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Digital Resilience Capability for Pervasive Digital Transformation: A Framework Notation

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Article Info	ABSTRACT
	Digital transformation is inevitable and happening at different scales and scopes. At a higher-order level, digital transformation proliferates changes in society and industries through agile customer experience and enhanced business capabilities. It is not merely about technology adoption and use but also entails a strategic mindset to reimagine and reinvent the core business.

1. Introduction

Undoubtedly, the transformation process is not a one-off event but rather a recurring phenomenon. In most cases, digital transformation happens based on the pull factors, i.e., the requirements of an organisation. However, certain '*push*' factors can also drive digital transformation, such as a crisis. A different level of digital transformation occurs regardless of whether it's a pull or push environment. The basic form of change encompassing the adoption of technologies and tools such as cloud and software-defined networking occurs. At the higher end of the spectrum, transformation involving advanced technologies such as the Internet of Things (IoT) and comprehensive business analytics is a common phenomenon. As an organisation is settling down with one level of transformation, a re-transformation agenda sets forth, involving the next level of transformation. The critical element that perpetually facilitates the upward re-transformation is the intensity of digital resilience capability, defined as the ability of an organisation to grow and survive in a changing environment by implementing continuously evolving strategies.

2. Context of disruptions leading to transformations

The year 2020 was certainly a year to remember as it shook humanity to its core. This year, digital transformation became unavoidable, suggesting that digital transformation is associated with inevitable disruptions emanating from two sources: information and communication technologies (ICT) and crises-driven disruptions. ICT encompasses both the infostructure (including data and knowledge structures) and the infrastructure (from 5G to IoT) components which affect the competitive potential of a business either with peers in its industry or other companies. The comparisons reflect the extent of differences in terms of the value creation and value delivery capabilities. A case example is the digital twin technology adoption by Newport News Shipbuilding, a subsidiary of Huntington Ingalls Industries in the US. This business is regarded as one of the only companies able to design, build, refuel and inactivate nuclear aircraft carriers for the US Navy. The entity has revolutionized its shipbuilding process by incorporating real-time visual management and artificial intelligent diagnosis as part of the smart manufacturing process. These technologies allow

simulations when building the new ships, enabling real-time modifications and simulating the final performance before completing the building process. The automation has enabled accurate material requirements and reduced wastages associated with overestimations. Incorporating such integrated digital shipbuilding has also extended to a collaboration with Newport's suppliers, 3D design systems. This is a 3D printing company that uses 'deep material science' to produce additives at a period 75% shorter than the traditional cast methods, an indication of enhanced supply chain efficiencies. These ICT advances are thus a source of disruption to which Newport News' competitors have to respond.

The other disruption source is crisis-driven which seems to be frequently happening in recent times. The global financial crisis in 2008 and the current Covid-19 pandemic showcase the increasing severity of the contagion effect due to the increased interconnectedness of the global value chains. The result has been a severe impact on businesses, sometimes extending over very long periods. So, one may not know the nature of the next crisis or when it will strike, but we know that it will undoubtedly affect businesses and society in general when it does. McKinsey has reported the complicated nature of work-from-home arrangements from business response to the Covid-19 pandemic, yielding mixed outcomes. They observed one company (undisclosed) with two workgroups. The first group had small but highly distributed members in Cape Town, Los Angeles, Mumbai, Paris, and other big cities. The second and more concentrated larger group had a shared office in downtown Chicago. At the start of the pandemic, the business' new leader hastily centralized operations to the on-site group. The new arrangement worked as remote working began. The smaller group became invisible even when, the larger group began working remotely as well. The larger group was assigned much of the work while the distributed smaller group was left with less or nothing to do. The result was dissatisfied and underperforming employees. The implication is that in crisis circumstances, the business has to find a talent management approach that works. Thus, remote working is only part of the crisis responses. For other companies, responses extend to different extenuating scenarios. For example, in-dining companies had to jump onto online delivery platforms as they found themselves with less to nil revenues due to the strict adherence to minimal physical contact with customers.

3. Digital resilience capabilities

Given these two primary disruption contexts, a business's digital resilience determines an organization's capacity to absorb the shocks that will affect its existing and future transformations. While there is an argument that digital resilience is about having a good cybersecurity platform and measures, the truth is, the resilience is beyond this. Raguseo et al. (2018) recognised essential sets required to facilitate digital transformation, as follows:

1. mindset (*the digital entrepreneurship culture)*
2. toolset (*digital technologies and platforms*)
3. skillset (*digital skills*), and
4. the dataset (*the data ecosystem*)

The interplay of these sets characterises the digital resilience capabilities which embodies preparedness to bounce back after some form of failure. Together these aspects interact to create, deliver and preserve business value. They also determine the likelihood of success for any digital transformation or re-transformation journey.

The **mindset** of digital entrepreneurship culture denotes the strength of the enterprise wide digital savviness, which enables a fail fast, fail a lot, and learn fast mentality. Such a mindset builds a boldness to develop new technologies with a culture of high tolerance for experimentation. Experimentation culture fosters a benchmarking practice - from vertical as well as horizontal perspectives. For example, as a digital lifestyle company, AirAsia Digital can benchmark

Amazon for its e-commerce and logistics business. Being struck by the pandemic, AirAsia moved quickly to rebuild and extend its business model by experimenting using existing resources. Such a mindset outlines the digital resilience capability of AirAsia.

Toolset, outlined by digital technologies and platforms, is deployed for any level of transformation. With more technologies advancing, the functional capacities of the customer enabling devices such as mobile phones are constantly changing implying that a digital platform's architecture should be resilient enough to support expanding data structures and its sources. For example, big data promotes the need for advanced storage and analytics, including agile technology and secure computing systems. Such a need enables higher resilience capabilities for potential data acquisition, storage or real-time analysis and insights generation.

In terms of the **skillset,** a business should have a sufficient number of relevant experts whose resilience is built on their continuous skills upgrade, pioneering, and learning. This may also extend to the ability of the business to understand what constitutes the current workforce demands and forecast the company skills by managing the evolving clusters of skills. If a business considers its part-time and full-time employees as its only workforce, it runs the risk of having a narrow perspective of the workforce creating and delivering its value. The contribution of this set to resilience is in managing the workforce ecosystem and the collective evolution of the interactions. For example, research by MIT and Delloite found the existence of two conflicting realities of digital transformation. The first reality is that every business is increasingly reliant on an external workforce. However, the management practices and processes are built for internal employees. An efficient skillset organization should flawlessly manage the value creation and value delivery processes by both the internal and external workforce. For instance, Applause, a United States-based software testing company, has 400 employees but relies on 700,000 crowdsourced software testers in 200 countries which it considers as a testing community. Such a skillset built as a community implies that the resilience capability should enable an effective coordination of these complicated overlapping software user testing projects.

Dataset infers the continuous extraction of relevant data and the insight generation models, and the need for agile storage capabilities. Such a phenomenon is also known as the creation of a data ecosystem. AirAsia is a local example of a business that has prioritized the creation of a data ecosystem. The 20-year-old airline business has evolved its data assets tremendously, driving the customer understanding much more superior than arguably most of its competitors. For them, customer understanding seems to have been at the heart of the most significant business decisions. The re-transformation exercise of Redbeat Ventures to AirAsia Digital demonstrated AirAsia's agility by swiftly rearranging resources to utilize emerging opportunities emanating from the logistics and ecommerce business. AirAsia's story suggests that a business with an excellent architectural view of the data ecosystem can also shape the business realignment to attain new strategic outcomes. Advancing the resilience for perpetual digital transformation.

The interaction of these four digital resilience elements underpins the capacity for an organisation to respond to disruptions, paving the way for perpetual transformation agenda (*Figure 1*). However, the nature of the interaction is dependent on the transformation journey that the business has undertaken. For example, a company with an early-stage transformation will face many hurdles. Much of the transformation activities may happen in a silo characterised by cultural and departmental tensions. Such businesses are failing to build agile systems with many legacy issues hindering the attainment of successful outcomes. The priority, therefore, is to remain resolute so that the organizations reach mature transformation with tangible benefits realised. As per the experimentation cycle, the departmental and cultural tensions weigh in on the change projects resulting in protracted and fruitless experiments.

As the transformation journey advances, the business learns to overcome tensions, resulting in better processes for coordinating digital innovation experiments. The experiments become more frequent as the culture also embraces digital entrepreneurship adopting, for example, agile methodology practices allowing the collaboration of multi-functional teams and several similar projects. The period to optimal process roll-out or new product enhancements becomes faster. With such businesses, the outcome is on preparing for the perpetual transformations. This process can culminate in working out a broader number of scenarios, resulting in preparedness for external and internal disruptions. The responsiveness to technological changes becomes swift, with many such organisations determining what technologies are to be adopted and which business models to make the most of the adopted technologies. Such businesses have thriving competitiveness.
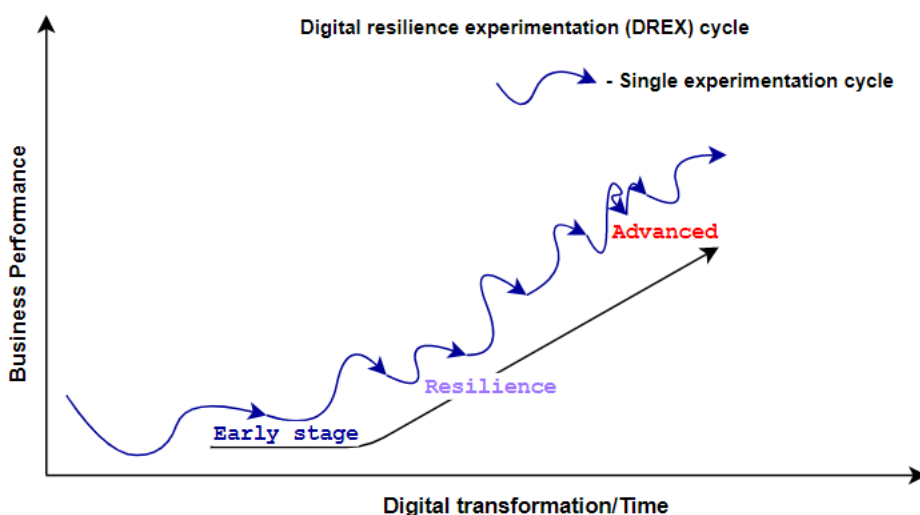

Figure 1: Digital Resilience Experimentation Cycle

The digital resilience and transformation model

We have determined two contexts of the sources of disruption the ICT and the crisis-driven disturbances (*Figure 2*). Every business can agree that technological advancement has become consistent and expected, with every enterprise always running some testing or app or platform upgrade. It is either the company is doing it, or the competitors are. On the other hand, while crises are challenging to determine when the next one is coming, the consequences have been severe every time one has hit. In essence, every business will have to prepare for both scenarios. The level of preparedness depends on the interplay of the digital transformation and the digital resilience capabilities it has built.

A business with advanced transformation can absorb external disruptions effectively, primarily because of the seasoned experimentations and the learning experience. When the context of disruption is ICT-driven, the business' dynamicity and extensive simulations enable it to reduce the negative impact. For a company with basic or early-stage transformation, the response is different. The business will require time to assess the impact areas and to determine

the appropriate response. As the company is figuring and working out the alternatives, the answer is slow, resulting in a moderate to severe impact on business performance.

On the other hand, when the disruption is crisis-driven, the uncertainty always renders everyone insufficiently pre-pared. The difference is that the business with advanced transformations has shorter experimentation cycles. This leads to the realisation of a quick re-organisation which provides a digital resilience capability regarded as an adaptive reconfiguration that can either facilitate minor to significant structural business changes. The response of these busi-nesses is akin to the fluidity of river water which has an exceptional adaptive capacity, finding the alternative routes to avoid any obstacles – sometimes circumventing or triggering a flow-around or flow-over depending on the height of the obstruction. The bottom line is, it keeps flowing. This adaptive reconfiguration results in a moderate business impact even in the most severe of circumstances. An example of such a business is AirAsia, which swiftly reconfigured its group business model amid the crisis.
The company is anticipating its e-commerce business (AirAsia Digital) to make the most considerable contribution to the group earnings in the next five years potentially capacitated by AirAsia's fleet, which can run a cross-border logis-tics arm. The re-organisation facilitates a significant shift of the digital outcomes, from a successful low-cost carrier to a digital travel and lifestyle company.

While this is true for businesses with advanced transformations, entities with fundamental changes are usually heavily damaged if they ever make it. The severity of crisis-driven disruptions is potentially high, but the resilience of these businesses is low because of their low tolerance for experimentations. The lower-level learning capacity results in long rebound or recoveries as the response is mainly reactive. These businesses have no starting point in finding a way out during and post the crisis period. The bulk of Malaysian companies fall under this category, with 34% of companies that participated in the IDC 2020 survey admitting their intention to start implementing transformation in 2021, and 46% have implemented "some" form of digital transformation. Knowing that the success rate of change is still a meagre less than 30% globally, it is reasonable to assume that Malaysia companies have not gone above the global success rate.

Regardless whether the outcome is transformation or perpetual transformation, organisations constantly explore agile options to optimise operations. This happens through series of experimentations comprising of the business units as the customers and the technology experts. A bank may pose a process transformation to reduce the account opening process from 3 working days to 15 minutes. Therefore, come all the financial, talent, and technological support. Thus, the business insulates the teams from structural and cultural tensions by granting them full autonomy when running the experiments. The "fail fast, fail so many times and learn quickly" is a reality with such groups. This model over-comes innovation silos and ensures continuance and constant monitoring of tasks such that the resilience is in keeping the momentum of the experiments alive.
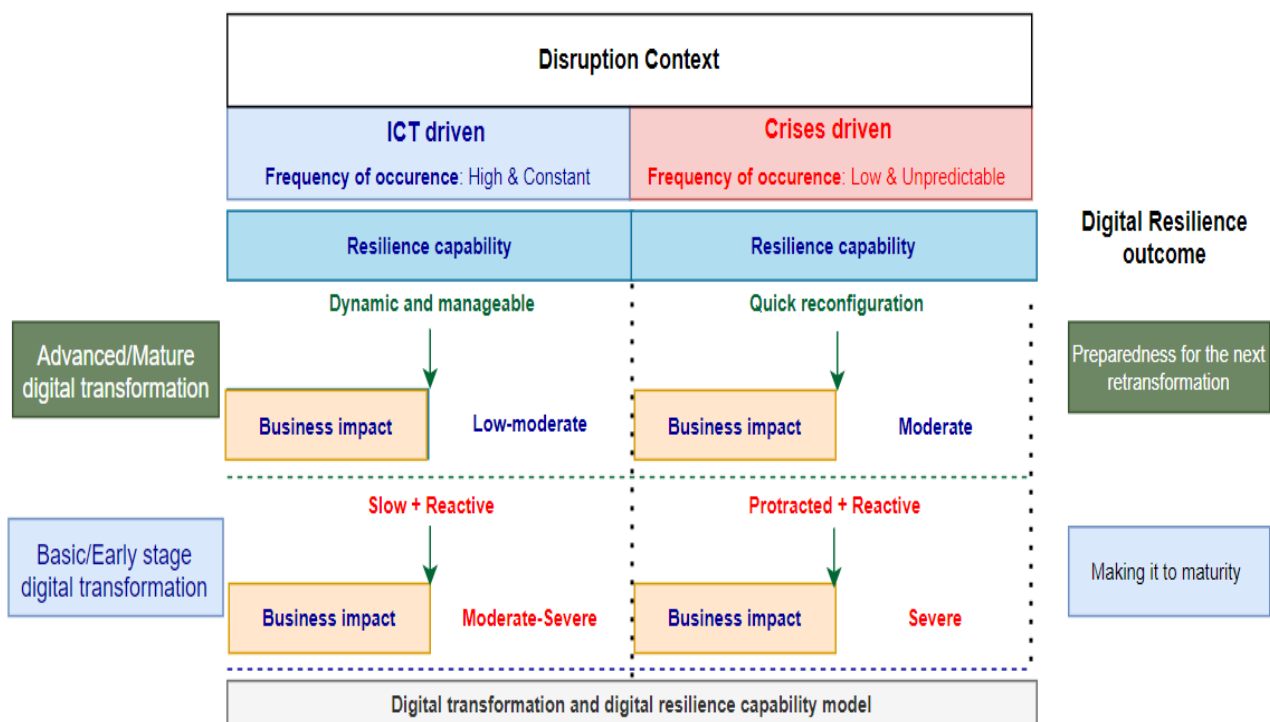
Figure 2: Digital Transformation and Digital Resilience Capability Model

Conclusion

Today's business environment poses various needs for change, with resilience being at the forefront of digital transformation. Disruptions caused by ICT and crisis (e.g., the Covid-19) foster the role of resilience capabilities across the different magnitude of digital changes. Organisations experienced in a smaller-scaled transformation display a slow, protracted but reactive response to a disruption, thus moving up the transformation value. When a crisis hits an organisation with a matured level of digital transformation, it will have a dynamic, manageable, and swift reconfiguration resilience capability. Such an organisation is ready to embrace perpetual digital change.

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