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Paradigm of technological convergence and digital transformation: The challenges of CH sectors in the global COVID-19 pandemic and commencing resilience-based structure for the post-COVID-19 era

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ABSTRACT

Technology and digitalization are vital for helping organizations to survive in the competitive marketplace. The global COVID-19 pandemic has fixed attention on the cultural heritage sectors. This study presents technological convergence and new digital platforms that require business societies to transform into new sustainable meanings. The concept of technological convergence to the autonomous ecosystem is supported by cutting-edge technologies, a distinctive life cycle for value-added creation. This study is based on a five-part conceptual context to examine the impact of pandemic on the cultural heritage sectors. The major impacts like institutional issues, financial limitations, data access policies, and stakeholders diverging views are fully addressed. An additional impression of this study is that it has comprehensively expressed the opportunities and capabilities of technological convergence in terms of competence, integration, impound and novelty for higher value creation most related to the cultural heritage sectors in the current and post COVID-19 pandemic era.

1. Introduction

Since the world is at the beginning of a hyper-connected culture, distracting innovations are transforming the corporate business atmosphere into continuous digital transformation (Cappiello, 2020). The global societies will familiarize themselves with the technology revolution while the present business's structures, processes, models, services, and values will be switched to entirely new ones (Presenza and Petrizzelli, 2019). The global pandemic of COVID-19 has created disapproving circumstances and the organizational network is changing absolutely. The pandemic has a great impact on several small and medium-size organizations that are trying to discover new business strategies for the ensuing time (Seetharaman, 2020). From the aspect of market constancy, the most significant factor is not a financial risk, but the degree of uncertainty (Altig et al., 2020). Due to the involvement of critical factors like relentless innovations, societal tensions, and the global contagion emergency, the business atmosphere is becoming denser (Verma and Gustafsson, 2020). At present, Indian and Chinese marketplaces have successfully established their local-based trades, and their dependence on international trade has reduced considerably (Ali et al., 2020). The rate of geopolitical division has so intensely speeded that it has progressively disturbed the logistic network and supply system. Hence there exists a significant degree of uncertainty in the global marketplaces (Govindan et al., 2020). The provision of a novel context for working and the applications of digital transformation in the pandemic situation has developed various opportunities in which some countries have already incorporated advanced digital technologies for surveillance, analysis, and quarantine (Brigo et al., 2020). With both short and long term perspective, a technology revolution has been established by introducing digital technologies like online trading, blockchain, internet of things (IoT), 5G, digital currencies, cloud computing, artificial intelligence (AI), e-Agriculture, serverless computing, 3D printing, industry 4.0, quantum computing, machine learning, natural language processing, lager data analysis, robotics, virtual and augmented reality (Lee and Trimi, 2020). The disruptive business models are not only shifting the mode of organizations function but they also deliver value chain to the consumers with advanced opportunities and problem solutions especially in the post-COVID-19 pandemic domain (Vanapalli et al., 2020). Presently, the exceptional contagion crisis is encouraging many business societies to create digital platforms to find out innovative solutions to such issues as the restricted testing and treatment capability for checking the infection from spreading and the unavailability of medicines and domestic materials due to supply network (Akpan et al., 2020). Today, innovation is depending on the merging of apparently dissimilar and distinct things which may produce a positive outcome (Dirani et al., 2020). The author of this work presents
how technological convergence and innovation can establish a framework for organizational sustainability based on sustainable innovations in a highly disruptive atmosphere. The main characteristic of technological convergence and innovation is based on the ecosystem which allows transforming the necessary actions by scanning the digital information with the help of machine learning, the internet of things, or big data (Serrano et al., 2020). The COVID-19 pandemic extends a reproving role that technological convergence and innovation can play in terms of emergency controlling related to economic, and social lockdowns. This study is based on the contributions of both theory and exercise of innovation. For highlighting the innovation concept, new ideas of technological convergence and innovation and its interactions with other sustainable approaches are briefly discussed. The novelty of this work makes it more productive because it highlights new comprehensions for organizational agility over technological convergence and innovation as a reasonable aptitude in the era of digital transformation.

1.1. Theoretical background of technological convergence and innovation

Technological convergence and innovations are based on the significant process for explaining the nature of existing technological advancement to improve the values of life (Sun et al., 2020). Technological innovation has initially brought a major transformation in different spheres like automobiles, computers, semiconductors, PC manufacturing, medical healthcare facilities, and telecommunication through digital convergences. However, making permanent investments in inadequate technology can extremely drop the competitive status rapidly (Hynes et al., 2020). Accordingly, once the new transformation is being functioned, a stable time of processing would overcome by new advancements, and transformations will deliver significant insights for the future and will be more superior as compared to previous ones (Zeng et al., 2020). The technological revolution was most exclusive about the industrial revolution (agriculture, energy, metallurgy, textiles, chemicals, and transportations) because it was the merger of technology with industry. However, over time, the frequency of some of the driving factors such as speed, frequency, the impact of such factors appeared to speed up as well (Oztemel and Gursev, 2020). Innovation makes it possible to explore the effective sources of approaches and elements like establishing a cross-discipline innovation team, associating innovation with business objectives, and framework for managing planning which help to increase the output for the organization and its patrons (Szopinski et al., 2020). At present, the speed of technological advancement has changed very quickly. It gives the impression like there is a first-hand innovation made approximately every day. Some impressive technological innovations that have changed our lives and made new businesses include Practical Augmented Reality (PAR), Generative Adversarial Networks (GANs), Chatbots, and the latest technological advancement to handle the COVID-19 pandemic outbreak and its disasters (Korkmaz and Toraman, 2020).

1.1.1. Digital transformation and innovation

Considering the basic three meanings of “digital” namely, the organizational, the strategic, and the innovation, the leading digital transformation and innovation deliver a broad suite of implements. The concept of the fourth industrial revolution has extended all over the world and has been incorporated as a source of viable innovation by most organizations and consider identical to digital transformation (Kagmann, 2015). However, digital transformation is based on the integration of digital technologies into all extents of business activities which will deliver ultimate changes to how organizations work and supply value to consumers. Digital transformation is a social change that involves organizations frequently experiment with the status of existing systems and get contented with failure (Correani et al., 2020). There are several reasons, but by far, the most probable is that they have a survival issue. On the other hand, in the outbreak of the pandemic, an organization can ensure the supply chain values and shifting customer prospects are the additional critical considerations (Purell and Charles, 2020). Recently, digital transformation has facilitated the improvement of artificial intelligence and Machine Learning Powering, Blockchain beyond Crypto, XaaS, ACPC Heats Up, and Driverless Cars, Drones, and Smart Cities. These advances have not only empowered the design of ambient intellect but also the paradigm of digital trends (Kaur et al., 2020). Digital transformation has speeded through business areas and helped organizations to increase productivity and reduce costs, explore new ways of business opportunities, agility, and dynamic capabilities for sustainability in the era of urgency. Speed and compliance are important aspects of controlling disastrous conditions. It depends upon the responses like an organization’s top-down communication, how effective is the organization’s bottom-up communication, and how synchronized is the implementation, which will frequently define who is suitable to survive. If a specific culture lacks those virtues, no technology will benefit them to continue and survive. Digital transformation is best suited for strengthening culture. Its main advantage is to ensure to do more with less, reduce delivery sequences, and time to market. The important event of early 2020 is the COVID-19 pandemic outbreak. Being an extremely unpredictable event that has a life-threatening impact and its adverse effect on our daily lives and business set-ups is increasing and affecting new people and new businesses, companies, enterprises each day.

1.2. Practical implications of technological convergence and innovation practice

1.2.1. Exemplary process & innovation models of different generations

Innovation practice today shows that innovation is covering the range of practical applications of new knowledge. Considering the technology convergence concepts, businesses have established different innovation models to normalize their innovative strategies. Due to the huge number of literature on innovation models and processes, the exemplary process models are considering a successful tool for innovation (Pieroni et al., 2019). The COVID-19 crisis will subsidize to create new business models, that will enhance the CH sector’s chances of existence into a much more sustainable arrangement. These theoretically based process models as shown in Fig. 1 take a wide-ranging perception in analyzing the innovation process. For instance, six different generations of innovation models are:

1.2.1.1. Black Box model – 1st generation. This model is the first endeavour to take in technological development in the economic
calculation. It takes up that the innovation practice itself is not significant but the only inputs and outputs are the points of interest. The model was accepted by the US military and developed by NASA in 1960. Since the model was engineering-driven, hence its major benefits helped the technological processes to reduce technical uncertainty. The only shortcoming of this model was that its impact was limited to the development stage and not with the whole innovation process.

1.2.1.2. Linear model – 2nd generation. The linear model is based on the inaugural of the black-box model and concentrating on new technologies using a sequence of the step-by-step process. This model was reproduced on the science-based innovations related to technological progress which further discover new processes and products for supplementary market and research. This model was accepted as a management tool by numerous large-scale firms such as Northern Telecom, IBM, and American multinational conglomerate corporation (3 M-Mining and Manufacturing Company).

1.2.1.3. Interactive model – 3rd generation. The model is based on the shortcoming of previous models regarding science, technology, and marketplaces. The model was combined with the first and second generations models into a wide-ranging model of convergence innovation.

The model was based on the principle that innovation is not the output of a final stage of actions but can take place throughout the innovation process. Still, this model fails to specify the dynamic forces for the innovation process. For instance, some firms are good at innovation than others and have a better prestige for the triumph of innovation. An extensive approach was used by several famous corporations, including Ford, General Motors, Motorola, Intel, and Hewlett Packard.

1.2.1.4. System model – 4th generation. This model provides a better understanding and an in-depth explanation of all the features of the innovation process. It helps to provide a new gaze at innovation as a process, segmented into distinct steps and each of them works together with the others.

1.2.1.5. Evolutionary model – 5th generation. This model aimed to explore opportunities to contest the main shortcoming of preceding models which were recognized as failures in archaeological economics and weak explanatory influence of the mechanical allegory accepted in orthodox economic discerning for innovation dynamics. The model uses the key functions as the external environment such that market structures, standards, and regulations, and patent systems accordingly.

Fig. 2. Strategic progress of micro-and macro-models of open innovation.

Fig. 3. Key elements of technological convergence.
In today’s hypercompetitive setting, organizations need continuous change. The organization’s strategic orientation requires self-motivated agility, flexible adaptability, and a high notch of dynamic capabilities. To construct such a dynamic structure and understand the future of global markets in the 21st century, a market-based perception is necessary. Therefore, the challenge is to bring together the need for ongoing sustainability with constant flexibility in terms of how to effectively change the technological and organizational strategies into hypercompetitive-based businesses (Pandl et al., 2020). The main objective of technological convergence innovation is to support such organizational effectiveness. In Fig. 3, the structure of the technological ecosystem convergence is presented as a web of a spider comprising of several elements and stages. The elements of each stage perform definite functions by connecting, coordinating with each stage to create certain opportunities for gaining innovation consequence. The first stage of the structure is the early stage of the technology process in which the initial ideas of convergence are shaped. The composed data are transferred for big data analytics and the related information is forwarded to the self-governing decision-making system using sustained digital technologies, IoT, and machine learning (Douze et al., 2020). These innovative and subsystem ideas are further shifted to the second stage. The ideas are further processed and evaluated by specific team leaders. During the third stage, based on the subsystems categories, the knowledge convergence is transferred into a new technological combination. In stage four, the transition of technological convergence is performed by combining new technologies and introducing those which were not familiar to the customers before. Stage five indicates the transition of technological convergence into new value creation through applications. Some complex issues are reviewed and forwarded to stage six. Here the internal factors and their influence on the organizations’ efforts to find new technology fields are analyzed. This stage is more effective because here alternative solutions are suggested that can change the broad picture of the innovative progression. Stage seven has a particular platform, where the business tries to co-create common objectives with prominent customers, community, and society at large. Major decisions at this platform include setting priorities related to the above-mentioned entities (Luo et al., 2012). However, the influence of some of the external factors like customer recommendations for innovative product improvement and previously existing products are examined in stage eight. These recommendations help to create new technologies in a given market especially when an existing company announces an emergent technology. The final stage is the ecosystem from which the drive of innovation transits forward to the other stages for implementation. Since value creation is the preferred goal of any organization, hence for the interest of all stakeholders, the vital goal of innovation can be much more motivating. This goal should be treated as a role model for creating a smart future for organizations and societies (Benitez et al., 2020).

1.2.4. Development of a digitized cultural heritage model for sustainability promotion

Concerning the case of cultural heritage, the use of VR/AR technology in historical and museum settings creates a source of information for the visitors in new and exciting ways. There has been a paradigm from a traditional type of practice related to galleries and museum centers. There is a rise in the volume of visitors who search for the voyage, archaeology, culture, history, and dealings with local people due to the adaptation of technology convergence (Psomadaki et al., 2019). Tourism is significant for many reasons; it has an optimistic cost-effective and public impact, launching and strengthening characteristics by helping the CH. Sustainable use of digitized CH resources in the practice of informative and entertaining developments is strictly related to
sustainable tourism. Fig. 4 some of the significant components, features, and responsibilities necessary for the development of a digitized CH vibrant model (Nishanbaev, 2020). The model has a wide range of applications in the tourism sphere. From a topographical point of view, cultural heritage tourism is essential to flows in a 3D system connecting the origin and destination while influencing these destinations and encouraging the tourism sector. One of the benefits of this model is related the forecasting tourism activities which needs reliable data. Furthermore, the lack of data makes it challenging to estimate tourism from a systematic point of view. The forecasting structural models make it easy to describe how modifications in the nearby environment, culture and society upset tourism.

2. Methodological approach on the curve of innovation in different transition

Technology convergence and innovation is a unique process and has a definite life cycle. The paradigm of digital transformation for famous global companies like Blockbuster, Sharp, Blackberry, Nokia, and Kodak witnessed in the processes of innovation. Due to this rapid paradigm, the convergence innovation life-cycle has turned shorter. Normally, the innovation life-cycle bears a resemblance to the S-Curve of technology. In the start, the need for new-fangled knowledge for emerging technology is established. However, most of the innovative designs, developments, charters, and process models ought not to qualify this stage. A fruitful convergence innovation would have an S-Curve as presented in Fig. 5a.

When the innovation process is started, the values of returns upsurge progressively up to a mature stage of technology which is usually the harvesting shift of innovation where the returns start to reduce up to the top of the curve (Lin and Zhu, 2019). A progressive business must have a practical plan for constant invention. Once the first innovation reaches its highest point, it may take off the following process by learning the lesson learned from preceding developments as shown in Fig. 4b. In this illustration, effort in terms of time and money are represented at X-axis while the performance improvement terms of value-added chain capability, new marketplaces, or new business models are presented at Y-axis respectively. It is noticeable that the S-Curves in the age of digital transformation will be dissimilar to the uninterrupted innovation as shown in Fig. 5a & b. Convergence innovation will normally have smaller S-Curves while the succeeding S-Curve will jump from the upper point than the top of the preceding curve. Furthermore, the transition contour from the top of the preceding S-Curve to the early point of the succeeding S-Curve would be sharp, as in the case of technological shift and improvement (Ardabili et al., 2019). Here, the new starting points of succeeding S-Curves will be governed by the environment of technology convergence and involvement. The distinctive S-Curves of convergence innovation for an effective organization in the age of digital transformation are presented in Fig. 5c.

3. Opportunities of COVID-19 on the cultural heritage: The rise of digitized platforms

Cultural heritage institutions were harshly affected by the outbreak of the world pandemic since many had to stopover their activities while trying to succeed with the new challenges. These institutions had to explore new ways to reach their audience and increase their business by organizing cultural events online. For instance, theatres and cinemas organized online shows, music centenaries were broadcasting live on the Internet, operas and visual arts openings were organized on social media and ZOOM calls, all wishing to continue with their social activities and continue operating on a normal basis. Particularly museums observed a greater than 45% increase in virtual visits and increased their online presence by 85% throughout the lockdown, contributing to more social media collaborations. However, museum studies have confirmed that the digital consent of cultural heritage is still a significant concern in the online museum domain. European Network of Cultural Administration Training Centers (ENCATC) has seriously taken the need to sustain robust networks to deliver the intellectual interface and innovation for better society merit. Canada’s Culture Days have shifted to create digital events to keep up their network engaged. This has allowed the organization to grow its audience (Koliopoulos et al., 2020). The organization has provided various digital links to freely perform digital events. Softy and YouTube have launched formal Artist Channels designed based on a
one-stop-shop to help artists from around the world to participate with their fans acting from their homes.

4. Technological convergence and innovation for managing the COVID-19 epidemic

One of the most crucial steps to manage the epidemic of COVID-19 is to restore effective activities. These activities are the key elements of convergence innovation. Some of the important activities in this regard are:

4.1. Collaboration at the time of uncertainty

Global societies are passing through a thought-provoking time with many uncertainties about the virus controlling, its treatment, the implementation, and management of vaccines’ distribution. Tech-based organizations have to come together and focus on the social impact technologies have on people's lives, and cooperatively recognize the critical role of new technologies play in human relations and business success by launching new business connections, websites, bringing together the sector's support during this time (Richter and Wilson, 2020). Regarding the social disruption brought by the COVID-19 pandemic, the collaboration among the international communities, private organizations, university researchers, scientists, and various public-private corporations for struggling with the virus, have invested both in values and human resources to produce an active vaccine in an exceptional time of uncertainty.

4.2. Exponential-based technological convergence

During the COVID-19 pandemic, people and organizations have already adopted new solutions. Societies are more interested to adopt new technologies. A growing interest in new technologies is driven by enhanced safety. Many societies want to continue using new technologies like online shopping, interconnecting with a firm using online chat, and paying for products or services using a smart device. This is where the more social customer uses the power of technology convergence like technologies, industries, companies, even endowed people around the world come together.

4.3. Priorities and environment scanning for a second wave COVID-19 pandemic

Evidence shows that the magnitude and severity of the COVID-19 pandemic have increased due to the start of its second wave since September 2020. It is critical to learn the lessons from the past several months and preparing for the existing challenges that the second wave has already created. It is expected that the global communities will face different scenarios like progressively infecting younger people, low-grade ongoing infection, and multiple epidemics on a small-scale (Dubé et al., 2020). The pandemic shows pre-standing ill health issues due to social and economic differences because coronavirus is not a pandemic issue but a social one that is reflected by the virus. The critical chain of six effective priorities that should be focused on during the second wave of the pandemic to ensure the best behaviours of emergency preparedness involve:

The Estate system which was formally activated during the first wave of COVID-19 will be trying to upsurge the number of non-COVID-19 services based on the need to keep COVID-free sites to minimize risks to patients and staff. The supplementary bed capacity created by the hospitals during the first-wave must be fully staffed and adequately resourced. Staff for social care must go throughout the pandemic. They should have the capabilities to boost social care for second waves. The confederate clinical staff must have access to a risk management and assessment context and be organized properly. The supply chain policies and other logistical contests of PPE must be fully reviewed and resolved by authorities as it has been one of the workforce's major concerns during the first-wave of COVID-19. The social care suppliers must ensure that staff is confident in the procedures for putting on and discarding PPE. COVID-19 is likely to continue and it is therefore recommended to review and intensify the review of the availability of winter flu vaccine plans. As the flu vaccine can build resilience in the general public and workforces, therefore in the occasion that a COVID-19 vaccine is available at the same time when the winter flu vaccine programs start, it is good that the two programs work together to successfully cover the public need. Social distance and care must be treated effectively by providing sufficient resources to manage future pandemic waves and outbreaks. Social care must be placed on a maintainable footing. Like PPE, COVID-19 testing must be considered as a national strategy for setting out a broader and vibrant way forward to confirm that clinical staff, patients, and the general public have the opportunities for testing they will need in the occurrence of future waves and outbreaks.

4.4. Information flow for decision making on the continuous transitions

The key to innovation is to achieve clear evidence from data analysis and further, the information must be applied quickly for making decisions. Indeed, the spread of the virus has affected most economic spheres like aviation, hospitals, educational systems, tourism, sports, and entertainment. The small and medium enterprises of the US were particularly suffered and many had to terminate their operations entirely. Although the concerned authorities have initiated serious steps to
improve economic incentive strategies, still some proficient decisions are necessary for controlling the economic impact of the pandemic.

4.5. Adoption of agile and digital technologies

Although the current pandemic crisis is intensely affecting the growth of the global economy and intimidating the survival of businesses worldwide, businesses and organizations have learned how to innovate in crisis. The firm that has been expecting for a long time to develop an innovative system in few days, is innovating their marketing policies by ascertaining the typology of firms’ innovations using stimulus for innovations and the level of cooperative innovations. In the course of the pandemic, the publics’ motivation has shifted dramatically on the way to online networks, and businesses and trades have responded consecutively. This shows the rapid adoption of interacting with consumers through digital technologies and networks. This consequence also shows that rates of adoption of these technologies are years ahead of wherever they were once prior studies were conducted. Such a shift has been observed even more in developed Asia regions than in other regions as shown in Fig. 6. Respondents are three times expected now than earlier the crisis and confirm that 85 per cent of their customer dealings are digital.

5. Post-COVID-19 era with technological convergence

The global pandemic has paused the global economy without any warning. COVID-19 has marked the tilting point in the system how the business’s activities were conducted before. Companies and enterprises that were shifting to digital transformation are now at risk of being left behind. However, it is time to re-imagine what the organizations pivot efficiently for the post-COVID-19 era. Rebuilding our world after coronavirus will not be the same as before coronavirus. The economic influence of this disaster will be perceived for several years to come. Having fewer cash flows and needful resources, the organizations will face difficulties to successfully manage and implement strategic business policies (Malliet et al., 2020). Every industry will reorganize itself to empower a distant dynamic workforce and avoid expenditure at all costs to direct the tricky waters of the post-COVID era. As the converging technologies are being confirmed and used to present innovative approaches, it is believed that the notion of technological convergence will be able to bring a turning process as suggested below:

5.1. Digitized and robust supply chains systems

The supply interruption that started in February has already exposed vulnerabilities in the supply chains of firms. These vulnerabilities of production systems will establish new ways to start the development of new systems of supply chains with liable collaborative associations. The evolution to a new model for supply chains will be reinforced by rapid and extensive digitization of the correspondence that accompanies global trade. Despite prompt advances in technology, the relationship between consumers and dealers remains mostly paper-based. Digitizing the consumer-dealer relationship is an important element for building robust consumers and dealers remains mostly paper-based. Digitizing the supply chains system may quickly shift to other suppliers when regular traders face interruption.

5.2. Novel approaches to big data analytics

The new outbreaks of coronavirus are broadcasted repeatedly and huge extents of data are created. Moreover, lessons learned from previous pandemics have already generated great amounts of data, occasionally called big data. Big data analytics will help the communities to understand the nature of the future pandemic outbreaks, providing different sources of information that can stimulate the treatment. Big data analysis will play effective roles in supporting the organizational changes, self-governing innovation environments, and standard of living that may result from the existing COVID-19 pandemic.

5.3. Connecting to contact-less payment

The COVID-19 pandemic has changed the consumers’ behaviours to shift their purchasing to digital transactions because they believe that digital transactions are the way ahead. Consumers will likely take and continue spending digital payments as a safety provision to avoid the extent of COVID-19 because currency notes or ATM cards spread the physical-touch, which is being examined during the pandemic (Pandey and Pal, 2020).

5.4. Future work trends

The COVID-19 pandemic will have a long-term impact on future trends in different ways. The pandemic has changed the public’s behaviour in different ways towards socializing, travelling, exercises, learning, entertainment and handshaking. The HR leaders will have to evaluate the impact of each trend concerning their organization's operations. Some trends are speeding up their existing shifts including contingent worker extension, (De-)Humanization of workforces, Development of new top-tier businesses, and transition from designing for competence to designing for flexibility and resilience.

5.5. Advanced health care value

COVID-19 has highlighted several public health issues across the full scale of prevention. Also, according to the opinion of the experts, the COVID-19 may continue for a minimum of two years even if vaccines are tested and applied. Therefore, a higher health care value will be implemented to face future challenges such as quicker integration of public health setup and medical care to ensure acceptable public health cares for nursing homes, enhanced national supports for state and public health departments, and an emphasis on health preparedness (Nguyen et al., 2020). This measure will surely minimize the gaps and will help to prepare for future public health issues.

6. Digital platforms for developing sustainable converging technologies

Innovation policies are based on the competency of upper management, business type, and culture. Nevertheless, different organizations have dissimilar value chains and a system of functions and actions for value-added. Organizations must constantly use incremental-based innovations to increase their value chains using different policies and approaches. Some of the most projecting platforms for developing sustainable converging technologies by organizations are as follows:

6.1. Making distinctions around evolutionary and revolutionary innovations

Being able to differentiate between diverse types of innovation will make it easier to understand what the organizations want to achieve and in what manner. Considering the two classes, evolutionary and revolutionary, there is a big difference between these two types of innovations. Evolutionary innovation is related to the incremental sector of innovation (Zhao et al., 2020). This type of innovation inclines to be slow and is mostly related to the introduction of goods that renovate the market. It is based on adaptation rather than disruption. When an organization is assertive and its value chain is effectively running, then the businesses’ innovation policy would be focused on incremental and linear enhancements. Evolutionary innovation has a key role in most businesses, and what creates products valuable for customers. Toyota’s brand and
development is the best example of evolutionary innovation based on the kaizen approach which decodes as continuous improvement. This focus is conveyed by Toyota’s on long-term business solutions that consumers of today are concerned in. They are not trying to reinvent the vehicle that will disturb the entire auto market. On the other hand, revolutionary innovation is about discovering the anonymous to find out different techniques of creating value. It does not have a concrete effect on already existing products. Google’s current attempt at driverless cars for this innovation from the marketplace context would be an example for developing new technology (Jabagi et al., 2020). Consequently, there would certainly be numerous features for people not to have to do the tasks of driving from one place to another. This is a new way to formulate a new business model while changing the value chain for making new customer value.

6.2. Making distinctions around Disruptive and non-Disruptive Innovations

Rather than having a complex perception, disruptive innovation is designed to create a process or product that unsettles current markets and produces something new. However, not everyone looks to fully recognize what disruptive innovation is. The basic concept is that businesses tend to overextend their markets by introducing new technologies to satisfy the demand of their customers. Naturally, this comes with higher risks because, during the implementation, the new market competitors can grow so speedily that they may eventually takeover incumbent market-leaders (Yrjola, 2020). For instance, edge computing, human augmentation, hyper-automation, the democratization of technology, and autonomous things are examples that have disrupted the marketplace. Due to this rapid change, modern companies are trying to implement new disruptive technologies because it has become a greater whoop of businesses in the era of digital transformation. On the other hand, there are still numerous innovations that do not essentially disrupt the present circumstances but propose new potentials. Non-disruptive innovation is a balanced process, however, when companies compete on one aspect of value for an extended period, the distinction becomes difficult.

7. Disingenuousness in innovation

From the above discussion about innovation, it may be concluded that different sorts of innovation do different jobs. It must be clear that all organizations should maintain proper steadiness between the contradictory innovation approaches. Such an effort is disingenuousness in innovation, which strives to decrease tension among the two opposite types. Passing through the age of digital transformation, many businesses follow resilience, agility, and dynamic competencies by adopting different types of innovations (Gibson and Shukla, 2016). At the same time, companies should chase their prevailing competitive gain through comparatively stable innovations. Being able to differentiate between different kinds of innovation, the organizations can discover a better understanding to find the best fit for their products into their particular marketplaces. Therefore, managing disingenuousness among contrasting aspects of innovation is becoming progressively significant.

8. Technological conversion innovation

In the age of technology revolution, dynamic economy and convergence isn’t just an improvement of one technology but acutely requires the technological convergence innovation. Instead, it often requires an idea, an ingenious bundling, integration, strategies to brand astonishing products and opportunities. Therefore, technological convergence innovation features a wide selection of applications throughout the value chain. An intellectual outline of various innovation attitudes relevant to the value-added chain is represented in Fig. 7. This approach is based on three key factors considerations. (a) The application of primary level step that deals with an innovative solution to a business’s existing problems. (b) The application of medium level step that deals with reexamining an
existing business issue and offering suggested problem solutions and (c) The application of premier level step of determining and solving a new-fangled issue (Pang et al., 2020). Disruptive and non-disruptive innovations typically grab the bottommost of the marketplace by meeting the needs of the solutions simply and straightforwardly. For instance, new technological innovations like Gillette, smartphones, online education, video streaming, personal copiers, and retail medical clinics have remarkably enhanced the existing processes, products, organizational needs and permanently becoming potential threats to business competitors in the market. Conversely, evolutionary and revolutionary-based innovations emphasize determining the new possible values for solving businesses’ technology-based issues. For example, Medopad is a healthcare setup, that collects and analyzes health data from patient mobile devices to predict chronic diseases. Utilizing machine learning, big data, and personal data collected from apps, and sensors to recognize, treat, and prevent health issues. Similarly, AIME, Real-time interactions & 5G, Supply chain & logistics, and AI computing are among those new technological innovations which have brought foreseeable changes in consumer behaviour (Laskar et al., 2020). The purpose of the disingenuous innovation is to establish a progressive balance between two contrasting innovation approaches. The impact of the disingenuous innovation would be comparatively small because the innovation efforts are focused on disruptive and evolutionary innovations. This comparison is shown on the left-hand side of the figure. Similarly, on the right side of the figure, the impact of the disingenuousness approach would be noticeable due to the leading approach of Non-disruptive and revolutionary innovations. As a result, the range where disingenuousness innovation plays a vital role would be nearby the midpoint of the innovation scale. It is the locations where the industry’s existing issues are reexamined and proposing new solutions by implementing either innovation strategy. This strategy plays an important role during the value-added chain process.

9. The challenges of CH sectors in the COVID-19 era: Beginning of a resilience structure for the post-COVID-19 era

In the circumstance of the COVID-19 pandemic, the wearing of masks delivers a dissimilar form of safety. In the years and epochs to come, these surgical masks possibly will become a mark of 2020. However, it is hoped that cultural heritage may be a source of comfort and resilience in such challenging conditions. In this context, many galleries, museums, and other cultural heritage institutions have changed their strategies towards digital transformation to share their work with fans from home. At present, the cultural heritage sectors are likely to face significant challenges that affect social interaction in the following areas:

9.1. Institutional issues and opportunities

The cultural heritage sector has turned into one of the focal public faces of COVID-19 in the global media after the public health sector. The issues and challenges that have been caused due to the pandemic in terms of customer manners, business performance, and policies. Also, the usage of consents on mobility, human resources, employment, education in travel policies, financial and economic policies to support the cultural heritage institutions are the points of interest (Weible et al., 2020). However, some of the institutions have tackled the challenges by adopting innovative responses. For example, European museums have improved their online incidence by 85% in the course of the lockdown and perceived more than 45% growth using various digital approaches.
like online tours, webinars, and exhibitions. Digitization in a museum is based on online collections and digital demonstrations that used AV effects in which online invitees have the choice to move and carefully observe the shows, thus mimicking the concrete visiting involvement. At present, Google Art Project has digitally collaborated and working with several top-notch museums around the world and provides a free online catalogue to view different artworks from homes in a gallery-style collection. In recent times, Meet Vermeer has digitally collaborated with 18 different museums to exhibit an enhanced wide distance of Vermeer’s work. The simulated museum combines the artworks in one platform that any physical museum would probably be capable to offer.

Fig. 8 shows the complete digital demonstration features that can be navigated to enhance the reality feature. One of the motives that museums have becoming progressively relevant, and why presence is going active, is that the opportunities of COVID – 19 have made them capable to adopt digital technologies which successfully break down obstacles and make them more accessible to build resilience for the post-COVID 19 set-ups.

9.2. Data access policies

At the time when the majority of the world heritage sectors are closed, the appraisal of data access plans and policies has been truly exposed. Tourism is supposed to be the sole contributor to the survival of the CH sectors and it must reinforce cultural distinctiveness and tourism purposes. Despite all the challenges, the CH sectors are fronting some opportunities to establish new collaboration by executing new digital data access policies. These new policies will have the competencies to mutually reinvent and expand the agreement, improve new skills, and upkeep the world’s shift to the new environments (Pillay et al., 2020). The endorsements charted in Table 1, have been equipped by the UNWTO recommendations in association with its global companions to empower the competence in CH sectors.

9.3. Financial limitations and opportunities

During the pandemic, some businesses have switched to digital platforms and endure their struggle for subsistence. However, Travel is amid those sectors that have faced unparalleled letdowns due to global restrictions and have created financial issues in different forms. According to the IATA statement of February 2021, the Air Passenger Traffic in terms of RPK has embarked by 68% in 2020 which was a major surprise to the business (Albers and Rundshagen, 2020). Though the traffic was improved from April, the progress has festered after the second waves of the pandemic in 2020. Fig. 9 shows the forecast of Passenger Traffic for 2021 and associates it with a threat setting for the advent of new virus alternatives. Here the solid red line displays the restricted recovery in the 1st half of 2021 due to the challenges of vaccine delivery. But, a strong recapture is predictable in the 2nd half of 2021 as soon as exposed peoples and healthcare employees are vaccinated. It is noticeable that reservations rushed after administrations boosted travel restrictions in markets. The spotted line in the figure demonstrates a conceivable risk picture during which travel limitations are kept by the governments as new-fangled virus alternatives. In this situation, travel petition improves by only 17% compared to a very small level in 2020. This slow recapture would result in scheduled carriers continue significant cash over 2021. Still, the progress has stopped at both national and international levels to the year-end. The 1st quarter of the year is more challenging for the Travel sector. The vaccination has been slow so far, and more time will be required before its effect is revealed. It is clear from Fig. 10 that the readiness to travel is small due to low reservations for upcoming travel which were downhearted about 70% year on year in January.

According to Fig. 11 illustrations, the reduction within European international RPKs relieved to 80% since improved progress due to the holiday spell decreases from new travel sanctions later in the month. Latin and North American airlines had a decreased level of RPK at 76% and 79% respectively. However, it is expected that new restrictions in the area will be further improved in the near duration. Based on the COVID-19 crisis, it is hoped that there are some opportunities to critically reconsider travel’s development and to question the sense of more advancements indicating greater paybacks.

9.4. Market organisation restrictions – shift to a resilience-based structure

Fig. 12 illustrates the gradual progress of shifting towards establishing a new market and business. This structure is based on the COVID-19
challenges to the global CH sectors. The growing rate of joblessness in these sectors has also been reflected in many ways. It is because different CH sectors such as restaurants, travels, sports proceedings, airlines, and tourism are suffered from several restrictions of the pandemic. Therefore, the proposed resilience-based structure for new markets and business orders will be helpful to digitally transform the CH sectors both in and after the COVID-19 crisis. The CH sectors need to establish a resilience-based structure for several drives. The elements of proposed structures are technology convergence, administrative policies, and local societies. Digital transformation needs to expand to a high level in these sectors (Dutta et al., 2020). The use and integrations of digital technologies with robotics, AI, and IoT can promote meaningful change within these sectors. The pandemic has already bounded CH sector leaders to discover new digital technologies to recapture consumer assurance. But, policymakers understand that the blow of the pandemic is exclusive as it is not promising to shop the unsold size in near-term times, affecting a permanent obstruction for these sectors. In the future, the support from the administration, together with local communities, will furnish the way for the digital convergence and transformation for the CH sectors. The resilience-based structure may successfully convert the CH sectors into a new-fangled digitized market and business in terms of sustainable milieu, moderating climate actions, the welfare of society, and the envelopment of local societies.

9.5. Stakeholders diverging views and interests

Keeping in view the big data access issues and diverging interests of stakeholders, the CH sector is undertaking a practice of digitization to establish new ways of value addition. Being the stakeholders of CH sectors, the policy-makers, tourism sector, cultural institutes, galleries, archives, museums, libraries, scholars, professionals, academics, supervisors and consumers, must be gratified to make value addition from the usage of digital technologies. However, due to the shortage of disorder of work performs, they have different diverging interests. This is inspired by the in-built difficulty of the value creation network about CH sectors (Hunt, 2019). At present, some digital platforms define why a particular stakeholder should adopt a distinct network for sustainability. 

Table 2 shows the value creation of the stakeholder for Digital European group.
and further to the combined extents in theoretical terms. The first stake of
value creation is to bring together the collections of European’s CH. This
has successfully removed the obstacles to big data access and assisted the
Digital European individuals. The next stage of value creation is con-
cerned to simplify knowledge in the CH sectors. As the needs of re-
searchers are placed on top, Digital Europeana has developed partnerships
between different IT systems. The third stake is to facilitate teachers and
students for knowledge gaining for improving necessary
skills. The last stake is to engage various users in different means of
taking part in their CH by different Apps and widgets that have made the
Digital Europeana's events online. Table 3 shows the value creation of
different stakeholders for Google Arts. The primary value creation stack
is associated with indexing and searching means. Using these tolls CH
sectors manage, control, and direct their digital possessions with Google
sustenance. It is also helpful for policy-makers and tourism institutes as
Google Art is transforming traditional heritage, diet, celebration, and
adventure into web-based exhibitions. The second value creation stack is
to reach the global spectators to virtually visit galleries. It also supports
researchers and scholars in conducting the research work. The next stack
is connected with the distribution of digital objects with stakeholders.
The virtual facilities make it easy to immerse visitors in Bruegel's work.

The fourth value creation stack is connected to engage users to study
culture that could enhance the entertaining element. The HD digital
artworks increase the strength of the online involvement which have
been made easy to get access to the general community. The final value
creation stack is to offer the stakeholders to adopt new digital prospects
using new concepts to distribute culture. The new digital technologies for
testing use machine-learning techniques based on specified algorithms
to know the artwork content self-reliantly. Also, a collaborative 3D setting
by machine-learning has controlled artworks based on the graphical
resemblance to find new ways. Similarly, Google settled a 3D-VR painting
app known as Tilt-Brush which helps to create 3D brush strokes in the
virtual background.

Table 4 shows a comparative analysis of the value creation of both the
digital platforms based on stakeholders’ diverging views. In this regard,
First, Google Arts have been established more meaningful value creation
drivers than Digital Europeana. Google has also satisfied and straightens
the stakeholders through the prospect of big data around CH heritage in
various aspects.

First value creation driver - Competence: This driver emphasizes
the cost reduction for the users, museums, and researchers to access big
data of artworks. In this regard, Google Arts suggests in-depth solutions
to stakeholders for easy access to any cultural institute by distributing
shareable links to the official museums’ websites.

Second value creation driver - Integration: Here both the digital
platforms have the potential to integrate digitization experiences with
CH sectors and stakeholders. Digital Europeana, has limited opportuni-
ties for an online source of digitization since the platform cannot
permit the visitors to express their content around creations. However,
Google Art presents more valuable services through which users can
access the content-related institution of their interest. Using smartphones
and the Chrome cross-platform web browser, users can visit museums,
their popular times, and nearby hotels, restaurants, and shops. As such,
Google Arts wins over Digital Europeana that performs as a structure
integrator for CH and stakeholders.

Third value creation driver - Impound: In this regard, once again,
the benefits offered by Google Arts are higher than the Digital Europeana.
Google Arts helps in providing knowledge to a local extent to its stake-
holders via Google Maps and gamification system. Still, museums feared
that a digital player could distribute their collections in a very different
from the one made by the cultural institutes in the offline domain. But
using digital Technogym, an online distribution strategy for putting the
digital content of the museums on their website and using their incidence
on Google Arts has attracted visitors to their websites.

Table 4

| Stakeholder group | Stakeholders’ viewpoint in supporting the digital CH | Digital Europeana value creation strategy | Google Arts value creation strategy |
|-------------------|--------------------------------------------------|------------------------------------------|----------------------------------|
| **Tourism**       | Promoting tourism in attracting visitors inflows  | Multidirectional engagement of the stakeholders | Competition in aggregating CH institutes form different spheres by novel broadcast techniques |
| **Policy-makers** | Multiple interests like Preserving, awareness about local CH | Competence in creating web-based visibility for CH institutes. | Competence in aggregating CH institutes form different spheres by novel broadcast techniques |
| **Users**         | An online visit to cultural heritage institutes   | Competence search based cost reduction   | Competence in cost reduction through digital technologies |
| **Researchers**   | Costs reduction                                   | Competence in search costs reduction     | Novel Competence based on inspection tools |
| **Suppliers**     | Introducing innovative and digital products around culture | Integration                             | Multidirectional and novel gamification via digital technologies |
| **CH institutes** | Outspreading the assortment’s prominence to a broader public | Competence in gaining costs             | Competence in gaining costs |
|                   |                                                  |                                         | Integration-multidirectional |
|                   |                                                  |                                         | Novelty in testing |

Fig. 13. Progression of value creation and stakeholder's viewpoint.
Fourth value creation driver - Novelty: Digital platforms must support CH sectors in providing new scopes of value creation by promoting new products, services, approaches, and new methods of doing business. Relating social data with machine learning and AI techniques, Google Arts rearranges the attention of stakeholders by augmenting new-fangled extents of value creation. The methods of testing for policy-makers and cultural institutes, available on Google, have created new openings of game capabilities in non-game backgrounds to make learning along entertaining. Also, machine-learning setups of rules and AI tools for image processing and recognition, have enhanced the quality of research activities.

Fig. 13 shows the process of convergence between the stakeholder’s viewpoint and the impact of the value creation-driver impact of the two digital platforms for value creation. It may be concluded that each driver adds to create value for a particular set of stakeholders. The entire set of drivers can successfully attract the stakeholders’ wellbeing, thus generating sophisticated value over the full ecosystem. More specifically, the greater the digital platform’s ability to pass different value creation drivers through interdependence and portability in big data access, the greater the convergence in the wellbeing of stakeholders in joining the digital platform, and the greater the value created in the digital platform ecosystem.

10. Conclusion

This paper highlights the new technological advancement in the COVID-19 pandemic when its second wave is in progress. To successfully thrive in a new global market environment, and living in an age where changes are unsettled in scale, business societies must be nimble enough with self-motivated capabilities. At present, various global economies are trying to implement new strategies by making new opportunities in the background of digital transformation. Likewise, some unanticipated crises like market downturns, radical uncertainties, and the global pandemic of COVID-19 have put business societies in the competitive stage of sustainability. The study also presents the theoretical and practical inference of innovation in different cultural heritage sectors. Its main focus is on the impression of technological convergence and innovations, that converges innovative strategies for value-added creation. This study recommends necessary steps toward covering the analysis on the progression of the CH sectors through digital transformation and has deliberated how technology convergence is determining this process by allowing new techniques for value creation by different groups of stakeholders. Through a comparative analysis of the two digital platforms namely, Google Arts and Digital European, it was precisely addressed how Google Arts have boosted the drivers of value-creation, that is competence, integration, impound and novelty more than Digital European. Since all the stakeholders of cultural heritage sectors should have a common motive to make these industries appropriately resilient, a resilience-based structure has been proposed through which the cultural heritage sectors might transpire progressing in a much more resilient, a resilience-based structure has been proposed through which the cultural heritage sectors might transpire progressing in a much more sustainable digital platform ecosystem.

The complete study has been carried out by the single author of the paper.

11. Declaration of competing interest

The author declares that he has no competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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