MFSA FinSights | Enabling Innovation
Internet of Things

The financial sector is continuously evolving through the rapid development and adoption of new technologies. The term 'FinTech' generally refers to financial innovation that seek to provide enhanced financial service offerings through the utilisation of enabling technologies. These generally include Distributed Ledger Technology & Smart Contracts; Artificial Intelligence, Machine Learning & Big Data, Cloud Computing, Web 3.0, Application Programme Interfaces and Micro-Services; Robotic Process Automation and the Internet of Things.

As part of the MFSA's initiatives to generate awareness, drive culture and deliver a cross-sectoral knowledge platform which can support the MFSA's functions in preparing for the financial services of tomorrow, these insights will delve into enabling technologies, enabling innovations and their sectoral applications.

1   What is the Internet of Things?

Internet of Things, otherwise known as IoT, refers to a network of physical objects embedded with sensors, software, and other technologies that connect, communicate, and exchange data with other devices and systems over the Internet in real-time. This technology has revolutionised business operations through seamless interactions between objects that are connected to the internet via embedded devices. Smart homes, wearable devices, industrial IoT, and smart cities are just a few examples of how IoT has transformed various industries.

2   Layers of IoT

IoT solutions are integrated on a multilayer and multiconnected infrastructure that defines the functions carried out by IoT devices.

Perception Layer – also commonly referred to as the infrastructure layer, this layer encapsulates the physical devices which make up an IoT system; tasked with environment sensing and data collection to be processed accordingly.

Transport Layer –also referred to as the communication and network layer, maintains the connection of IoT devices on the perception layer to those on other layers of the IoT architecture. Thus, this layer serves the primary purpose of connecting such devices to cloud computing technologies hosted over the Internet. Communication technologies used to undertake the process include Wi-Fi & Bluetooth.

Processing Layer – controls data processing and analysis to generate insights on the new data obtained. This layer is also referred to as the middleware layer.

Application Layer – this layer's functionality mainly revolves around logical process management by providing a user interface for human-machine interaction facilitation.

Business Intelligence Layer – in order to appropriately explain how conclusions are reached by means of the enabling technologies, this layer provides users with visual representations of functions carried out by the processing layer. Such representations mask the complexity behind the middleware layer to make it simpler for more efficient and informed business decisions.

3   Elements of IoT

When analysing IoT, one must note the key elements that characterise its many use cases in multi-sectoral applications. These elements include:

Data collection – financial institutions can collect data on consumer behaviour, spending patterns, and preferences from IoT-enabled devices such as sensors. This data can then be analysed using artificial intelligence and machine learning algorithms ('AI/ML') to derive insights for the purpose of sound business decisions.

Data processing – is the conversion of raw data that involves storing and sorting of data into digestible clusters representing classified information which is then analysed.

Data analyses – refers to the monitoring, tracking and analysing of data such as consumer spending patterns. As a result financial institutions may offer personalized recommendations to their clients with respect to suitable or tailored financial products and services.

4   Applications of IoT

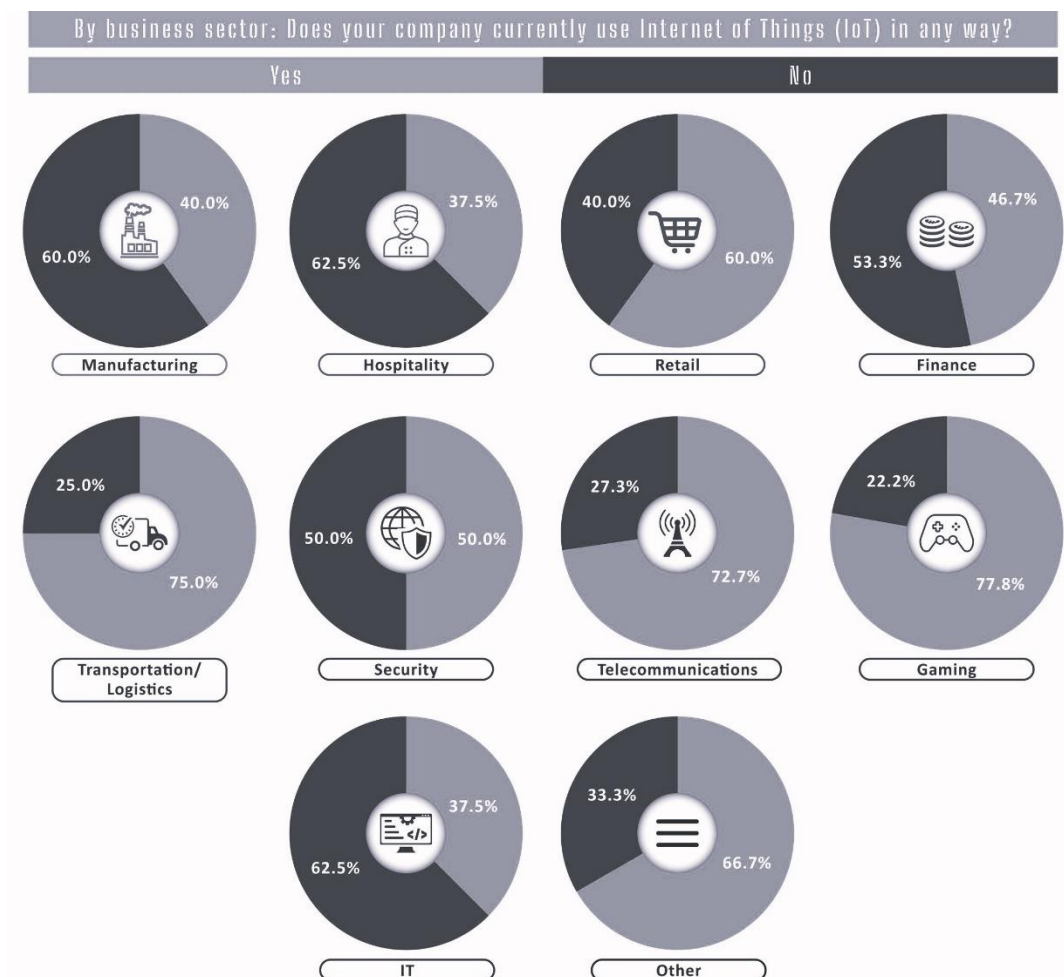## 4.1   General Applications of IoT

Figure 1: Sectoral IoT applications
Source: Tech.mt, 2021. The Adoption of Internet of Things (IoT) among Maltese Businesses

In the past several years, IoT technology has grown significantly, having applications across multiple sectors including manufacturing, telecommunications, and information technology. A survey conducted by Tech.mt has shed light on the use of IoT amongst Maltese businesses, where 106 local entities were surveyed. The report details how Maltese companies are using IoT in various sectors of the economy, addressing issues such as investment readiness, obstacles, impact on company operations, and real-world industrial applications. According to this report, the gaming, transportation/logistics, and telecommunications sectors had the highest uptake of IoT applications as illustrated in Figure 1, above. Also, amongst the top five industries benefiting from IoT is the financial industry.

4.2   Applications of IoT in Financial Services

As is the case in many other sectors, IoT provides numerous applications within the financial sector which simplify the existing services as well as facilitate the creation of new technological standards. IoT-enabled devices can automate processes and streamline operations, reducing the need for manual labour, thereby invariably reducing costs, increase productivity and ensures timely delivery of services. More specifically some of the application of IoT in financial sector include:

> **Payments** – IoT solutions have provided users with the ability to make easier contactless payments through applications on their devices.

> **Security** – IoT solutions have increased fraud detection capabilities of unauthorised access in several mobile applications, thereby enhancing the safeguard of sensitive financial information. These solutions have also improved application security through biometric technology based on IoT-enables devices.

> **Fraud Detection** – IoT devices can be used to monitor financial transactions in real-time and identify unusual patterns or behaviours.

> **Insurance** – IoT devices, such as telematics, can be used to monitor driving behaviour, allowing insurers to offer usage-based insurance policies. This in turn can allow customers to save money on their insurance premiums while also incentivising road safety.

One international use case in terms of the above is American Express, where the company has integrated IoT technology into its payment processing systems to collect and analyse data from wearables, mobile phones, and other smart devices. Furthermore, IoT-enabled fraud detection systems that rely on machine learning algorithms were integrated in the systems to identify and prevent fraudulent activities in real-time. The company has also launched the "Shop Small" program. Essentially, it uses IoT technology to support local SMEs[1] by tracking and analysing customer spending habits whilst providing targeted recommendations, based on customer location and preferences, in order to encourage them to consume local products.

5   Benefits and Risks

When assessing emerging technologies such as IoT, one notes numerous benefits to both consumers and innovators. Nevertheless, due consideration ought to be given to the risks and challenges arising from such innovation.

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[1] SMEs - Small and medium-sized enterprises.

BENEFITS

Process Automation – having an automated process, such as the streamlining of data, enhances business's operational activities, leading to increased productivity and a decreased risk of human error and data inefficiencies.

Security – IoT-enabled security systems may be set up to detect fraudulent activities in real-time, safeguard sensitive financial information, and to monitor physical security via surveillance camera systems.

Efficiency & Optimisation – With IoT-enabled devices such as sensors, cameras, and wearables, financial institutions can collect data on consumer behaviour, spending patterns, and preferences. This data can be analysed using artificial intelligence and machine learning algorithms to derive meaningful insights that can inform business decisions. Similar, IoT can also be used to monitor and track consumer spending habits thereby allowing financial institutions to offer tailored products and services that better meet their customers' needs.

RISKS

Cybersecurity – given the rapid growth of the underlying technology, IoT devices may suffer from possible data breaches and cyber-attacks which exploit vulnerabilities present in newer technologies.

Cost – adequate IoT infrastructure that relays sensed data to the managed network, software implementation as well as staff training and security measures that protect sensitive information may prove to be costly for any business enterprise.

Interoperability – varying communication protocols may be utilised by IoT devices, resulting in interoperability issues which may limit information sharing and in turn limit the benefits associated with IoT devises.

In conclusion, financial institutions must carefully consider the associated challenges and implement robust security measures to protect sensitive financial information. With proper planning and implementation, IoT can help financial institutions to be competitive in an increasingly digital environment.

Supplementary Reads...

Peter Mell and Timothy Grace, 2011. The NIST Definition of Cloud Computing, Recommendations of the National Institute of Standards and Technology. Available online.

Bernardo Nicoletti, 2013. Cloud Computing in Financial Services, *Palgrave Macmillan Studies in Banking and Financial Institutions*. Available online.

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Tech.mt, 2021. The Adoption of Internet of Things (IoT) among Maltese Businesses online.

Check our other **FinSights** and should you have any queries or wish to discuss your ideas within the context of our **MFSA Fintech Regulatory Sandbox**, contact us at **fintech@mfsa.mt**.

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