REAL TIME RESPONSE (RTR): CONCEPTUALIZING A SMART SYSTEMS APPROACH TO ADVANCING DESTINATION RESILIENCE.

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ABSTRACT

Destination resilience is an emerging area of research, that supports tourism managers and policy makers in the development of more adaptive strategies in the face of vulnerabilities, growing risks and the uncertainty of crises and disasters. Risks at the local, national and international levels are becoming ever more systemic, unpredictable, with high (and rising) costs for recovery. Tourism managers and stakeholders at both the local and national level must be empowered through greater information sharing and responsiveness during the crisis/disaster. The article introduces Real Time Response (RTR) as a smart systems approach to advancing destination resilience offering a conceptual framework that synthesizes knowledge and develops the emerging body of work on Destination Resilience. RTR seeks to demonstrate how a stronger focus on smartness and real time can condense space and time and increase a destination's adaptive response capacity. RTR builds proactive and reactive measures to strengthen response efforts that will ultimately strengthen and mitigate the severity of impacts leading to a faster recovery and development.

KEYWORDS
Real Time Response, Destination Resilience, Tourism Crisis and Disaster Management, Smart Systems, Tourism Crisis Response.

1. Introduction

The tourism industry is familiar with natural and human-induced crisis and disasters and their implications. The need for greater resilience of tourism destinations is widely acknowledged (Amore et al., 2018; Filimonau & De Coteau, 2019; Gretzel & Scarpino-Johns, 2018; Hall et al., 2018; Schroeder & Pennington-Gray, 2018). The incongruence between high disaster vulnerability, low crisis response and resilience has not only become a source of concern for disaster and emergency management teams (Yang et al., 2017), but for destination managers. It is contingent that systems are framed within a context to withstand disruption while moving seamlessly between various unexpected events (Zolli & Healy, 2012). This concept of seamlessness can also be expanded to destination ecosystems. Resilience acknowledges that disequilibrium can be persistent and disruptive, and this can disrupt the most prepared systems (Manfield & Newey, 2018). Managing dynamic and unexpected events is what resilience is about; change is not an exception but an ever-abiding constant (Vos et al., 2017). Within the domain of the unexpected sensemaking of an emerging pattern is equally important to the anticipation

and planning, the capacity to cope and respond to the unexpected necessitates a different mindset (Weick & Sutcliffe, 2015) approach.

Ecosystems are characterized as complex networks due to the interdependency of organizations, industries, stakeholders and resources within a destination (Gretzel, Werthner, et al., 2015). Since 2019, international tourism has been confronted with the challenges of natural hazards on scales not seen previously. These include the forest fires, in Australia, Brazil and the US, prominent seismic events like the New Zealand volcano eruption, Hurricane Dorian in the Bahamas as well as the global onset of the unprecedented SARS-Coronavirus 2 (COVID19) pandemic. The individual and combined scale, scope and impact of these disasters, threatens the long-term viability of communities, businesses and ultimately destinations. Scholars have been compelled to further disaster risk reduction (DRR) research, strategies and planning, as well as mitigation and containment measures employable by and applicable to destinations (Paraskevas & Altinay, 2013; Ritchie & Jiang, 2019). The impact of the COVID-19 pandemic on travel and tourism has been catastrophic, (Curley et al., 2020; UNWTO, 2020). The protracted and multi-wave impact of the virus has also been discernible with varying lengths of outbreak worldwide prompting various degrees of lockdown impacting economic activity (John Hopkins University, 2020). This further accentuated uncertainty for travel and tourism. COVID-19 has reinforced the demands for greater interconnectedness, agility and resilience within the tourism ecosystems when confronted by crises and/or disasters (Kumar et al., 2020; WTTC, 2020).

Destination management has historically placed emphasis on the management of demand and supply, visitor experience and maintenance of competitive advantage. This has been enhanced through the application of smartness to elements of the industry including value co-creation and smart service experiences (Buhalis & Sinarta, 2019; Gretzel & Scarpino-Johns, 2018; Kabadayi et al., 2019; Polese et al., 2018). However, the applicability smartness must demonstrate scalability from the micro-level of enhancing visitor experience, to the macro-level perspective of a destination. Enhancing the visitor experience is inextricably linked to the provision and foresight of safety during times of

uncertainty. Previous works have explored DMO's and other organizations as the core of the response mechanism (Scarpino & Gretzel, 2014). However, while there is a role for centrality and individual organizational resilience, greater consideration must be given to an ecosystem response that can be scaled based on the nature of the disaster/crisis. This is especially beneficial for tourism dependent destinations where resources are not equally available to all stakeholders. More than ever, there is a need for tourism managers to understand crisis/disasters and develop strategies to mitigate their impact protecting both the industry and societies, especially those dependent on tourism for growth and survival (Ritchie & Jiang, 2019). RTR focuses on the empowerment and interoperability of all levels within destination to respond and represents a contribution to the development of Destination Resilience and TCDM. It is this strategic ecosystem approach that is required in shaping resilience through systems thinking and enabling smartness to strengthen resilience.

The destination is an ecosystem and its resilience needs to be built on the resilience of all organizations and stakeholders (Amore et al., 2018) and empowering them to be frontline actors. Planned resilience involves the encouragement and comprehensive use of existing, predetermined planning, procedures, systems and capabilities, (Prayag et al 2019). It strengthens all the five components of resilience i.e. robustness, resourcefulness and redundancy in response and recovery (WEF, 2013). The scope of this conceptual paper explores the role a destination can play during the response phase as part of the wider goal of destination resilience. It represents a pathfinding attempt to advance the Destination Resilience Agenda, through exploring the concept of Real Time Response (RTR). This concept emerged from the nexus of Organizational Resilience, Smartness and Real Time. The interconnections between these three areas institute unprecedented opportunities for the response capacity of destination ecosystems. The paper highlights the thinking behind the framework and the nuances of this nexus represents part of the intended contribution of this paper, with a focus on smartness and real time. The development of resilience is a destination management function, and the strength of resilience can be used to develop confidence in the destination's ability to safeguard both its residents and visitors. The test of resilience is however, also demonstrated in the

capacity of the destination's response to crisis and disaster. For the sake of brevity, this article will highlight therefore those aspects of the framework that have greater emphasis on and resonance for response.

Resilience represents a function of an organization's situation awareness, identification and management of keystone vulnerabilities and adaptive capacity in a complex, dynamic and interconnected environment (McManus, 2008). Walker et al. (2004) take the view that resilience is "the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks". This macro-level viewpoint is necessary for the destination ecosystem as it broadens the scale to facilitate synergistic exchanges. Simultaneously, enabling technologies and innovation enhance knowledge and value co-creation (Buhalis et al., 2019; Polese et al., 2018) and strengthens the adaptive capacity required to respond during crisis/disaster.

Technology is not new to the field of Disaster Management or Tourism Crisis Management. Rather the field(s) are littered with references highlighting the importance, key developments and applications as well as future utility of, amongst others, horizontal scanning, Geographical Information Systems (GIS) and mapping and Early Warning Systems (EWS) (Paraskevas & Altinay, 2013; Yang et al., 2017). There has also been a greater focus on 'gamification' aspects in developing virtual scenarios for training and exercising purposes. In the response area, there have been increased discussion on the potentials for machine learning, enabling technologies and platforms to enhance planning, training and exercising. Additionally, notable advances in communication systems as well as greater propensity for the use of robotics and drones to aid disaster response and responders have been made (Al-Dahasha & Kulatunga, 2018). Technological advances and innovation remain intrinsic to the successful development of resilience in practice. The introduction and interactions between Smartness and Real Time components in destinations are conducive to technological adoption and innovation.

Two core elements are fundamental to Organizational Resilience, planning and adaptive capacity, and these must be embedded in all areas of the ecosystem to bolster the system's resilience (Lee et al., 2013). The success of the response to crisis/disaster builds on and is contingent on the strength of the planning/mitigation measures. RTR emerges as an innovative approach to Destination resilience, hinged on a smart, systems approach. This approach is not solely reliant on technology, but the capacity of the tourism destination ecosystem to facilitate real time decision making and action during crisis and disaster. A smart, systems approach is beneficial during crisis/disaster for the management and mitigation of impact within the complex ecosystem of tourism.

2. Resilience in Tourism: Context Setting

In the tourism domain, concepts of resilience are usually interpreted and associated with the protection and safeguarding of a tourism (eco) system from variables that have been internally or externally induced. Tourism is a system incorporating dynamic (potentially unstable) elements that constantly, and without warning, move from equipoise to chaos (Boavida-Portugal et al., 2017). Due to its socio-ecological nature, there has been a rising awareness among key researchers that the tourism industry remains increasingly vulnerable to the risks associated with disasters and crisis (Hall et al., 2018; Ritchie & Jiang, 2019) These risks are a concern for destinations, businesses and visitors as it impacts their visibility and experiences. Resilience has further permeated tourism studies, ranging from a focus on response management of tourism crisis and disasters to the mitigation of the risk to tourism caused by crisis and disaster (Faulkner, 2001; Ritchie, 2004; Ritchie & Jiang, 2019). Prayag (2018) furthermore argues that resilience thinking can – *if conceptualized effectively* - provide a better frame of reference to understand how systems like tourism destinations cope with adversity.

Destination resilience promotes a more strategic and integrated approach to handling crises and disasters (Hall et al., 2018; Lee et al., 2013; Parsons & Morley, 2017; Prayag, 2018). The advantage of strategic management is that it engages and encourages destination managers to adopt a long-term view with greater levels of planning, reassess their "if" thinking and engage in more proactive and intentional actions (Jiang et al., 2018; Scarpino & Gretzel, 2014). Destinations are central focal points around which tourist

activities coalesce (Fyall & Garrod, 2019). This introduces not only complexity but unforeseen challenges from a management point-of-view, especially the handling of crises and disasters in a timely manner. Destination resilience seeks to balance multiple interests and appreciates that within ecosystems stakeholders achieve greater benefits due to their shared goal, optimized by data value chains (Gretzel, Werthner, et al., 2015; Maheshwari & Janssen, 2014). The resilience of a destination includes the tourism industry, non-tourism sectors and the community (Amore et al., 2018). Tourism destinations need to identify and clarify the size, scale and timing of inherent vulnerabilities and to develop resilience strategies to mitigate and collectively cope with them (UNWTO, 2020).

Although the research of tourism and resilience is burgeoning, some elements, such as system-level thinking, that remain instrumental to the practical application of resilience concepts and require further development and attention from tourism scholars (Hall et al., 2018). A stronger focus on macro-level systems thinking, not only incorporates organizations, but also allows for the mapping of space and time as part of an effective resilience plan. Refining systems level thinking, in relation to destination resilience, is foundational to RTR. Amore et al. (2018), for example, emphasized a macro Multi-Layer Perspective (MLP) of destination resilience highlighting four (4) critical segments, namely: the operating landscape; the regime, the niche of the resident and non-resident population and the role of individual actors. Ritchie (2004) developed a Strategic Management Framework for Crisis and Disaster Management which also takes this wider viewpoint. However, while the authors outlined strategic implementation, there is a gap in relation to its applicability in practice. It is only through a clearer understanding of the systemic relationship between destinations and resilience that effective strategies and management can be achieved, and long-term sustainable development secured (Hall et al., 2018). Systems-level thinking on resilience allows us to consider the dynamic ‘multiscale’ interactions of complex networks, organizations and actors across the tourism space. Resilience identifies key perspectives and ways of thinking that propels resilience-compatible planning (Bhamra, 2015; Prayag, 2018; Quendler, 2015; Sellberg et al., 2018). The COVID19 pandemic has increased the search for industry wide consensus to

integrate resilience thinking into operational and decision-making settings within tourism industry. This is especially applicable in the response phase.

When viewed as an expanding eco-system, tourism systems involve rising cross-boundary interdependency of resources, governed by (hyper) complex networks of stakeholders and involved in the delivery of highly interconnected products, services and offerings (Gretzel, Werthner, et al., 2015; Howie, 2003). The tourism product, is an amalgamation of core products offered by organizations to tourists within a well-defined ecosystem (Millenium Ecosystem Assessment, 2005). These cross-boundary interactions offer substantial potential to employ new technologies to strengthen and sustain them (Polese et al., 2018). While physical boundaries exist, advances in technology present ongoing opportunities to fortify those weak interactions and foster the implementation of a smarter approach in the face of unprecedented crisis (Buhalis & Amaranggana, 2013; Yang et al., 2017; Yeoman & McMahon-Beattie, 2019). This thinking supports Smart Destinations in the RTR Framework (Buhalis and Amaranggana (2013) and Gretzel, Sigala, et al. (2015).

3. Smartness the path to Destination Resilience

3.1 Smartness Conceptualised

Smartness finds its non-human genesis, in the development of smart cities and that these cities emanate a degree of spatial intelligence and innovation through its dependence on embedded devices, real-time information and sensors (Komninos et al., 2013). The term “Smart” has become synonymous with the introduction of a technological shift founded in the desire to create a more efficient, safe, healthy and convenient environment (Figueiredo et al., 2020). This simplistic interchange of the term is narrow in its approach*, as smartness is more an approach than a shift*. The lack of common understanding further exacerbates the challenge among researchers and industry as there are varying approaches to the concept (Figueiredo et al., 2020; Townsend, 2014).

Smartness is interpretative lens where the end goal is to increase efficiency of a system through the use of resources and interconnectivity on which the system is built (Caputo et al. (2017). Buhalis (2015 n.p) presents the view that smartness is a framework to re-

engineer processes and data through honing the benefits of the interconnectivity and interoperability of integration technologies with the aim of produce innovation of procedures and systems to the benefit of all stakeholders. This begins to expand the scope of the concept provided by Figueiredo et al. (2020), to increasing efficiency within the framework of ecosystems and value cocreation (Boes et al., 2016; Gretzel, Werthner, et al., 2015). Smartness of tourism destinations requires interconnectivity of stakeholders enabled by technology, where big data is accessible in real-time (Buhalis & Amaranggana, 2013).

3.2 The Three I's of Smartness – Interoperability, Interconnectivity, Intelligence

For an ecosystem of smartness to be facilitated within a destination, three core principles are foundational and have been influenced by the IBM (2008) "Smarter planet". These are interoperability, interconnectedness and intelligence and are in part reflective of the rapid developments of the 21st century that inherently introduced new problems and challenges for governance including crime, informal settlements and traffic congestion (Harrison & Donnelly, 2011). These principles have been applied to the concept of smart destinations (Boes et al., 2016; Gretzel & Scarpino-Johns, 2018) and support the development of destination resilience through the RTR framework. The 3 I's of smartness demonstrate systems thinking and propel the formation of a smarter approach to harmonized ecosystems in order to enhance RTR and strengthen destination resilience.

3.2.1 Interoperability

Interoperability reflects the ability of heterogeneous systems, applications and data sharing processes to work together on elements ranging from the technical to organizational level (Gottschalk, 2009; Maciel et al., 2017; Maheshwari & Janssen, 2014). It is seen as a continuum ranging from compatibility to integration (Huemer et al. (2018). However, changes within one system can propel adaptation in the other which can, in some cases, be problematic. Loose integration (coupling) and the demonstration of mindfulness in interoperability settings can provide greater support as systems evolve (Huemer et al., 2018). Within loose coupled systems, independent elements are distinct or separate from one another, yet demonstrates proactivity and responsiveness allowing

it to maintain flexibility and stability in its response (Boley & Chang, 2007; Hein et al., 2018, July). Within the destination, loose coupling can safeguard the tourism ecosystem from the shocks that may impact one element of the system, allowing that element to retain their reactive flexibility to change outside the systems (Dini et al., 2008; Hein et al., 2018, July).

Relationships are constantly changing as individual organizations are no longer “independent” but exist within an ecosystem (da Silva Serapião Leal et al., 2019; Maheshwari & Janssen, 2014). Interoperability facilitates the ability of agencies to collaborate across both functional and jurisdictional borders. It provides organizational interoperability (Gottschalk, 2009) and places the tourism systems and stakeholders in a better position to support the identification of problems as well as select and prioritize decision-making (da Silva Serapião Leal et al., 2019). One of the challenges faced by tourism stakeholders is achieving standardization in alignment with industry best practices. This can serve as an insurmountable hurdle for many developing and emerging tourism entities and destinations. However, interoperability can facilitate greater access to information, resources, improve efficiency and enhance the decision-making processes across the destination ecosystem. Through the simplification of complexed unfamiliar workflows and dynamic inter-organizational relationships (Gottschalk, 2009), interoperability provides an viable alternative to standardization (Buhalis & Law, 2008). Within crisis and disasters more than anytime, the decision making process and knowledge sharing finds strength in this integration, as rapid response is key to the response required in emergency situations (CYVIZ, 2019). As destinations embark on new opportunities and participate in collaborative networks, interoperability becomes of greater importance.

3.2.2 Interconnectedness

Interoperability is hinged on the interconnectedness of both networks and processes, with the aim of facilitating both adaptation and co-creation (Buhalis & Foerste, 2015). The magnitude of the COVID-19 pandemic presented overwhelming challenges requiring

coordination across multiple stakeholders and jurisdictions in real time to respond the uncertain and dynamic environment. Greater system-wide interconnectedness is invaluable, as it supports fast-tracked responsiveness of tourism authorities and stakeholders. Data has become an indispensable tool within tourism and hospitality industries, supporting innovations, enabling cocreation, shaping the development of comprehensive business analysis and enhancing service experiences (Buhalis & Sinarta, 2019; Kabadayi et al., 2019). Interconnectedness supports the development of responsiveness during the management of crisis/disaster, leveraging data in real time.

With the rapid developments in the ICT space, there is a need for greater connectivity between the physical and the virtual spaces. With the progressive development of the web and technology-driven enterprises, increasingly, more smart objects and spaces are interconnected, communicating and propelling change (Buhalis et al., 2019). Interconnectedness is not solely about connecting with instrumented systems that connect us to the virtual space through public and private networks, but also logically connecting IT software used by various agencies (Harrison et al., 2010) and the wider ecosystem. These technologies provide the necessary infostructure for smartness to thrive, as interconnection supports seamless transitions between the physical and virtual interactions (Buhalis, 2020). Greater accessibility through ICT and the interconnectivity between ecosystems allows for the use of centralized coordination and provision of real time services which is advantageous to all stakeholders (Buhalis & Amaranggana, 2013). A crisis nerve centre can provide leaders with the structure and clarity to inform effective responses through the provision of an agile coordinated team where crucial organizational skills and capabilities are centralized (Kumar et al. (2020). This approach doesn't negate the fact that timely crisis response is primarily bottom-up and the local ecosystem is the first point of response (Miles & Shipway, 2020; Paraskevas & Altinay, 2013). It however adds another layer of capacity to support the local efforts. Interconnectedness provides the platform for the harmonization and seamless flow of information within a destination during crisis and disasters. It establishes avenues for added capacity to be developed through knowledge sharing and/or reallocating resources during a disaster. The ability to achieve this is contingent on and built upon the effective

horizontal and vertical coordination i.e. the interconnectedness of the ecosystem (Miles, 2016). Value must be demonstrated for the multiple players across the ecosystem and the pre-requisite for this is interconnectivity at the very minimum.

3.2.3 Intelligence

Intelligence is resultant from several variables working in harmony and represents the third element of smartness. The value and role of intelligence lies within the capacity and strength of the interconnectedness and interoperability of systems. These systems are not limited to technological, operational, or infrastructural systems but extends to the connecting these to human intelligence. The term intelligence has mutated from its ontological meaning “as the exclusive function of the human brain” to the understanding that intelligence is a result of a symbiotic relationship between the thinking centre (brain; human or non-human), body and environment (Voyatzaki, 2018).

The nature and uncertainty of the threats resultant from this anthropocene, requires a comprehensive intelligence-based picture of the threats pooled from multiple sources (CYVIZ, 2019). An intelligence engine can leverage information from interconnected networks to produce real-time insight on the operations of cities (IBM, 2008). This can fortify a destination’s resilience and responsive capacity, as intelligence helps in the sense-making of information at hand to provide contextually relevant information especially at the onset and during crisis/disasters. The movement towards big data, data analytics, predictive analytics and the automation of knowledge is fast advancing disaster and crisis planning and management (Alicke et al., 2017; Yang et al., 2017). Data representation and visualization as well as pattern-mining make big data a critical asset and supports more accurate decision making. This fosters innovative and intelligent methods to assist the monitoring and control within tourism systems (Komninos et al., 2013; Yang et al., 2017).

Spatial intelligence integrates human, collective and artificial intelligence (Komninos, 2018). It addresses the processes and systems that garner information, cognition, innovation, and intellectual resources from cities/organizations through collaboration and smart infrastructure seeking to address, through efficiency, challenges faced. Spatial

intelligence must be embedded and evidenced in any system wide approach to optimize independent systems and coordinate output in real time. Human intelligence provides the advantage of tapping into to the individual creativity and innovativeness of individuals (Komninos, 2008) and helps in the interpretation and understanding of cultural nuances within a given social context. Weick and Sutcliffe (2011) however, caution against the temptation to rely on past experiences while responding to current events as the assumption is inherently made that variables of both events are similar. This disallows persons to demonstrate mindfulness within the present context and respond to the present nuances.

During crisis, analysts are engaged in the investigation of vulnerabilities and incidents through exploration (CYVIZ, 2019). They can exchange data and can provide contextual relevance to information that may be provided from external partners. This, along with the strengths and skillsets of the team working in response to a given crisis/disaster produces collective intelligence. This is reliant on leveraging the interconnectedness and social capital within the ecosystem, its resources and learning, which increases innovation (Harrison et al., 2010; Komninos, 2018). Collective intelligence develops comprehensive approaches to shape models and solutions to multi-agent problems (Chmait et al., 2016). This systemic thinking demonstrates applicability within the multi-stakeholder ecosystem of tourism, where resources are not equal across the system. Artificial Intelligence on the other hand, seeks to optimize quality, efficiency, and flexibility of outputs through an intelligent system that gathers, learns and interprets information with contemporary intelligent systems being internet connected and interconnected (Curry, 2020). While AI integration is supportive at varying levels among destinations, the benefits within the context of crisis/disasters are many including the aggregation of data from multiple sources.

3.3 The Smart Systems

Smart systems cannot exist in isolation as elements and processes require support and human and technical input (Figueiredo et al., 2020). Human and Social capital is acknowledged through the literature, in addition to the knowledge base and creativity

needed. The capacity to innovate also highlights the non-technological side of smartness (Harrison et al., 2010; Komninos, 2006, 2008, 2018). There are five main elements presented by Boes et al. (2016) on smartness and are categorized as hard smartness describing technology and soft smartness classifying human capital, social capital, leadership and innovation. These elements help to shape the framework to support the strengthening of resilience.

3.3.1 Human Capital

Human capital refers to intellectual capacity, relational capital, creativity and innovation (Al-Nasrawi et al., 2017; Boes et al., 2016; Lombardi et al., 2012). The amalgamation of human capacity and ICT is what converts data into smart value propositions for stakeholders (Gretzel, Sigala, et al., 2015). The quality and diversity of human capital strengthens the collective intelligence of the ecosystem and sets the foundation for novel strategies required to shape the crisis response in the face of uncertainty. For effectiveness in the high-pressured crisis environment, these capacities must be exercised, and synergies developed prior to onset. This is core to the success of smart systems as they assists with the necessary interlinkages and cooperation needed for the entire ecosystem to function (Boes et al., 2016).

3.3.2 Social Capital

Social capital provides a useful framework to overcome the challenges associated with the fragmentation within the tourism industry, as it facilitates networks (Soulard et al., 2018). The connection between two or more parties that creates competitive advantage because of the relationship is known as social capital and two notable elements of this construct are group cohesion and brokerage (Arena & Uhl-Bien, 2016). Group cohesion refers to the quality of connection persons have with others in the same group. Brokerage is described as a bridge that connect groups with each other (Arena & Uhl-Bien, 2016). Where there is a lack of coordination, collaboration and cohesion around a shared purpose fragmentation is the outcome (Atzori, 2020; Filimonau & De Coteau, 2019). This has been an issue for destination ecosystems. Resilience within a destination underscores the utility of all stakeholders being involved to develop social capital (Amore et al., 2018). The absence of sound and responsible partnerships at the time disaster

strikes can result in unexpected delays and failures (Cahyanto et al., 2021) which reduces the response capacity.

The culture within a tourism eco-system is also part of its social capital. This along with the strength, strategic outlook of leadership and the collective knowledge harnessed provides the template for innovation to be birthed. Soulard et al. (2018) notes that within complex organizations, innovation appears to be both a social as well as technological phenomenon and the implication of social capital is greater when it comes to innovation. This represents an innovative approach and thinking, during unprecedented events as the trust and cohesion that exists among stakeholders plays a critical role. Garau-Vadell et al. (2018) note that within crisis, tourism destination managers must pivot approaches to mirror the needs of stakeholders. They should create opportunities to position the destination for sustainability and engender the long-term support from these stakeholders. Social capital complements the aforementioned concepts, serving to condense space within the ecosystem.

3.3.3 Innovation

Inherent in smart ecosystems is the capacity for learning and innovation, where communities play a fundamental role (Komninos, 2008) ultimately propelling smartness. The blend of both top down and bottom up initiatives characterizes innovation ecosystems and facilitate collaboration between stakeholders (Komninos et al., 2013). This is also key in the development of the social capital at the local level, which must be leveraged as part of the development of resilience and interconnectivity. Its application in tourism finds smartness being part of a toolkit to implement innovation which has become an asset to destination managers (Buhalis & Amaranggana, 2013). Innovation drives the creation of sustainable competitive advantage and must be connected to the ‘core competencies’ of a destination to facilitate success (Volgger et al., 2019).

Within the ecosystem of the destination, innovation has typically been focused on the systems to co-create value for the tourists and their experience. This has been fostered through the enabling of co-creation through access to real time information (Buhalis & Sinarta, 2019; Gretzel, Werthner, et al., 2015; Neuhofer et al., 2012). However, this can

be further expanded to the wider destination as part of the development of responsiveness during uncertainty. There is evidence of a strong structural interconnection between real and virtual components of a smart tourism destination and within such a complex system the dissemination of information and knowledge is key to the development of innovation and consensus (Del Chiappa & Baggio, 2015). This should emanate from strong leadership.

3.3.4 Leadership

Leadership is critical and must be responsive to the requirements of its operating environment within the digital ecosystem (Boley & Chang, 2007). This is not only confined to the digital space is applicable to the destination ecosystem. Strong leadership is necessary for dismantling cultural and political silos to facilitate the inclusive mindset required within a collaborative environment (CYVIZ, 2019) focused on co-creating value for ecosystem during crisis/disasters. Researchers have identified that for the effective management of disasters there is a need for greater cooperation within destinations despite the challenges due to the fragmented and hierarchical nature of private and public sector (Pennington-Gray et al., 2014). Leadership within crisis plays a critical role in the implementation of knowledge management strategies; this is hinged on proactive and visionary leadership (Paraskevas et al., 2013). While some governments have shifted to a more devolved model, strong local leadership is fundamental especially in crisis response (Pennington-Gray et al., 2014). Leadership styles, play a vital role in facilitating cooperation, as they have the capacity to influence the willingness of stakeholders to potential interoperation within a collaborative framework (Gottschalk, 2009) which is paramount for destination resilience.

3.3.5 Technology

Technology represents one component of the smart systems and remains an enabler for innovative solutions and strategies forming part of many crisis/disaster response strategies (Buhalis et al, 2019). Ambient ecosystems, synthesizing innovations and enabling technologies provide greater capacity to support business functions and maximize the development of intelligence through the collection and exchange of data and decision support systems (Buhalis & Leung, 2018; Gretzel, Sigala, et al., 2015). The

Internet of Things (IoT) is hinged on hardware, connectivity and the services and software that support intelligence of the systems so that the IoT framework is operational (Maciel et al., 2017). These reflect the hard smartness referred to by Boes et al. (2016).

The role of ICT and its rapid transformation in tourism over the last few years demonstrates the possibilities of smart strategies for destination management (Buonincontri & Micera, 2016). Digitization has created disruptions and have increased the speed, flexibility and accuracy in the delivery of services (Alicke et al., 2017). The advances in technology and smartness has proved advantageous in not only increasing efficiencies within the supply chain, but increasing the benefit from the synergies between the ubiquitous sensing technology and the social elements that underpin the experiences that is provided to tourists (Alicke et al., 2017; Buhalis & Amaranggana, 2013; Marine-Roig & Anton Clavé, 2015). Real time data management brings the ecosystem together, as resilience is developed through the mitigation of the impact during the response of a crisis/disaster.

4. Real Time Tourism Management

The access to real-time information is fundamental to the transformation to smart destinations (Buhalis & Sinarta, 2019) and the development of destination resilience. Real time is defined as “when time and distance vanish, when action and response are simultaneous” (McKenna, 1997, pg 5). It focuses on knowledge enabled business processes where interactions are guided by relentless speed, agility, scalability, technology and analytics resulting in real time responses (Leib, 2014; Malhotra, 2005). Delivering outcomes within real time, is promulgated by the expectation of immediacy relevance and access to information (Leib, 2014). This is more critical within the context of disasters. Immediacy, data-driven, contextually relevant, co-creation, customer-focused, delivery and interactions in both physical and online setting, as well as public/private engagement form key elements of real-time (Buhalis & Sinarta, 2019). A number of these characteristics are considered facilitators of *real time sharing*. Immediacy in Real Time Marketing (RTM) is described as the strategy and practice of immediate response to external events and triggers (Leib, 2014). These real time triggers stem from an expanding array of touchpoints and digital channels include breaking news, User

Generated Content (UGC), geo-tags/fencing and other sophisticated digital triggers (Al-Dahasha & Kulatunga, 2018; Buhalis & Sinarta, 2019; Leib, 2014). Real time data has demonstrated its importance as fundamental to the delivery of decisions especially within the dynamic context of crisis/disasters evidenced in the management of political, economic, natural and health crises (UN, 2015).

Real-time systems are reliant on the accuracy of both the analytical and time-based elements. They require a granular focus on both the accuracy of the information and the timeliness of the results. Real time operations must be executed within strict time constraints or risk system failure (Sonar & Lande, 2018). The advances in technology continue to develop with focus on efficiency and speed. Compression of time requires the acquisition and use of information based decision-making, initiating action, deployment of resources and ultimately innovation within time constraints (McKenna, 1997). This simultaneously accelerates the relationship between organizations and customers in co-creation and creates enormous opportunities for value creation (Sinarta & Buhalis, 2018).

4.1 Value Co-Creation & The 'Nowness' Framework

Engagement through r*eal-time co-creation propels the nowness service ecosystem*, (Buhalis & Sinarta, 2019). Nowness operates within the context data-driven information, real time co-creation and customer-centricity. These pool together to provide value to the end user through real time service enablers. Current application has been visible in the development of the concepts of smart destinations (Buhalis & Amaranggana, 2013) smart tourism (Gretzel, Sigala, et al., 2015) and smart hospitality (Buhalis & Leung, 2018). These enablers include Employee Empowerment & Operational Flexibility (Buhalis & Sinarta, 2019; Ritchie, 2004) Resilience Thinking and Data Reliant Strategies and Relevancy (Alicke et al., 2017; Migliorini et al., 2019; Yang et al., 2017).

The analysis of UGC is an important asset of both smartness and real time as it proves instrumental in the making of 'smarter' decisions at the policy and marketing level of a destination (Marine-Roig & Anton Clavé, 2015). This ecosystem informs the conceptual framework on Real time Resilience (RTR) as nowness, and real time forms a central part of the framework. The context of value co-creation extends to public service ecosystems and generates value by meeting the individual and social need in manner that provides

value for the society (Osborne et al., 2016). In times of crisis, the quality of the human capital (Biggs et al., 2015; Prayag et al., 2019) across all stakeholders on the strategic and executional (tactical) teams is fundamental to the response needed. Human analysis and responses are needed to address major incidents and provisions and to facilitate the anticipation, detection, response, recover and monitoring of threats (CYVIZ, 2019).

Within the context of disaster management, the conveyance of accurate information quickly is important as this minimizes the likelihood of damage (Uchida et al., 2015). The developments in technology along with the changing roles of individuals as co-creators require new approaches, tools and capabilities to inform the decision making processes under the unpredictable circumstances of a crisis or disaster (SeungSub et al., 2017). The distribution of information during disasters are typically centralized in the Command Centre and provides real time intelligence, enabling users in rapid decision making (Iserson, 2017). This has advantages for inter-agency and multi-sector collaboration and coordination during various crisis/disaster, as it provides the capacity for all stakeholders to have a common view and enables better decision making and deployment of resources (Harrison & Donnelly, 2011). Real time network supervision is an advantage of the smart system interconnectivity. It has the potential to strengthen relationships between various industry players and necessitates a high degree of stakeholder collaboration (Sajhau, 2017).

Integrating smartness and real time management, as part of the destination resilience infrastructure, creates a dynamic responsive mechanism for crises and disasters. Value also extends to the provision of real time information to visitors who are within hostile environments i.e. in unfamiliar territories, cultures, languages and may not be familiar with the resources available while they visit these destinations (Buhalis et al., 2019).

5. Real Time Response for tourism

Real Time Response (RTR) leverages a smart systems approach, using technology, data, and paradoxical thinking within the context of immediacy, to advance the adaptive response capacity of systems to crisis and disaster. Immediacy connotes real-time which

highlights nowness, and the value extracted and analyzed from a data infostructure to support decision making. RTR is positioned as part and an outcome of the Smart Ecosystem allowing all relevant actors to benefit from a diverse yet interconnected network of data, people and processes during crisis/disaster. A smart systems approach enhances the ability to respond, and quickly pivot strategies and actions, during crisis and disaster. RTR aims to minimize disruption, damage, discontinuity, chaotic turbulence and reduce the recovery time following a disaster.

This conceptual framework presents the opportunity for the integration of a smart system through the 3 I's of Smartness. It is supported by real time enablers and collaboration to bolster the decision-making systems during a crisis or disaster that creates value for all stakeholders (See Figure 1). It integrates the concept of real time to condense the variables of time and space during disasters and aggregates information for effective decision making. The framework represents and integration of a systems thinking approach to destination management through the optimization smartness and real time.

Smart systems are not contingent on *sophisticated* technology but uses technology as an enabler of real time big data integration; as a communication platform; and as methodology for inclusive participation within the ecosystem.

Multiple perspectives and key principles are integrated from fields where these concepts were prevalent, including: Network Management, Information Communication Technology (ICT), Computing, Electrical and Electronic Engineering, Supply Chain Management, Built Environment, High Reliability Organizations and Real Time Marketing. A critical assessment was done on the basis of understanding the foundations of the core areas (Paré et al., 2015) in relation to Destination Resilience and focused on a level of conceptual innovation (Grant & Booth, 2009). Primary documents of key tourism stakeholders, such as: The United Nations World Organizations (UNWTO), WTTC, World Health Organization (WHO) and reports generated by other stakeholders including McKinsey were consulted in the conceptualisation.

The conceptual RTR framework provides a systems-based approach which focuses on empowerment and creating an *enabling environment* for seamless operations while

highlighting the *input* needed to actualize the desired *outputs*. RTR builds on the "Real Time Co-creation and Nowness Ecosystem" (Buhalis & Sinarta, 2019). The 3 I's of Smartness set the foundational thinking for the application of the conceptual framework and serves as the connecting principles. While smartness is not new to the operations within destinations, integrating it with real time within the context of crisis and disasters provides a disruptive opportunity for innovation. Real time can only be generated through smart technology, enabled synergies between information providers (industry partners, permanent and temporary residents etc.) and decision makers. The aim is to enable resilience in response to mitigate the extent of the impact. The smart systems approach sets the platform for efficiency and ensuring optimal performance through collaborative and established synergies within teams. It demonstrates the importance of leadership, social and human capital in response to the in the crisis/disaster. These teams possess the intellectual capacity, innovation and resourcefulness to facilitate the kind of thinking and responsiveness during the hyper complexity of crisis/disasters identifying not only 'what is' but could 'possibly be' (Paraskevas & Altinay, 2013). Strong leadership that possesses strategic foresight, management capabilities and an inclusive mind-set, is important to facilitating co-creation among fast paced disparate (response) teams typical within inter-agency and public-private partnerships (CYVIZ, 2019). The success of the adaptive capacity within the response strategy is predicated on the quality of planning prior to the onset of an event. The desired synergy is built on *Smart Systems*, principles of *Organizational Resilience*, a comprehensive *Data Infostructure*, *Real Time Enablers*, hyper-sensitivity to *Real time triggers*, *Real sharing systems* and *partnerships* to enable collaboration and monitoring.

Real Time Enablers are key for making informed decisions in a multi-stakeholder environment in the face of potential threats during a crisis. Team members at both the local and national level need to be empowered to act in the moment and have access to the necessary technology and tools to visualize and analyse cyber intelligence in real time to facilitate the required response (CYVIZ, 2019; Leib, 2014). Any inordinate delays in the system operations, access to information or approvals delays may be detrimental to the effectiveness of response operations.

For real time to be actualized the development of the enabling environment is paramount. *Employee Empowerment and Operational Flexibility* emerged from real time marketing and the development of adaptive resilience (Leib, 2014; Pal et al., 2014). The absence of these elements results in a rigid approach to the problem, disproportionately focused on procedure and the leadership hierarchy to respond (Weick & Sutcliffe, 2015). Additionally, a culture of blame, rather than the confidence to quickly evaluate and respond to unpredictable disruption has been evidenced (Burnard et al., 2018). These are the antithesis of the responsiveness required during uncertainty as decisions can be made on the frontline to mitigate the impact. The system must empower the frontline to co-create responses in real-time.

Data Reliant Strategies provide the foresight to responsiveness and must be the driving force behind decision making. The wider systems infrastructure must be in place to facilitate the provision of data, including data mining and the necessary technical capabilities to ensure relevancy of the data being mined. *Resilience Thinking* represents a macro approach and provides a perspective to understand how systems cope with adversity (Prayag 2018). This becomes important as it is a facilitator and is interwoven into the policies and decision making at all levels of the ecosystem; a lack of understanding could present hurdles to decision making. The capacity for *creative decision making* must be present as an enabler, as the nuances presented by the uncertainty of crisis and requires diverse approaches, creativity and creative compromise (Denyer, 2017). There are several elements that serve as situational pulses of the internal and external state of a destination and serve as a source of real time information that sets off an alarm. These are referred to as real time triggers and serve to bring awareness and a ‘snapshot’ of the current state of a matter, that may or may not be in the crosshairs of the authorities.

TABLE 1: REAL TIME TRIGGERS DURING CRISIS & DISASTER

REAL TIME TRIGGERS	DESCRIPTION
User-Generated Content	Local and temporary citizens often share content of their social about accidents, incidents they encounter. These platforms have enabled citizen journalism and allow for the real time sharing and re-sharing of content and can become viral in minutes., this is proliferated during crisis and disasters, and often picked up by media houses.
Location/geolocation & geo-fencing	Smart devices allow for the provision of geographically relevant content, which registers a metadata based on specific locations at the time an individual visits. Geo-fencing is critical to understand contextual factors in real-time and trigger real-time response. It can also be used for push notifications of special geo and time-based notifications in times of crisis/disaster.
Sentiment	Consumers share positive or negative opinions, emotions and feelings in social media. This can surround the rate of responsiveness to a crisis or disaster communicating to tourism managers and other stakeholders' information they may or may not be aware of.
Keywords	Leveraging keywords by tracking locations or key attributes can also assist destinations to engage with stakeholders and to capture opportunities to respond while co-create value during the disaster.
Mention Tags	When persons mention or tag organizations, they want to engage with or bring awareness to a matter. This is to share experiences or feelings, ask assistance or information, complain, or simply engage the brands. Acknowledging, responding and supporting are critical to support customers, maintain engagement and improve experience.
Hashtags	Hashtags track particular topics for specific conversations. Hashtag tracking is used to track particular event. This is usually linked to the nature of the event and the message to be communicated. In unpredictable crisis, these hashtags are generated by ordinary people and can be picked up by others tracking or sharing content regarding the same event. #HurricaneEta #COVID19Ja #LondonBridgeAttack #AustralianBushFires
Breaking news or events	Break news Incidents may change the context dramatically and therefore they must be served through real-time interaction. Real-time monitoring of news assist brands to update stakeholders by providing reliable information. This may include severe weather, natural disasters, earthquakes, storms, strikes, political unrests, violence outbreaks, accidents, terrorism attacks and other crises and unpredicted eventualities. Real-time knowledge about a particular crisis or negative situation may be critical for customer safety and also for the decision whether to travel to a destination or not. Engaging with real time, accurate and reliable information is critical in a crisis situation.
Anomalies	This category accounts for elements that are not consistent with the pattern of expected behaviour within the system or are usual occurrences. These are noticed while they can be traced and isolated (Weick and Sutcliffe; 2007)

Source: Adapted from Buhalis and Sinarta (2019)

The Data Infostructure represents all the instrumented ways that data can be obtained regarding impending or live events within the destination through data mining. The advances in technology have shattered barriers enhancing the ways data can be

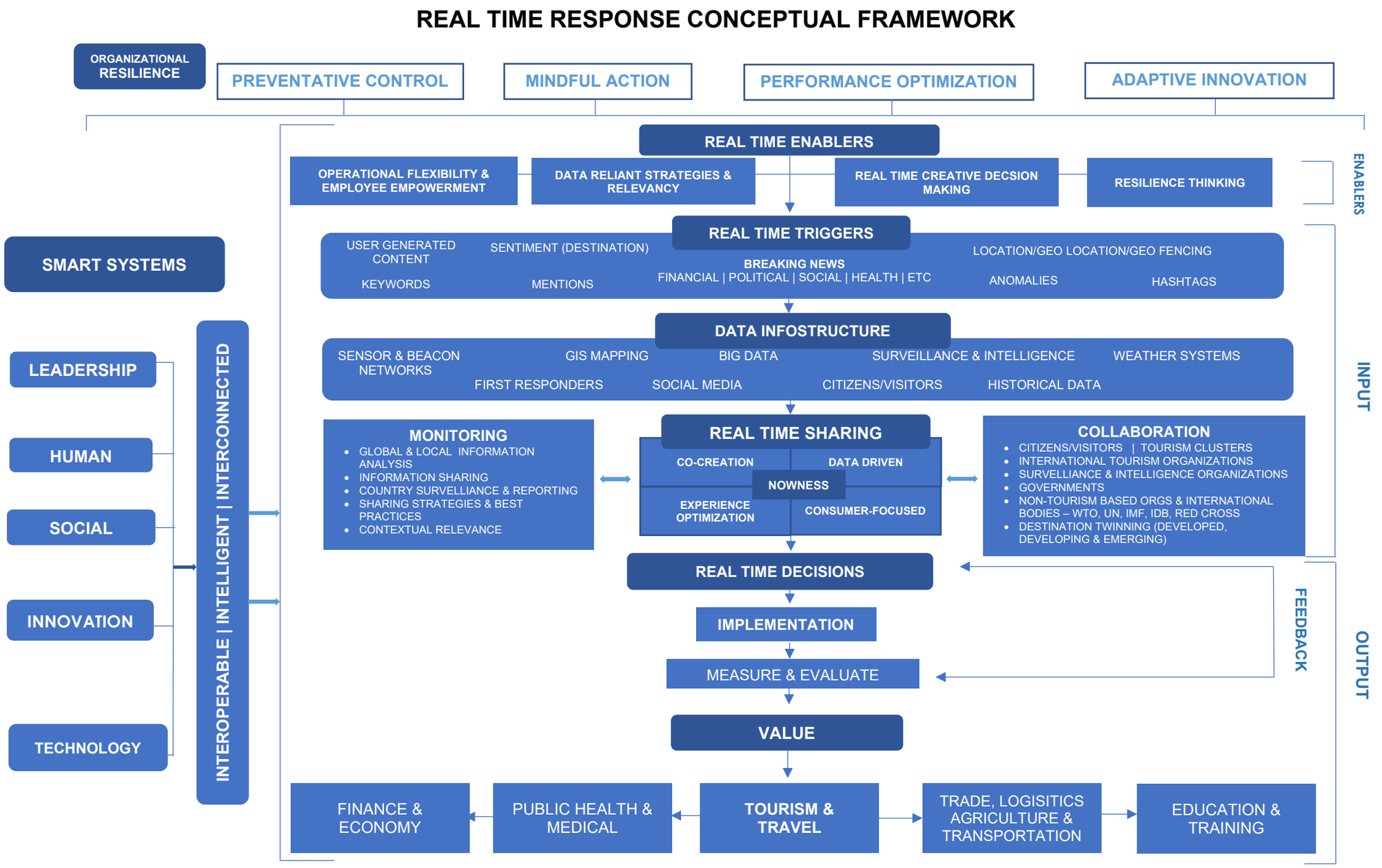

FIGURE 1. Real Time Response Conceptual Framework

obtained. Access to a myriad of options enables the creation of the most accurate situational awareness of the events as they unfold. This includes smartphones, big data GPS trajectories data, and location-based online social networking data etc. sensors, GIS mapping, weather systems as well as live feedback from first responders, citizens, and visitors (Kabadayi et al., 2019; Zhang et al., 2019 Fig 1). This instrumented space feeds into the wider interconnectedness of the ecosystem and supplies decision makers and tourism managers with the tools to identify and assess risk through the core infrastructure operating/sensor data. This then facilitates their ability forecast and support its stakeholders and visitors through geo-locations from smartphone or social media data (Yang et al., 2017).

Real Time Sharing, Monitoring and Collaboration feeds into the real time sharing and across borders allows destinations to capitalize on the extent of cyber intelligence from analysis and monitoring of security threats and dark web interactions (CYVIZ, 2019). This stands to position the destination in a greater place of readiness to disseminate data through *real time sharing* which is centred on the concept of nowness (Buhalis & Sinarta, 2019). The need for collaboration, through coordination, planning and adaptation is critical to effectively combat climate vulnerabilities (Mackay & Spencer, 2017). Within the RTR framework, purposeful clustering is encouraged i.e. bringing resources into proximity and the importance of principles of tight feedback, in-built counter mechanisms etc as part of the tools needed to create effective systemic resilience (Zolli & Healy, 2012). Knowledge sharing within the interconnected space builds adaptive capacity which is core to resilience building and effective disaster response.

As a facilitator of resilience, the RTR framework is reliant on the function of other elements of the system to produce value for all tourism stakeholders. The output of value is contingent on the systems in place to facilitate real time *measurement and evaluation* of decisions made and the creation of seamless *feedback* loops to make the necessary adjustments and updates. This real time feedback allows tourism managers to demonstrate responsiveness with the aim of minimizing the impact on lives and livelihood. Historically value creation has been explored through the primary context of customer and the organization (Buhalis & Foerste, 2015; Buhalis et al.,

2019; Prahalad & Ramaswamy, 2004). However, co-creation of value is also relevant when considering the development of a response to unprecedented and unpredictable crisis and disasters. The IIRC (2016, in Iacuzzi et al., 2020) describes value creation "…as the increase or transformation caused by an organization's activities and outputs to private and public assets, that is the organisation's and its stakeholders' capitals." Value co-creation within this context refers to the ability of tourism stakeholders to safeguard the shared interest of the sector, through real time information and resource sharing empowering the (shared/collective/partnered) response to imminent threat posed by crisis/disaster. Value can be realized within local tourism clusters, enhancing the localized response and capacity while strengthening the both the industry and national efforts. This is especially valuable within tourism dependent destinations where tourism is a major contributor to GDP. This will be developed as part of the future research from this larger research project.

6. Concluding on the benefits of Real Time Response in Tourism

The future of tourism is moving faster than the strategic direction of some destinations. Capitalizing on the possibilities and benefits provided by a smart systems approach can create immense value for all stakeholders while undertaking disaster response and thereby facilitating the ultimate goal of enhancing destination resilience in the face crises and disasters. In a constantly changing environment, the implementation of the RTR framework stands to provide benefits not only for the management of the tourism industry and destinations, but for tourists themselves through the provision provide safety and assurance during unprecedented times of crisis and disaster. Big data analytics can contribute to the development of not only smart marketing but policy decision making (Marine-Roig & Anton Clavé, 2015) and one of the benefits of the RTR is information and knowledge sharing across geographic locations and industries. The intelligence gleaned by data analysis in one sector of tourism, a supporting sector or region can be shared across borders and sub nationally to action strategies in response to pending or real threats.

The interdependencies of systems at both the international and subnational levels make the risks observed in today's world more detrimental. They are systemic, unpredictable fast-paced and with high costs for recovery; consequently, new

approaches must be sought to not only mitigate but crafting an effective response mechanism in the wake of disaster. Tourism managers must become the eye in the storm strengthening the ecosystem through effective and adaptive leadership that will facilitate accurate and speedy decisions even when faced with uncertain conditions. There must be a tactical and strategic approach in response to crisis and disaster. Contextual knowledge can add greater value to situational awareness especially when exploring innovative problem solving within a crisis. This is hinged on an integration and enhancing interconnectivity across borders. The RTR framework also provides a comprehensive approach for developing countries and emerging destinations to strengthen resilience. The framework does not only focus on the technological advances of Hard Smartness but places a balanced focus on the Soft Smartness. It also provides response while providing practical research to governments and industry (Ritchie & Jiang, 2019).

The recovery time and costs for destinations post crisis/disaster is usually influenced by the mitigating impact of speedy and effective disaster response. Hence the smarter the disaster response will be, will also have implications for later recovery. The adoption of smart approaches that seek to enhance responsiveness, robustness, redundancy, and resourcefulness of systems can thus have a role to play. It is therefore important to understand and further refine the applications of smart systems and the 3 I's of smartness which connects the destination ecosystem, providing real time information sharing to enable decision-making to occur effectively. The smart systems approach seeks to facilitate local collaboration development of clusters to help mitigate against the debilitating impact associated with crisis and disasters.

Tourism destinations play an integral role to supporting the livelihood of many communities. Its sustainability is paramount which is why resilience must be safeguarded without leaving any destination behind by bringing synergy to the approach of response through optimizing the efficiency of the entire tourism system at all levels. A destination's capacity to response to uncertainty is a litmus test of its resilience. This framework contributes to the emerging body of work in Destination resilience and Tourism Crisis and Disaster Management focusing on strengthening these areas through the use of a smart systems approach. COVID-19 has provided a catalyst and exposed existing weaknesses in the level of resilience within destinations.

These issues can be addressed in part through digitization and innovation (UNWTO, 2020) but stakeholders must further refine how these agendas may further influence disaster response. This requires a long-term strategic perspective hinged on inclusive participation and greater synergies in communication to respond to the trans-boundary nature of crisis (Lagadec, 2009). RTR is a strategic approach that can improve disaster response, particularly through smarter coordination of stakeholders, that will ultimately assist in minimizing the impacts of crises and disasters while simultaneously contributing to the pursuit of greater resilience overall.

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