). The searches are also limited to the exact characters entered. The keyword searches for each case are as follows:

"EXO" AND "Olympics" AND "Pyeongchang" from 2017
"Red Velvet" AND "North Korea" AND "Kim" from 2018
"EXO" AND "K-pop" AND "Trump" from 2017
"BTS" AND "K-pop" AND "United Nations" from 2021
"BTS" AND "K-pop" AND "Biden" from 2022

In addition to the measuring amount of news coverage as described above, for the three cases about K-pop groups meeting American presidents and speaking at the United Nations, I also analyze each president's as well as the United Nations' approval ratings at the time as a possible explanatory factor for the effectiveness of the diplomatic trip. For the qualitative analysis of my cases, I use a mix of primary and secondary sources, primarily news articles, as these cases have not yet been analyzed in detail in an academic setting. The news coverage will range from South Korean to Western sources, depending on each case.

As for K-pop idols, I theorize that more popular groups will result in more soft power gains. A group's popularity can be quantified through the K-pop Brand Reputation index. Released every month by the Korean Business Research Institute, monthly brand reputations can also include actors and drama series, as well as K-pop idols. There are four main indexes focusing on K-pop idols: Boy Group Monthly Brand Reputation, Boy Group Individual Monthly Brand Reputation, Girl Group Monthly Brand Reputation, and Girl Group Individual Monthly Brand Reputation. Each group and individual idol generates a score on the index, with events piquing popularity resulting in higher scores for a particular month. I have gathered the scores for each group for the month of or after the case, depending on when the case occurred. These scores can be used to explain variation in soft power gains by quantifying a group's popularity and effectiveness as a public diplomat. I also use pre- and post-case approval ratings of the South Korean president at the time, taken from domestic South Korean Gallup polls, as well as the other party (if any) involved, which are taken from domestic American Gallup polls, to further explain variations in soft power gains.

The five unique cases I focus on, as outlined above, are: EXO performing at the 2018 Winter Olympics, Red Velvet performing in North Korea, EXO meeting President Trump, BTS speaking at the United Nations, and BTS meeting President Biden. Again, these five are selected specifically for cultural significance, worldwide impact, as well as for the nature of the trip. These are all cases of soft power in action.

EXO's performance at the 2018 Winter Olympics closing ceremony in Pyeongchang was selected since sports diplomacy is a prime example of soft power. States have used sports and the Olympics for public diplomacy since the modern re-establishment of the Olympics. By winning at an international sporting event, a country's soft power grows along with its prestige (Albert 2018). Therefore, having a K-pop group perform at the closing ceremony functions similarly to having athletes participating in an event: soft power and prestige increases. The South Korean government knew that the world would be watching, and used this opportunity to associate itself with a K-pop group, thereby using EXO as public diplomats on the world stage.

Red Velvet's performance in North Korea was specifically selected to emphasƒmize the role K-pop idols can play in bilateral relations between North and South Korea. K-pop, was, and is still banned in North Korea (Seo 2024). It has also played a unique role in current conflict between North and South Korea, as South Korea uses K-pop for its side of the "speaker wars", where North Korea blasts propaganda and South Korea plays K-pop from loudspeakers into the demilitarized zone (Sang-hun 2015). Red Velvet's performance in North Korea was a diplomatic trip consisting of a troupe of South Korean performers, similar to the North Korean troupe in the 2018 Winter Olympics in South Korea, a few months prior. I selected this case to show the effectiveness of K-pop diplomacy in bilateral relations.

EXO's meeting with President Trump was selected to demonstrate how K-pop idols interact with state actors, specifically heads of state. Trump was in South Korea for the G20 Summit, and was welcomed by both EXO and the South Korean President. This is a unique phenomenon to South Korea, as when foreign heads of state come to the United States, they are not typically greeted by a famous musical artist, say, Taylor Swift. South Korea specifically hand picks K-pop idols for these diplomatic visits to help associate their positive image with the government. EXO was also most likely selected since they had previously met Ivanka Trump at the 2018 Olympics closing ceremony (Andrew and Gray 2019).

BTS speaking at the United Nations was selected because out of all these cases, it was the one that most likely had the biggest impact on South Korea's soft power, seeing as it was the largest scale event. BTS were appointed by President Moon Jae-in as presidential envoys to the United Nations for "future generations and culture" (Oh and Lee 2021). Though many celebrities do work with the United Nations, this is the first time K-pop idols have received such a high honor and position within the United Nations itself. In addition, this is a case of public figures working with an IGO, which are two examples of non-state actors in public diplomacy.

The last, and most recent case is BTS meeting President Biden, which was also selected for K-pop idols interacting with heads of state. BTS also spoke at the White House press briefing room, which is a tactic that the American government uses with American celebrities for public diplomacy. The justification for this trip was for BTS to discuss anti-Asian hate with President Biden, however, BTS are not Asian-American, which drew backlash (Regan and Dailey 2022). The White House could have invited Asian-American artists, but chose to invite Asian artists from the continent, which suggests an ulterior soft power-related motive. BTS made international headlines with this trip to the White House, whereas an Asian American artist would not have made many headlines outside of the United States.

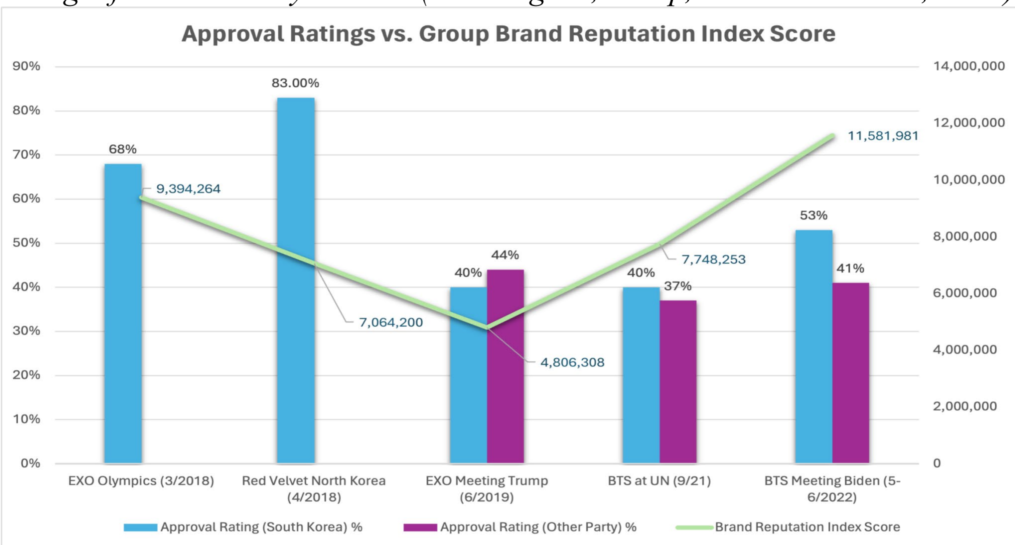
I have chosen here to focus on cases relating to the United States, where this type of diplomacy is most evident. K-pop idols were banned in China until recently, so this form of public diplomacy cannot apply to China, for example (Tai 2023). Since the United States is the global hegemon, all eyes are on the United States, which is why the South Korean government is focused on having K-pop idols meet American heads of state, or attend official business in the United States. In addition, the United States also has the biggest music market in the world, which shows another clear and unique motivation for these non-state actors: to get their group name out there, get more fans, and increase sales (Smirke 2024).

Results

Case Study Analyses

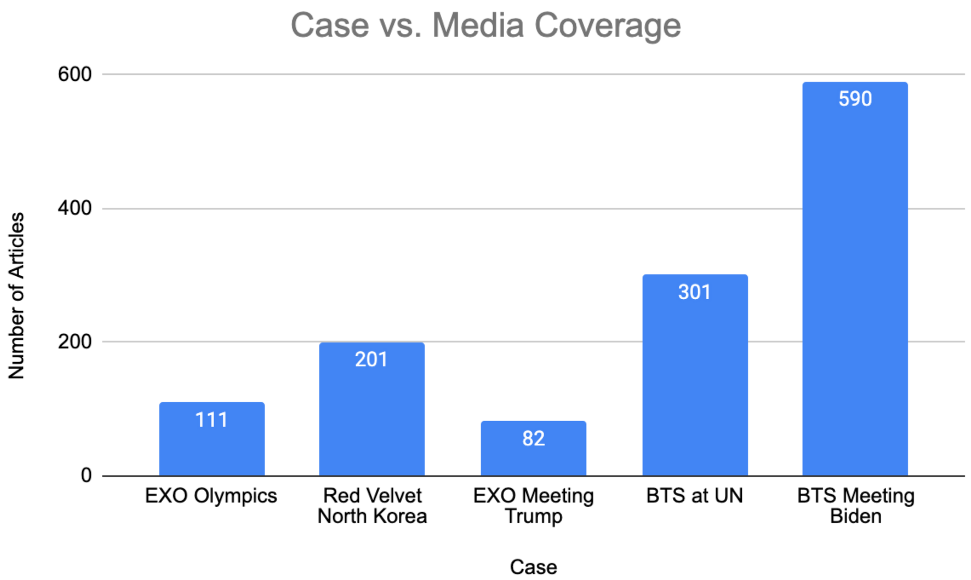
The five cases described above will be compared to corresponding administration approval ratings and K-pop group Brand Reputation rankings to explain variation in soft power gains (Figure 1), as well as measured through press coverage (Figure 2). Figure 3 illustrates the difference in approval ratings for each corresponding administration before and after each case.

Figure 1. *Variation in South Korean Presidential Approval Ratings, and the Approval Ratings of the other Party Involved (Kim Jong-Un, Trump, the United Nations, Biden)*



Note: The line helps illustrate a group's popularity by displaying its Brand Reputation Index score. The cases in this figure are listed in chronological order. EXO Olympics does not have an approval rating, as the Olympics is not a political entity.
See Appendix for detailed sources.

Figure 2. *Each Case's Media Coverage (Including Newspapers, Blogs, Wire Feeds, Podcasts, Websites, Magazines, Reports, and News Broadcast Transcripts) as accessed through the ProQuest Global Newstream Database (with above noted Limitations of Latin Characters)*

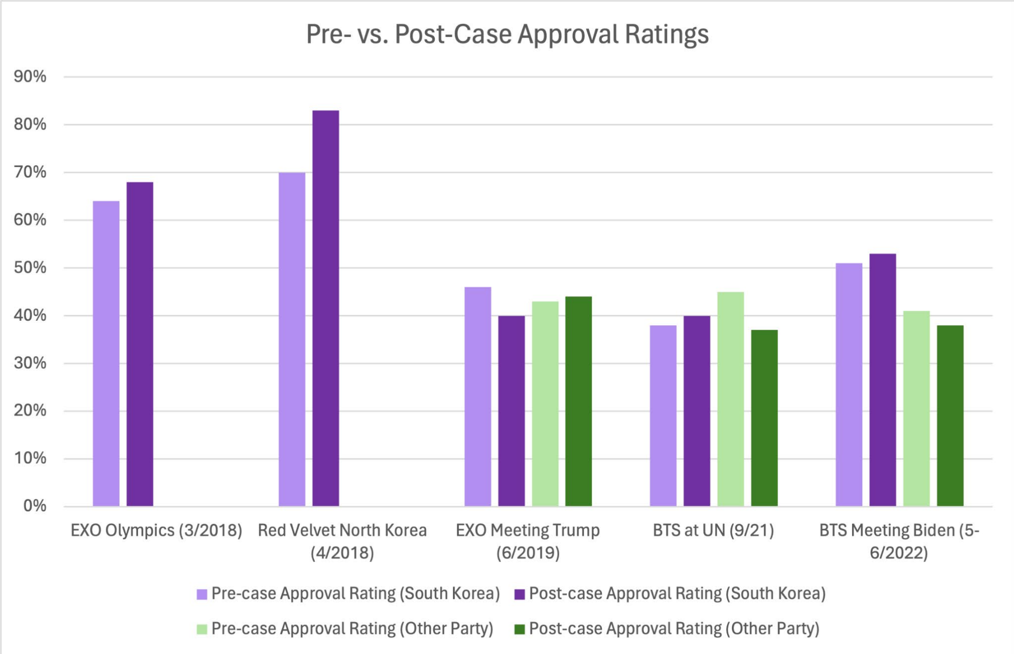


Note: data from ProQuest Global Newsstream[7].

Figure 2 notably follows the same trends as the Brand Reputation Ranking index score for each K-pop group. Both the Brand Reputation Index and amount of press coverage are useful indicators of a group's popularity, as well as their soft power gained through diplomatic activities. Overall, through the analysis of the amount of press coverage by case, it is evident that more popular groups will result in more soft power gains for South Korea.

[7]Data taken from ProQuest Global Newsstream database, number of articles individually counted by author https://about.proquest.com/en/products-services/globalnewsstream/.

Figure 3. *Variation in Approval Ratings of the South Korean President before and after each case, as well as the other Party (Trump, United Nations, and Biden)*



Note: It is useful, in particular, to demonstrate the effectiveness of the North and South Korean summit, of which, Red Velvet's performance in North Korea was part of, with President Moon Jae-in's approval rating going from 70% to 82%.
See Appendix for detailed sources.

EXO Olympics

The 2018 Pyeongchang Winter Olympics was very important for North and South Korea bilateral relations, with North Korea competing, and presidential summits to follow soon after. This makes the South Korean government's choice to have EXO perform at the closing ceremony an obvious way to link K-pop with South Korea's national identity and its government internationally. Nation branding is an aspect of soft power, and by broadcasting EXO when the whole world was watching, it is clear that South Korea wants to be associated with these idols, and have them as representatives of South Korea, and Korean culture. The Olympics are also perhaps an obvious example of soft power gains, as international prestige increases when athletes win medals. The Olympics are also a form of cultural diplomacy, with countries and athletes as representatives making diplomatic trips to compete in events. Thus, inserting a K-pop group into this longstanding example of soft power generation results in even more soft power gains for South Korea. In addition, EXO, also known as "The Kings of K-pop" (Allaire 2019), were officially labeled as "The Nation's Pick" by the South Korean Ministry of Culture and Tourism after their performance at the Olympics (Gardner 2022). All EXO members regard this performance as the highlight of their career, and with the Olympics' high viewership, it definitely increased EXO's popularity nationwide (Cha 2024a). EXO scored 7,084,200 on the Boy Group Monthly Brand Reputation index, which is much higher than the average 3-4 million (Cha

2024a). President Moon Jae-in's approval ratings were also at 64% (Gallup Korea 2018c). This case also resulted in 111 articles worldwide, as shown on Table 2.

Red Velvet in North Korea

Red Velvet's trip to North Korea was in response to a troupe of North Korean performers attending the 2018 Pyeongchang Winter Olympics a few months prior. South Korea sent a troupe of its own performers, including traditional Korean culture performances, as well as K-pop idols such as Red Velvet. As mentioned in the previous section, K-pop has always played a role in bilateral Korean relations, with K-pop being banned in North Korea, and South Korea using K-pop for its side of "speaker wars" (Sang-hun 2015). Since K-pop is technically banned in North Korea, sending Red Velvet to perform seemed an odd choice. However, this is a prime example of the South Korean government propping K-pop idols up as representatives of the country, and using them as public diplomats. In terms of the trip itself, some theorized that Kim Jong-un facilitated it to appeal to both the United States and South Korea in an attempt to ease sanctions (Associated Press 2018). The group Red Velvet were selected as representatives by Democratic party member Yoon Geong-young, the organizer on South Korea's end, who admitted Red Velvet was the only girl group he knew. In addition, Red Velvet also has the word *red* in their group name, and their popular song "Red Flavor", had potential to appeal to North Korean communist ideologies and symbols (Park 2023b). In addition, Red Velvet have a very palatable concept and image, compared to other groups such as Blackpink, who have a more fierce concept, and would not have been received as well by a North Korean audience.

In terms of soft power gains, as shown on Figure 1, President Moon Jae-in's approval rating in South Korea was soaring at 83%, compared to the same Gallup poll released a month earlier, which was 70% (Maresca 2018). The summit Moon Jae-in and Kim Jong-un did help with approval ratings and bilateral relations, and some of that can be attributed to Red Velvet and the South Korean troupe's trip to North Korea. Kim Jong-Un's approval rating is inherently unreliable, which is why there is no statistic for the "other party" in Figure 1.

In addition, in April 2018, right after their trip to North Korea, Red Velvet ranked first in the monthly Girl Group Brand Reputation Ranking, with 9,394,264 points on the index (Cha 2018). This is a staggeringly large number compared to normal Girl Group Brand Reputation rankings, with the monthly average being around 3-5 million points on the index (Cha 2024b). This trip also helped to increase Red Velvet's international and domestic popularity, as seen through the Brand Reputation Rankings. This case also produced 201 articles, as shown on Figure 2.

EXO Meeting Trump

When US President Donald Trump went to meet with South Korean President Moon Jae-in for the last day of the G20 Summit in 2019, EXO were also present (Andrew and gray 2019). K-pop idols being invited to official meetings between heads of state show their power as public diplomats, and representatives of South Korea. EXO were most likely chosen because they had already met members of the Trump family at the 2018 Winter Olympics. At this time, President Moon Jae-in's approval rating was 40%, and President Trump's, similarly, at 44% (Gallup Korea 2019b). EXO's Brand Reputation Ranking was also at 4,806,306, which is around average, due to two members enlisting in the military (Cha 2019). All of these factors resulted in less press coverage than other cases at 82 articles, and inferably, less soft power gains.

BTS at the United Nations

In September of 2021, President Moon Jae-in appointed BTS as special presidential envoys to the United Nations. President Moon even gave the members diplomatic passports, saying that they will serve as representatives for future generations, and culture (Oh and Lee 2021). Though BTS had spoken at the United Nations once before in 2018 and again virtually in 2020 due to a partnership with UNICEF (2018), but this time, they were formal envoys with diplomatic passports. In addition, their global popularity had also increased since their previous interactions with the United Nations. They also filmed a video of themselves performing their new song, further showing non-state actors' unique goals in public diplomacy. In a K-pop idol's case, it is increasing sales and popularity. This diplomatic trip coincided with an all-English song release, making it the perfect venue to promote it in the US, as well as internationally because the US has the biggest music market in the world. As their popularity had increased, over 1 million people watched their 2021 speech live, from all across the world. Notably, the members also promoted public health and the new COVID-19 vaccine, citing it as a reason they were able to travel to the US amidst COVID restrictions (Lee 2021). President Moon's approval rating was 40%, and the United Nations' approval rating was 37%, which is around average (Gallup Korea 2019b). BTS' Brand Reputation score was 7,748,253, higher than the average score (Han 2021). This trip also resulted in 301 articles worldwide, as shown in Figure 2.

BTS Meeting Biden

In late May to early June of 2022, BTS both spoke at the White House and met with President Biden. They were invited to give their thoughts on anti-Asian hate on the last day of Asian American and Pacific Islander Heritage Month (Regan and Dailey 2022). Again, the White House was criticized by the public that they could have invited an Asian American artist but instead, invited BTS. This is a clear soft power move on the part of the US, with President Biden's approval rating at 41% at the time, inviting the biggest stars in the world to meet him would absolutely garner him some good press, and positive sentiment with young people (Gallup 2024b). Biden has similarly invited American celebrities such as Olivia Rodrigo to speak at the White House in order to increase his influence domestically, having Rodrigo encourage the younger generation to get vaccinated for COVID-19 (Sullivan 2021). Though he did not appear to be involved in this trip, South Korean President Yoon Suk-yeol's approval rating was 53% (Friedhoff 2022). BTS' Brand Reputation index score was a staggering 11,581,981, nearly triple the average (Han 2022). This particular case also resulted in the most worldwide press coverage out of all five cases, at 590 articles, shown in Figure 2. BTS had just finished a successful concert tour in the US, and a few days later, would release another album, contributing to their increased popularity from the last case.

Conclusions and Looking Forward

Employing K-pop idols as public diplomats is an intentional strategy by the South Korean government to increase South Korea's soft power internationally. This phenomenon is relatively recent, and has yet to be studied academically in an international relations context. By acknowledging K-pop idols as effective non-state actors in diplomacy, we also acknowledge the recent and fundamental shift in the power game: soft power is now more important than ever, and can be gained through non-state actors.

The present study has synthesized and challenged previous scholars' works and notions of soft power, providing a comprehensive definition of soft power. Expanding on the constructivist school of thought, I have also employed the Nascent School of Diplomacy to explain and analyze the use of K-pop idols as public diplomats, as the Traditional School of Diplomacy does not acknowledge non-state actors. The five cases I analyzed demonstrate how the South Korean government uses K-pop idols as public diplomats, with press coverage as a dependent variable to measure soft power. I used the respective K-pop groups' Monthly Brand Reputation Index Score to quantify a group's popularity, as well as approval ratings of the corresponding administration involved to explain variation in soft power gains. More popular groups will result in more soft power gains for South Korea. Because K-pop is a recent phenomenon, the above analyses contribute to a clearer definition of soft power within the South Korean context.

The South Korean model of celebrity-driven public diplomacy can absolutely be applied to other cases worldwide, but it far surpasses efforts made by other governments in terms of the frequency of this strategy, and international soft power gains. As discussed earlier, using pop culture to increase a nation's soft power is not a new strategy, seen through Japan and the "Cool Japan Strategy", where the government funds the expansion and exportation of anime and manga. This differs from the South Korean strategy because Japan's pop culture is based on fictional characters while South Korea's is based on real people that are musical artists.

The US, as pop culture's global hegemon, also has extreme influence internationally by virtue of its pop culture dominating the world's media. However, a key difference in the American versus South Korean case is that American celebrities do not work with the government as often, and when advocating for certain causes, tend to act as independent actors. Though that is not to say that American celebrities *never* work with the government.

South Korean pop culture is inherently connected to the government, whereas American pop culture developed independently from the American government. Using celebrities as representatives of the state, or in order to accomplish a goal, is not new, but the extent to which South Korea projects its celebrities on an international scale firmly associated with the state is a novel concept. It can be argued that, say, Chinese celebrities are even more connected to the state than their South Korean counterparts, but due to the nature of Chinese pop culture and the lack of international applicability to this pop culture, a comparison cannot effectively be made.

Analysis of these five cases may help guide future research and enhance our understanding of actions taken by the South Korean government with K-pop idols for the purpose of gaining soft power. Future studies could look at unintended consequences of associating celebrities with the state, as human beings are fallible, and not immune to flawed behavior.

In addition to the Indexes discussed above, it would be helpful for future researchers if a new international pop culture index, focused on soft power, was created to better measure soft power gained through K-pop idols longitudinally, because this data does not yet exist. In addition, content analysis of the press regarding these cases could be employed for sentiment and to determine how much of the articles focus on policy versus the K-pop idols themselves. As more qualitative data becomes available, future research could potentially explore the role of fans, interviews with celebrities or fans, or include sentiment analysis. An even broader comparative study could also look into the countries mentioned in the previous paragraph, as well as others with significant pop culture industries, to further analyze the role of celebrities and their influence on soft power globally. Considering the future of South Korea's soft power, there are many limitations and issues regarding the current state of the K-pop industry itself, specifically with its treatment of women; for instance, if the anti-feminist movement in South Korea continues, they will simply run out of K-pop idols, and current female K-pop idols will retire from the music industry, and go into acting. However, currently, for middle powers such as South Korea, soft power remains a primary source of international prestige and as this study has shown, K-pop idols help with nation branding, act as diplomats, and serve to effectively increase South Korea's influence worldwide.

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Evaluating the Egyptian Flood Mitigation toward Resilience

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This paper evaluates the flood mitigation strategies employed by the Egyptian government to increase resilience to flooding. Existing literature in the field of disaster risk management highlighted the urge to shift the focus from response and recovery to mitigation. It is argued that in order for this shift to occur, it is necessary to integrate disaster management, community awareness and preparedness. Current practices in developing countries seldom reflect such a synthesis, and this is one of the reasons why hazard awareness is absent from local decision-making processes. Policy reviews and community initiatives are traced to explore the effectiveness of Egyptian's system in reducing the impacts of flooding on vulnerable populations and its potential to increase the resilience of communities to future floods. Therefore, it highlights the government's challenges in implementing these strategies. We argue that realising the available resources and tools for flood mitigation strategies in developing countries requires different measures and procedures due to the magnitude of challenges facing the government, therefore, community resilience is one of the key factors in this process. Accordingly, this paper provides recommendations for further research and policy development.

Keywords: *Disaster risk management, flooding, strategic planning, climate change, resilience*

Introduction

Climate change and its associated impacts, particularly sea-level rise (SLR), pose significant global challenges, with natural disasters potentially causing annual direct asset losses of $300 billion, escalating to $520 billion when considering impacts on human well-being (Hallegatte et al., 2017). Floods, which inflict severe damage, are especially devastating in lower-income nations with underdeveloped infrastructure. The global nature of this threat is underscored by recent events in countries such as Bangladesh, Nigeria, the United States, and Vietnam. During COP 26, the UK Prime Minister warned that cities like Alexandria, Miami, and Shanghai could be submerged if action against rising temperatures is not taken. Egypt, where the population is concentrated along a narrow strip of land by the Nile and coastlines, faces recurring flood challenges. Despite ongoing mitigation efforts, the country remains highly vulnerable. This paper evaluates Egypt's flood mitigation strategies, assessing their effectiveness in reducing community vulnerability and providing recommendations to enhance resilience against future floods (Agrawala et al., 2004).

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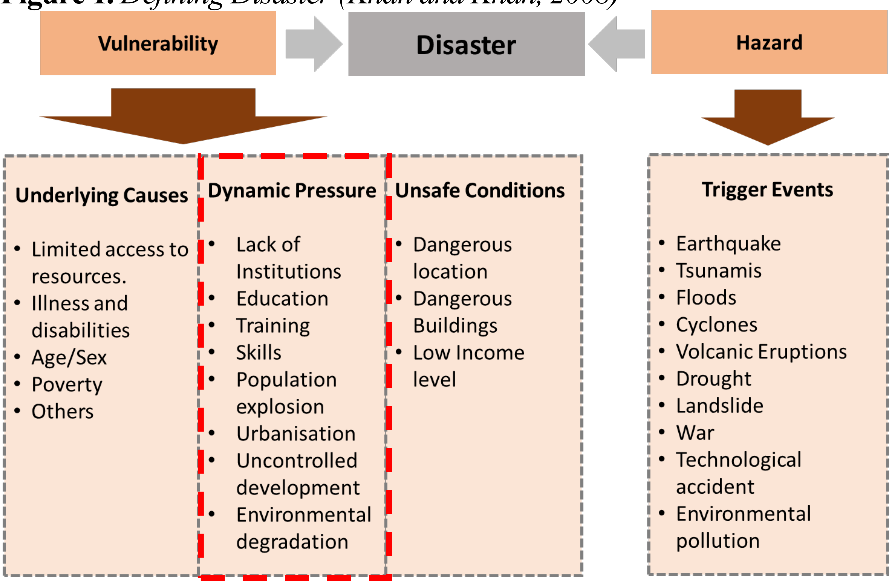
Disaster Risk Management

Disasters are unforeseen occurrences that result in significant property damage and fatalities (Moore and Lakha, 2006). Hazard, vulnerability, inadequate capacity or protective measures for property, and negative effects on the environment as shown in Figure 1 combine to create disaster (Khan and Khan, 2008). Research and practice in disaster management often use the following formula (Flanagan et al., 2020): Risk = Hazard * (Vulnerability – Resources) Risk is the expectation of loss, Hazard is a state that poses a danger of damage, Vulnerability is the degree to which people or things are likely to be impacted, and Resources are the assets that will lessen the consequences of hazards (Dwyer et al., 2004; UCLA Center for Public Health and Disasters, 2006).

The literature on disaster management is replete with theories, models, and techniques for dealing with calamities (Nojavan, Salehi and Omidvar, 2018). The disaster management cycle, which encompasses the stages of mitigation/ prevention, readiness, response, and recovery, is often the framework that predominates the literature (Coppola, 2011; Elboshy et al., 2019).

Figure 1. *Defining Disaster (Khan and Khan, 2008)*

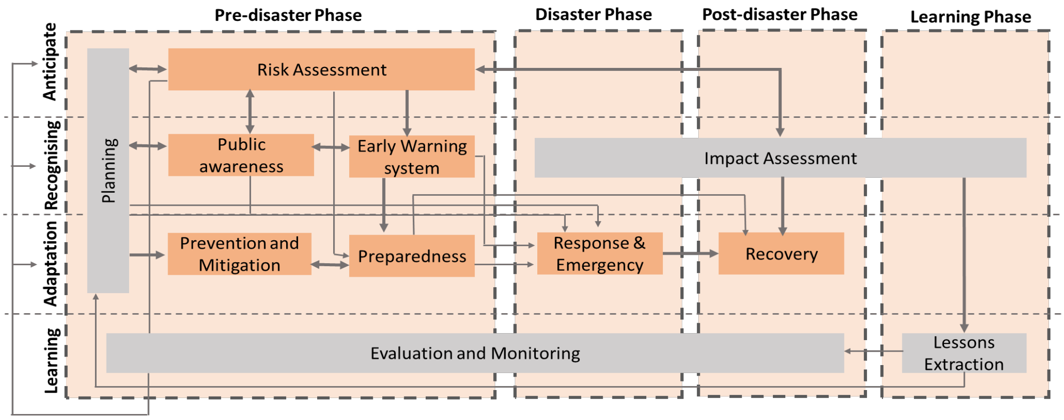


The increasing complexity and frequency of disasters, driven by various interacting factors, challenge the effectiveness of conventional scientific methods, requiring adaptable approaches that address complexity and uncertainty (Moore, 2008; GFDRR, 2016). This raises critical questions about whether current disaster risk management (DRM) policies and cycles remain adequate, or if new frameworks incorporating systems thinking and strategic approaches should be considered.

Disaster Risk Management Challenges

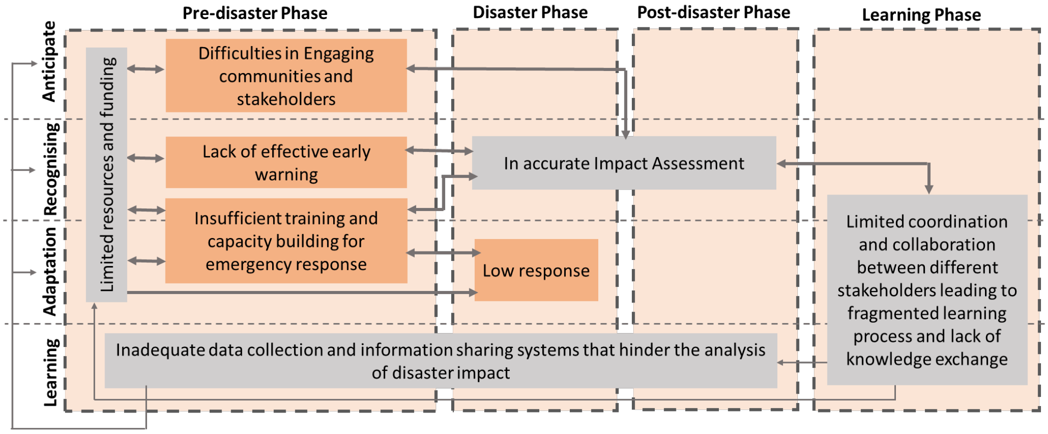
Disaster Risk Management (DRM) is a complex system requiring the integration of multi-sectoral and multidisciplinary planning and skills to mitigate the impact of disasters (NDMC, 2005). Despite the reliance on planning, issues arise from rigid procedures, outdated plans, and a segmented approach that often provides a false sense of security (Strelec, 2010; Moore & Lakha, 2006; Alexander, 2015). Plans are rarely updated and may not address diverse industry needs, leading to ineffective disaster management (Dynes, 1983). Figure 2 illustrates a DRM system, highlighting four key activities—anticipation, recognition, adaptation, and learning—across different disaster phases (Elboshy et al., 2019).

Figure 2. *DRM Complex System (Becker & Abrahamsson, 2012; Elboshy et al., 2019)*



The primary challenge in Disaster Risk Management (DRM) lies in the pre-disaster phase, particularly in planning and raising public awareness. Vulnerabilities such as population growth, lack of education, and institutional capacities are especially prevalent in developing regions. Despite awareness of risks, people are often drawn to hazardous areas due to job opportunities and access to essential services (Hallegatte, 2012; Patankar, 2015). Global trends indicate increased risk-taking, with populations in flood-prone and cyclone-prone areas growing significantly between 1970 and 2010 (Hallegatte et al., 2020). Effective DRM requires collaboration across institutions, reliable data, and a comprehensive legal framework (Ramos, 2009; Holden, 2013; UN, 2015). However, preparedness, a key element of DRM, faces criticism due to challenges in measuring readiness across different management levels and social structures (Castillo, 2005; Jackson, 2008; Fischbacher- Smith & Fischbacher- Smith, 2016). Figure 6 highlights the main challenges in translating DRM theory into practice, identifying gaps in each process.

Figure 3. *DRM Complex System Challenges (Researcher, 2023)*



The response phase of disaster management faces significant challenges due to varying human reactions influenced by stress, chaotic conditions, and cultural factors. First responders often encounter unexpected, hostile situations, leading to potentially ineffective behavioral patterns (Weisaeth, 1989; Sawalha, 2018a, 2018b). Cultural characteristics also play a crucial role, with dysfunctional cultures more likely to fail in crisis situations (Pauchant & Mitroff, 1990).

Importance of Mitigation in the DRM

Figure 4. *A Conceptual Framework identifying the Dominant Risks and Supply Chain Risk Mitigating Strategies in the DMC Phases. (Huay Ling Tay, Ruth Banomyong, Paitoon Varadejsatitwong, & Puthipong Julagasigorn, 2022)*

Disaster mitigation involves actions to minimize the impact of disasters through preparedness and long-term risk reduction, including planning and developing response strategies for natural and human-induced hazards (Huay Ling Tay et al., 2022). The preparedness phase, crucial for effective disaster response, focuses on pre-disaster operations, ICT systems, and stakeholder collaboration in disaster management (Huay Ling Tay et al., 2022).

The Sendai Framework emphasizes disaster resilience, defining it as the ability of systems and communities to resist and recover from hazards through risk management (UN, 2015). Climate-resilient pathways require mitigation, adaptation, and flexible, context-specific strategies to manage climate impacts, considering interconnected regions and ongoing innovation (UN, 2015). Immediate action is vital for enhancing well-being, livelihoods, and environmental stewardship.

The Sendai Framework and its Indicators

The Sendai Framework, adopted in March 2015 as a successor to the Hyogo Framework for Action, is a 15-year, voluntary, and non-binding agreement aimed at reducing the frequency and severity of disasters globally. It outlines seven targets, including reducing disaster mortality, decreasing economic losses, and improving early warning systems by 2030. The framework emphasizes four key priorities: understanding disaster risk, strengthening governance, investing in resilience, and enhancing preparedness for effective response and recovery. It promotes a multi-sectoral and multi-stakeholder approach, aligning disaster risk reduction (DRR) with sustainable development and climate change adaptation, and encourages a shift from disaster management to proactive Disaster Risk Management (DRM), focusing on reducing vulnerabilities and strengthening resilience at both national and community levels (Nations, 2015).

The framework also highlights the importance of international cooperation, global partnerships, and the "Build Back Better" principle in disaster recovery. It includes a set of indicators to measure progress in achieving its goals, which cover various aspects of disaster risk, vulnerability, and resilience. These indicators serve as tools for countries and organizations to develop, implement, and assess the effectiveness of DRR strategies. By providing a comprehensive set of criteria and priorities, the Sendai Framework guides the evaluation of DRR policies, ensuring that objectives are clear, specific, and aligned with the overarching goals of flood risk reduction and resilience (Omar Bello, et al., 2021).

Table 1. *Sendai Framework and Indicators (Nations, 2015)*

Criteria	Description
Understanding Disaster Risk	Policies should demonstrate a clear understanding of local, national, and regional disaster risks. This includes the identification and assessment of hazards, vulnerabilities, and exposure to risks.
Governance and Leadership	Effective policies should promote strong governance and leadership at all levels, emphasising the involvement of relevant stakeholders, including communities, in decision-making processes.
Investment in DRR	Policies should allocate resources and investments to support DRR activities, infrastructure development, and capacity-building efforts.
DRR Strategies	Policies should align with and contribute to the development and implementation of DRR strategies and plans, ensuring they are integrated into wider development agendas.
Resilience of Infrastructure and Critical Facilities	Policies should prioritise the resilience of critical infrastructure, such as hospitals, schools, and utilities, to ensure they can withstand and recover from disasters.
Community Engagement	Policies should promote community participation, empowerment, and awareness-building to enhance local resilience and adaptive capacity.
Early Warning Systems	Policies should support the establishment and maintenance of effective early warning systems to provide timely information and alerts to at-risk communities.
Climate Change Adaptation	Policies should integrate climate change adaptation measures into DRR strategies, recognising the interconnection between climate change and increased disaster risks
Reducing Environmental Degradation	Policies should aim to reduce environmental degradation and promote sustainable land use practices to mitigate disaster risks.
Monitoring and Reporting	Policies should establish robust monitoring and reporting mechanisms to track progress in DRR efforts and adapt strategies as needed.
International Cooperation	Policies should encourage international cooperation and collaboration to address transboundary disaster risks and promote the exchange of knowledge and resources.
Public Awareness and Education	Policies should promote public awareness and education campaigns to enhance understanding of disaster risks and encourage proactive risk reduction actions.
Knowledge and Innovation	Policies should support research, innovation, and the dissemination of knowledge and best practices related to DRR.
Accountability and Review	Policies should establish mechanisms for accountability and regular review of progress in implementing DRR measures.

Methodology

This study aims to examine the measures taken by the Egyptian government to boost resilience during the flooding mitigation through the implementation set of objectives leeds to strategies on the national level and local levels.

Based on the understanding of the disster risk management criteria and cycle through 1970 to 2030 as a base to investigate the disaster risk management challenges and highlight the importance of the mitigation stage as part of the disaster risk management and how it can be reflected on the disaster risk cycle, incorporating the synthesis of a set of Disaster Risk Reduction (DRR) indicators based on the Sendai framework. Comprising its four main prioprites, the proposed framework involves an examination of the DRM situation, an assessment of DRM elements, the evaluation of efficiency criteria, and the integration of results from each stage to furnish a comprehensive analysis of the DRM system.

In the initial step, understanding for the flood disaster in Egypt and how the institutional framework and practices employed in previous disasters are scrutinised to enhance understanding of the national Disaster risk management landscape. This phase identifies the entities involved in DRM, delineates their roles, and assesses how the existing system has responded to disasters across various phases. Data are collected from governmental documents and reports to facilitate a comprehensive analysis.

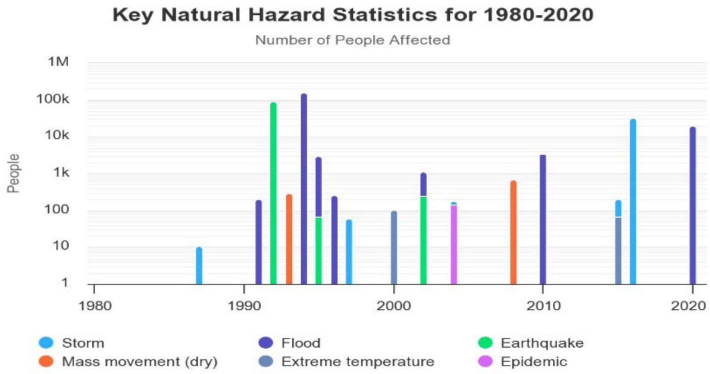
The second step concentrates on the assessment of efficiency criteria derived from the compiled list of indicators. Subsequently, findings from all stages are amalgamated, presenting a holistic analysis of the Egyptian Crisi and Disaster management and risk reduction system. This comprehensive evaluation identifies key issues impacting system performance and highlights impediments to its enhancement.

To demonstrate the applicability of the proposed framework, an evaluation of the Egyptian DRM system is conducted, yielding valuable insights into its strengths and weaknesses. This framework serves as a foundational tool for evaluating DRR systems in diverse countries, contributing to the formulation of more effective DRM strategies and policies.

Flooding in Egypt

Egypt, located in northeastern Africa, spans 995,450 square kilometers and has a 3,500-kilometer coastline along the Mediterranean and Red Seas, making its extensive coastal areas vulnerable to rising sea levels due to their low elevation (Abdeldayem et al., 2020; Egyptian Environmental Affairs Agency, 2016). Major cities in the Delta region, such as Alexandria and Port Said, host significant industrial, tourism, and agricultural activities, making them particularly at risk (Ali & El-Magd, 2016). Historically, Egypt has faced flooding since ancient times, with the Nile's annual inundation bringing fertility to farmlands, but in modern times, floods have caused severe damage to infrastructure and communities. The 2020 floods, which affected over 10,000 people, led to government emergency responses and efforts to enhance flood management systems (Ahmedet al., 2020).

Figure 5. *Key Natural Hazard Statistics for 1980-2020 (The World Bank Group, 2021)*



Investing in the Egyptian Flood Mitigation Policy

Egypt has a comprehensive disaster management system that includes different levels of coordination and risk reduction efforts. The levels of disaster management and DRR coordination in Egypt are as follows (Figure 6):

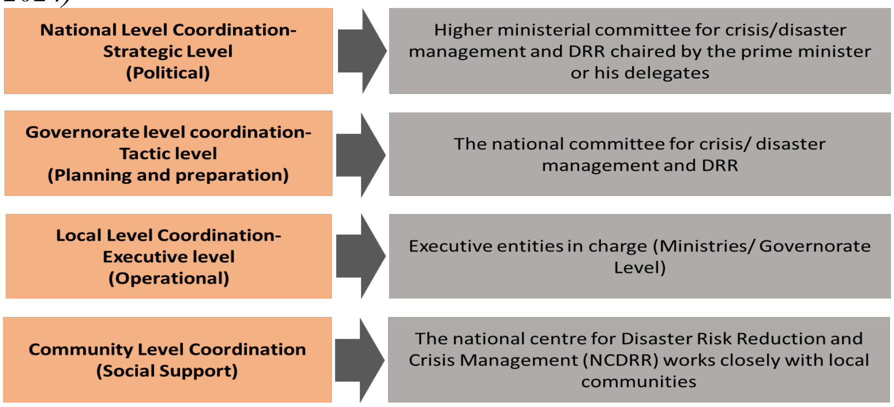
a) **National level coordination:** The National Disaster Management Authority (NDMA) is responsible for the overall coordination of disaster management in Egypt. The NDMA is responsible for developing and implementing national policies, strategies, and plans related to disaster management. It also coordinates with other government agencies, NGOs, and international organisations to respond to disasters and mitigate their impacts. (United Nations Development Programme. (2018).

b) **Governorate-level coordination:** The governorates are responsible for implementing the national disaster management policies, strategies, and plans in their respective regions. Each governorate has a disaster management committee that is responsible for disaster preparedness, response, and recovery. The committee is composed of representatives from different government agencies, NGOs, and the private sector.

c) **Local level coordination:** The local authorities, such as municipalities and local councils, are responsible for disaster preparedness, response, and recovery in their respective areas. They work closely with the governorate disaster management committee and other stakeholders to ensure a coordinated and effective response to disasters.

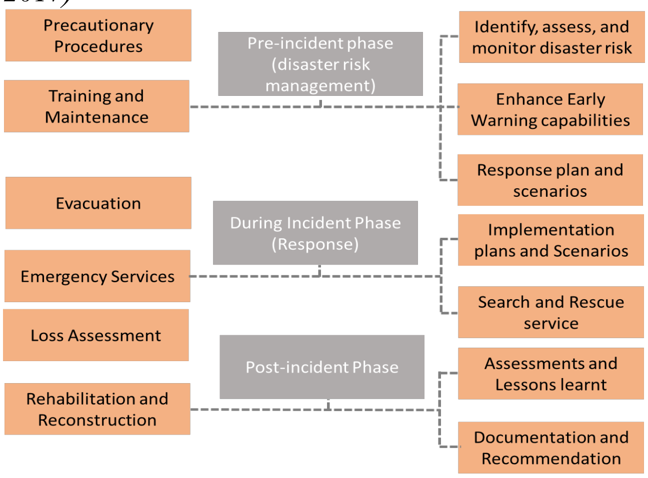
d) **Community-level coordination:** Community participation and involvement are essential for effective DRR. The community plays a crucial role in disaster preparedness, response, and recovery. The National Centre for DRR and Crisis Management (NCDRR) works closely with local communities to raise awareness about disaster risks and promote disaster preparedness (Egypt, 2005)

Figure 6. *Levels of Crisis/disaster Management and DRR Coordination (researcher, 2024)*



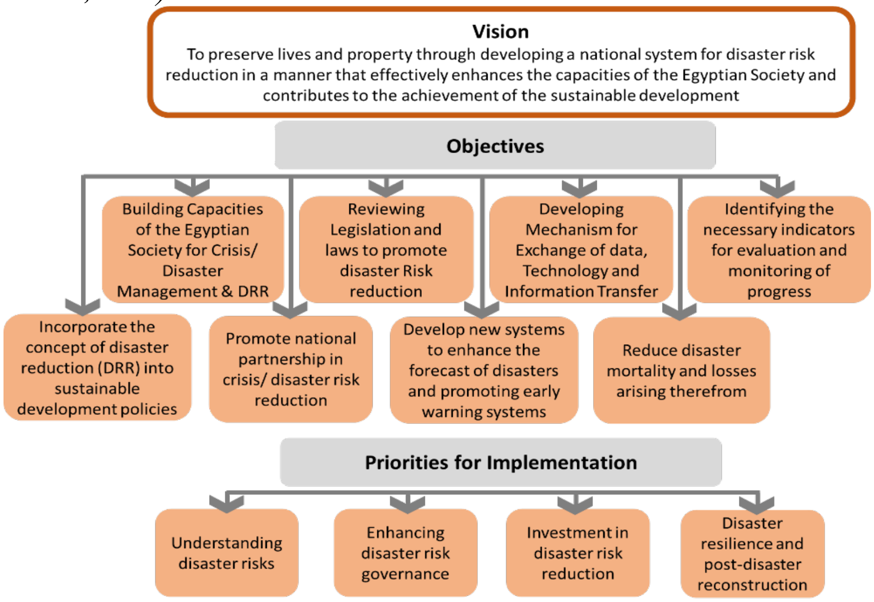
The committee's main goal is to reduce the impact of disasters through collaboration between government institutions, civil society, and the private sector. They aim to strengthen national mechanisms and capacities to enhance resilience and address future risks.

Figure 7. *The Three Phases of Crisis and Disaster Management (The Cabinet of Egypt Information and Decision S-Crisis Management and DRR Sector Support Centre, 2017)*



The committee's objectives include developing national policies for crisis and disaster management, enhancing technical and scientific capabilities to assess vulnerabilities, using advanced technology for crisis management, fostering expert cooperation, and implementing a national program to inform citizens about disaster risks. Their tasks span three phases: pre-crisis (preparedness and risk reduction), crisis management and response, and post-crisis recovery. In line with regional and international commitments, Egypt introduced the NSDRR 2030 to strengthen its disaster risk reduction framework. The vision of NSDRR 2030 is to "preserve lives and property by developing a national system for DRR that enhances national capabilities and contributes to sustainable development" (The Cabinet of Egypt Information and Decision Support Centre, 2017).

Figure 8. *Overall Summary of the National Strategy for DRR 2030 (The Cabinet of Egypt Information and Decision S- Crisis Management and DRR Sector Support Centre, 2017)*



To effectively execute the NSDRR 2030 and achieve its objectives, Egypt must undertake a series of defined actions that not only mitigate disaster risks but also align with international obligations and regional contexts. The implementation of these actions is guided by a handbook outlining the roles and responsibilities of various entities in crisis and disaster management. These implementation methods encompass a range of national plans developed to address Egypt's recent crises and tragedies. The following evaluation suggested projects in Figure 13 are prioritised based on their implementation timeline: short-term (two years), medium-term (five years), and long-term (ten years). Each responsible entity is required to provide a comprehensive identification and description of their specific responsibilities, as outlined in Table 2.

Table 2. *The Egyptian Crisis and Disaster Management and Risk Reduction Initiative (ECIDSC, 2010)*

Objective one: Concept of Crisis
Including crisis/disaster management and disaster risk reduction in all development policies and plans. It consists of poverty reduction techniques and sectors and multi-sectoral policies and initiatives.
Short-term stage (two years)

Objective 2: Building the Egyptian Society			
Supporting the establishment and strengthening of an integrated national mechanism for DRR that is responsible at all local and national levels for facilitating the cross-sector coordination	Adopting legislation to support DRR, including systems and mechanisms to encourage compliance and enhance mitigation activities.	Assessing the capacities of human resources to reduce disaster risks at all levels, while developing plans and programs.	Identifying clear priorities and budgets for resource allocation to design and implement DRR policies, programs, and regulations.
Short-term stage (two years)	Medium-term stage (five years)		Short-term stage (two years)

Objective 3: Volunteerism and Community Participation			
Increasing public understanding: -Improving the role of the media in persuading society to embrace a disaster-resilient culture.	-Protecting and improving infrastructures and rebuilding so that they are suitably resilient to threats. -Incorporating DRR measures into the post-disaster recovery process. -Establishing a structure for financial risk-sharing, particularly risk insurance and reinsurance.	-Incorporating disaster risk assessment in urban planning and management areas of high population density and rapid urbanization. -In the context of urban poverty reduction and poor district improvement programs, informal or temporary housing must be addressed alongside high-risk housing areas. -In the framework of land use and planning, developing, completing, and supporting the implementation of general guidelines and monitoring instruments for disaster risks.	-Introduce specialized ways to encourage stakeholders, including local communities, to successfully participate in and control DRR operations, particularly volunteerism. Local communities should work on adopting policies, improving network development, strategic management of volunteer resources, assigning roles and responsibilities, and delegating and providing appropriate authorities and resources.
Short-term stage (two years)	**Medium-term stage (five years)**		

Objective 4: Developing mechanisms for data required in crisis management	
-Improving projection-based risk assessments, Cost analysis of risk reduction measures at all levels, and incorporating such approaches into the decision-making process at the local and national levels. -Introducing and applying methods through scientific experts, research, and models to assess vulnerable areas and the impact of hazards related to geography, meteorology, water, and climate, as well as regional monitoring and assessment capacities.	Creating and updating risk maps and ensuring timely and appropriate distribution of essential information to decision-makers and vulnerable communities on a large scale. -Recording, evaluating, summarizing, and disseminating statistical data on risk frequency, impact, and losses regularly.
Medium-term stage (five years) ++	**Short-term stage (two years) +**

Objective 5: Enhancing existing Early warning systems			
Early alert: -Building institutional capacities that would ensure sound incorporation of the early warning systems in government policies and emergency management systems at the national and local levels. These systems should be tested, and their performance evaluated regularly.	Capacity: -Supporting the introduction and the sustainability of basic structures, and scientific, technological, technical, and institutional capacities required for research, monitoring, analysis and forecasting natural and other relevant risks, vulnerable areas, and disaster impacts.	Regional and emerging risks: - Collecting and unifying the statistical information and data related to disaster risks, impacts, and consequences at the regional level. -Cooperating regionally and internationally to assess and survey regional or cross-border risks, exchanging information, and making available early warning via the appropriate measures.	Information management and exchange: -Enhancing the use, application and availability of ICT and the related services to support disaster risk reduction, especially for training and information exchange and dissemination on the various beneficiaries. - Before each building project or land purchase or sale, urban development institutions shall provide information on DRR choices.
Long-term stage (ten years) +++	**Medium-term stage (five years) ++**	**Short-term stage (two years) +**	**Short-term stage (two years) +**

Objective six: Identifying the indicators for follow-up monitoring
There are indicators for implementing a crisis/disaster management and disaster risk reduction program.
Short-term stage (two years) +

The contiguity of Egyptian crisis and disaster management alongside the Sendai Indicators constitutes a pivotal examination of two separate yet interrelated strategies for disaster preparedness and risk mitigation. The Egyptian crisis and disaster management initiative is deeply rooted in the distinctive socio-economic and environmental challenges as discussed in Table 2. This initiative encompasses a comprehensive plan aimed at reducing risks, bolstering response capabilities, and nurturing resilience within the specific context of Egypt. Conversely, the Sendai Indicators, introduced as a global framework after the 2015 Sendai Framework for DRR, furnish a set of criteria and guidelines for evaluating worldwide DRR endeavours. Through the comparative analysis of these two approaches, we glean valuable insights into the adaptability and efficacy of disaster management methodologies across diverse settings, as well as the harmonisation of domestic initiatives with international benchmarks. Such an investigation will illuminate the strengths and weaknesses inherent in both approaches, fostering a more comprehensive comprehension of global DRR efforts.

Despite Egypt's adoption of the Sendai Framework for DRR, the implementation has faced challenges in unpacking and fully realising the magnitude of the situation within the country. The limitations and scarcity of resources in various areas have hindered the effective execution of the framework. Despite the commitment to DRR, the practical application has been impeded by these constraints, underscoring the need for targeted efforts and resource allocation to address the specific challenges faced by Egypt in enhancing its resilience to disasters. comparing the Sendai Indicators to the Egyptian crisis and DRM initiative, there are several areas of alignment and adaptation. The Sendai Indicator 1, which focuses on understanding disasters, corresponds to the Egyptian initiative's Objective 1, emphasising the concept of crisis. Indicator 2, Governance and Leadership, relates to the Egyptian initiative's Objective 5, which aims to enhance existing early warning systems. Indicator 3, Investment in DRR, aligns with Objective 3 of the Egyptian initiative, emphasising volunteerism and community participation. Indicator 4, DRR Strategies, is mirrored in Objective 4, where the Egyptian initiative seeks to develop mechanisms for data required in crisis management. However, several Sendai indicators do not have direct counterparts in the Egyptian crisis and disaster management initiative, such as Indicator 5 (Resilience of Infrastructure and Critical Facilities), Indicator 12 (Public Awareness and Education), Indicator 13 (Knowledge and Innovation), and Indicator 14 (Accountability and Review). The Egyptian government's efforts in the mitigation preparedness phase of the Disaster Risk Management (DRM) cycle have encountered notable shortcomings. These deficiencies stem from a range of factors, including resource limitations, inadequate infrastructure, and challenges in effectively implementing comprehensive and proactive strategies. The mitigation preparedness phase, crucial for minimising the impact of disasters, requires enhanced attention and strategic planning to address vulnerabilities effectively. Recognising and addressing these shortcomings is essential for improving the overall resilience of the nation in the face of potential hazards and disasters It also highlights areas where the Egyptian initiative can potentially benefit from further integration of these Sendai indicators to enhance its overall effectiveness in addressing disaster management and risk reduction.

Results and Recommendations

Egypt has implemented various flood mitigation strategies, including early warning systems, green infrastructure, and comprehensive land-use planning, to enhance community resilience against floods. The effectiveness of these measures, however, requires thorough assessment to determine their impact on reducing flood risks and bolstering community preparedness. Evaluating early warning systems involves assessing the accuracy, reliability, and community response to the information provided. The integration and impact of green infrastructure, such as wetlands and green roofs, in the overall flood management strategy also need to be examined. Additionally, the role of land-use planning policies in guiding development away from flood-prone areas and preparing communities for flood impacts must be evaluated. These evaluations are crucial for refining Egypt's flood mitigation strategies and ensuring that communities are better equipped to handle future flood events. Addressing these gaps in the current flood mitigation strategies in Egypt is essential in order to build a more resilient future and better prepare communities for the impacts of floods. Through evaluating of the flood mitigation strategies, the following gaps can be highlighted:

a) **Inadequate investment in early warning systems:** While early warning systems are an important part of the flood mitigation strategy in Egypt, they are not always well-funded and lack the resources needed to be effective. This can result in a lack of accurate and timely information for communities, making it difficult for them to prepare for and respond to floods.
   - **Resource Constraints:** Limited financial resources may pose a significant challenge to investing in comprehensive early warning systems. Budgetary constraints may prioritise other sectors over the development and maintenance of advanced warning infrastructure.
   - **Competing Priorities:** Egypt may face competing priorities for investment, with pressing needs in areas such as healthcare, education, and infrastructure development. Early warning systems might not receive sufficient attention in resource allocation decisions.
   - **Perceived Low Risk:** If certain regions of Egypt are perceived as having a low risk of specific types of disasters, there may be a tendency to underestimate the importance of investing in early warning systems. This perception can lead to a lack of prioritisation.
   - **Limited Technical Capacity:** Developing and maintaining effective early warning systems requires technical expertise and ongoing training. If there is a lack of skilled personnel and technical capacity, it can hinder the implementation and optimisation of warning systems.

- **Infrastructure Challenges:** Inadequate physical infrastructure, such as communication networks and meteorological stations, may impede the establishment and functionality of early warning systems. The lack of infrastructure can result in gaps in coverage and reliability.
- **Data Collection and Analysis Issues:** Insufficient data collection and analysis capabilities can impact the effectiveness of early warning systems. Accurate and timely data are crucial for issuing timely warnings, and limitations in this regard can compromise the system's reliability.

b) **Ineffective implementation of comprehensive land-use planning policies:** Comprehensive land-use planning policies play a crucial role in reducing the risk of flooding by ensuring that development takes place in areas that are less prone to flooding. However, in Egypt, these policies are often not effectively implemented, resulting in continued development in areas that are at high risk of flooding.

c) **Limited community engagement and participation:** Building resilience to floods requires the engagement and participation of all stakeholders, including communities. However, in Egypt, there is often a lack of community engagement and participation in the planning and implementation of flood mitigation strategies, limiting their effectiveness in building resilience. Several factors contribute to limited community engagement and participation in disaster risk management (DRM) in Egypt:

- **Top-Down Approach:** Historically, disaster management in Egypt has often followed a top-down approach, where decisions and strategies are formulated at higher levels of government without sufficient input from local communities. This may result in a lack of ownership and understanding at the community level.
- **Communication Barriers:** Challenges in effective communication and information dissemination can hinder community participation. Limited access to information, especially in rural areas, may prevent communities from being aware of the importance of their involvement in DRM.
- **Cultural and Social Factors:** Cultural norms and social structures can influence community engagement. In some cases, hierarchical structures or cultural norms may discourage active participation or input from community members in decision-making processes.
- **Limited Resources:** Communities, particularly in rural areas, may face economic challenges and lack the resources needed to actively engage in disaster risk reduction initiatives. This includes financial resources, infrastructure, and access to education and training.
- **Perceived Lack of Influence:** Communities may perceive that their input has limited influence on decision-making processes. This perception can arise if there is a history of decisions being made without community consultation or if there is a lack of mechanisms for feedback and dialogue.
- **Educational Gaps:** Limited awareness and understanding of disaster risks and the importance of community engagement may exist. Educational

gaps in disaster preparedness and risk reduction strategies can hinder the active involvement of communities.

- **Institutional Barriers:** Formal institutions and bureaucratic processes may create barriers that limit the direct involvement of communities in DRM. Streamlining institutional processes and creating mechanisms for community participation can address this challenge.
- **Emergency Response Focus:** The emphasis on emergency response rather than long-term risk reduction in disaster management initiatives may contribute to communities perceiving their role as reactive rather than proactive, reducing their motivation to engage.

d) Building resilience to floods in Egypt faces challenges due to a lack of coordination between government agencies, private sector organizations, and communities, leading to fragmented flood management efforts. The National Committee for Crisis/Disaster Management and DRR, chaired by the Prime Minister and including key ministries, oversees national crisis management at a strategic level. However, operational responses are decentralized, and fragmented coordination can hinder a unified approach, particularly in early warning systems. Egypt's national strategy aligns with the International Sendai Framework for Disaster Reduction 2015–2030, emphasizing disaster risk governance, risk reduction, resilience building, and post-disaster reconstruction. Effective collaboration among stakeholders is crucial for a coherent and efficient disaster management system.

Conclusion

In summary, this study has thoroughly examined Egypt's flood mitigation efforts and their role in fostering resilience. Beginning with an exploration of the disaster risk management (DRM) concept, the paper underscored the necessity for contemporary disaster management approaches, emphasising the shift from reactive to proactive and holistic strategies. The distinction between mitigation and resilience was elucidated, highlighting the evolution towards building community capacity to withstand and recover from disasters, representing a paradigm shift in disaster management. The evaluation criteria were outlined to assess the efficacy of Egypt's flood mitigation policy in enhancing resilience. The analysis, focused on the historical context of flooding in Egypt, illuminated the transformation of Egyptian DRM over time and provided insights into challenges and the importance of adaptive strategies. The assessment of Egypt's flood mitigation policy revealed commendable strengths alongside areas for improvement. While significant strides have been made in mitigating flood impacts, the study underscores the necessity for a comprehensive and integrated approach, encompassing various aspects of resilience such as early warning systems, infrastructure development, community engagement, and capacity building. Overall, the findings underscore the significance of continual evaluation and adaptation of disaster risk reduction policies in the face of evolving climatic and socio-economic conditions. Integrating resilience-building measures into flood mitigation policies can fortify Egypt's ability to withstand future flood events and mitigate socio-economic and environmental impacts. Achieving resilience necessitates a multi-stakeholder approach involving collaboration between government agencies, local communities, and international partners. Through concerted efforts and an unwavering commitment to improvement, Egypt can enhance its flood mitigation strategies and move towards a more resilient future.

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Government Sanctioned Health Claims, Regulations and Economic Policies: Strategies to Increase Consumption of Healthy Functional Foods in Canada

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Non-communicable diseases are chronic diseases that have significant economic and social burdens worldwide. Increased public awareness about the interaction between diet and health, a desire to improve well-being, and government efforts to reduce rising public healthcare costs have been major drivers of substantial growth in the healthy functional foods industry. This paper examines economic policies and regulations that could increase the consumption of healthy functional foods in Canada. It assesses the effectiveness of current public policies and regulations on consumer preferences/demand and considers alternative policies and regulations that could increase the development and growth of the healthy functional food industry, individual wellbeing, reduce health care costs, and stimulate an overall increase in social welfare. It is shown that the use of health claims and educational efforts alone are not enough to increase demand to the socially optimal level. The government needs to use stronger economic and public policies such as tax credits to consumers or subsidies on costs of production that provide consumers with additional incentives to consume healthier foods at the socially optimal level.

Keywords: *Functional/Health Foods, Market Failures, Health Claims, Economic Policies and Regulations*

Introduction

Non-communicable diseases (NCDs) also known as chronic illnesses have significant economic and social burdens. The economic impacts of chronic illness include both direct costs, such as hospital and drug expenditures, as well as indirect costs, such as lost productivity in the labour market (Public Health Agency of Canada 2014, WHO 2023b). There are also social costs that cannot be measured such as physical and emotional pain caused by illness and a decreased quality of life. In 2023, 80% of deaths globally were attributed to chronic or non-communicable diseases (WHO 2023a). Cardiovascular diseases (CVDs), cancers, chronic respiratory illnesses, and diabetes, are the top four causes of NCD deaths (WHO 2023a). In 2023, CVD accounted for 44% of NCD deaths and cancer accounted for 23% (WHO 2023a).

In Canada, cancer and heart disease were responsible for 49.6% of all deaths in 2011 (Statistics Canada 2015). In 2008, it was estimated that the largest portion of

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direct costs associated with illness and injury in Canada was due to CVD, which accounted for 6.8% of total healthcare costs (Public Health Agency of Canada 2014). Other chronic illnesses such as diabetes also accounted for significant portions of direct healthcare costs (Public Health Agency of Canada 2014).

Similarly, heart disease and cancer were responsible for 46% of all deaths in the U.S. in 2014 (CDC 2017a). In addition to heart disease and cancer, five other chronic diseases made it into the top ten causes of death in 2014 (CDC 2017a). It is estimated that treatment of these chronic illnesses is responsible for 85% of the total healthcare expenditures in the U.S. (Dietz, Douglas and Brownson 2016). In 2012, the direct and indirect costs of CVD and stroke alone were estimated to cost 15% of total healthcare expenditures in the United States (Mozafarian et al. on behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee 2016).

Research has shown that the risk for many of these chronic diseases, such as heart disease and cancer, can be significantly reduced through the adoption of a healthy diet and balanced lifestyle (Dietz, Douglas and Brownson 2016; WHO 2003; American Heart Association 2017a; CDC, 2017; WHO 2023a; WHO 2023b). Knowledge about the link between diet and health has led to increased interest from both consumers and health authorities in the adoption of a healthy diet as a means of improving well-being. Approximately 86% of Americans indicated they were interested in learning more about health foods (IFIC 2013) and recognized organizations such as the WHO, the American Heart Association, and the CDC now recommend adopting a healthy diet as part of a preventative care strategy (WHO 2003; American Heart Association 2017a; CDC 2017; WHO 2023a; WHO 2023b).

Increased public awareness about the interaction between diet and health, a desire to improve well-being, and efforts by public health authorities to reduce rising public healthcare costs have been major drivers of substantial growth in the functional foods industry (e.g., Milner, 1999; Ohama, Ikedo, and Moriyama 2006; Thompson and Moughan 2008**;** Moors, 2012; Malla et al., 2013a, Malla, Hobbs, and Sogah 2013b; Hobbs et al., 2014; Hobbs, Malla, and Yeung 2021).

Functional foods are defined as foods enhanced with bioactive ingredients, which have demonstrated health benefits beyond basic nutrition: they are foods with extra health benefits (Hobbs, Malla, and Sogah 2014). Functional foods may voluntarily carry various types of government-sanctioned health claims. Health claims are defined as any statement on labels or in advertising that directly or indirectly indicates a relationship between the consumption of food and health (Hobbs, Malla, and Sogah 2014). Another closely related product is 'natural health products' (NHPs), which are concentrated food products with health benefits that are sold in dosage form (AAFC 2017a).

Market estimates of the size of the health food industry cover a broad range due to a lack of consensus regarding the definitions of functional foods and natural health products (Stein and Rodriguez-Cerezo 2008). In 2010, Euromonitor estimated the global market for functional foods to be worth USD 168 billion (Vicentini, Liberatore, and Mastrocola 2016). By 2013, growth in the international functional foods and health products industry exceeded the conventional processed food market by estimated rates of 8% to 14% annually (AAFC 2014). According to

Grand View Research (2023) "The global functional foods market size was estimated at USD 280.7 billion in 2021 and is expected to expand at a compound annual growth rate (CAGR) of 8.5% from 2022 to 2030."

In Canada, revenues for the Canadian functional foods and natural health product sector generated approximately CAD 16.4 billion in 2011 (Khamphoune 2013). According to an EMR (2023) report entitled Canada Functional Foods and Natural Health Products Market Outlook, the Canadian functional foods and natural health products market value was USD 28.6 billion in 2022. IndustryARC, (2023) stated that "Functional Foods & Natural Health Products market size is forecast to reach $19.2 billion by 2026, growing at a CAGR of 6.3% during the forecast period 2021-2026." Consequently, the healthy functional food industry has great potential for producers, consumers, and society.

This study will assist in broadening our understanding of markets for healthy functional foods. The overall goal is to examine economic policies and regulations that could increase the consumption of healthy functional foods in Canada. The objective of this paper is to develop a graphical framework that would assist policy makers and communication experts to understand the effectiveness of current public policies and regulations on consumer preferences/demand, and to analyze alternative policies and regulations that could increase the development and growth of the healthy functional food industry. This could lead to improvements in individual wellbeing, reduce health care costs, and increase overall social welfare.

Specifically, this study will analyze how the implementation of government policies and regulations could increase healthy functional food consumption, which in turn would help to reduce chronic illness incidence, thereby resulting in a reduction of healthcare expenditures.

Functional Foods and Health Claims

In Canada, functional foods are defined as "foods enhanced with bioactive ingredients and which have demonstrated health benefits" (AAFC 2015, website). These are products that naturally contain high levels of bioactive ingredients or are fortified, enriched, or genetically modified (AAFC 2016; AAFC 2014) by adding important amino acids, vitamins, or minerals (CFIA 2016b).

Another product related to functional foods is natural health products (NHPs)[1]. NHPs are defined in Canada as naturally sourced supplements sold in dosage form and used for improving or maintaining good health, reducing the risk of disease, and restoring body function (AAFC 2017a). NHPs are created by extracting, purifying, grinding, or drying naturally occurring substances found in a variety of plant, animal, microorganism, and marine sources (Health Canada 2016a; AAFC 2017b). They are sold in dosage form and come in tablets, creams, ointments, drops and include vitamin and mineral supplements (Health Canada 2016b).

In Canada, different types of nutritional and health information are permitted on foods and NHPs (CFIA 2022). Most prepackaged foods must display a nutrition

[1]Natural health products were known as nutraceuticals in Canada until 2001.

facts table (NFT)[2] that provides consumers with information on serving sizes, calories, and the percentage of daily values of 13 required nutrients plus any additional optional nutrients (Government of Canada 2015). Percentage daily values indicate the amount of nutrients that are consumed in one serving of the food as a percentage of the recommended daily intake.

In addition to the mandatory NFT, foods may voluntarily carry various types of claims. In Canada, claims that can be made on foods are categorized under two broad categories: either health claims or nutrient content claims. Health claims are defined as any statement on labels or in advertising that directly or indirectly indicates a relationship between the consumption of a food and improved health (CFIA 2016c), for example, "*a diet low in saturated and trans fat may reduce the risk of heart disease*" (Health Canada 2016c). Nutrient content claims are statements that indicate the quantity or presence of a nutrient, or the amount of energy provided by a food (e.g., "*excellent source of calcium*" or "*zero Calories*") (CFIA 2016d).

Health Canada further defines five subcategories of health claims that are permitted on foods: 1) general health claims; 2) implied health claims; 3) function claims; 4) therapeutic claims; and 5) disease risk reduction claims (AAFC 2012; CFIA 2016c, CFIA 2019a, CFIA 2019, CFIA 2022). General health claims provide broad dietary guidance in line with Canada's Food Guide recommendations and do not reference health effects. An example of a general health claim is: "*part of a healthy diet*" (CFIA 2016c, CFIA 2019). Implied health claims can consist of logos, symbols or words (e.g., prebiotic, probiotic, antioxidant) that contribute to the overall impression about the food product and are evaluated on a case-by-case basis (CFIA 2019). Functional claims describe how consuming a specific food or food constituent can have positive effects on normal body functions. For example, the "*consumption of 1 cup of green tea helps to protect blood lipids from oxidation*" is an acceptable functional claim in Canada (AAFC 2012). Therapeutic claims indicate the treatment of a disease or a body function through the consumption of a food or food constituent (CFIA 2016c, CFIA 2019), such as "*ground (whole) flaxseed helps lower cholesterol"* (Health Canada 2014). Disease risk reduction claims, such as "*a diet low in saturated and trans fat may reduce the risk of heart disease*" explain how consumption of a specific food reduces the risk of a specific diet-related illness (CFIA 2016c, CFIA 2019).

In addition, there are two further subcategories of function claims: nutrient function claims and probiotic function claims (CFIA 2016c, CFIA 2019). Nutrient function claims explain the specific effects of nutrients on the normal development, growth and functioning of the body (CFIA 2016c, CFIA 2019). For example, products containing sufficient levels of iron may use the nutrient function claim, "*factor in red blood cell formation*" and "*helps build red blood cells*" (CFIA 2016c). Foods permitted to use nutrient function claims may also use a type of nutrient function claim called "general nutrient function claims". General nutrient function claims are broad claims that indicate certain nutrients maintain "good health" or "normal growth and development" (CFIA 2016c). For example, a product containing

[2]A few prepackaged products are exempt from carrying a nutrition facts table, such as individually sold one-bite confectionaries, milk sold in reusable glass containers, fresh produce, and raw meats.

the required levels of iron may also use the general nutrient function claim "*iron is a factor in the maintenance of good health*" or "*iron is a factor in normal growth and development*" (CFIA 2016c).

The second subcategory of function claims, probiotic function claims, describe the health benefits of the consumption of microorganisms (CFIA 2016c, CFIA 2019). There are two types of probiotic claims in Canada: non-strain-specific and strain-specific. Non-strain-specific probiotic claims are claims that indicate the general effects of probiotics on body function without reference to a specific strain of bacterial species. For example, "*contains probiotics that contributes to healthy gut flora*" (CFIA 2016c). Strain-specific probiotic claims refer to the health benefits of a specific strain of bacterial species. Health Canada does not currently have an example of a strain-specific probiotic claim as none have been approved thus far (CFIA 2016c).

In Canada, the regulations and definitions for functional foods, NHPs, health claims, and nutrient content claims are governed by the *Food and Drugs Act* (Health Canada 1998). The *Food and Drugs Act* legislates safety, quality, and labeling standards for food and drugs sold in Canada (AAFC 2012). Under the *Food and Drugs Act*, functional foods are regulated as foods and NHPs are regulated as a subset of drugs under the Natural Health Products Regulations (Health Canada 2016b). The *Food and Drugs Act* regulations are jointly governed by Health Canada, the Canadian Food Inspection Agency (CFIA) and Agriculture and Agri-Food Canada (AAFC) (AAFC 2012). Health Canada develops health and safety regulations, the CFIA enforces those regulations as well as develops non-health and safety-related labelling policies, and AAFC helps the industry to understand and navigate the various rules and policies.

Under the *Food and Drugs Act*, health claims and nutrient content claims made on foods are both voluntary and generic (Health Canada 2010). Generic claims are claims that, once approved, may be used on any product provided the product satisfies the criteria to carry the claim. Health claims are also permitted on NHPs, but, in contrast, health claims made on NHPs are product-specific and mandatory to inform consumers how to appropriately use the products (NHPD 2006; Health Canada 2016b). Product-specific claims are claims that are reviewed on a case-by-case basis and approved for use on specific products only. Health claims on NHPs must link the product to a health condition or disease except for those diseases referred to in Schedule A of the *Food and Drugs Act* (NHPD 2006). Nutrient content claims do not apply to NHPs.

While all health and nutrient content claims for use on foods are generic once approved, there are some differences in the approval processes for each type of claim. General health claims do not follow explicit regulations but, like all types of claims in Canada, are subject to Subsection 5(1) of the Food and Drugs Act (Health Canada 2016c; L'Abbe et al. 2008). Subsection 5(1) indicates that all claims must be factual, accurate, and not misleading. In addition, general health claims must give broad dietary guidance that corresponds with the Canada Food Guide recommendations (CFIA 2016c). Health Canada does not review or approve new general health claims and manufacturers do not need pre-market authorization to use general health claims (CFIA 2016c).

As for function claims, Health Canada requires pre-market review and approval of new function claims (CFIA 2016c). For new function claims to be approved, the claims must meet the acceptable standards of evidence outlined by Health Canada. First, the target consumer must be able to consume the amounts of the food necessary to achieve the beneficial effect as part of a typical diet (CFIA 2016c). Second, the claims must clearly indicate a specific physiological effect. Last, function claims must not indicate the prevention or treatment of a disease or illness or their symptoms (CFIA 2016c). Once approved, function claims become generic and may be used without premarket authorization. There are currently 4 function claims that have been reviewed and approved by Health Canada (CFIA 2016c; Health Canada 2016d, CFIA 2019).

The approval process for new nutrient function claims and probiotic claims is similar to the approval process for function claims. New nutrient function claims are evaluated and approved if the scientific evidence in support of the claim is accepted by an authoritative scientific agency, such as the Institute of National Academies of Science, and reflects agreement among the scientific community about the health benefits (CFIA 2016c). Once approved, new nutrient function claims become generic and are added to the Table of Acceptable Nutrient Function Claims. Currently, there are 28 accepted nutrients recognized in Canada to have beneficial effects on the body (CFIA 2016c, CFIA 2019). In addition, Health Canada permits the use of general nutrient function claims on foods containing any of the 28 accepted nutrients[3]. Manufacturers do not need pre-market authorization to use any of the approved nutrient function claims or general nutrient function claims.

Similarly, Health Canada also approves new probiotic function claims based on sufficient evidence in support of the claim (CFIA 2016c). Once approved, these generic claims are either added to the list of acceptable strain-specific claims or non-strain-specific claims depending on the type of claim. Producers do not need pre-market authorization to use any approved generic probiotic function claims. Currently, there are 16 approved non-strain-specific claims and no approved strain-specific claims (CFIA 2016c, Health Canada 2017, CFIA 2019).

New therapeutic and disease risk reduction claims must undergo an in-depth evaluation and approval process by Health Canada to ensure their validity prior to being made available in the market (Health Canada 2016c). Approval of new therapeutic and disease risk reduction claims is granted if the scientific substantiation to support the claim is found to be comprehensive, well-established, systematic, and transparent (Health Canada 2009). Submissions of new claims also must show that the food or food constituent needed for the beneficial effect can be consumed as part of a normal diet. If the health claim relates to a Schedule A disease, then an amendment to the *Food and Drugs Regulations* must be made prior to approval. Once approved, disease risk reduction and therapeutic claims are generic, and producers do not need pre-market authorization to use any of the approved claims (Health Canada 2016c). However, manufacturers must comply with specific wording, formatting, and language requirements for the health claims. There are

[3]General nutrient function claims indicate the approved nutrient is either 1) "*a factor in the maintenance of good health*" or 2) "*a factor in normal growth and development*".

currently 16 approved disease risk reduction/therapeutic claims available for use on foods in Canada (Health Canada 2016b, Health Canada 2017). A list of the approved disease risk reduction and therapeutic claims can be found in Appendix 1.

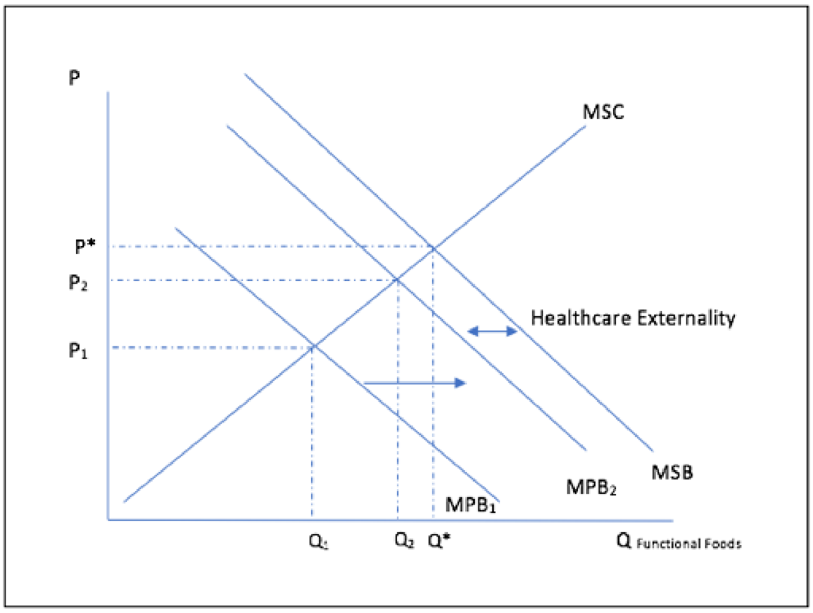
Health Canada currently has defined 13 categories of nutrient content claims (CFIA 2016d). Each of the 13 categories has several types of generic nutrient content claims that can be used on foods. New nutrient content claims are approved at the discretion of Health Canada. Manufacturers can use any of the approved generic nutrient content claims without pre-market authorization. However, nutrient content claims must also follow prescribed wording requirements determined by Health Canada (CFIA 2016d).

Correcting Market Failure in the Functional Foods Industry

Market failure in the functional food industry could occur due to imperfect information and healthcare externalities (Hobbs, Malla and Sogah 2014, Hobbs, et al 2014, Malla, Klein, and Presseau 2020, Malla, Klein, Presseau 2022). Market failure occurs when the private market equilibrium does not equal the socially optimal equilibrium and there is a loss of welfare due to an inefficient use of resources (Watts and Segal 2009). In the absence of health claims on foods, consumers have imperfect information about the health benefits of functional foods. Consumers might not understand the implications of their dietary choices on their health or, due to the credence nature of functional foods, might not recognize which foods provide extra health benefits (Veeman 2002; Herath et al. 2006). As a result, they might under-consume healthy foods and over-consume unhealthy foods. In addition, market failure in the functional foods industry occurs if consumers do not bear the full costs associated with poor dietary choices in a public healthcare system that operates in Canada (Hobbs, Malla and Sogah 2014).

A graphical analysis of the impacts of health claim regulations in the functional foods industry is provided in Figure 1. The socially optimal equilibrium occurs where the marginal social benefit (MSB) of consuming functional foods equals the marginal social cost (MSC) of producing them. The social benefits include all private benefits, for example, improved health and well-being, plus external benefits to society such as reduced public healthcare costs. The social costs include all direct and indirect costs associated with producing functional foods, including private costs such as labour and external costs such as pollution. At the social equilibrium, P* and Q*, net social welfare from the consumption of functional foods is maximized.

Figure 2. *Impact of Health Claim Regulations on Consumption of Healthier Foods*



Source: Authors

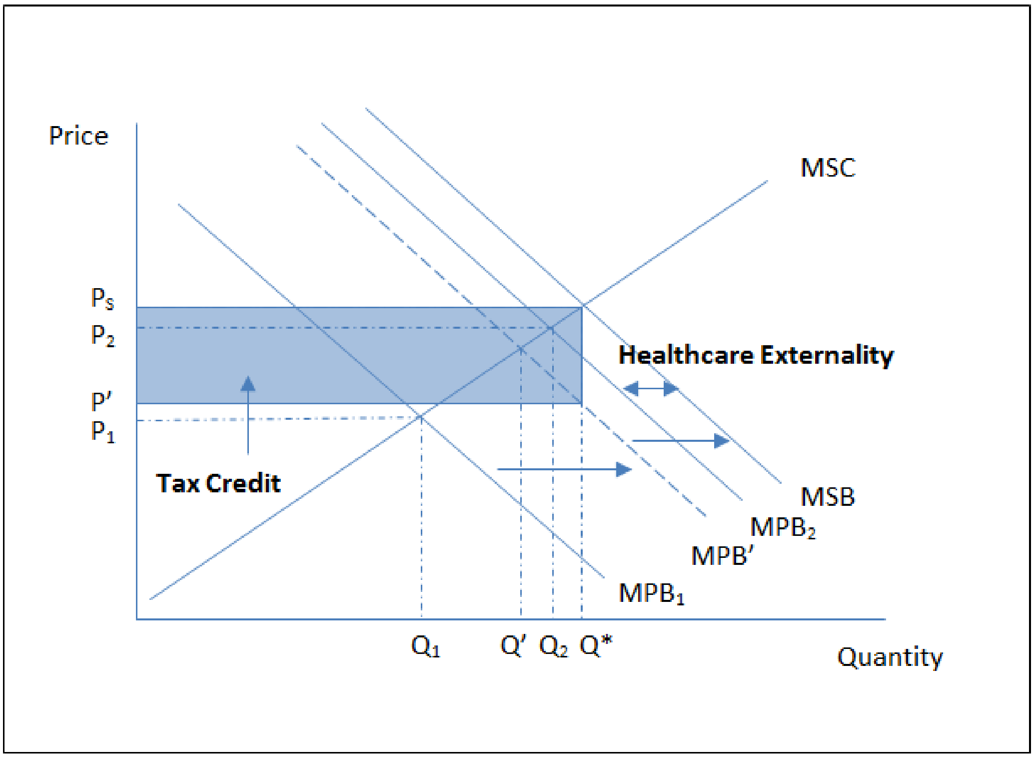
In the absence of health claims, the marginal private benefit (MPB) of consuming functional foods is lower than the MSB. The initial private equilibrium occurs where MPB_1 is equal to the MSC and the private optimal price and quantity are at P_1 and Q_1. Health claims can increase the consumption of healthy foods by providing information to consumers of the improved health and well-being they might receive from consuming these products. If consumers place greater value on the consumption of functional foods, MPB_1 will shift to MPB_2, and the new private equilibrium occurs at P_2 and Q_2. However, since consumers do not bear the full costs of an unhealthy diet, MPB_1 does not shift all the way to MSB. Instead, the distance between MPB_2 and MSB represents the healthcare externality.

The first, and potentially most cost-effective, policy recommendation to move MPB to the right (and get it closer to the MSB) is for public health authorities to increase communication of health information to consumers. This could take the form of articles in popular media, radio advertisements, social media, and planned social events that get people directly involved in raising awareness (Wansink and Cheney 2005). In addition, public health authorities might collaborate with grocery stores to post educational posters in the stores. These forms of communication can facilitate healthy eating by raising awareness and understanding or, in the case of in-store education campaigns, can help to increase the impact of health information on consumers as they are influenced directly at the point of purchase. Revised educational curricula in the public education system would teach children how to make healthy decisions for themselves.

In addition to making greater education and information available, governments could institute certain types of economic incentives to encourage greater consumption of these healthier foods. For example, the government could provide tax credits to consumers of functional foods. A tax credit could increase the consumption of foods where the use of health claims has not been as successful, for example, the "Fruits and Vegetables and Cancer" health claim. In this case, government could provide consumers with an annual monetary incentive to increase their consumption of fruits and vegetables. In the presence of health claims and other educational campaigns, MPB_1 shifts to MPB_2. If the government provided an appropriate amount of a tax credit, then consumers would have additional benefits from the consumption of functional foods and the MPB_2 would shift right to align more closely with the MSB in Figure 1. The new equilibrium consumption would occur at (or closer to) the socially optimal Q*.

However, if health claims are not completely successful, MPB_1 will shift only to MPB' as shown in Figure 2. An appropriate amount of tax credit to consumers of functional foods could be used to increase the benefit of consuming functional foods from MPB' to MSB. The optimal price and quantities after the incentive of the tax credit are at P_3 and Q*. The government would pay the difference between the new price, P_3, and the price consumers are willing to pay for Q* units on the original MPB' curve, P', per unit of consumption in the form of a tax credit. The total cost of the tax credit is indicated by the shaded area.

Figure 2. *Impacts of a Tax Credit in the Functional Food Market*

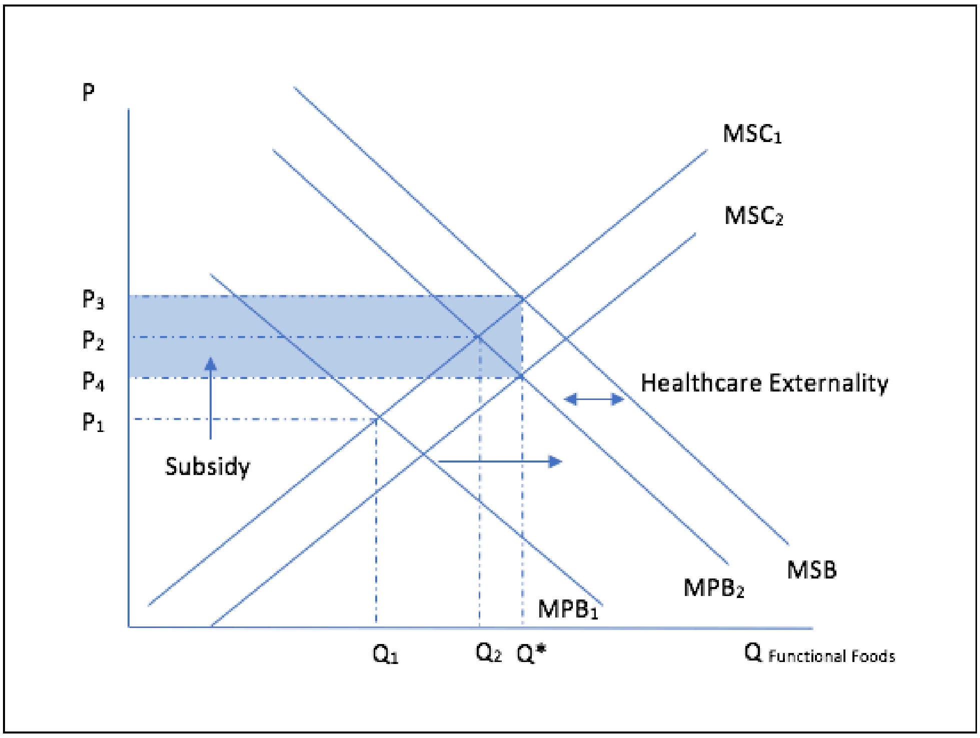


Source: Author's

Another economic policy option would be a subsidy on the costs of inputs to producers of functional foods. As shown in Figure 3, in the presence of health claims, the initial quantity of consumption prior to the use of a subsidy occurs at Q_2 where MPB_2 equals MSC_1. An appropriate amount of a subsidy on the cost of inputs would decrease the marginal cost of production and MSC_1 would shift right to

MSC_2. The price paid by consumers would decrease from P_2 to P_4, resulting in an increase in the quantity demanded from Q_2 to Q*. The new equilibrium price and quantity would occur at P_4 and Q*. The cost of the subsidy paid by the government would be the difference between the cost of producing Q* units on the original MSC_1 curve and the new MSC_2 curve. The total cost of the subsidy is represented by the shaded area.

Figure 3. *Health Claims and Subsidies on Functional Food Consumption*



Source: Authors

Both economic policy options, a tax credit to consumers and/or a subsidy to producers on the cost of inputs, could help increase consumption of healthy foods to the socially optimal level. However, the efficacy of these policies is dependent upon several factors, including how responsive consumers and producers are to changes in price and whether the food products have close substitutes. Also, other government policies or programs might affect consumption patterns as might conflicting health or product information (IISD n.d.), thus affecting the efficacy of these policies.

Conclusion

This graphical analysis has shown that government issued health claims on specific foods can be effective at improving dietary patterns and improving social welfare. It is recommended that public health officials continue to regulate health claims as this provides consumers with credible, accurate, and reliable health information. To increase the success and effectiveness of health claim policies, it is recommended that public health officials increase other methods of communicating health information, such as media coverage, in-store educational campaigns, social media, and planned fundraising and awareness events, as this is likely to reach a larger proportion of consumers. Further, educational programs that begin teaching children in school at an early age about nutrition and continue to secondary school should be included in the public education curriculum.

Last, the use of health claims and educational efforts alone likely are not enough to increase demand to the socially optimal level. Governments need to use stronger economic policies to provide consumers with an additional incentive to consume healthier foods at the social optimum. The use of tax credits to consumers or subsidies for producers could significantly improve the consumption of functional foods, thereby leading to improved health and a reduction in public healthcare costs.

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Appendix 1. *Canada Approved Disease Risk Reduction or Therapeutic Health Claims*

- Sodium and Hypertension (2000).
- Dietary Fat, Saturated Fat, Cholesterol, Trans Fatty Acids and Coronary Heart Disease (2000).
- Fruits, Vegetables and Cancer (2000).
- Calcium and Osteoporosis (2000).
- Plant Sterols (Phytosterols) (2010).
- Oat Products and Blood Cholesterol Lowering (2010).
- Psyllium Products and Blood Cholesterol Lowering (2011).
- Unsaturated Fat and Blood Cholesterol Lowering (2012).
- Barley Products and Blood Cholesterol Lowering (2012).
- Sugar-Free Chewing Gum and Dental Caries Risk Reduction (2014).
- Ground Whole Flaxseed and Blood Cholesterol Lowering (2014).
- Soy Protein and Cholesterol Lowering (2015).
- Vegetables and Fruit and Heart Disease (2016).
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Source: Health Canada 2017.

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The Role of Government in Institutional Enhancement of Innovation and Competition

*By Yaron Katz**

The paper explores innovation policy's role in a globalized world. It focuses on how a policy of governmental intervention can propel innovation and secure a leading role in global markets. The world is in flux due to the transformative impact of technology and innovation, and competition between countries is intensifying. The role of governments in technology development is crucial and indispensable in a globalized world. This is because economic growth is intricately linked to innovation. As the research shows, governments have the most significant influence on innovation. They foster the creation of new innovative products and bolster the success of local companies in the global competition. Governments should lead a policy that champions innovation to triumph in global competition. This policy is deeply entrenched in the market and shapes the trajectory of technological advancement. It differs from previous policies that advocated free trade and allowed markets to dictate developments. The paper also demonstrates that government support for technological advancement and global competitiveness requires a robust economy, deregulation of financial markets, and technological supremacy in building human resources. Technology transfer is a vital conduit of cooperation for businesses and nations. Competition policy permits competitors to collaborate on innovation and empowers governments to contribute to private-sector investments in innovation. Open markets are not just desirable but imperative for countries in global competition. In a global world, competition between countries hinges on open markets and globalization, underlining the urgency of these factors. The research concludes that countries that lag in their technological development and secure economies are at risk of exploitation in a global economy and a globalized world. This is the nature of competition between countries, with technology and innovation serving as the bedrock for the economic survival of countries.

Keywords: *Innovation, Technology, Competition, government, Public Sector*

Introduction

In modern times, one of the most distinguishing factors among countries is their technological standing. Technology is critical in driving change due to its transformative power across multiple domains. Technological advancements often increase efficiency and productivity in various sectors. Automated processes, improved machinery, and streamlined workflows allow organizations to produce more with fewer resources, driving economic growth and development. Technology fuels innovation by providing tools and platforms for creativity and problem-solving; technology enables the development of products, services, and processes.

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The study aims to explore the dynamics of innovation policy within the context of globalization, mainly focusing on how government intervention can stimulate innovation and position a country as a leader in global markets. With the profound impact of technology and innovation, the international landscape is undergoing rapid transformation, intensifying competition among nations. In this context, the role of governments in fostering technological development becomes paramount, given the strong correlation between economic growth and innovation.

The research examines the central role of governments in driving innovation, emphasizing the need for proactive measures to encourage the creation of innovative products and support local companies in competing globally. In today's competitive environment, governments are urged to adopt policies that not only oversee markets but also actively stimulate innovation and shape the trajectory of technological advancement. As the paper elucidates, adequate government support for technology advancement and global competitiveness hinges on several factors, including a secure economy, deregulation of financial markets, and a focus on nurturing human capital.

The research underscores the complex interplay between technology, innovation, government policies, and global competition, highlighting the need for strategic approaches to navigate these interconnected realms effectively. It looks into governmental intervention policies as the mechanism that can drive innovation and secure a leading position in global markets. It shows that government intervention policies can serve as mechanisms to drive innovation and secure leading positions in global markets, indicating a proactive role for governments in shaping technological progress and competitiveness. It demonstrated that innovation requires financial investments and investments in human capital and institutional frameworks. These conclusions are based on the European Central Bank's (2019) finding that innovation should catalyze progress in societies and countries striving to bolster their competitive standing through technology investments, with structural measures such as increased spending on research and development and educational investments crucial for promoting innovation. This policy includes structural measures such as spending on research and development (R&D) and educational investments for innovation. The indicators commonly used for the OECD countries focus on R&D expenditures, R&D labor force, patents, and high-technology product exports (Erdin & Çağlar, 2022).

Research Methods

This research aims to provide a comprehensive understanding of the role of government in enhancing innovation and competition, offering valuable insights for policymakers, industry leaders, and scholars interested in the dynamics of technological and competitive advancements. The primary goal of this research is to investigate the role of government in fostering innovation and competition through institutional enhancements. This includes understanding how government policies, regulations, and interventions impact technological advancement, economic development, and competitive dynamics in various sectors. Specifically, the study aims to analyze the effectiveness of government strategies in promoting technological innovation and maintaining competitive advantages. It further examines how government actions influence institutional frameworks that support innovation, aiming to identify best practices and strategies employed by different governments to enhance innovation and competition.

The research explores the interplay between government policies and industry responses to technological and competitive challenges, particularly in advocating how government policies and regulations impact innovation and competition within different sectors. This question explores the relationship between governmental interventions and their influence on technological advancements and competitive dynamics. Another research question concerns the role of government institutions in shaping the innovation landscape. This analysis question focuses on understanding how various government bodies contribute to or hinder innovation and how their roles evolve in response to changing technological and competitive environments. The research attempts to demonstrate practices employed by governments to enhance institutional frameworks that support innovation and competition and identify effective strategies and practices that governments have used successfully to promote innovation and competitive advantages.

The central hypothesis of this research is that effective government interventions and institutional enhancements significantly contribute to fostering innovation and sustaining competitive advantages across various sectors. Governments that actively create supportive policies, provide funding, and facilitate infrastructure development will experience higher levels of innovation and more robust competition within their economies. Additionally, institutional frameworks integrating government support with industry needs and technological advancements are more likely to result in successful innovation outcomes and competitive market positions.

This study employs a multifaceted approach to examining the dynamics of innovation policy within the context of globalization. It focuses on the role of government intervention in fostering technological advancement and enhancing global competitiveness. The methodology integrates qualitative and quantitative research methods to analyze how government policies influence innovation and technological progress comprehensively. This study examines the pivotal role of technological supremacy in driving global innovation, competitiveness, and economic development. Technological supremacy is a country, organization, or entity's significant advantage over others regarding technological capabilities across various sectors. This advantage can be evidenced through advanced research and development (R&D), state-of-the-art infrastructure, a highly skilled talent pool, and effective technology deployment in diverse applications.

At the heart of this supremacy is the catalytic effect on innovation. Technological supremacy accelerates progress, drives economic growth, and facilitates societal advancement. Countries or entities with superior technology often produce better products, services, and solutions, translating into increased market share, higher revenues, and robust economic growth. They influence global standards, shape regulations, and set industry trends, thus directing the course of worldwide innovation.

The study emphasizes that innovation is inherently linked to technological supremacy and is crucial for contemporary global business and inter-country competition. Technological advancements have revolutionized the global economy and become central to competitive strategy. As nations and organizations contend in a globalized environment, policies must evolve to address international competition challenges, necessitating technological creation, acquisition, absorption, and dissemination strategies.

The study underscores the role of governments in driving technological innovation and competitiveness. Governments are integral in funding R&D and creating supportive frameworks for innovation. Innovation is increasingly a component of national economic growth and competitive positioning strategies. Effective governmental policies include public venture capital for early-stage funding and initiatives to mitigate risks associated with innovation. These policies are essential for maintaining global competitiveness and fostering technological advancements. In the public sector, innovation is driven by the need to address public issues and improve service delivery. Governments must encourage innovation and investment in digital systems to enhance public services and drive economic growth. Implementing innovation in public systems requires overcoming these obstacles and ensuring effective policy frameworks.

The research maintains that technological supremacy is critical in shaping global competitiveness and economic development. Governments that support innovation and technology can enhance their competitive advantage and contribute to broader economic growth. As the global landscape evolves, the interplay between technological advancement, economic strategy, and public sector innovation will continue to be pivotal in determining success and stability on the world stage. The study formulates policy recommendations for governments to enhance innovation capacities and global competitiveness. These recommendations address vital areas such as investment in R&D, support for human capital development, and creation of conducive regulatory environments. The goal is to provide actionable guidance for policymakers to design and implement effective innovation strategies. The approach provides a comprehensive understanding of the factors influencing technological advancement and the role of policy in shaping competitive advantages.

Government Intervention

This research highlights governments' critical role in shaping technology and innovation and ultimately participating in global competition. Examining the role of governments emphasizes how closely intertwined technology, innovation, and international competition are. With the impending reality of international competition, governments face pressure to enhance innovation and public sector performance while containing expenditure growth (Curristine et al., 2007). Innovation presents equal opportunities to all countries, yet those leading in generating advanced technologies and leveraging their digital economies gain strategic competitive advantages (Schwab, 2018). With technology's rapid growth, the digital economy has transformed government and business operations and reshaped global competition dynamics. However, although technological advancements and innovation are key drivers of competitiveness worldwide, and innovation is portrayed as offering equal opportunities to all countries, not all countries may be equally positioned to take advantage of these opportunities. Countries that generate advanced technologies and utilize digital economies gain significant strategic advantages in global competition. This reflects the idea of technological leadership as a determinant of competitiveness.

As explained by Pingali et al. (2023), the rapid growth of technology has led to transformative changes in how governments and businesses operate in the public sector and innovating their service delivery, communication, and data management. Accordingly, strategic government intervention can lead to resource concentration in specific industries and entities, with governments having a critical role in directing resources towards priority areas or deemed sectors crucial for national competitiveness. Such policy facilitates the relationship between innovation, technology, government policies, and global competition, emphasizing the importance of proactive measures to foster innovation and maintain competitiveness in the contemporary economy. As explained by Wang et al. (2021), a particular lesson from the consequences of the COVID-19 pandemic is that governments have initiated steps to balance economic policy objectives to address the social and public crisis to revive economic growth and innovation systems to stabilize their economies.

Innovation system refers to the institutions, actors, and infrastructures that shape innovation activities within national boundaries (López-Rubio et al., 2024). Edquist, 2009) defines global innovation as the capability of a nation's financial influence on the creation, diffusion, and adoption of new ideas and technologies. Innovation is widely recognized for its societal benefits and crucial contribution to economic growth. It transforms novel ideas into products, processes, or organizational structures. It aims to enhance and streamline performance while bolstering organizational productivity and enabling private and public entities to adapt to evolving environments. Initially focused on private organizations, innovation has become intricately linked with globalization and technological progress.

Collaboration and technology transfer between businesses and nations are highlighted as essential avenues for fostering innovation, facilitated by competition policies encouraging competition among competitors and government contributions to private-sector investment in innovation, given the imperative of open markets in global competition, countries that lag in technological development and economic security risk vulnerability to exploitation in the interconnected global economy. This underscores the contemporary nature of competition among nations, where technological innovation is a cornerstone for financial resilience and survival in the globalized world.

Traditionally, government intervention in innovation was confined to facilitating private-sector initiatives, allowing businesses to pursue their interests largely independently. Governments typically adhered to traditional innovation policies, which were believed to create an environment conducive to innovation rather than actively stimulating it. This approach was rooted in the notion that the state's involvement in the economy should be minimal, intervening only when market failures occurred. However, as Deleri (2015) explained, this policy had significant shortcomings, primarily because it socializes risks while privatizing rewards.

In contrast, acknowledging the state's role in shaping innovation allows for public investments as a catalyst for driving innovation and economic growth. A heightened interest in fostering innovation within the public sector has emerged, driven by the imperative for public organizations to adapt to global and technological shifts and secure strategic advantages crucial for sustainability. Many countries have recently strengthened antitrust enforcement to maintain a fair market competition environment, mainly targeting digital platform companies. Recognizing the state's role in shaping innovation allows governments to increase economic growth through public investments. This shift in perspective allows for the strategic allocation of resources toward research and development, infrastructure, education, and other initiatives that directly support innovation efforts. In doing so, governments can effectively leverage their influence to create an environment where innovation flourishes, benefiting society and the economy.

Innovation has increasingly intertwined with globalization and technological advancements (Niebel, 2018). There has been a growing interest in nurturing innovation within the public sector. This interest is driven by governmental organizations' need to respond to global and technological transformations and gain strategic advantages essential for their sustainability. These initiatives encompass management strategies, services, processes, products, and technologies to advance administrative systems and foster regulatory and legislative frameworks conducive to public sector innovation (Eldar & Fagerberg, 2017).

Innovation policies have evolved significantly, transitioning from addressing market failures through indirect governmental involvement to actively leading the market through direct intervention. This policy shift is rooted in the changing landscape characterized by intensified competition among nations, underscoring the crucial role of governments in driving technological development. Unlike before, governments now play a pivotal role in fostering innovation by proactively creating new markets rather than solely rectifying existing ones. This recognition of the indispensable role of public investments in shaping and establishing new markets marks a fundamental departure from previous approaches. According to Wang (2017), government intervention is paramount in supporting research and development initiatives since relying solely on markets may not provide sufficient incentives for knowledge generation and production. He argues that the government serves as a critical determinant of innovation capacity, although the extent and nature of its involvement in innovation remain subjects of debate. Consequently, government intervention varies across economies, from directive intervention, where governments actively advise industrial policy and invest in selected sectors, to facilitative intervention, where governments focus on creating a conducive environment and providing public goods for industries.

Technological Supremacy

This study emphasizes the central role of technological supremacy in driving innovation, competitiveness, and economic development in the global landscape. This aspect refers to a state where a country, organization, or entity possesses a significant advantage over others regarding technological capabilities across various fields. This advantage can manifest in advanced research and development, cutting-edge infrastructure, a superior talent pool, and effective technology deployment in multiple sectors.

Technological supremacy catalyzes innovation, driving progress, economic growth, and societal advancement. Its impact on innovation provides a significant competitive edge in the global market. Countries with superior technology can offer better products, services, and solutions, leading to increased market share, higher revenues, and enhanced economic growth. These countries significantly influence the global stage by setting standards, shaping regulations, and influencing industry trends, thereby shaping the direction of innovation worldwide.

Innovation revolves primarily around technological supremacy, which is crucial in contemporary global business and inter-country competition. Technological advancements have revolutionized the global economy and emerged as a significant component of competitive strategy since policies must adapt to meet the challenges of international competition, necessitating a national strategy for technology creation, acquisition, absorption, and dissemination across various economic sectors. As a result, the government's role in advancing technology has become indispensable for countries' global and economic development, given the transformative impact of technological advancements that integrate economies into a unified market (Akis, 2015). In a globalized world, technology is increasingly important for countries' prosperity and competitiveness, with innovation playing a crucial role in nations' competitiveness. Developed and developing countries rely on investments in science and technology as critical components of sustainable development. According to Reghunadhan (2020), technological supremacy has become an inherent aspect of national and strategic positioning among countries.

Technology is critical in driving change to adapt, innovate, and thrive. Digital technologies represented by big data and artificial intelligence are profoundly changing enterprises' business models and competitive landscapes (Bresciani et al., 2021). Digital economy and technological advancements have transformed individual organizations and reshaped the dynamics of global competition. This implies a shift in traditional notions of competitiveness and the emergence of new factors driving success in the worldwide marketplace (Feliciano-Cestero et al., 2023). The proliferation of digital technologies has connected people and businesses, interconnecting the exchange of ideas, knowledge, and resources and driving collective advancements in science, medicine, education, and beyond. Technology influences socio-economic dynamics by shaping how people interact, work, and live. From the rise of digital economies to the democratization of information, technology has also profoundly affected employment patterns, income distribution, social mobility, and quality of life. Digitalization is critical for enterprises to mitigate risks, enhance competitiveness, and ensure survival.

Technological advancements have revolutionized the global economy, driving technological progress and staying ahead, which are crucial for success in contemporary global business and competition among countries. Appio et al. (2021) emphasize the roles of innovation, digital adoption, and financial technologies in driving the economic and financial landscape. Di Vaio et al. (2021) explain that success in global competition is increasingly tied to technological capabilities and innovation since technology has become a vital component of competitive strategy for businesses and nations. According to Huesig and Endres (2019), given the challenges of global competition, nations must formulate a national strategy focused on technology creation, acquisition, absorption, and dissemination across various economic sectors. This reflects the recognition that policies must adapt to the realities of global competition to foster technological advancement and competitiveness by playing a crucial role in shaping the technological landscape through policies to ensure sustainable development and maintain competitiveness on the world stage. This includes initiatives such as public venture capital for early-stage funding and assistance in mitigating risks associated with innovation.

Technology and innovation encourage global competitiveness and economic development, underscoring the need for strategic policies and investments to foster technological advancement and maintain competitive advantages. In a contemporary economy, innovation is a crucial driver of financial growth, complemented by technology's openness to the global market and the deregulation of financial markets. In a globalized world, where economies are interconnected, competition among countries is predicated on innovation. Falling behind technological advancement and economic stability renders countries vulnerable to exploitation in this competitive landscape. Caragea et al. (2024) show that greater competition increases the probability of innovation. Wang (2017) explains that adequate government support targeted at companies significantly enhances their innovation performance, with strategic government intervention leading to resource concentration in specific sectors and entities.

This approach emphasizes how technology's openness to the global market contributes to economic development. Technological advancements facilitate cross-border transactions and market integration, fostering economic growth on a worldwide scale. The deregulation of financial markets is a significant factor in innovation and technology, as it removes barriers to market entry and fosters competition. In a globalized world, where economies are interconnected, nations must continuously strive to stay ahead in technological advancements to maintain competitiveness on the global stage. In contrast, falling behind in technological advancement and economic stability leaves countries vulnerable to exploitation in the competitive global landscape. This highlights the importance of innovation in avoiding being marginalized or taken advantage of by more technologically advanced competitors.

Economic Security

The research underscores the growing significance of governmental involvement in technology development as competition intensifies between countries. It asserts that governments are central in driving innovation and funding new markets to foster technological progress. One of the primary advantages of innovation is its contribution to economic growth, which can yield substantial benefits for both consumers and businesses. Through their innovative initiatives, nations can achieve a competitive advantage. López-Rubioa et al. (2023) explain that competitiveness has become a sustainable development strategy worldwide, allowing countries to implement policies to boost national competitiveness. However, not all countries have been prosperous because each country has unique characteristics that apply only within its national borders. According to the European Central Bank (2019), for innovation to fully realize its benefits, it must permeate the economy and benefit companies across various sectors and sizes equally.

Economic security is vital to technological advancement and global competitiveness (OECD, 2018). This fosters economic growth and stability while upholding living standards, education, and consumer welfare (World Bank, 2016). Rapid technological advancements and accelerated globalization alter the context for economic development, offering developing and emerging countries opportunities for increased productivity and access to new resources and markets. However, the characteristics of research and development activities often result in lower financial benefits for investing entities than the overall market benefit. Consequently, private investment may fall short of the optimal level perceived by the market, and government intervention is necessary to mitigate these market failures and incentivize investments in research and development (Lamba & Malhotra, 2009).

The outcome of this reality in a global economy demonstrates the critical role of innovation, government policies, and competition in driving economic growth and competitiveness in the contemporary global landscape. It emphasizes the need for proactive measures to foster innovation in the private and public sectors, focusing on leveraging technology and creating supportive frameworks for innovation. The most distinctive factor that differs between countries in modern times is their technological status since technology is a crucial driver of change (Borrás & Edquist, 2013). Governments must have and should play a vital role in innovation and creating new markets rather than merely rectifying existing ones. These include public venture capital for early-stage funding and assistance in mitigating technical, commercial, and financial risks associated with innovation. By funding R&D programs and demonstration projects to alleviate these risks, the government provides the private sector with a clearer understanding of the potential demand for innovative products.

The interplay between competition and innovation has been a longstanding focus for economists and scholarly investigations into global competition among nations (Petropoulos, 2015). Globalization typically brings about market expansion (Vives, 2008), driven by technological advancements that lead to the integration of economies into a single market. Technological progress and open markets are imperative for countries engaged in global competition, as competition among nations in a globalized world is based on open markets and globalization, contrasting with economies centered on closed markets. Government policies must foster competition to comprehend the dynamics of global competition among countries and the role of technology in a globalized context. As Petricevic and Teece (2019) explain, the global economic order requires fundamental business and management practices shifts. Doğan (2016) explains that technology and innovation are the predominant factors shaping countries' competitive status globally since each category's defining characteristic is its innovation policy, as innovation's role in global competition has become pivotal for both developed and developing nations. Eldar & Fagerberg (2017) concluded that a common thread among all countries is the essential nature of innovation policy for their competitive advantage, prompting policymakers to consider all stages of the innovation process when formulating and implementing policy.

This role of governments needs to advance the multifaceted relationship between business innovation, government policies, global competition, and technological advancement. There has been increasing recognition of the role of business innovation in facilitating substantial societal advancements and enhancements. Research by Cainelli et al. (2004) suggests that innovating firms outperform non-innovators in terms of productivity levels and economic growth. Farida and Setiawan (2002) explain that business innovations have become indispensable strategies for enterprises to cultivate competitiveness and market potential in the fiercely competitive global landscape. Jung and Shegai (2023) found that digital market innovation directly and indirectly affects the firm's performance.

Innovation determines firm performance (Bauweraerts et al., 2022). Digital services and technologies enable firms to accurately portray customers' credit and reduce information asymmetry in financial lending. They also help firms deliver information to consumers very quickly. Digital technology apps have also lowered transaction costs through the flow of credit funds (Feng et al., 2022). Financial innovation, digitalization, and sustainable development have emerged as crucial forces in today's rapidly changing global business landscape (Yang & Zhang, 2020). Global competitiveness motivates firms to make different strategies to increase their profits by increasing market shares, consolidating comparative advantage, and improving product efficiency (Goel et al., 2022). Technological innovation combined with financial and digital breakthroughs has revolutionized how businesses work (Han et al., 2023) and given a potential route toward a more sustainable future as the world struggles with severe environmental concerns (Tabbasam et al., 2023).

The Public Sector

The public sector plays a crucial role in fostering and embracing innovations, which leads to higher levels of trust and satisfaction with governmental operations. Innovation processes within the public sector are geared towards implementing novel ideas to generate public value while leveraging technology to address public issues and enact governmental policies. These efforts encompass policies to sustain economic progress and development and support management strategies, services, processes, and technologies across public organizations. They encompass changes in policy formulation, revision of policy-setting processes, and initiatives to foster and disseminate innovation.

Governments should encourage and support innovation and public and private investment in digital systems in the global landscape (Wang et al., 2023). Among all areas of public service, digital services hold the most significant potential for economic growth, driving innovation in products, services, processes, business models, and organizational arrangements. The significance of innovation culture in global competition underscores the role of government policies and regulations in fostering or hindering innovation. Cinar et al. (2024) argue that while there is growing literature on innovation types in the public sector, prior studies have analyzed data from a single country. This can be achieved by depending on local strategic partners to mentor newly-born companies and providing access to scientific facilities in universities or hospitals. Friedmann and Pedersen (2024) found that innovation policies should facilitate knowledge creation and diffusion within national innovation systems. According to Devarakonda (2024), the role of government venture capital is to promote startup innovation within transition economies, which is valuable for entrepreneurs and policymakers in transition economy contexts.

The Organization for Economic Co-operation and Development (OECD) defines innovation in the public sector as implementing a new or substantially improved product or process, marketing method, or organizational method in business practices, workplace organization, or external relations. OECD countries aim to deliver user-focused, better-defined services aligned with user demand. Public service employees play a pivotal role in enhancing the public supply of services or introducing new services. Technology facilitates increased citizen awareness and engagement with government services, necessitating more innovative approaches within the public sector. However, as further explained by the OECD (2018), there still needs to be more knowledge and application of public sector innovation and its outcomes, costs, and enabling environment. Public sector innovation is sporadically institutionalized in government budgets, roles, and processes, necessitating more consistent application of the full range of tools available to policymakers for accelerating innovation. To aid governments in fostering more innovative practices, the OECD has developed an integrated framework for mapping existing approaches and policies supporting public sector innovation in human resource management, training, and regulations.

The Global Risks Report (2022) highlights the rapid digitalization efforts in developing economies but also cautions about the potential deepening of digital divides due to limited technical and financial resources. The World Bank report (2016) emphasizes the criticality of adopting an innovation culture in the public sector to fully leverage the digital age's potential and ensure institutional coordination and resource mobilization for both the private and public sectors.

Implementing innovation in public systems is fraught with complexities, particularly in environments needing more practical competition and characterized by bureaucratic hurdles. These obstacles dampen motivation for innovative processes within central governments and their public branches. Developed countries' experiences demonstrate that effective intervention necessitates robust government support, yet disparities emerge between developed and developing countries. Experiences from developed countries underscore the importance of strong government support for effective intervention in terms of their ability to implement such interventions effectively. The evolving role of governments in fostering innovation highlights a growing recognition of their instrumental role in driving technological progress and economic growth on a global scale. Governments are under pressure to improve the performance of their public sectors while also managing expenditure growth. This suggests a dual challenge of improving services and efficiency while considering costs.

Despite the significant impact of innovation on reshaping industries, the concept of innovation in the public sector and its implications for political, social, and cultural systems have yet to receive adequate attention. This neglect must be addressed, given the imperative to enhance public services and deliver value for the public good (Lee et al., 2012). The practices observed across different countries underscore the complexities associated with implementing innovation in public systems that operate without practical competition and within an environment deemed secure for their continuity and political stability. In developed and developing nations, the digital divide and bureaucratic hurdles pose significant obstacles to progress, dampening motivation for innovative processes within the central government and its public branches. As explained by Chaudhry and Garner (2006), countries lagging in technological advancement and economic stability become more susceptible to exploitation, which demonstrates the finding of Deleri (2015) that gaining a favorable position in the global competitive landscape hinges on devising appropriate strategies for innovation and establishing supportive frameworks by public authorities to support private business initiatives.

A critical aspect of fostering an innovation culture is addressing the digital divide, which delineates access to information and communication technologies and the capacity to utilize them. The OECD (2018) asserts that digitalization can alleviate poverty by enhancing underserved populations' access to education, health, government, and financial services. However, a stark contrast exists in Israel between governments` success in cultivating an innovation culture and innovation policy for the public sector. Bureaucracy embodies the administrative authority of the state and its public institutions and manifests when citizen services are limited. Efforts to reform bureaucracy aim at enhancing governance quality. However, Meier et al. (2019) contend that significant governance failures in developed and developing nations stem from political rather than bureaucratic issues. They argue that political institutions often need to be able to set clear policy goals, allocate sufficient resources to address problems adequately, or rant bureaucracy adequate autonomy in implementation, leading to additional governance challenges that could have been avoided with proper political functioning. The OECD characterizes this lack of reform policy as a political state where no significant reform initiatives emerge (OECD, 2010).

Conclusion

The impact of technological innovation and global competition underscores the critical role of governments in shaping policies that foster innovation and economic growth. As explored throughout this study, technological advancements have become synonymous with progress, driving change across various sectors and reshaping the dynamics of global commerce. The study shows that government intervention in innovation policies has shifted from traditional approaches, where governments merely facilitated private-sector initiatives, to proactive measures to drive innovation through direct intervention, acknowledging the state's critical role in shaping technological development and fostering economic growth. By strategically allocating resources toward research and development, infrastructure, education, and other initiatives, governments can create an environment conducive to innovation and ensure that their countries remain competitive globally.

Technological supremacy has been identified as a critical determinant of competitiveness in the contemporary global landscape. Countries that generate advanced technologies and leverage their digital economies gain significant strategic advantages, shape industry trends, influence global standards, and examine the public sector's role in fostering innovation and leveraging technology to address public issues effectively.

Technological advancements catalyze innovation, driving progress, economic growth, and societal advancement. Nations with superior technology enjoy competitive advantages in the global market, influencing industry trends and setting standards worldwide. However, achieving and maintaining technological supremacy requires proactive government policies that foster innovation and create conducive environments for technological advancement. As the global landscape evolves, governments face pressure to enhance innovation and competitiveness while containing expenditure growth. Strategic government intervention can lead to resource concentration in priority sectors, driving technological progress and ensuring national competitiveness. Policies that foster innovation include increased spending on research and development, investments in human capital, and the creation of supportive regulatory frameworks.

Innovation extends beyond the private sector to encompass the public sector, where governments play a crucial role in fostering innovation and embracing technological advancements. Implementing innovation in public systems presents complexities, but adequate government support can drive progress and improve public services. Addressing bureaucratic hurdles and promoting an innovation culture is essential for enhancing public sector innovation and delivering value for the public good.

The research concludes that technological supremacy, government intervention, and innovation are interconnected components driving global competitiveness and economic development. Governments must adopt strategic policies to foster innovation, enhance competitiveness, and leverage technological advancements to navigate the worldwide economy's complexities successfully. By investing in technology, fostering innovation, and promoting an innovation culture, nations can position themselves as global market leaders and drive sustainable growth and prosperity. By adopting strategic approaches and encouraging collaboration between the public and private sectors, countries can position themselves as leaders in technological advancement. As we look toward the future, it is clear that innovation will continue to shape the trajectory of global development, with governments playing a central role in driving progress and prosperity for their citizens.

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