![Data Driven logo] **Data Driven**

STATE OF THE NATION SERIES

Delivered to you by:

FUJITSU

ICT in Thailand 2020

Smart Factory Trends &
Digital Transformation

Table of Contents

Foreword

The 'State of The Nation: ICT in Thailand 2020' Report Series

Fujitsu commissioned DataDriven, an independent Asia/Pacific based research to conduct a series of large-scale surveys of ICT decision makers in Thailand.

This report is based on the second large-scale survey conducted in October 2019 (the first was in December 2018). It examines the ICT market through the eyes of the people who actually manage and deliver these technologies – the ICT decision makers.

Digital transformation continues apace, and ICT challenges are increasing as are demands on organizations' budgets. To shed light on these issues we went to the ICT decision makers themselves – people like you who can provide real insights grounded in real experience.

Focused on Smart Factory and Manufacturing in Thailand

DataDriven surveyed 125 ICT decision makers in Thailand across a broad range of technology and business issues.

We then extracted the response from 38 manufacturing and related organisations including logistics/warehousing and produced this report focused specifically on Smart Factory and manufacturing in Thailand.

The first part of the report covers the more traditional elements of ICT, where the majority of budgets are still spent, in many cases just to maintain existing operations. These areas include:

- Meeting business objectives
- ICT objectives and challenges
- Budgeting and staffing
- Technology Adoption Profile of Thai organizations
- Digital Transformation in general

The second part of the report focuses on Digital Transformation in the Smart Factory and Manufacturing environments including:

- Implementation vs Investment for DX, IOT and ERP
- DX Outcomes Importance
- DX Overall Outcomes Achieved
- Progress of DX, IOT, AI and Cybersecurity
- DX Challenges for Manufacturing
- ERP Progress
- ERP Selection Criteria
- Manufacturing Preferred Digital Co-creation partners
- Preferred ICT Provider Origin
- Manufacturing ICT Provider Satisfaction

Thai Organizations' Response to the DX Challenge

The results of the survey indicate that Thai manufacturing organisations are generally well advanced in the implementation of ICT-based manufacturing systems. They prefer global suppliers and standardized ERP applications and are generally satisfied with their providers. Security is an important issue, as it is in most areas of ICT.

Thai manufacturers are using a range of technologies in many different ways to evolve the manufacturing process. A range of new technologies such as artificial intelligence, robotics, and 3D printing mean that smart factories can be built and operated at a much lower cost and at a much smaller scale than conventional manufacturing facilities

We trust that you find the information interesting and useful in setting your own technology directions and look forward to your feedback via email to info@datadrivenservices.com.au.

About the DataDriven 'State of the Nation: ICT in Thailand 2020' Report

Real Insights from Real ICT and Business Decision Makers

We recognize that business leaders, especially those responsible for ICT decision making have a difficult job. Budgets are tight and management demands more accountability and greater ROI from their ICT investments. In addition, ICT professionals need to maintain and improve the current mission critical systems, whilst simultaneously driving Digital Transformation to compete in the market.

Read the Views of Thai ICT Decision Makers

To shed light on these challenges we went to the ICT Decision Makers themselves – people like you who can provide real insights grounded in real experience. DataDriven an ICT research and advisory firm with a specific focus on Asia/Pacific surveyed ICT decision makers in Thailand. After an extensive respondent selection and surveys fielding process, DataDriven were able to collect high quality, valid completed responses from 125 ICT Decision makers in Thailand and then extract detailed responses from 38 manufacturing organisation.

Balancing Existing Systems and Advancing DX

Unlike many other recent ICT reports about the *digital economy and digital transformation*, this report series also paints a comprehensive picture of the relative strengths and weaknesses of the *current state of ICT implementation and investment* in Thailand. This is important for ICT decision making as the majority of ICT budgets are spent on '*keeping the lights on*' and maintaining/upgrading infrastructure and applications.

ICT Decision Makers Need Clarity

However, the need for *Digital Transformation* is increasing, and ICT decision makers often don't have time to cut through multiple, confusing, conflicting and biased sources of advice. Importantly, to provide some clarity, this report provides detailed analyses of the ICT Decision Makers' *Business Strategies and associated ICT Strategies; Staffing and Budget intentions and Sourcing considerations*.

DX Drivers, Challenges and Investment Plans

In addition, the report covers, Digital Transformation Drivers, Challenges and Implementation and Investment directions for key digital transformation technologies or strategies being used in Smart Factory environments including: AI, Cybersecurity, Workplace Innovation, ERP and related topics.

A Unique Report

We believe this to be the first Smart Factory survey of this scope and size conducted in Thailand. Almost every aspect of current and future ICT plans and issues have been covered. Taken in their totality they build a comprehensive picture of the issues and challenges facing ICT Decision makers in Thailand now and for the next 12 to 18 months.

DX Technology Matrix and Methodology

Complete details of the DataDriven Digital Transformation Technology Matrix (DXTM) which was used as the framework for development of this research, and the research method and approach are contained at the end of the report.

Executive Overview and Key Findings

Executive Overview and Key Findings

In October 2019, DataDriven conducted this **'State of The Nation: ICT in Thailand 2020'** survey. DataDriven applied 7 levels of exhaustive selection, screening and validation questions, then conducted extensive data scrubbing, and removal of non-representative data and outliers. The result was a highly qualified and reliable set of complete responses from 125 ICT decision makers. 38 respondents from the manufacturing and related industries were then analyzed to produce this report focused on Smart Factory and manufacturing in Thailand.
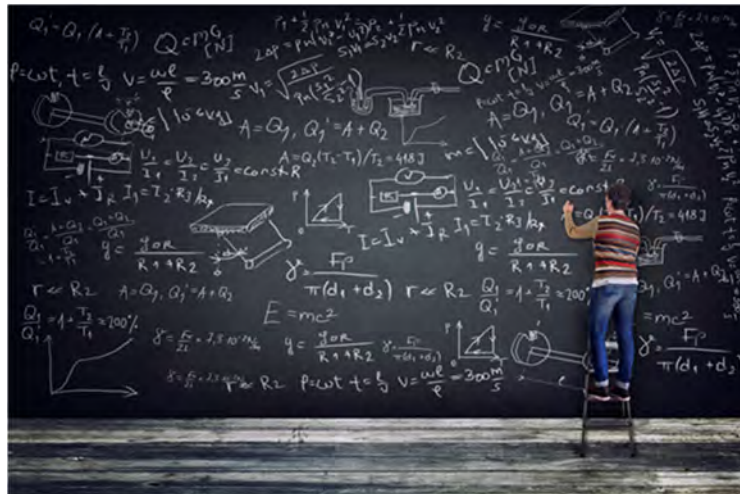
Smart Factory in Thailand Key Findings

The survey asked Thai ICT leaders about their organizations' key business objectives in manufacturing.

- The most important is managing risk, mentioned by 86.5% of respondents. Next came the achievement of budget targets (81.1%) and achieving sales targets and improving processes and productivity, both mentioned by 75.7% of respondents. The biggest strategic challenges are business continuity and disaster recovery (94.6%), cloud security the network access (89.2%), and optimizing and controlling costs (86.5%).
- Thai manufacturing ICT decision makers are quite positive about their budget expectations in the next 12 months. Three quarters (74.5%) are expecting budget increases. The largest increases are expected in sustainability initiatives in manufacturing and digital transformation. Staff numbers and budgets are also expected to rise substantially.

- Manufacturing budgets are affected by many factors, most important of which is technology changes (mentioned by 89.2% of respondents) Other important factors are internal R&D Investment (75.7%) and environmental regulations (73.0%). The most negative impacts are from local politics (48.6%), inflation (43.2%) and the state of the local economy (35.1%).

Digital Transformation in Thai Manufacturing

- Thai manufacturers are generally well advanced on their digital transformation (DX) journey. More than three quarters (78.4%) of their Implementations of DX across the manufacturing process are 'mature with outcomes delivered' or 'well underway'. The most significant DX challenge for Thai manufacturing organizations is procurement of digital technologies and the alignment of existing ICT systems with DX, both rated at 'somewhat challenging' or 'highly challenging' by every single respondent.
- Thai manufacturing organizations mention a range of outcomes from their DX initiatives. Most important is improved efficiency and reduced cost (mentioned by 27.63% of respondents), followed by strengthened competitiveness and transformed business models (both at 17.1%). Three quarters (73.4%) have implemented cybersecurity measures in their manufacturing operations.
- Thai manufacturers report significant progress in the implementation of the Internet of Things (IOT) in manufacturing. More than three quarters (78.3%) of respondents have a mature implementation or are well underway. IOT is being widely used for operations, maintenance and workstyle innovation. One quarter (24.3%) have created a manufacturing IOT roadmap or pilot.

Executive Overview and Key Findings (Cont'd)

- Respondents to the survey were asked about their most important co-creation partners in smart factory/manufacturing. At the top of the list is the organization's customers, mentioned by 91.1% of respondents. Government organizations and technology providers are next, with 86.5% each, followed by consulting firms (83.8%) and channel and sales partners (81.1%). Start-up companies are important co-creation partners for 78.4% of respondents.

- Overall, Thai manufacturing organisations prefer global providers for their ICT manufacturing requirements. Nearly one third (30.4%) prefer a blend of local, regional and global players, and one quarter (24.8%) prefer a regional player. Only 7.6% prefer a local player.
- In general, Thai manufacturing ICT decision makers are 'highly satisfied' or 'very satisfied' or with their manufacturing ICT providers (67.4% of

respondents). Another 30.5% are 'satisfied' with their providers. They are also generally satisfied with their manufacturing recruitment providers (78.4%) and networking and data center services providers (75.7%). They are least satisfied with research and advisory services (58.3%) and telecommunications providers (56.8%).
- In terms of preferred origin for their mission critical manufacturing related ERP applications, third-party off the shelf implementations are preferred by 30.1% of respondents. Outsourced offshore providers are popular with 23.7% of respondents, closely followed by 23.0% for providers outsourced within Thailand.
- Thai manufacturing organizations select their ERP applications with a priority of improving applications security, lower cost of enterprise software and enabling mobile access (all at 86.5%). The next most important criteria are implementing SaaS models to improve agility and improving access to information (83.8%).

Response of Thai Manufacturing IT Decision Makers for DX Challenges

The results of the survey indicate that Thai manufacturing organisations are generally well advanced in the implementation of ICT-based smart factory or manufacturing systems.

They prefer global suppliers and standardized ERP applications and are generally satisfied with their providers. Security is an important issue, as it is in most areas of ICT.

Thai manufacturers are using a range of technologies in many different ways to evolve the manufacturing process. A range of new technologies such as artificial intelligence, robotics, and 3D printing mean that smart factories can be built and operated at a much lower cost and at a much smaller scale than conventional manufacturing facilities.

Smart Factory Overview

Smart Factories

The digital revolution has transformed manufacturing. If mass production was the key technology for 20th-century manufacturing, in the 21st century it is mass customisation.

Smart factories take many forms and use many technologies. These include:

- **Artificial Intelligence**: AI is used throughout smart factories as an enabling technology and to supplement human decision-making. Applications include voice recognition and augmented reality.
- **Robotics**: Robots are the original smart factory technology. They have evolved far beyond the simple automation of processes to include a large variety of self-operating machines.
- **Autonomous Vehicles**: Driverless vehicles are increasingly used in manufacturing and mining in other industries with a high reliance on mobility. Autonomous forklifts are increasingly common.
- **3D Printing:** No longer an interesting prototyping methodology, 3D printing (or additive manufacturing) is being used in an increasing range of manufacturing processes, enabling efficient one off or low volume runs.

- **Computer Numerical Control (CNC)**: This is the reverse of 3D printing and is where digital technology controls the removal of material from a blank to produce a custom-designed part.
- **Wearable Technology:** Technologies like smart glasses and smart gloves can help greatly improve worker productivity and safety.
- **Sensors and The Internet of Things:** RFID has become commonplace in smart factories. A new generation of wireless sensors provide enhanced capabilities throughout the manufacturing process.
- **Big Data Analytics:** Manufacturing, by its nature, generates vast amounts of data. All the techniques of data analytics, including the important new field of predictive analytics, are applicable to the manufacturing process.
- **Computational Simulation:** Massive computational power can stimulate the manufacturing process and the operation of manufactured components without the need for high cost physical testing.
- **Manufacturing Led Design:** A step beyond CAD/CAM, where the manufacturing process feeds into design, rather than the reverse. This ensures a more efficient manufacturing process.

These technologies mean that smart factories can be built and operated at a much lower cost and at a much smaller scale than conventional manufacturing facilities.

They are an important aspect of what is sometimes called the fourth Industrial Revolution, or industry 4.0. The first generation was steam power, the second electricity and mass production and the third the introduction of computers and electronic communications.

The fourth Industrial Revolution refers to the use of the manufacturing technologies referred to above on a large scale. The Smart Factory is the embodiment of these technologies into a practical form and their combination in novel ways to completely transform the manufacturing process.

Thailand Manufacturing: ICT Business Objectives

ICT Business Objectives

ICT Decision makers take their responsibilities for aligning their operations with overall corporate responsibilities very seriously.

We listed 17 potential business objectives for ICT decision makers to consider as priorities and asked them to rate each of them from the lowest score 'not a priority' to the highest score 'extremely high priority'.

We then graphed the findings (showing percent of respondents for each rating for each item) in the bar chart shown. To make it easier to see the relative rankings of each item, we grouped the highest rating with the next highest rating and added the number of respondents together to give us a weighted total. We then sorted the weighted total from highest to lowest and graphed them from top to bottom. All bar charts in this report are sorted using the same method.

On the chart shown here for ICT Business Objectives, this means that we added the number of respondents for each of 'High Priority' and 'Extremely High Priority', and then sorted from highest combined total to lowest.

Managing risk came in at number one with 86.5% of respondents.

81.1% of respondents cited making budget targets and reducing costs as high or extremely high objectives.

Making sales targets improving processes and increasing productivity are next in line with all at 75.7%.

Thailand Manufacturing - Business Objectives
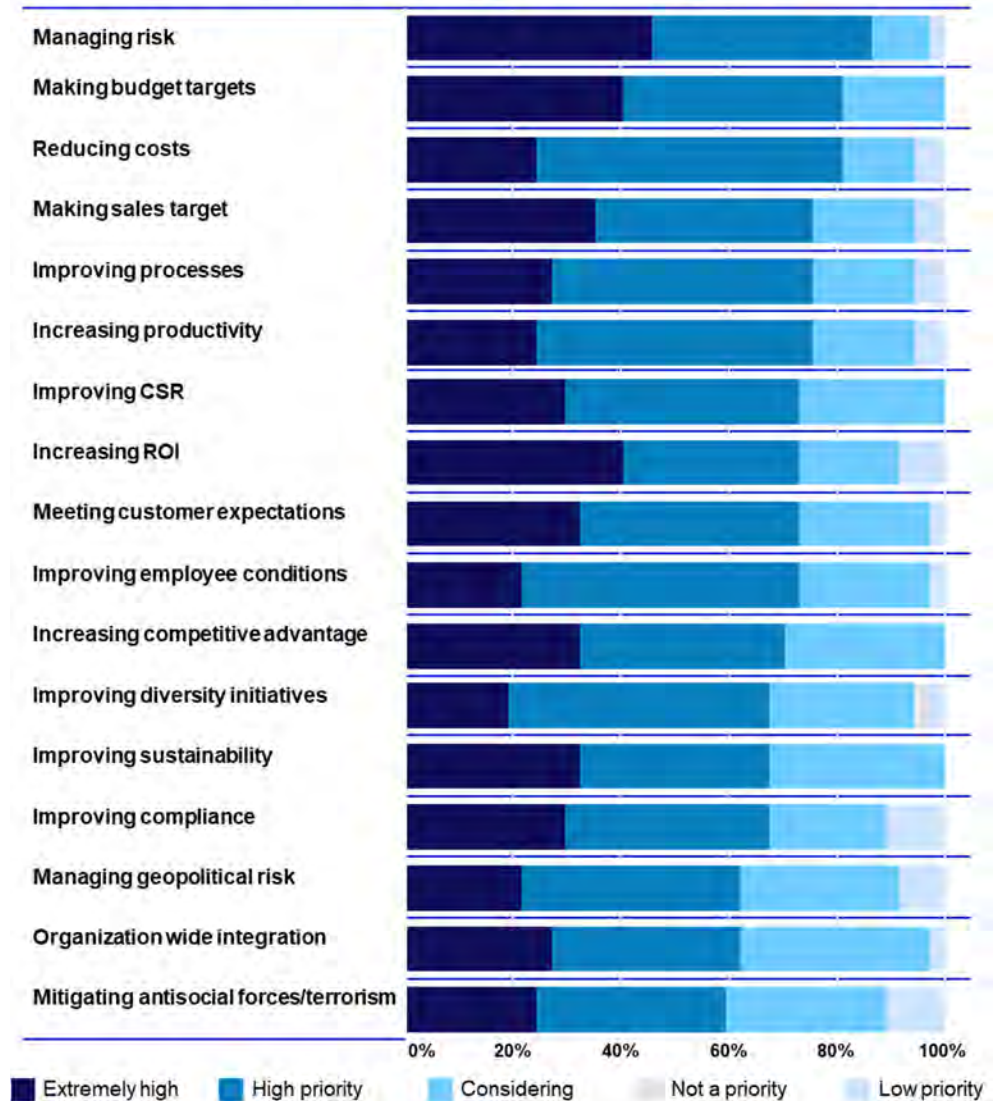
Thailand Manufacturing:
ICT Strategic Challenges

Top ICT Strategic Challenges

Despite the increased requirement for organisations to embrace Digital Transformation, ICT Decision makers are still plagued by a raft of more traditional challenges.

We listed 14 potential ICT challenges and asked the decision makers to prioritise them from 'not on our list' of challenges to 'highly significant' challenges.

We then sorted them from highest to lowest to produce the chart.

Everything we listed came in as highly significant/major significance with no item scoring less than 78.4%.
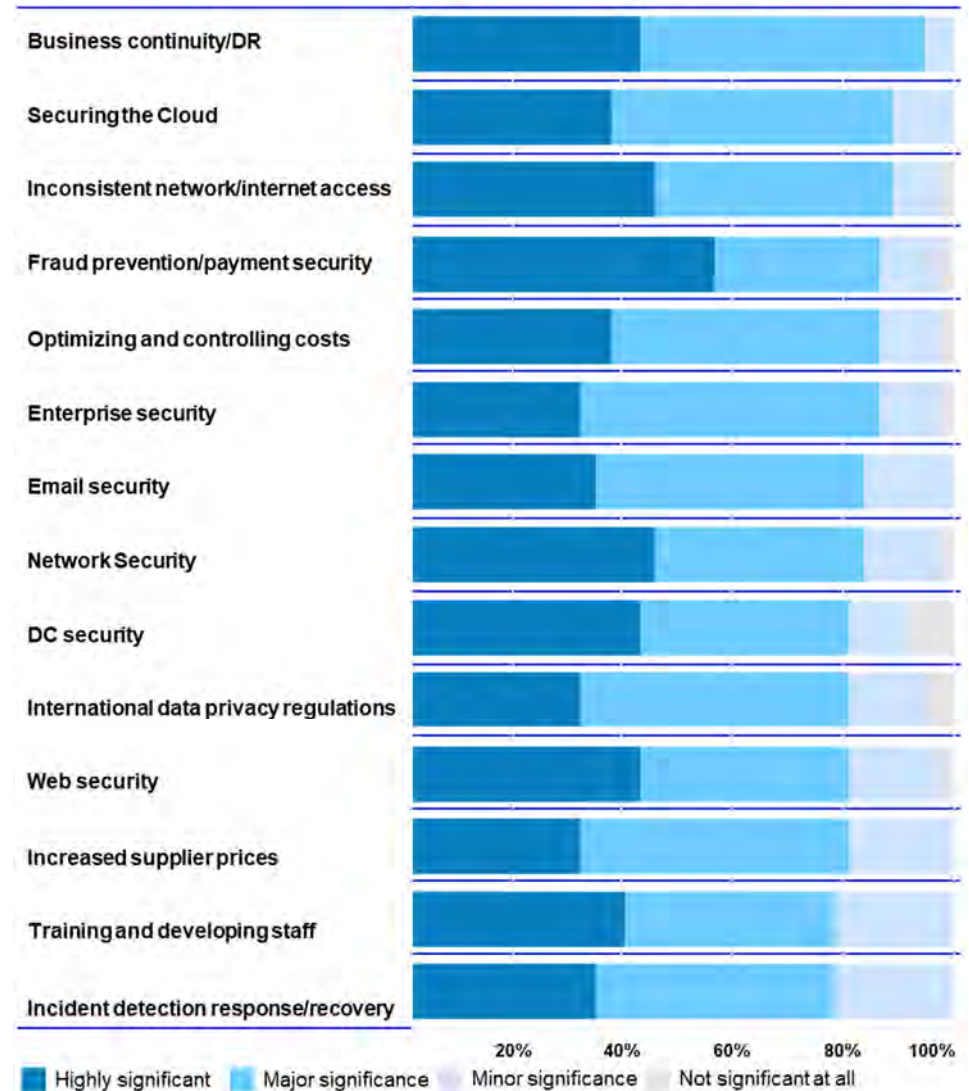
Business continuity/DR is the most significant challenge (94.6%).

89.2% of respondents cited securing the cloud and inconsistent network access as the next most significant challenges.

Fraud prevention/payment security, optimizing and controlling costs and enterprise security followed with all at 86.5% of respondents.

Security related matters are the toughest challenges and appeared eight times in the top ten strategic challenges.

Thailand Manufacturing - ICT Strategic Challenges

Chart categories (top to bottom): Business continuity/DR, Securing the Cloud, Inconsistent network/internet access, Fraud prevention/payment security, Optimizing and controlling costs, Enterprise security, Email security, Network Security, DC security, International data privacy regulations, Web security, Increased supplier prices, Training and developing staff, Incident detection response/recovery

Legend: Highly significant | Major significance | Minor significance | Not significant at all

Thailand Manufacturing:
ICT Budget, Expenditure, Headcount

Thailand Manufacturing
Planned Changes in ICT Budget Next 12 Months

Categories (top to bottom):
- Sustainability initiatives
- Digital transformation
- In-house data center
- Cloud processing
- End user software
- ICT staff permanent
- End user mobile devices
- Enterprise applications
- End user desktop
- Colocated data center
- Communications/networking
- Compliance initiatives
- Outsourcing
- Workplace innovation
- ICT OPEX
- Cloud service(s)
- ICT staff part time
- Training staff
- Overall ICT budget
- ICT CAPEX
- ICT staff contractors

Legend: Large increase | Small-Mod. Incr. | Small- Mod. Dec.. | Large decrease | Stay same

Planned Changes in ICT Budget over Next 12 Months

How do these challenges and considerations translate into reality? How do they affect actual expenditure?

Respondents were asked what changes will take place in their organisation in the next 12 months, in terms of changes to the ICT budget, expenditure in various areas and ICT headcount.

Thai manufacturing ICT decision makers are quite positive about their budget expectations in the next 12 months, with more than 74.5% expecting small to large increases across all categories

22.4% expect an increase of more than 10% across all categories, with over 52% expecting smaller increases of <10%. 20.3% expect budgets to stay the same and 5.1% expect a small decrease.

The largest increases are expected in sustainability initiatives and digital transformation in general, with both at 83.8%.

Strong increases are also expected in the areas of in-house data center, cloud processing (both at 81%) and end-user software and mobile devices (78.4% of respondents).

73% expect OPEX budgets to increase, with 64.9% expecting CAPEX to increase.

On the people side, 78.4% expect strong growth in ICT permanent staff, ICT part time staff (70.3%) and contractors (59.5%).

Thailand Manufacturing: Impacts on Budget

Impacts on ICT Budget

Apart from business objectives and ICT challenges, there are many external factors which have some level of impact on ICT strategies and resultant budgets.

Although we provided a list of 23 potential impacts on ICT budgets in Thailand, all are rated as having some level of positive impact on ICT budgets for the next 12 months.

89.2% indicated that technology changes have the most significant positive impact on their budgets.

R&D investment (75.7%) and environmental regulations (73.0%) are also rated positively by respondents.

Energy costs and price performance of in-house vs outsourced processing are both rated as positive by 70.3% of respondents.

Overall the positive effects far outweigh the negative effects, however there are a few negatives that are significant enough to warrant attention.
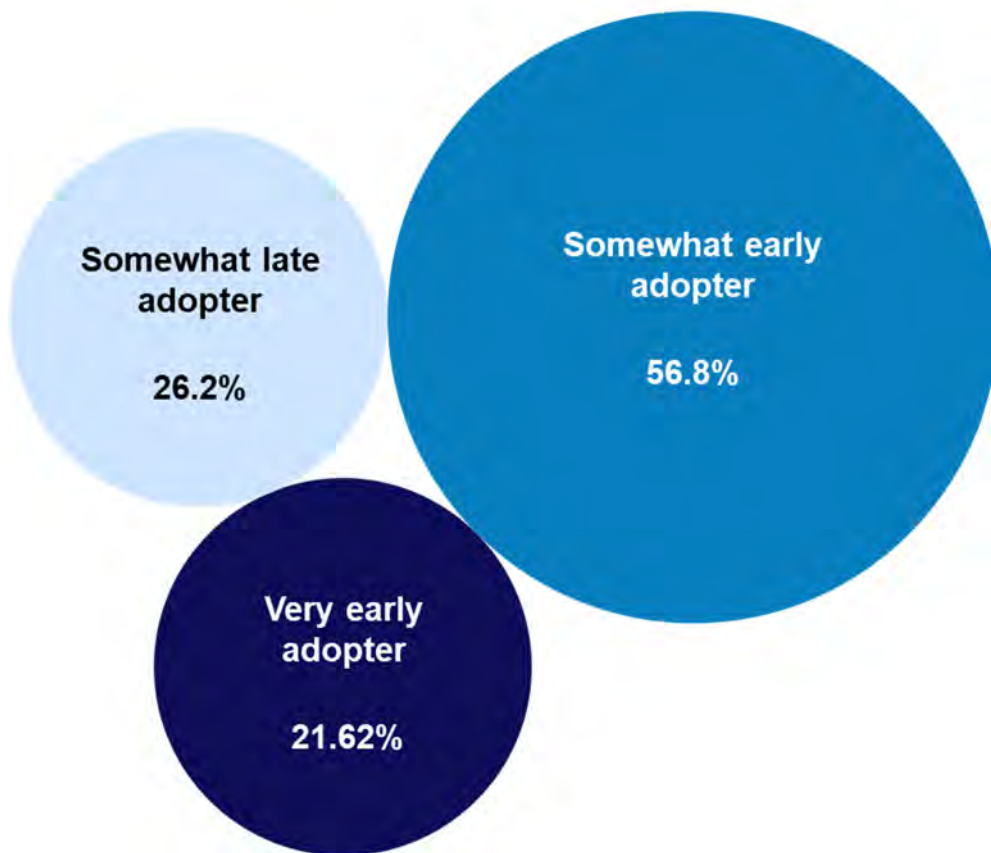
The most negative impact (shown in pink/red) was local politics (48.6%), inflation rates (43.2%), cost of living (37.8%), the local economy (35.1%) and the global economy (32.4%).

Thailand Manufacturing - Impacts on ICT Spending
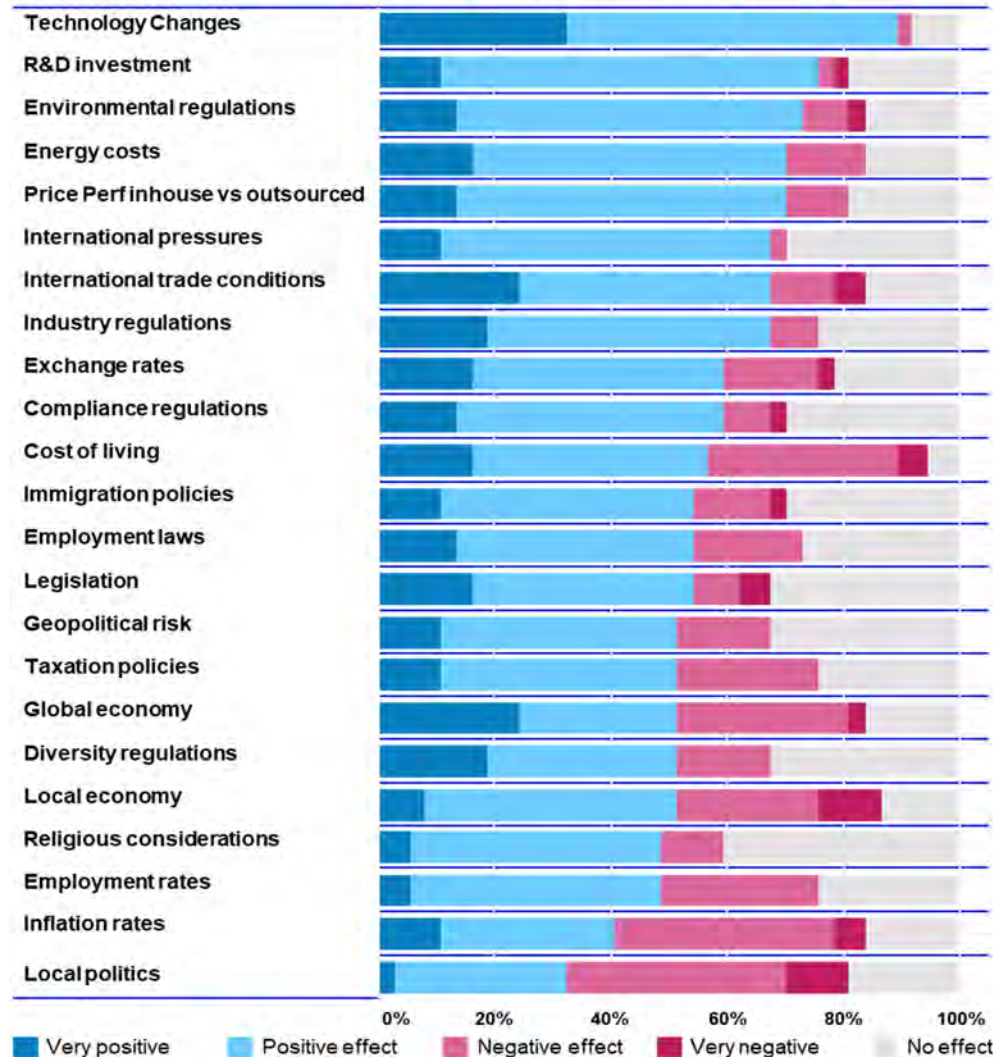
Thailand Manufacturing: Technology Adoption Profile

Thailand Manufacturing - Tech. Adoption Profile

Technology Adoption Profile

Organizations have very different profiles in terms of their level of adoption of new or unproven technology.

We asked each respondent to rank themselves in terms of how they perceive their technology adoption in comparison to their peers.

They were asked to select from:
- Very early adopter
- Somewhat early adopter
- Neither late nor early adopter
- Somewhat late adopter and
- Very late adopter

21.62% of Thai manufacturing ICT decision makers consider themselves to be ahead of the pack as very early adopters.

56.8% consider themselves to be somewhat early adopters, while 26.2% consider themselves to be somewhat late adopters.

No respondents considered themselves to be in the middle of the pack, or at the end (very late adopter).

Digital Transformation (DX) Overview

Digital Technology is Changing the World

The world is changing. Digital technology, in all its forms is transforming business and society. Virtually every area of human activity is being profoundly altered. The most successful people and organisations are those embracing this transformation to build new products and services based on innovative business models enabled by the many technologies that comprise the trend.

The famous Austrian economist Joseph Schumpeter, regarded as the father of the study of innovation, described it as 'creative destruction'. That is what is happening now, all around us. The old ways of doing things are being destroyed. In their stead are rising new ideas, new techniques and whole new industries. In our increasingly digital economy that process is called **Digital Transformation (DX).**

Cloud and IOT

There are many enabling technologies driving this revolution. Foremost amongst them is the Internet, which has allowed levels of communication, connectivity and information sharing unimaginable a few short years ago. It has given rise to the **Cloud**, to the **Internet of Things (IOT)**, and to new ways of delivering and sharing software and services. In a few short decades it has grown from a limited low bandwidth network connecting just a few computers to a universal high-speed matrix covering the whole planet.

AI and Big Data

Another key driver is the range of technologies known collectively as **Artificial Intelligence (AI)**, which are enabling new ways of working, new ways of analysing data, and new ways of using existing technology. Massive advances in computing power have made possible AI technologies like machine learning, robotic process automation (RPA) and predictive data analytics. These techniques enable us to make sense of the vast amounts of information (often called **'Big Data'**) generated by the new technologies of the era of Digital Transformation.

Workplace Innovation

Massive changes are happening all around us. In the workplace, mobile technologies increasingly mean that for the first time in history we are location independent. We are connected anytime and anywhere. Smart phones have transformed many people's lives and have been the most quickly adopted technology in human history. They have also enabled many new applications and new ways of working, driving a whole range of initiatives and technologies, often referred to as **Workplace Innovation,** to improve employee productivity and engagement.

Cybersecurity

Governments at every level are delivering their services digitally and are opening up government data to third parties to help them develop new information-based services. Electronic identity management has become commonplace. These changes are revolutionary. But they are not without cost. New technologies mean new opportunities, bad as well as well as good. In a totally connected world, **Cybersecurity** has become a major issue. It encompasses a range of technologies designed to protect computers and networks from unwelcome intrusion and to ensure their continued reliability.

Digital Transformation is sweeping the world. Its effects are significant, at every level of business and society. The future is here, now.

The DataDriven Implementation vs Investment Matrix (I^2M)
What has Been Implemented and What is Planned?

DataDriven Implementation vs Investment Matrix (I^2M)

When evaluating what technology profile is best for your organization, it is often useful to have information about what other organizations are doing and are planning. To reveal the actual status in your market, DataDriven has developed the Implementation vs Investment Matrix (I^2M).
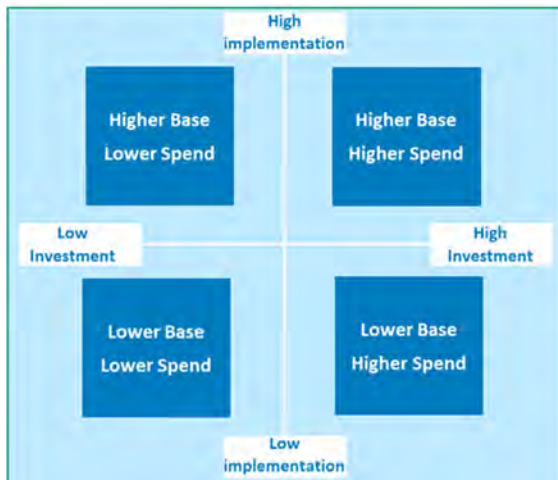
Directly from ICT Decision Makers

As an integral part of our extensive research process, DataDriven surveys hundreds of ICT decision makers in specific markets. We ask respondents to indicate the level of *current technology implementation* (from nothing at all to highly mature) and the level of *planned technology investment* (from none-at-all to major investment plans).

Actual vs Planned Technology Use

Overall results are analysed and expressed as a matrix which maps actual implementation (low to high) against planned investment (low to high). The positioning of technologies within the DataDriven I^2M shows their status relative to each other and is not designed to reflect actual market shares.

## DataDriven I^2M Enables Comparison in One Place

Traditional research analyses often focus on technology market share, market size and forecasts, but this doesn't allow for a useful comparison of the actual organisational level of technology use, or the maturity of organisations' planned technology use. The I^2M allows current and planned implementation and investment for clusters of related technologies to be compared on one chart.

Example Chart for Fictitious Country and Infrastructure Technology

The example chart for Cybersecurity shown here (not for any specific market), compares the level of implementation of various Cybersecurity related technologies with the level of planned investment.
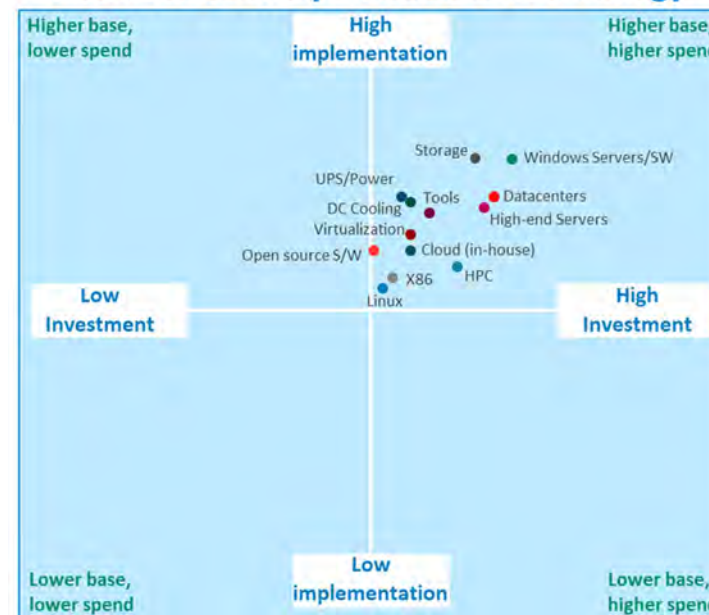
### Use Other DataDriven Tools to Establish Context

The DataDriven I^2M should be used in conjunction with other DataDriven tools such as the DataDriven Hype-Dial and other DataDriven charts and graphs. This will assist in establishing the context of these technologies against business and ICT objectives, as well as budget and implementation plans and the associated challenges.

Thailand Manufacturing – Digital Transformation: Implementation vs Investment Matrix (I^{2}M)

Thailand Manufacturing – DX Initiatives

D | DataDriven Implemented vs Investment Matrix (I^{2}M)
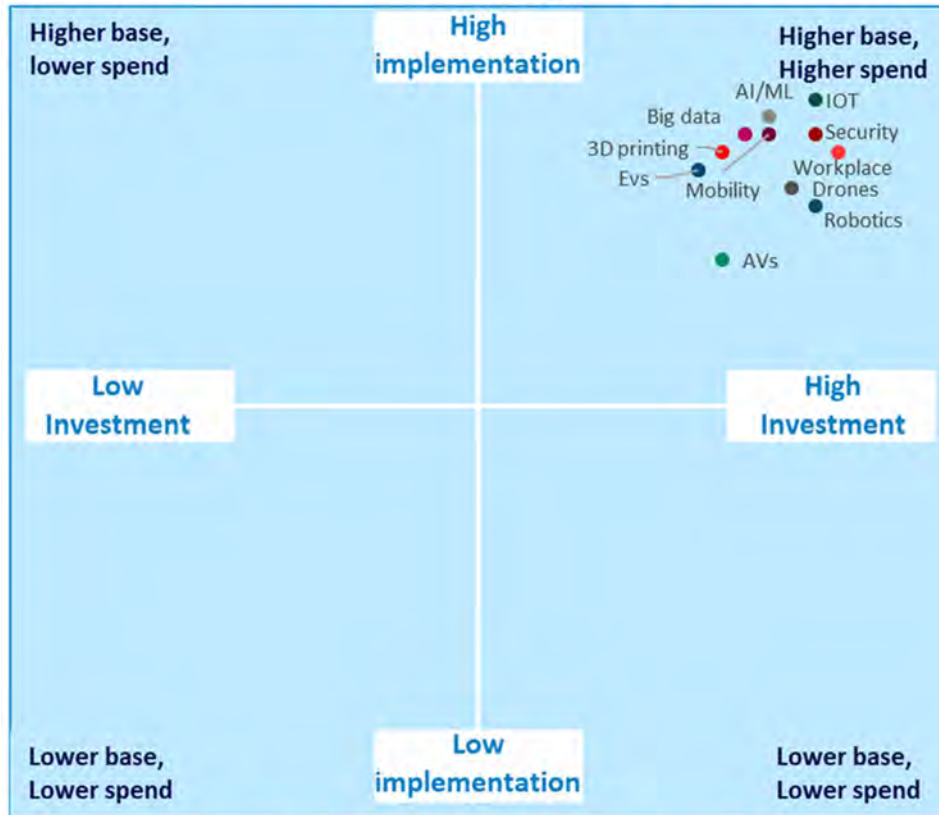
DX Implementation vs Investment Matrix (I^{2}M)

Implementation of digital transformation in the majority of key enabling technologies is at a moderate to high level.

However, AI/machine learning, IOT, big data, mobility and security are all at higher levels of implementation.

Initiatives like 3D printing, workplace innovation, electric vehicles, drones and robotics are still at high levels but slightly less than the others. Autonomous vehicles have moderate levels of investment in relative terms.

Regarding the future IOT, security, workplace innovation, drones and robotics stand to benefit from higher levels of investment.

Although not as high in relative terms, AI/machine learning, mobility, big data and 3D printing also have a high level of planned investment.

This is closely followed by investment in autonomous vehicles and electric vehicles.

Thailand Manufacturing - Internet of Things (IOT): Implementation vs Investment Matrix (I²M)

Manufacturing - IOT Implement. vs Investment Matrix (I²M)

As is expected for manufacturing organizations, IOT technologies are all clustered in the highest levels of implementation, due to it's extreme importance to the industry.

The use of IOT for asset management and tracking, secuirty, workflow management and dash cams has the highest level of implementation. This is closely followed by pick and pack operations, ID management, training (using AR/VR) and staff location (including whether vertical or horizontal/fallen).

Digital twins, predictive maintenance, body cams and staff biometric monitoring all have high levels of implementation.

In terms of future investment security/surveillance systems, picking and packing operations, asset management, workflow applications, ID management and staff monitoring/biometrics lead the pack.

These are closely followed by a cluster consisting of dash cams, staff location, predictive maintenance and body cams.

Digital twins, will also see a moderate level of investment.

Thailand Manufacturing – IOT Initiatives
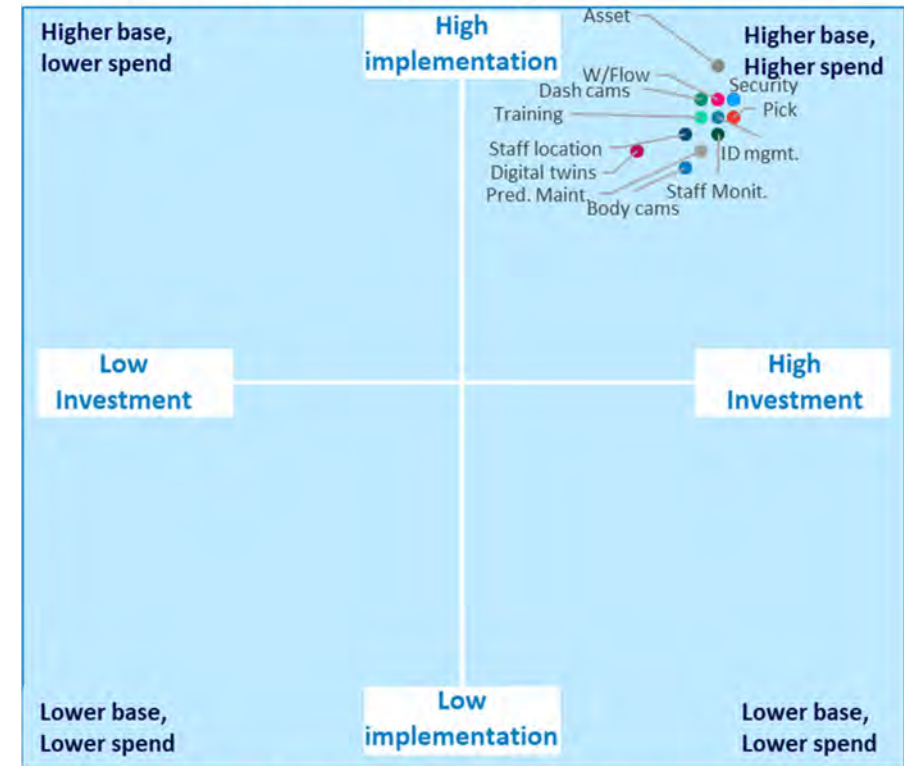
DIDataDriven Implemented vs Investment Matrix (I²M)

Thailand Manufacturing:
DX Outcomes Importance & Overall Outcomes

Importance of Outcomes for DX Programs

Digital transformation is not just about introducing new technologies. Organizations need to have very clear objectives for measurement of their DX success.

We provided respondents with six choices and asked them to indicate the relative importance of their DX programs overall.

Strengthened customer relationships and increased revenue are the equal number one most desired outcomes from DX in Thai manufacturing organisations (1.8% of respondents)

The next desired outcome for 89.2% of respondents is strengthened competitiveness, followed by 83.8% desiring improved efficiency and reduced costs.
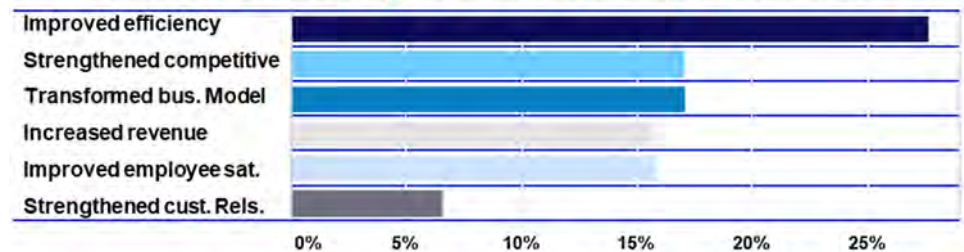
Transformed business models/processes was cited by 81/1%, followed by 78.4% with improved employee satisfaction.

Thailand Manufacturing - DX Outcomes Importance
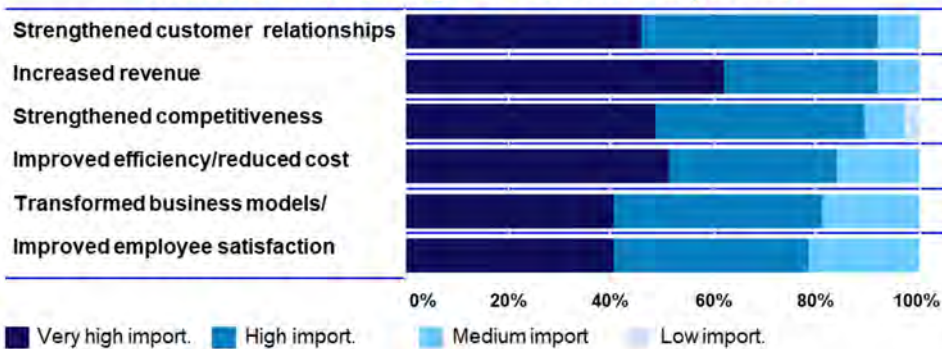
Overall Outcomes for DX Programs

Thailand Manufacturing - Overall Outcomes of DX Initiatives

Thai manufacturing organisations ranked the outcomes of DX as follows:

The number one actual outcome was improved efficiency and cost (27.63% of respondent.) this was first place in terms of desired outcomes.

Followed by strengthened competitiveness and transformed business models (both at 17.15), these are third and fifth in terms of desired outcomes.

Then increased revenue and employee satisfaction (15.8%) and strengthened customer relations (6.6%) these are second and sixth in terms of desired outcomes.

Although Thai IT decision makers indicated that their DX programs achieved outcomes in all areas, they are targeting the actual outcomes achieved are quite different.

Thailand Manufacturing: Progress for Digital Transformation, IOT, AI & Cybersecurity

Overall Digital Transformation Progress for Business Ops

We asked ICT decision makers to identify their progress levels for DX in general across 15 key business operations areas and extracted the key manufacturing related business operations areas as shown on the chart.

Manufacturing DX Progress in General

Many Thai manufacturing organisations are well advanced on the DX journey.

Implementation of DX across manufacturing in general was cited by 78.4% as 'well underway' or 'mature outcomes delivered'.

Workstyle innovation and operations (67.6%) and maintenance/logistics and warehousing (64.9%) are the next most mature in the Thai manufacturing industry.

Manufacturing IOT Progress

An average of 74.3 of respondents are well underway or have mature implementations in the area of IOT for their manufacturing operations overall.

In terms of specific business/operations areas within their organisation, 78.3% are well underway or have mature outcomes from IOT initiatives in the area of manufacturing processes.

IOT for operations, maintenance and workstyle innovation initiatives are next with 75.7% of respondents citing strong progress for all three.

24.3% of respondents have created a roadmap or pilot/proof of concept (POC), and less than 1.5% have not started anything at all in the area of IOT.

Thailand Manufactoring - DX Implementation Progress

Thailand Manufacturing - IOT Progress

Thailand Manufacturing:
Progress for Digital Transformation, IOT, AI & Cybersecurity (Cont'd)

Thailand Manufacturing - AI Progress

Thailand Manufacturing - Cybersecurity Progress
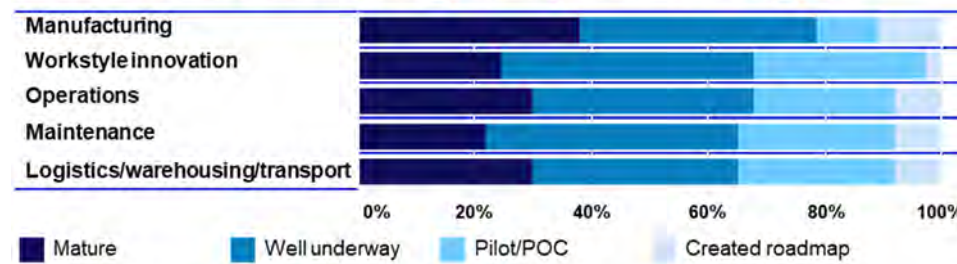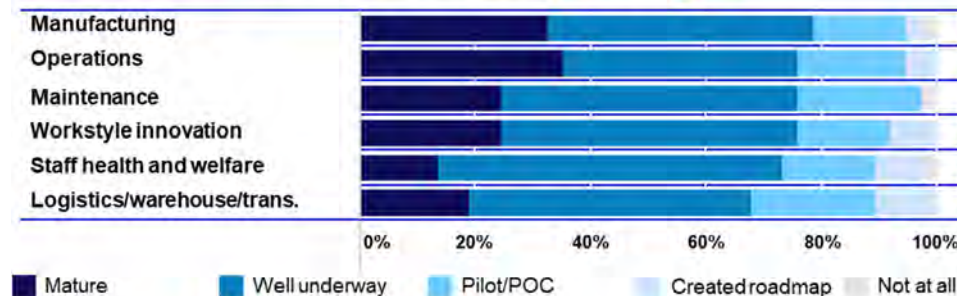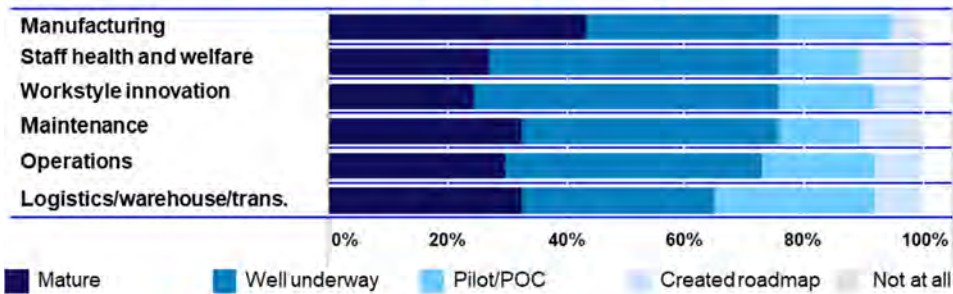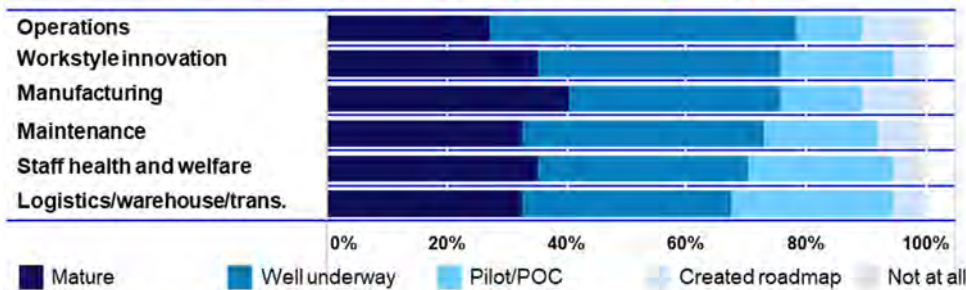
Manufacturing AI Progress

An average of 73.4% of respondents are well underway or have mature implementations in the area of AI for their manufacturing operations overall.

In terms of specific business/operations areas within their organisation, 75.7% are well underway or have mature outcomes from AI initiatives in the area of manufacturing processes, staff health and welfare, workstyle innovation and maintenance.

25.2% of respondents have created a roadmap or pilot/proof of concept (POC), and less than 1.5% have not started anything at all in the area of AI.

Manufacturing Cybersecurity Progress

An average of 73.4% of respondents are well underway or have mature implementations in the area of cybersecurity for their manufacturing operations overall.

In terms of specific business/operations areas within their organisation, 78.3% are well underway or have mature outcomes from cybersecurity initiatives in the area of operations.

Cybersecurity for workstyle innovation and manufacturing processes operations themselves are next with 75.7% of respondents citing strong progress for both.

24.8% of respondents have created a roadmap or pilot/proof of concept (POC), and less than 2% have not started anything at all in the area of cybersecurity.

Thailand Manufacturing:
Digital Transformation Challenges:
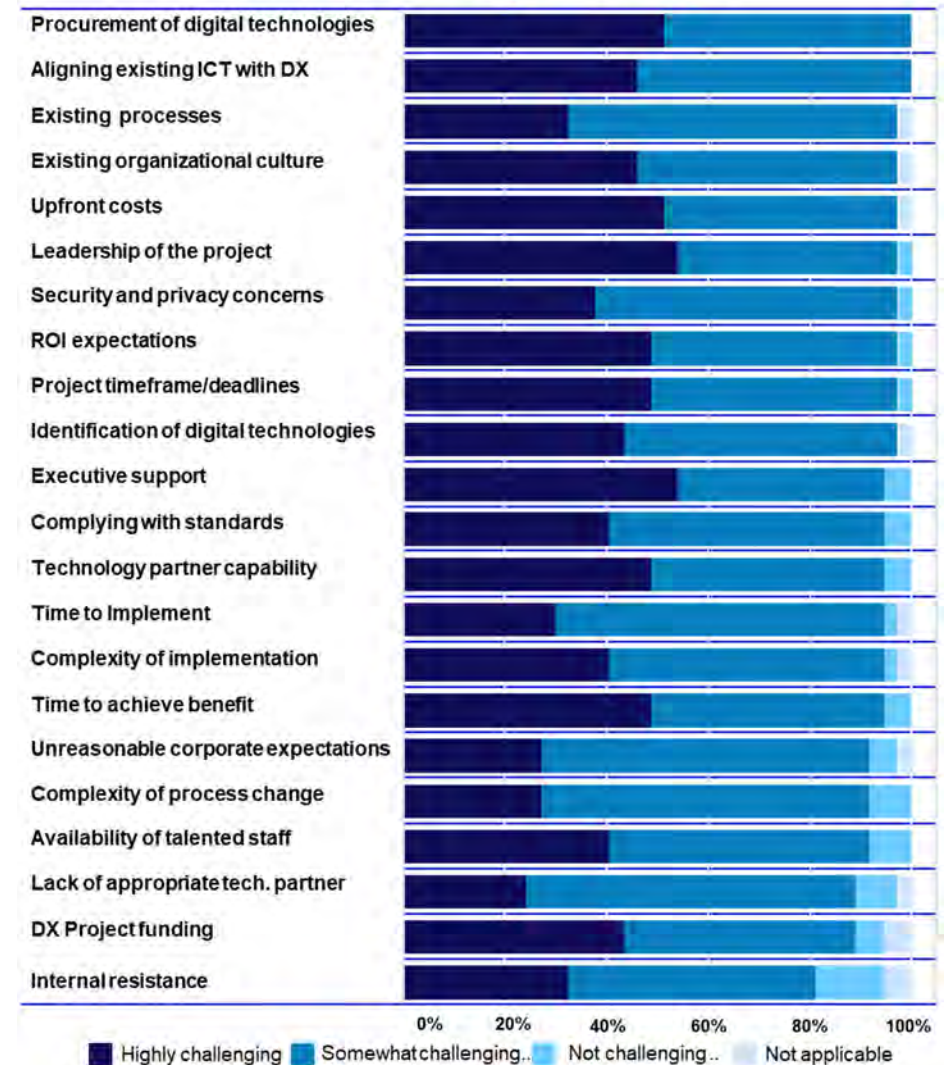
DX Challenges for Manufacturing

We provided respondents with a list of 22 potential challenges for Digital transformation within their organisation and asked them to rank the level of challenge.

Overwhelmingly, and the highest score we have seen in this report series for any Asia/Pacific country, the most significant DX challenge for Thai manufacturing organisations is procurement of digital technologies and aligning existing ICT with DX (both at 100% of respondents).

The next eight challenges (all at 97.3% of respondents) are existing processes, organizational culture, up-front costs, leadership of the project, security and privacy concerns, leadership of the project, ROI expectations, project timeframes/deadline and identification of digital technologies.

In fact, all of the potential challenges we listed are rated as highly challenging or somewhat challenging with very few indicating that anything was not challenging at all or not applicable.

Thailand Manufacturing - DX Challenges

Chart categories (top to bottom):
Procurement of digital technologies
Aligning existing ICT with DX
Existing processes
Existing organizational culture
Upfront costs
Leadership of the project
Security and privacy concerns
ROI expectations
Project timeframe/deadlines
Identification of digital technologies
Executive support
Complying with standards
Technology partner capability
Time to Implement
Complexity of implementation
Time to achieve benefit
Unreasonable corporate expectations
Complexity of process change
Availability of talented staff
Lack of appropriate tech. partner
DX Project funding
Internal resistance

Legend: ■ Highly challenging ■ Somewhat challenging.. ■ Not challenging.. ■ Not applicable

Enterprise Applications/ERP

Enterprise Applications are Core to Business

All enterprises run core application software essential to their business. These include financial software and applications like human resources/human capital management (HR/HCM) and customer relationship management (CRM). They also typically run mission-critical applications like manufacturing, distribution and logistics, and others, depending on their vertical market sector.

Banks and insurance companies run vast client databases. Manufacturers run sophisticated production and asset management systems. Retailers, government agencies, educational institutions, transport companies – organisations in every market sector – run specialised applications that enable them to efficiently run and manage their operations.

Generically These Systems are Referred to as ERP

These important but disparate applications are often called ERP systems. The term stands for Enterprise Resource Planning. It was originally applied to manufacturing systems, but today ERP describes the software at the core of an organisation's business, without which it could not function.

ERP software has evolved significantly since the term first came into widespread use in the 1980s. Major vendors like SAP and Oracle offer sophisticated suites of software that integrate several functions. Other vendors offer 'best-of-breed' applications optimised for a particular purpose or market segment. The implementation, maintenance and efficient management of ERP software is a large industry in its own right. ERP services companies are a major part of the global ICT industry.

ERP is Increasingly Cloud Based

Like all applications, ERP systems are increasingly cloud-based, or use cloud infrastructure for much of their functionality. All the major vendors are migrating their product offerings to the Cloud, using the SaaS (Software-as-a-Service) mode. Many user organisations are following, though the urge to maintain mission-critical systems in-house remains strong. As ERP migrates to the cloud it is changing the business models of both vendors and user organisations. It is also affecting the ERP services market. Cloud computing encourages a pay-per-use subscription model for ERP and other applications, which is changing the structure of the industry. Users are moving their budgets from the CapEx (capital expenditure) to the OpEx (operational expenditure) model, where outgoings are better able to be varied according to use.

ERP Plays a Visible Role Externally

A key change in ERP in recent years has been the imperative to ensure it is outward facing as well as internally focused. It has never been more important to interface with clients, business partners, and the wider community. ERP systems are integral to ensuring the efficient operation of the digital age.

A Giant Interconnected Mission Critical Matrix

ERP, by whatever name, will always be with us. They are called 'mission-critical' applications for a very good reason. The organisation's core business functions are non-negotiable. Without them the organisation will cease to function. They need to be robust and flexible, and capable of meeting the demands of changing technologies, economics and business conditions. In this increasingly connected world, ERP extends beyond the enterprise. Modern ERP systems are interconnected in a giant business matrix that enables a world of global commerce

Thailand Manufacturing – ERP: Implementation vs Investment Matrix (I^{2}M)
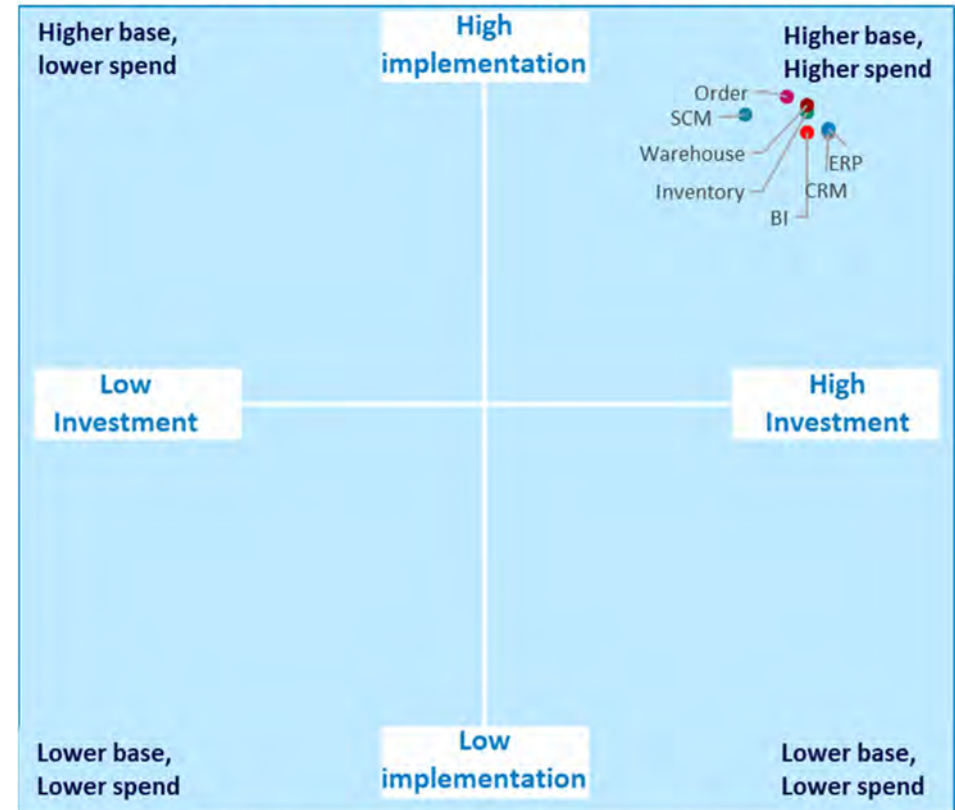
ERP Implementation vs Investment Matrix (I^{2}M)

ERP applications of all kinds are considerd mission-critical to manufacturing organisations, which is where they mostly originated. All are at very high levels of existing implementation.

Order entry systems, warehousing, supply chain management (SCM) and inventory systems lead the pack in terms of implementation. However these are very closely followed by specific ERP (enterprise resources planning) systems, CRM (customer relationship management) and BI (business intelligence) which in general includes big data and analytics of all kinds.

Future investment plans in the ERP area are also aggressive with very high levels of investment planned for ERP, CRM, warehouse, inventory and BI.

Investment in order entry and SCM is also anticipated at a high level.

Thailand Manufacturing – ERP Initiatives

Implemented vs Investment Matrix (I^{2}M)

Thailand Manufacturing - ERP: Progress

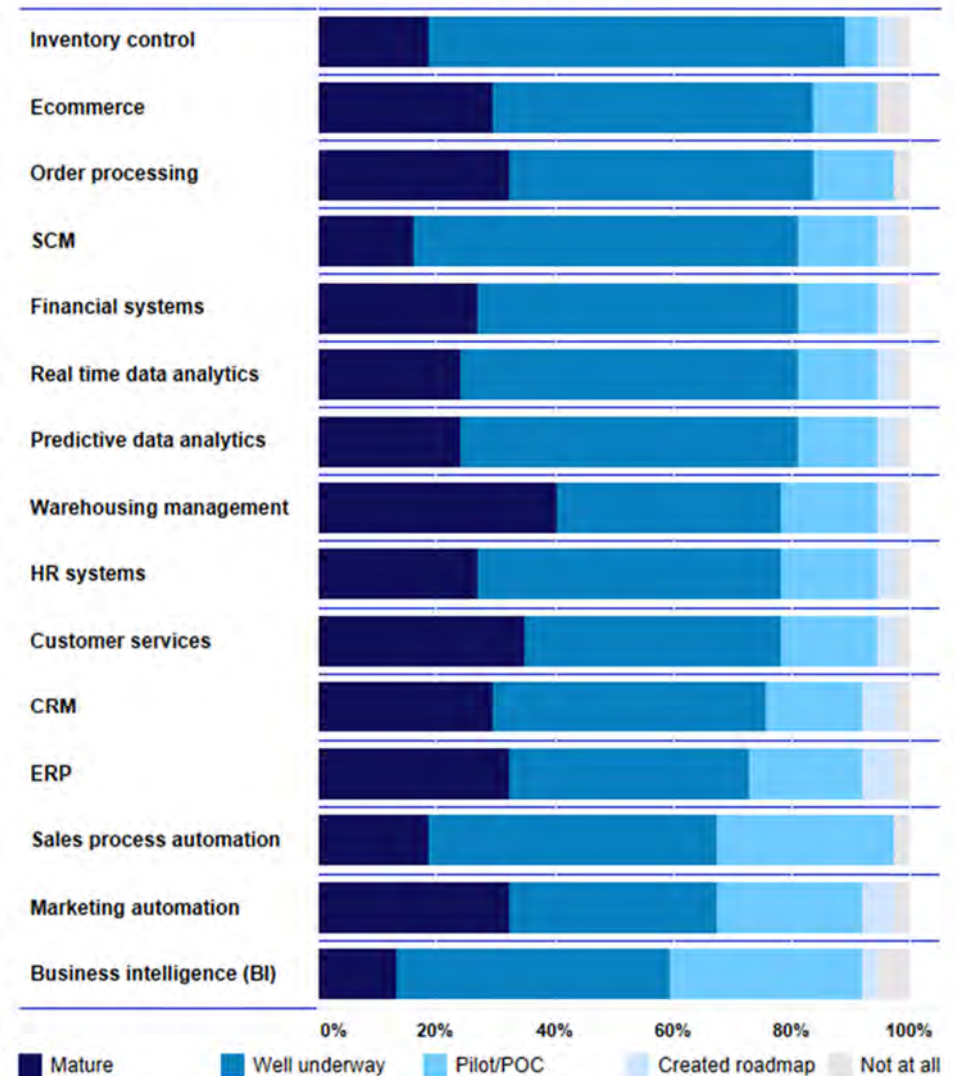## Manufacturing – ERP: Progress for Business Operations

We asked ICT decision makers to identify their progress levels for ERP across 15 key business operations areas.

Most stated that they are making progress with programs that are well underway or mature and outcomes delivered in the areas of inventory control (89.2), Ecommerce and order processing (both at 83.8%).

Progress in the areas of SCM, financial systems, real time data analytics and predictive data analytics also rate highly in terms of mature outcomes or initiatives which are well underway (all at 81.1%)

Overall 77.3 of respondents have made progress in at least one area, with another 19.7% having conducted a pilot or at least created a roadmap. However 3.1% have not started anything at all.

Thailand Manufacturing - ERP Implementation

Categories (top to bottom): Inventory control, Ecommerce, Order processing, SCM, Financial systems, Real time data analytics, Predictive data analytics, Warehousing management, HR systems, Customer services, CRM, ERP, Sales process automation, Marketing automation, Business intelligence (BI)

Legend: Mature | Well underway | Pilot/POC | Created roadmap | Not at all

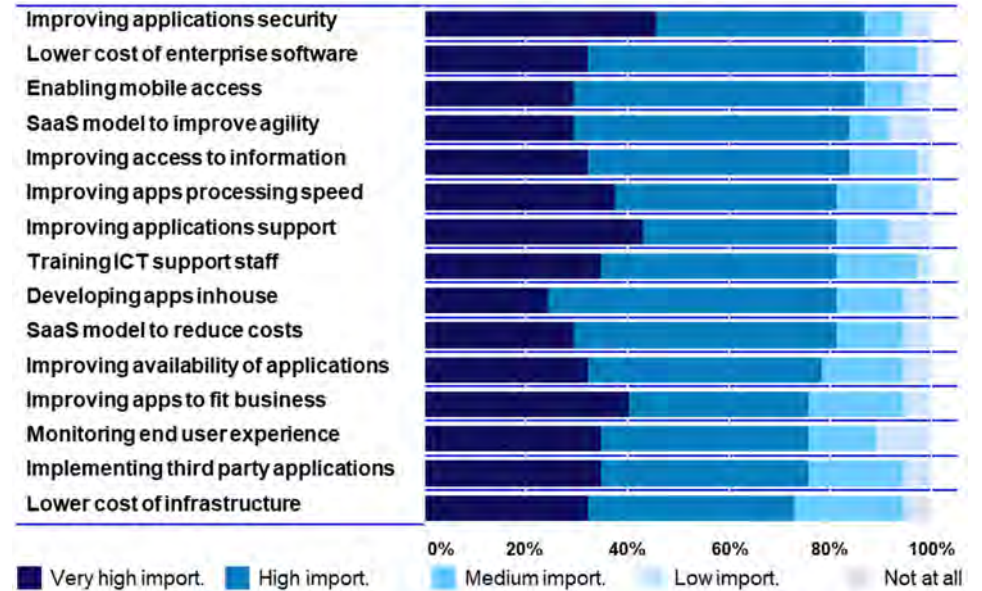# Thailand Manufacturing – ERP: Selection Criteria

Manufacturing - ERP Selection Criteria

Thai manufacturing organizations select their ERP applications with a priority on improving applications security, lowering the cost of enterprise software, and enabling mobile access (all at 86.5%).

The next most important criteria are implementing SaaS Models to improve agility and improving access to information (83.8%).

These are closely followed in importance by improving applications processing speed, improving applications support, training ICT support staff, developing applications inhouse and applying SaaS models to reduce costs (all at 81.1%).

Thailand - ERP Selection Considerations

Improving applications security	
Lower cost of enterprise software	
Enabling mobile access	
SaaS model to improve agility	
Improving access to information	
Improving apps processing speed	
Improving applications support	
Training ICT support staff	
Developing apps inhouse	
SaaS model to reduce costs	
Improving availability of applications	
Improving apps to fit business	
Monitoring end user experience	
Implementing third party applications	
Lower cost of infrastructure	

0%   20%   40%   60%   80%   100%

■ Very high import.   ■ High import.   ■ Medium import.   Low import.   Not at all

Thailand Manufacturing: Preferred Digital Co-Creation Partner Types

Manufacturing – Preferred Digital Co-Creation Partners

In common with most answers for this part of the survey across Asia/Pacific the most important co-creation partners are customers with 91.1% of respondents citing this.
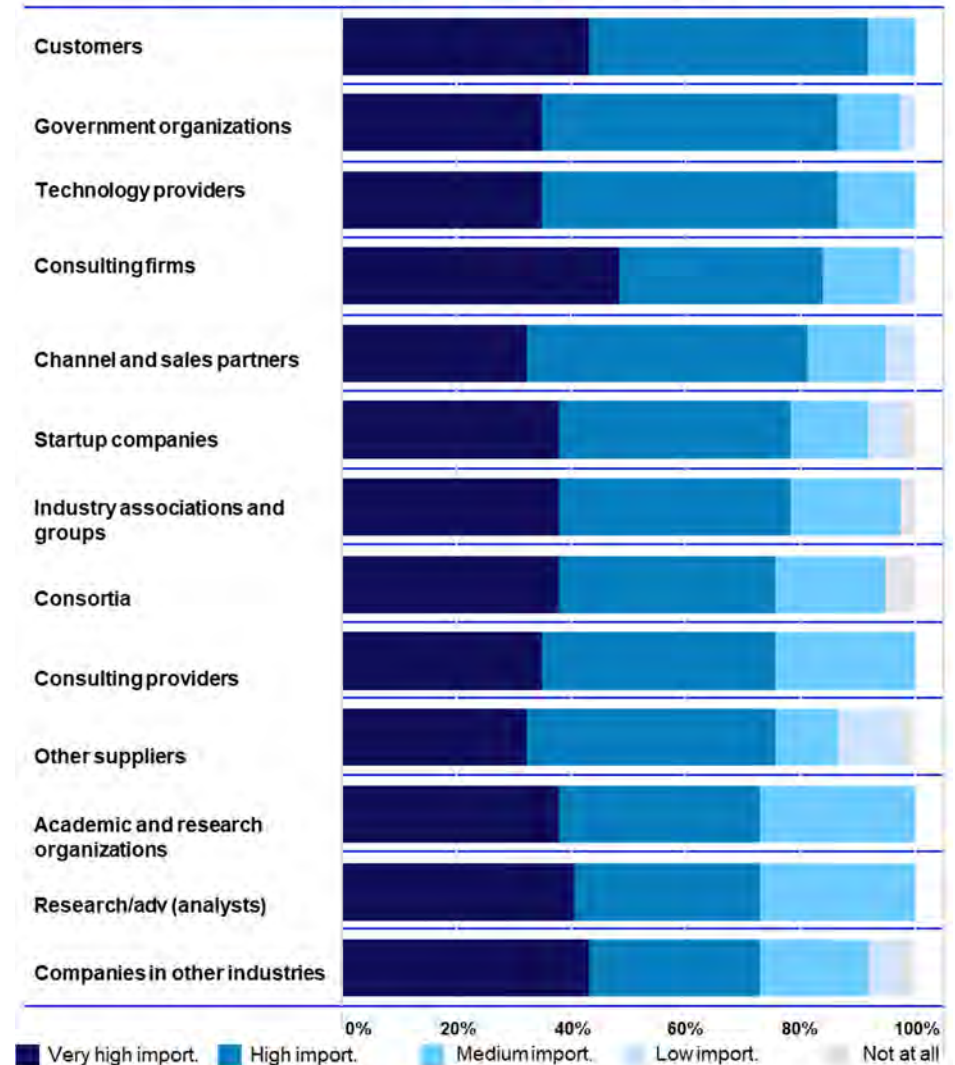

Government organizations and technology providers are next with 86.5% each.

Followed by consulting firms (83.8%) and channel and sales partners (81.1%).

Interestingly start-up companies are also seen as important co-creation partners by 78.4% of respondents.

Thailand Manufacturing - DX Partner Importance

Chart categories (top to bottom):
- Customers
- Government organizations
- Technology providers
- Consulting firms
- Channel and sales partners
- Startup companies
- Industry associations and groups
- Consortia
- Consulting providers
- Other suppliers
- Academic and research organizations
- Research/adv (analysts)
- Companies in other industries

Legend: Very high import. | High import. | Medium import. | Low import. | Not at all

Axis: 0% 20% 40% 60% 80% 100%

Thailand Manufacturing: Preferred ICT Provider Origin

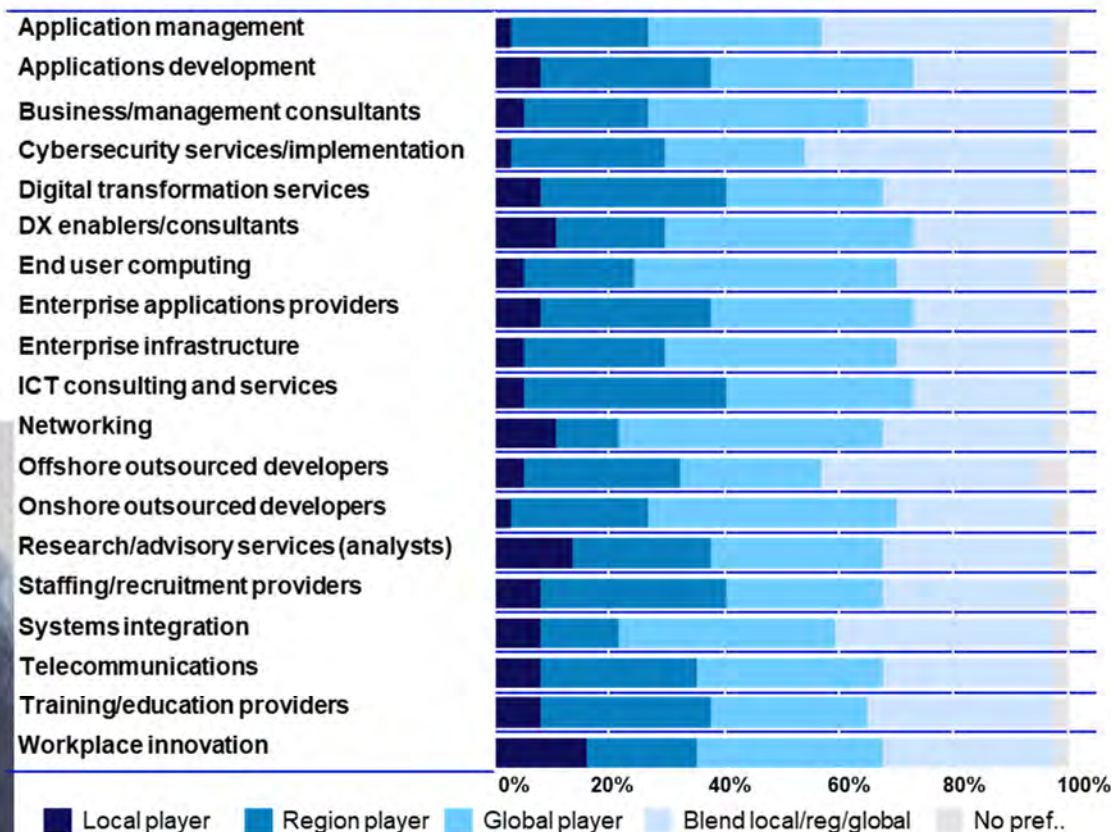## Manufacturing – Preferred ICT Provider Origin

Overall, Thai manufacturing organisations prefer global providers for their ICT requirements.

30.4% prefer a blend of local/regional/global players.

24.75% prefer a regional player, with only 7.6% preferring a local player.

Thailand - Preferred ICT Provider Origin

Application management
Applications development
Business/management consultants
Cybersecurity services/implementation
Digital transformation services
DX enablers/consultants
End user computing
Enterprise applications providers
Enterprise infrastructure
ICT consulting and services
Networking
Offshore outsourced developers
Onshore outsourced developers
Research/advisory services (analysts)
Staffing/recruitment providers
Systems integration
Telecommunications
Training/education providers
Workplace innovation

0%   20%   40%   60%   80%   100%

Local player   Region player   Global player   Blend local/reg/global   No pref..

Thailand Manufacturing:
Satisfaction with Types of ICT Providers

Manufacturing - Overall Satisfaction with ICT Providers

Service levels for different types of ICT providers can vary widely. We listed 22 provider types and asked respondents to provide a satisfaction level - from 'not used at all' to 'highly satisfied'.

In general, Thai manufacturing IT decision makers are 'very satisfied' or 'highly satisfied' with the ICT providers in general (67.4% of respondents).

Another 30.5% are satisfied with their providers.

In terms of the highest satisfaction levels 78.4% are very or highly satisfied with their staffing recruiting providers.

Networking and data center services providers are also highly rated by respondents (75.7%).

The providers that respondents are least satisfied with are research/advisory services (58.3%) and telecommunications providers (56.8%).

Thailand Manufacturing - Satisfaction with ICT Providers
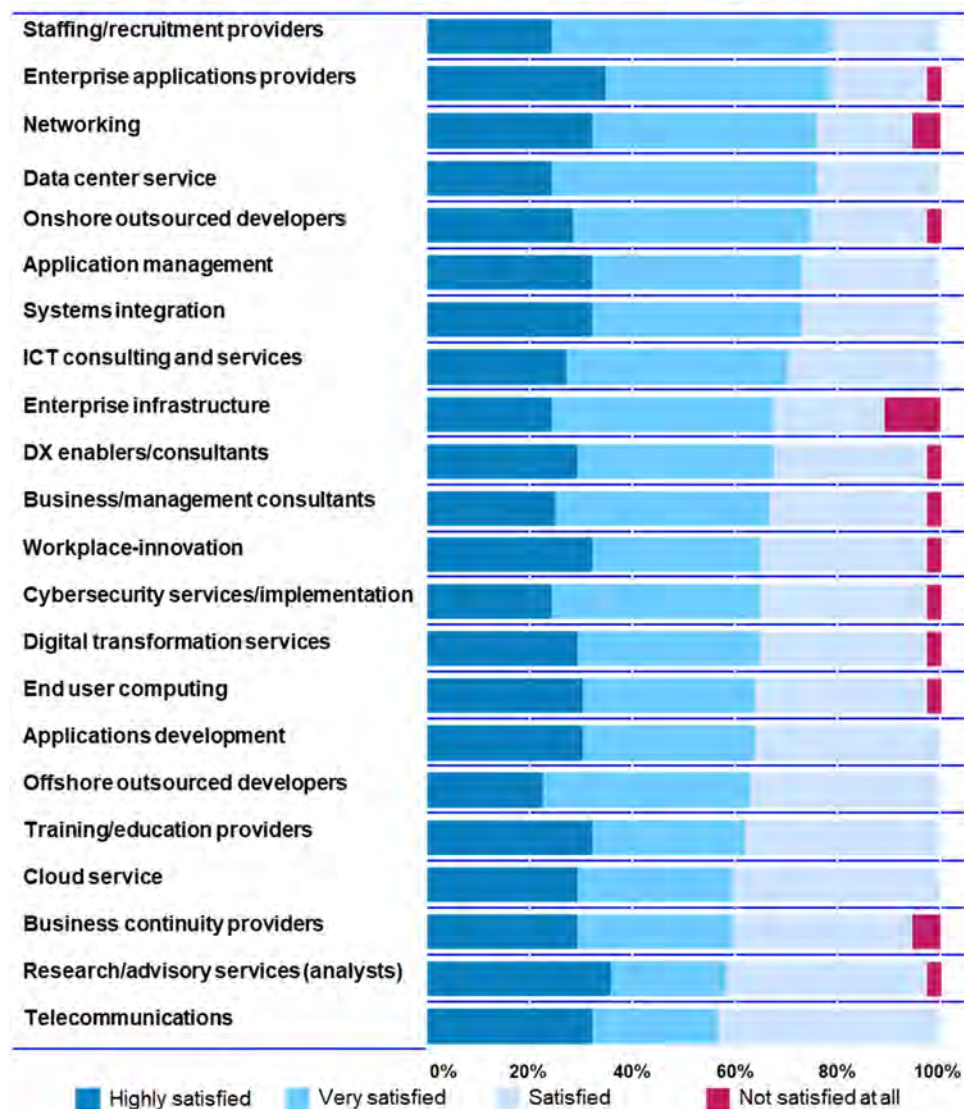
Conclusion

Conclusion

The digital revolution has transformed manufacturing in Thailand and globally. If mass production was the key technology in 20th-century manufacturing, in the 21st century it is mass customization.

A range of new technologies such as artificial intelligence, robotics, and 3D printing mean that smart factories can be built and operated at a much lower cost and at a much smaller scale than conventional manufacturing facilities.

Managing risk is the biggest concern for Thai manufacturers

The most important business objective for Thai manufacturing organizations is managing risk, mentioned by almost all respondents to the survey.

The biggest strategic challenges are business continuity and disaster recovery, cloud security network access and optimizing and controlling costs.

Thai ICT decision makers are generally positive about their budget expectations in the next 12 months

Three quarters of Thai manufacturing organizations are expecting budget increases in the next year. The largest increases are expected in sustainability initiatives in manufacturing and digital transformation. Staff numbers and budgets are also expected to rise substantially.

Digital transformation is a reality in Thai manufacturing

Thai manufacturers are generally well advanced on their digital transformation (DX) journey. More than three quarters of their Implementation of DX across the manufacturing process is 'mature with outcomes delivered' or 'well underway'. The most significant DX challenge for Thai manufacturing organizations is procurement of digital technologies and the alignment of existing ICT systems with DX, both rated at 'somewhat challenging' or 'highly challenging' by every single respondent.

Thai manufacturers report significant progress in IOT

More than three quarters of respondents to the survey have a mature implementation of IOT or are well underway. IOT is being widely used for operations, maintenance and workstyle innovation. One quarter have created a manufacturing IOT roadmap or pilot.

Thai Manufacturers are Relatively Well Advanced

The results of the survey indicate that Thai manufacturing organisations are generally well advanced in the implementation of ICT-based manufacturing systems. They prefer global suppliers and standardized ERP applications and are generally satisfied with their providers. Security is an important issue, as it is in most areas of ICT. Thai manufacturers are using a range of technologies in many different ways to evolve the manufacturing process.

The Thai manufacturing industry is well positioned to handle the future and further developments in Smart Factory technology and strategies.

DataDriven Digital Transformation Technology Matrix (DXTM)

DataDriven Digital Transformation Technology Matrix (DXTM)

DataDriven has developed a proprietary taxonomy of technologies and trends to ensure consistency of terminology. The DataDriven Digital Transformation Technology Matrix (DXTM) provides a comprehensive model for our research focus.

DXTM comprises five user groups, from individual to the wider society:

- **Individual**: The effect of Digital Transformation on individuals, at work and in their personal lives.
- **Workplace**: The effect of Digital Transformation on individuals and workgroups within the workplace.
- **Intra-Enterprise**: The effect of Digital Transformation on business practices and business models within the organization.
- **Extra-Enterprise**: The effect of Digital Transformation on the way the organization interacts with other organizations.
- **Society**: The effect of Digital Transformation on the economy, government and the wider community.

Four major classes of application or technology are overlaid on these five groups. Some of these have their primary effect on only one level, some affect two or more. The four technology areas are:

- **Platforms & Connectivity**: Technologies which enable individuals and organizations within each level to communicate and interact with others at their level and beyond. At the base are the underlying connectivity technologies – Cloud / Internet / 5G / Comms infrastructure/Hardware & Software Platforms – which sit across all five user groups and are the key enablers of the interconnected world at every level.
- **Productivity**: Technologies which enable and increase the productivity across functions at every level and across levels.
- **Cybersecurity**: Technologies which prevent unwanted intrusions, and which enable the efficient and continued operation of the other technology areas.
- **Artificial Intelligence**: Machine based technologies which enable new applications through the simulation of human reasoning.

Sustainability/Corporate and Social Responsibility (CSR) are increasingly critical considerations at all levels, and this aspect also overlays the four major classes of application and technology.

Industry Verticals have differing levels of technology uptake and maturity and are therefore specifically included in the research focus.
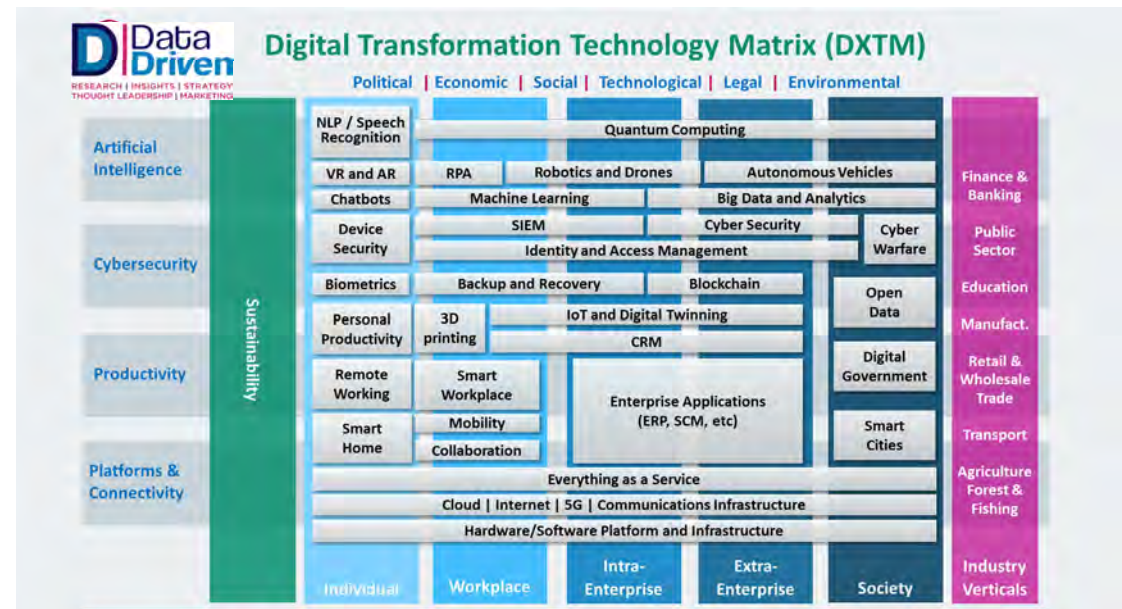
DataDriven Research Approach Based on DXTM

DataDriven Research Approach

The DataDriven Digital Transformation Technology Matrix (DXTM) enables us to clearly identify key technologies and the groups they affect. We discover the trends in each area through primary research – comprehensive and intensive large-scale surveys of ICT decision makers across major industry sectors.

Demographic analysis then allows us to measure and compare the effect of each technology in each industry sector, and also to compare their impact across different sizes of organization and different countries.

Primary research of this nature is based on what the **users** of the technology are thinking and doing. This quantitative analysis is complemented by qualitative research based on interviews with key players in the user and vendor communities.

This proven methodology offers insights simply not available with secondary research. It is the users of technology that ultimately determine the success and speed of its implementation.
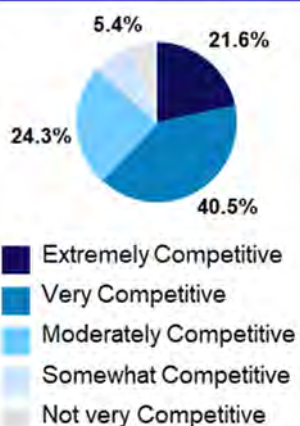
When predicting futures there is no substitute for asking the users of the technology about their attitudes, behaviours and intentions.

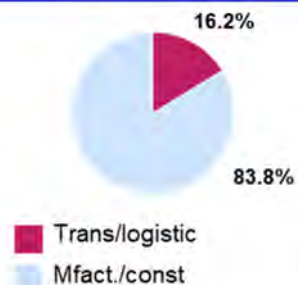# Demographics – 38 Thai Manufacturing Organizations

Exhaustive Data Collection Process and Demographics for This Report

Thousands of potential respondents were contacted across Thailand, with the aim of identifying over 100 key ICT Decision makers. DataDriven applied 7 levels of exhaustive screening and validation questions, then conducted extensive data scrubbing and removal of non-representative data and outliers using SPSS. The result was a highly qualified and reliable set of complete responses from 125 ICT decision makers. The responses from 38 manufacturing and related organizations were then extracted and analysed to produce this report. These responses have been summarised in the above report. Key demographic splits are shown below.
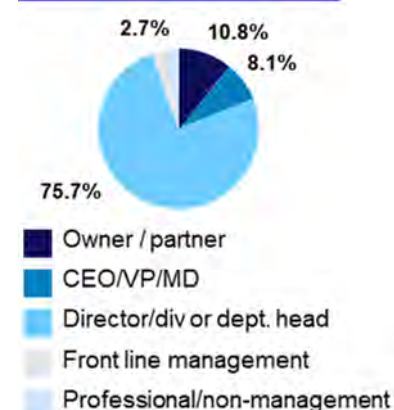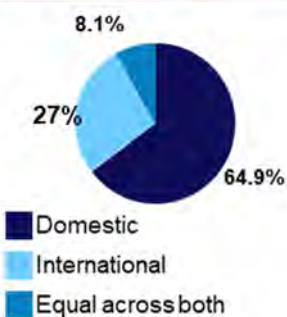
Competition Intensity

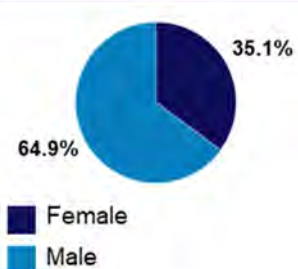- 21.6% Extremely Competitive
- 40.5% Very Competitive
- 24.3% Moderately Competitive
- 5.4% Somewhat Competitive
- Not very Competitive

Industry Grouping

- 16.2% Trans/logistic
- 83.8% Mfact./const

Employee Level

- 2.7% Owner / partner
- 10.8% CEO/VP/MD
- 8.1% Director/div or dept. head
- 75.7% Front line management
- Professional/non-management

Competition Source

- 8.1% Domestic
- 27% International
- 64.9% Equal across both

Gender

- 35.1% Female
- 64.9% Male

Age
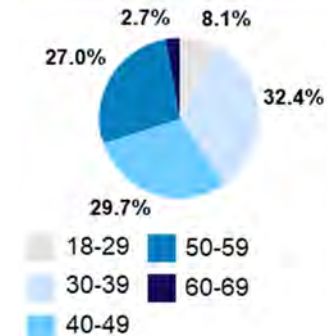
- 2.7% 8.1%
- 27.0%
- 32.4%
- 29.7%
- 18-29
- 30-39
- 40-49
- 50-59
- 60-69

How to Contact Us

Acknowledgement to ICT Decision Makers

DataDriven would like to thank the many hundreds of people and organizations involved in the production of this report. We would particularly like to thank the ICT decison makers/CIOs and senior IT managers who responded to the survey upon which it is based. We appreciate the many time constraints they face, and without their assistance the exercise would not have been possible.

About Fujitsu

Fujitsu is the leading Japanese information and communication technology (ICT) company, offering a full range of technology products, solutions and services. Approximately 140,000 Fujitsu people support customers in more than 100 countries. We use our experience and the power of ICT to shape the future of society with our customers. Fujitsu Limited (TSE:6702).

For further information, please see http://www.fujitsu.com

Copyright information

About DataDriven

DataDriven is an Asia/Pacific based Research and Advisory services company specialising in the areas of ICT Strategy for technology users and providers, Research-based Thought Leadership, Market and Competitive Intelligence, and Marketing and Technology Strategy consulting projects.

DataDriven is also highly experienced in the area of Cross-Cultural Communications and Leadership, Managing Virtual Teams across multiple geographies and runs training and workshops in these areas. In addition DataDriven associates are skilled at the delivery of presentations at events ranging from facilitation of small C-level roundtables, through to 'big-tent' major keynotes with audiences in the thousands.

With a combined ICT market experience of over 120 years, DataDriven associates have supported hundreds of ICT providers and other private and public sector organizations. DataDriven has successfully executed projects globally, but has a particularly strong focus on Asia/Pacific and Japan.

RESEARCH | INSIGHTS | STRATEGY
THOUGHT LEADERSHIP | MARKETING

@ datadrivenservices.com.au
✉ craig.baty@datadrivenservices.com.au
🐦 @CraigBaty
in linkedin.com/in/craigbaty/

For further information email: Info@datadrivenservices.com.au