DIGITAL TECHNOLOGIES IN THE TAX INDUSTRY: THE CASE OF VAT

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SYNOPSIS

This paper presents a case explaining how digital technologies can be applied in tax administrations to create new capabilities that are geared towards improving compliance, efficiency, and increased revenues. The case specifically focuses on Value Added Tax and shows that digitization of this tax should begin with taxpayer recruitment and return processing. The paper relies on evidence from countries that have started the journey of digitization to build a case of digitization that can be applied in any tax administration. Its main contribution is that artificial intelligence can deliver positive results in terms of taxpayer-tax agency engagement.

CONTENT

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INTRODUCTION

Taxation is one of the oldest method used by governments to raise revenues to cater for public debts. Ancient history show records of taxes paid, Taxes in the ancient world (2002). However, Value Added Tax (VAT) is relatively new form of taxation introduced in the 20th century, Ebril, Keen, Bodin, and Summers (2001). In France, VAT was introduced in 1954 (Charlet and Owens 2010). Adoption of VAT across different countries was facilitated by different factors including trade agreements or trading blocs, and need for financial development assistance. Member countries in the European Union had to adopt VAT quickly since it was a prerequisite for members of the trading block while in other countries the adoption was driven by the support of International Monetary Fund (IMF), Charlet and Owens (2010). 160 countries in the world have implemented VAT and more countries are preparing to adopt VAT, Ministry of Finance Malaysia. The standard VAT rate charged in different countries vary from 1.5% to 27%, See Appendix 1. This relatively new tax has been argued to be the most effective tool that governments have at their exposure to generate revenues (Go, Kearney, Robinson, and Thierfelder 2005). VAT is computed ad valorem on select goods and some services. The tax bands for VAT vary and some countries have goods and services that are exempt from VAT, while others have a VAT rate of zero percent.

Administration of VAT can be classified into two different categories. First, VAT on imports is usually assessed, and collected by the customs during declaration and clearance of imported goods. The amount of VAT payable at importation is computed based on the customs value of the goods. Determination of customs value is based on the existing customs tax laws and procedures, but generally, includes a summation of price paid or payable on the goods, freight charges, marine insurance, and costs directly attributable to the goods. Secondly, VAT on goods sold within a country is assessed at the point of sale and VAT payable to the government is the difference between VAT on sales and VAT on purchases. To simplify VAT administration process, tax administrations have employed information technologies that range from registration of taxpayers, automation of VAT return process, and deployment of tax registers. Application of technology in business has resulted in numerous changes regarding how business conduct their affairs. These changes range from new production methods, new products, to new business models, and now to artificial intelligence.

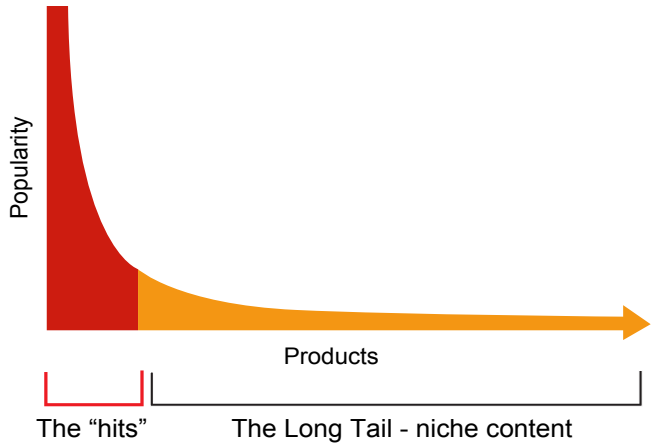
The technology world is changing at a faster rate than it was few years ago. Modern equipment are able to generate data, communicate with other equipment, act independently, and send and receive data that is analysed for another action. As a result, traditional businesses are constantly facing disruption. These disruptions cut across all aspects of business including operations, procurement, finance, human resource, marketing, and communication and reporting. Some of the notable disruptive technologies include Internet-of-things (IoT), cloud computing, advanced data analytics, and software-as-a-service (SaaS). The application of these technologies into business operations has led to improved efficiency, intelligence gathering, machine-to-machine data exchange, cost reduction, compliance management among others. Some businesses are adopting disruptive technologies as a strategy for competitive advantage. Take for example, IoT in the medical industry where patients get a wearable wristband that is able to capture data including patients sleep patterns, changes in body temperature, and blood pressure. This wearable device is able to collect patient data and send it autonomously to the hospital's patient management system. The band could also notify a patient when the body temperature has gone up beyond a set limit and notify the patient's doctor about the changes in the patient's body temperature. The data collected by this band will give a detailed view that was not previously possible to capture, providing the doctor with more information about the patient and probably lead to better diagnosis and treatment of diseases. Appelboom, Camacho, Abraham, Bruce, Dumont, Zacharia, D'Amico, Slomian, et.al. (2014). This example shows the potential new digital technologies can deliver on businesses by enabling new capabilities and allowing better understanding of problems. In the era of digital technologies, tax agencies have more options to create new solutions that improve compliance and increased revenues. Digital technologies are a major disruption to current businesses. To leverage technology for better service delivery, this case study shows how tax agencies can apply digital technologies in VAT administration.

In most developing countries, Small and medium enterprises (SME) contribute a lot to the economy growth and as such they are a great target for government revenues. SME's share of GDP compared to their payment of taxes is very low, Keen (2013). One question policy makers should ask is: how can the SME's be supported to continue contributing to economy growth as well as improve their compliance with tax laws? This case study argues that the solution lies in digital technologies. Some of the major technological disruptions stem from improved connectivity. The invention of 4G LTE (Fourth Generation Long-Term Evolution) network delivered increased connectivity and as a result, application of innovative and disruptive technologies in business operations is causing major changes in the traditional business models. Similarly, these technologies enable cooperation between businesses, which ultimately reduce costs, and risks.

1. DOES LONG TAIL EXIST IN THE TAX INDUSTRY?

The long tail concept proposes a new business model where products that have less demand can be as lucrative as highly demanded products. Anderson (2006) first suggested long tail concept in 2004. For these low demand products to be lucrative, Anderson (2006) suggested that there has to be a platform that supports many niche products making them readily available to buyers. The long tail concept postulates that hit products (high demand products) do not stay as hits for very long. Some products never become "hits" from the time they go to markets. Since consumer tastes and needs are varied, some will want to buy hit products while others prefer non-hit products. The hit products move from the top as soon as newer products come to market. This leaves very few products as hit and many products go to the non-hit section. This section often becomes the long tail.

Figure 1:
Long tail diagram



Source: www.longtail.com/about.html

There are lessons that tax agencies can learn from the long tail concept and customize them to tax administration. These lessons offer great opportunities and insights for tax agencies to align their operations to business environment thereby achieving revenue growth, improved compliance, and promote fair and legitimate trade practices.

Tax agencies usually trade-off the cost of doing an audit and the expected returns after the audit. This principle makes sense in that if a business invests $100 the returns should be more than the initial investment. With limited resources, tax agencies have few options: to focus on high tier medium and large corporations. In the long tail concept, these two groups (medium and large corporations) will be the hit products. They are fewer compared to small businesses, they handle huge transactions, and since they maintain detailed reporting systems, they are easier to audit. One oversight from this group would lead to high returns for the audit team. On the other hand, small and medium businesses has the largest user based and rarely are audited by tax agencies. This is due to resources limitation, lack of transaction supporting documents, and the large number in this category. This challenge presents a big opportunity for data analytics. *Gartner (2016) defines advanced analytics as the autonomous and semi-autonomous examination of data or content using techniques and tools, to discover insights, make*

predictions or generate recommendations. Adoption of IT based technologies go a long way in managing costs and improving efficiency. In the long tail concept, the non-hit products are put in a platform that minimizes search costs and makes it easy for buyer and seller to connect. This platform acts as an ecosystem connecting a number of interested parties in one location. Looking at the tax administrations, most of their systems are not ecosystems but a solution centred on the needs of the tax agency. An ecosystem offers benefits to all the parties creating cooperation as well as competition.

Tax agencies desire to bring SMEs into the tax bracket must be done in a way that does not shrink their contribution to the economy, minimizes cost of compliance, promotes traceability of transactions, relies on data that is available on real-time to the tax agencies, and incorporates third party information as a support for non-traceable transactions. This case study argues that audit of SMEs can be done without requirement of any hardcopy files being submitted to the tax agency. This will be possible where digital technologies are incorporated in tax administration and data from SMEs is collected in real-time, collated and analysed for tax purposes. With 4G LTE penetration increasing in most parts of the world, connectivity will increase and this will set stage for more disruptions and opportunities. Tax administrations have greater role to digitize tax administration process.

2. EMPIRICAL EVIDENCE

This section presents a brief review of evidence to support the claim that traceability of transactions act as a good deterrence against tax evasions as well as investment in digital technologies by tax agencies will deliver positive results.

2.1 Tax transactions traceability and compliance

The underlying principle in this section is that audit requires examination of documents to determine the truthfulness of the entries as declared in financial statements. In the practise of audit, availability of supporting documents forms the basis on which an auditor gives opinion regarding the statements. In the tax audit, availability of supporting documents forms basis upon which tax assessment is done. Unavailability of transactions supporting documents in tax audit can be frustrating, and often can lead to unfair assessment of taxes payable. Documents aid in establishing traceability of goods from one firm to another. In the case of Chilean tax agency (Pomeranz 2015), it was found that firms that had their transactions traceable were more compliant as compared to those whose transactions were not traceable. This indicates that traceability of transactions is a strong deterrence to tax evasion. The Chilean findings indicate that there was low compliance levels among firms that sold to final consumers. These probably small businesses do not keep records and as such they may not declare any returns. In Denmark, Kleven and Waseem (2012) show that when the probability of detection of evasion is low, taxpayers engage more in tax evasion. Following Kleven and Waseem (2012), this case study argues that where detection and enforcement are low, tax evasion extends beyond SMEs to all sizes of taxpayers including large corporations. Tax agencies should work on increasing possibility of audit and audit should be move from the traditional aspects of examining manual statements that takes long time to using digital technologies that can act independently to analyse data, generate insights and trends. Digital technologies should lead to shorter period of audits. Audit data should include both real-time data from taxpayers as well as data from third parties.

Transactions traceability can benefit a lot with availability of third-party information. In the case of Ecuador, Carrillo, Castro, and Scartascini (2016) show that third-party reports declared a higher amount than self-reported amount. Carrillo et.al (2016) argue that in weak enforcement third party information will be less useful. With digital technologies, firms can easily receive third-party information and through analytics can identify trends that will uncover fraud and tax evasion. This evidence shows that improved traceability should act as a deterrence against tax evasion and that enforcement should be strengthened to increase compliance with tax laws.

2.2 Digitization of tax administration

The relationship between a tax agency and taxpayers is shaped by the technology that exists in the operating environment. Tax agencies are facing one big challenge:

the threat of shrinking revenues, and therefore, they have to move to digital technologies, which enables real-time collection and assessment of data, Ernst & Young consulting (2016). Access to data in real time forms a basis for quick response to compliance risks (Ernst & Young consulting, 2016) and overall, with this deterrence the compliance levels will increase.

The digitization journey is continuous and tax agencies should implement long-term goals aimed at a completely transformed organization. In Brazil, the tax digitization is ongoing and delivers a good reference for this case study. The tax digitization journey in Brazil began with establishment of the public digital bookkeeping system (SPED) [*Sistema Público de Escrituracao Digital*] (Silva, Passos, Gallo, Peters, 2013) which ensured that companies selling goods had to send invoice electronically to the government, Ernst & Young consulting (2016). Brazil has also implemented E-filing where both accounting and tax records are required, automated information exchange, e-invoicing, data analytics, and e-social where companies file electronic books and payroll information, Ernst & Young consulting (2016). The results of digitization efforts in Brazil are encouraging. The value of audit rose from R$ 6.2 in 2012 to R$ 9 million in 2013 and average increase in federal annual taxes has been 12.46%, Ernst & Young consulting (2016).

New technologies have continued to be developed which have the potential of revolutionizing the VAT tax assessment. One key technology is block chain technology. Ainsworth (2017) argues that block chain will deliver substantial efficiencies to VAT tax administration. In the blockchain technology, transactions are verified by the network nodes, and recorded in a public distributed ledger, Ainsworth (2017). This technology will be of great help to facilitate traceability of transactions from one company to another. This brief evidence shows that the expected changes in tax administration are huge if tax agencies move to digital technologies.

3. DIGITIZING VAT ADMINISTRATION

Digital technologies have caused major disruptions in business operations and tax administrations have to align their operations to the digital economy. There are opportunities for tax departments to develop and deploy digital solutions that will result in increase in taxpayer base, improved compliance levels, intelligence-based targeting and audit, reduced cost of tax assessment, and increase in tax collections. This section will discuss digital technologies that tax authorities can adopt to digitize tax administration. This case study argues that taxpayer recruitment and tax return processes are the primary candidates for digital transformation. This is because these two processes provide key data that is useful in VAT administration.

3.1 Taxpayer recruitment

Tax administrations have a section that deals with recruitment of new taxpayers into the tax bracket. Officers in this section will schedule visits to specific regions where they will physically enter into an office block and check whether a business has registration certificate from the tax agency. Businesses without tax registration certificate will be required to register. Some of the businesses are small and medium enterprises (SME) and recruiting them is both challenging and a lot of work. The tax agency requires massive resources to keep visiting the regions periodically to monitor which taxpayers are not registered with the tax agency. Digital technologies can be applied in taxpayer recruitment to simplify and standardize taxpayer registration and monitoring can be done remotely from the office.

Tax agencies can develop a solution incorporating maps application program interface (API) that will enable tax officers to view a region of interest in a map that includes all facilities. The facilities (buildings) owner will submit an approved building plan to the tax agency showing the number of floors in a facility, number of spaces to let per floor, and details of current tenants. The solution should allow the facility owner to update the tax system with details of the new tenants, or tenants leaving the facility. The tenant's details submitted will include tenant Taxpayer identification number (TIN), lease fees, and any other costs paid to the property owner by the tenant. The tenant will verify information submitted to tax agency once they access the tax agency system using their TIN. At the tax agency office, tax officers should be able to

view in map buildings in a region/ area and query buildings to see how many of the spaces are vacant and those already occupied. Each office space will be uniquely identifiable and no tenant rents the facility without the property owner submitting their details to the tax agency. Registered taxpayers will receive a smart device (Smart Tax Register) that can transmit a signal to the tax office to show that the office space is occupied by a registered taxpayer. The device can be configured to show when the taxpayer is operating and when they are closed for business. Tax officers will periodically do physical inspection of buildings to verify occupancy.

Implementing this solution will have a number of benefits. First, taxpayer registration will be automated enabling new tenants to automatically become recruited into the tax base when they sign a lease with the facility owner. Existing tenants' data will be captured once in the system and thus all tenants operating within an area becomes active taxpayers. This will result into increase in taxpayer base. Secondly, for tax agencies that collect rental income tax, this solution will result into additional tax revenues. The rental revenues received by the property owner will be easy to determine and any allowable deductions can be determined assuming there is interface between third party and tax administration solution. Thirdly, this solution creates a level playing ground where all businesses operating within the tax jurisdiction become active taxpayers.

3.2 Tax Returns

Taxes are remitted to tax agencies to comply with existing legal framework and filing of tax returns is aimed at providing relevant information that enables monitoring of tax liabilities, Kopczuk and Slemrod, (2006). Tax returns is one of the pain points many taxpayers have to face in many tax jurisdictions. This happens because some of the tax laws are not clearly understood by taxpayers, fear of tax penalties and non-compliance, and complex process for filing the returns. In some instances, taxpayers never get to see the benefits of their taxes and therefore the need to file returns. Some taxpayers will want to verify whether the tax deducted monthly by their employers is actually remitted to the tax agency. In tax jurisdictions where tax returns are done using manual forms, the tax officers are faced with a new challenge of receiving the forms, sorting and capturing the tax data in the tax management system. The pain of tax returns affects both the tax agency and taxpayers, putting pressure on the agency's resources. Application of modern technology should eliminate the pain of tax returns filing by simplifying and standardizing the procedure as well as providing taxpayers with more information that will empower them to improve their compliance levels. This section explains the opportunities available for tax agencies to deal with the tax returns.

Tax returns can be classified into two main categories: individual tax returns and business tax returns. Individual tax returns includes employees Pay as you earn (PAYE), sole proprietor businesses, partnership business, and similar activities undertaken by an individual. Business tax returns include returns on corporation tax. In order to leverage digital technologies in modernizing tax returns, this case study suggests deployment of a smart tax register (STR). This tax register should have, in addition to tax register capabilities, cloud storage capabilities, 4G LTE connectivity or higher, ability to send and receive data autonomously, and ability to locate the position of the device remotely (location-enabled). Could storage capability will ensure connections between the tax servers and independent STR is optimal. 4G LTE connection will enable faster exchange of data between the STR and cloud servers. The STR will collect data and send it to cloud where analytics will be done and notifications from the tax agency could as well be communicated through the STR. Location detection will enable the tax officers remotely view where devices are located as well as when the devices are not in use. This smart tax register (STR) should replace existing tax registers.

In digitizing the value added tax (VAT) returns, this case study suggests a shared ledger format where the system is able to trace movement of products from one trader to another until the end consumer. Ability to trace transactions is a fundamental requirement for imposition of tax, Pomeranz (2015). Enforcement of tax is a very complex issue in developing countries. This limited availability of information issue is aggravated by lack of traceability of transactions (Pomeranz 2015)

and this challenge leads to differences in tax systems between developed and developing countries, Kopzcuk and Slemrod, (2006).

In any tax jurisdiction, there are three main starting points for any products. First is farm produce that originates from local farmers. When a farmer has harvested his produce and sells it to a supermarket, a tax invoice should accompany the purchase and this acts as the starting point to trace the movement of the product. The second source is imports. Customs handles the imports of goods and most of the transactions can be traced from the customs system. Lastly, the local manufacturers are the third source of products consumed in a tax jurisdiction. For efficient digitization of VAT on goods, the tax agencies focus should be on these three originators of goods. When a manufacturer has manufactured goods and sold to firm A, the STR at the manufacturer premises will send the details of the transaction to the STR of buyer A via the cloud connectivity. When firm A receives the stock, STR at A is updated with stocks received and input VAT. When firm A sells goods to smaller retailers B and C, the STR will record the sales, output VAT, and determine the VAT due. This information will be send to the tax agency to show the expected receivable from firm A as well as all other firms.

It is a common practice for retailers to re-classify goods that should attract VAT as though they are zero-rated, reducing the amount of VAT tax payable. This tax offence will be dealt with in this solution. The three primary originators of goods are fewer compared to the many small retailers spread across the tax jurisdiction. If the tax agency focuses on ensuring the originators of goods classify the goods correctly for VAT purposes and that retailers are not allowed to re-classify goods, then there will be no revenue leakage on VAT. This reduction in number of entities that the tax agencies should focus on is in line with Kopczuk and Slemrod (2006). Imported goods are managed by customs and there is high probability that most of the goods will be correctly classified. This will require that as products moves from one firm to another they maintain a unique identifiable code to enable tracing and ensure no re-classification is done. Similarly, taxpayers who are not familiar with which products attract VAT will not need worry anymore. The STR will identify products that have been sold at a specific shop and cannot be traced back. Similarly, the STR will be able to track quantities to ensure that quantities declared at importation match the quantities sold, but this should be implemented on specific products.

Application of artificial intelligence on different industries is on the rise and tax agencies should not be left behind on this area. The STR should become part of artificial intelligence in the tax industry. STR can be configured to send reminders to taxpayers about due date for VAT return or it could act as a tool to educate taxpayer about tax matters. A taxpayer may want to understand what the tax law says about tax invoices. Think of a situation where the taxpayer asks the STR which section of the law deals with tax invoices and the STR responds immediately. Or suppose there is a new legislation that affects the operation of the VAT. Similarly, a taxpayer can be reminded by the STR on deadlines for filing returns immediately they report to office through an audio. Incorporating text to speech capabilities in the STR will ensure that the STR can convert a text notification to an audio and play it to the taxpayer. Tax agencies can use the STR to communicate detailed information regarding the new legislation in different formats including digital audio recordings, video or animation. It saves taxpayers time, ensures direct communication with taxpayers, and it can be used to evaluate the effectiveness of the different methods used be the agency to communicate to taxpayers. This case study argues that digitization of taxpayer recruitment and return processing will revolutionize VAT administration. It also proposes development of artificial intelligence that will be create a new avenue for engagement between tax agency and taxpayers.

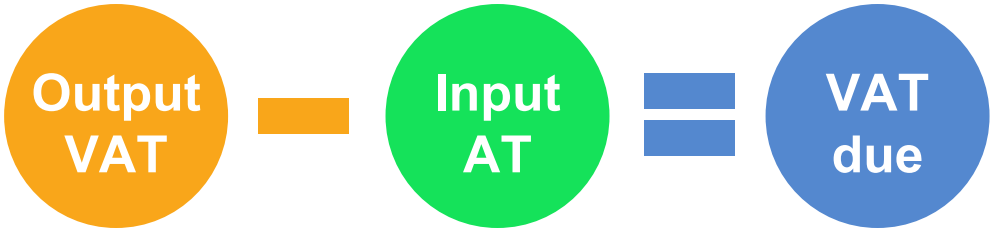
3.3 Why VAT

VAT is charged either at clearance of imports or at point of sale by local businesses. This puts VAT at the middle of a number of other taxes assessed by tax agencies. For imports, VAT is assessed and collected by customs and this acts as one source of data to trace movement of goods from one firm to another. In the local businesses, VAT is charged on sales (revenues). The sales revenue becomes the basis upon which firms generate profit and

are able to finance their operations. From the sales, VAT is payable and other taxes including corporation tax are computed from the basis of sales. This scenario shows that there is a link between imports, sales, and taxes. In a situation where all local transactions are digitized and traceable, VAT becomes the most critical tax to focus on. This case highlights three reasons as to why VAT digitization is so critical for digital transformation of tax administrations. First, data from VAT provides insights and intelligence to customs. Secondly, digitization of VAT eliminates the need for excise good management solutions, and finally high frequency of VAT returns filing increases probability to detect fraud and evasion.

VAT data can be a very resourceful input in customs compliance and audit functions. VAT covers all purchase and sales transaction leading to input VAT and output VAT respectively. The difference between output VAT and input VAT gives VAT due.

Figure 2:
Computation of VAT due



VAT due at imports clearance is computed differently. At the clearance of imports, the importer makes a customs declaration that includes goods description and quantities imported. Imported goods are identified using the Harmonized Commodity Description and Coding System (HS). In facilitating international trade, customs departments have continued to employ different techniques including non-intrusive cargo inspection, intelligence gathering and sharing, and other intelligence-based examination of cargo. However, these techniques do not ensure that all goods are correctly declared. With limited resources and huge volume of cargo, manual examination of cargo is not possible. To increase compliance, VAT data should provide insights in relation to imported finished goods are raw materials.

Imported goods (finished goods or raw materials) are consumed locally or re-exported to another country. Re-exports falls under customs, providing a clear link to trace the goods movement. Local consumption is through businesses that sell to other businesses or to final consumers. These local businesses charge VAT on sales and this data can be traced back to imports. Using the STR, the sales data will be available real-time to the tax agency. With analytics, the sales data can be mapped with the import data. This will enable customs identify some of the products that local businesses are selling but the import data is missing. Similarly, the data could show differences between quantities declared in import declaration and quantities in sales data. These insights will be useful for customs to understand which goods are under declared or misdeclared by importers. Customs could as well identify the source of the goods (transactions traceability) and therefore initiate intelligence-based audit. VAT digitization will uncover tax fraud and evasion in customs, provide insights and intelligence, and ultimately ensure higher compliance.

Operationalizing this function requires a unique identifier of goods in the local businesses. The point of sale machines installed in businesses should be re-designed to ensure goods have unique identifier as this will ensure traceability of goods from one business to another. This unique identifier should link customs and sales data such that through analytics insights and trends are identified and relayed to respective tax office. This will shorten time to discover fraud and evasion of taxes.

Tax administrations are working on solutions to manage excisable goods. Similar to VAT, excise duty is charged on imports as well as local transactions but on select products. This case argues that digitization of VAT will eliminate the need for excise goods management solutions. In a situation where all goods transacted have a unique identifier, it is possible to pull data for excisable goods and track their movements from one firm to another. The sales data generated under a digitalized VAT system will identify quantities of excisable goods, excise duty due, and firms within the supply chain. VAT digitization will enhance VAT administration, excise duty, provide data for customs audit and compliance as well as provide a basis for corporation taxes.

VAT returns have a higher frequency of filing. Most tax administration require VAT returns be done monthly, See Appendix 1. This high frequency of returns filing coupled with availability of third-party information could provide a good ground for tax administrations to uncover tax fraud and evasion. Empirical evidence shows that third party information had higher amounts compared to returns declaration, Carrillo, Castro, and Scartascini (2016). Digital technologies are creating new capabilities that enable faster exchange of data. Tax agencies taking advantage of third-party information coupled with high frequency of VAT returns filing can go a long way in discovery of tax malpractices.

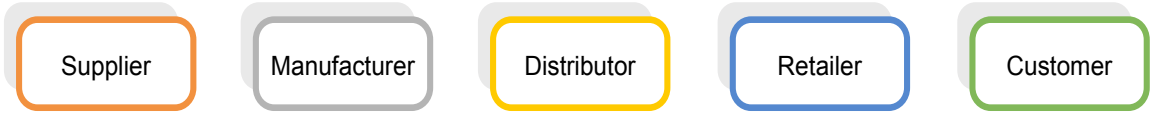
4. IMPLICATIONS OF DIGITAL TECHNOLOGIES IN VAT

This case shows the opportunities available to tax agencies in different parts of the world to revolutionize and improve efficiency in tax administration. These opportunities stem from digital technologies. Digitization of VAT is recommended as a key focus area that can change the whole tax administration, and not just VAT only. In this section, the focus is to understand how digital technologies are affecting VAT amount collection and build a justification as to why digitization can close the VAT deficit occurring due to digital technologies in the business environment. The first part the case focuses on supply chain changes because of digital technologies in the business environment and second part examines how these changes affect VAT collection.

4.1 Supply chain changes

Supply chain has been defined as all activities associated with transformation of raw material to final product and delivery to the final consumer, Handfield and Nicholas (1999), Lummus and Vokurka (1999). In a simplified format, the traditional supply chain was as shown below:

Figure 3:
Traditional supply chain



As growth of new technologies continue to shape business operations, new business models creating new value and enabling new capabilities that never existed before have come to life. One of the key changes in the supply chain is reduction of the intermediaries that existed in the traditional supply chain. The “Amazon effect” is a term that is increasingly being used in today’s business to mean the changes that digital technologies have on the traditional supply chain. Some intermediaries have been pushed out of business, staff have lost their jobs, some firms have reduced the number of their physical offices, and the changes are still increasing. All these changes affect government revenue in different ways. In this case, the focus will be on VAT.

The adoption of digital technologies in business has led to reduction of intermediaries in the supply chain. VAT is charged on value added in the supply chain. Reduction of intermediaries means customers can get products at a relatively lower price but a reduction on VAT. To demonstrate this reduction in VAT, this case assumes a VAT rate of 10%, price mark-up of 20%, production input VAT of $9, and manufacturer selling price of $120. With the traditional supply chain process, the flow of goods from manufacturer to end consumer for VAT computation will be as show in the table 1 below:

Table 1:
VAT Computation

	Purchase Price	Selling Price	Input VAT	Output VAT	VAT Due
Manufacturer	---	120	9	10.90	1.9
Distributor	120	144	10.90	13.09	2.19
Retailer	144	172.8	13.09	15.71	2.62
Customer	172.8	---			
Total VAT					**6,71**

Source: Author demonstration

In the traditional supply chain, the total VAT due from the same product will be $6.71 if it moves through two intermediaries as shown in table 1. The more the intermediaries, the higher the VAT amount due. However, with digital technologies the manufacturer can sell the product directly to the consumer and charge a price less than the price charged in the traditional supply chain. If the manufacturer sells the product at the same price retailers would buy from a distributor ($144), the total VAT from the product reduces from $6.71 to $4.09. (Output VAT of $13.09 less input VAT of $9). Customers have access to information regarding available substitute products and this makes it hard for the manufacturer to sell the products at the same price a retailer would sell ($172.8). PWC (2017) shows that price is very critical in digital channel transactions. The number of monthly online shoppers in the Middle East rose to 29% and 40% of the respondents pointed to price as their motivation for online purchases, PWC (2017). The preference of digital channels over physical stores means consumers are very price sensitive with increasing access to information and ability to compare prices between different sites.

The supply chain is continuously changing. These changes are affecting VAT due as it shortens the value addition process. Tax agencies have to work on reducing the cost of VAT administration and improve efficiency of the process to achieve high level of compliance with VAT laws. Accenture (2016) explains that digital platforms have three distinct power; that is network effect, concurrence of technologies, and open and shared data. Accenture explains that these platforms not only do they generate revenue they also reduce costs. Tax agencies can learn a lot from the business platforms and develop solutions that bring different stakeholders together in an ecosystem that reduces costs, enables faster data sharing, and creates new value to all stakeholders. This ecosystem might close the revenue gap that has originated from changes in supply chain.

5. CONCLUSION

Digital technologies are creating new capabilities that were not possible before. Collection of information from taxpayer is now more simplified than ever before and storage costs of data have continued to fall. This case study has presented on overview of opportunities that tax agencies can adopt to increase their tax base, raise additional revenues, and simplify the process of tax filling. However, these benefits are not without challenges. The cost of the hardware, the development of artificial intelligence, cost of internet for small and micro-traders who are not ready to incur additional and unnecessary costs, training and support are some of the issues that are likely to occur during implementation of this program. Overall, tax agencies will be better off digitizing their operations and VAT should be the leading tax head to be digitized.

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APPENDIX

Country	STD. VAT	Period	Country	STD. VAT	Period
Albania	10	Monthly	China	17	Varied
Jersey	5	Monthly	Morocco	20	Monthly
Argentina	21	Monthly	Colombia	16	Bi-monthly*
Jordan	16	Bi-monthly	Myanmar	5	Quarterly
Armenia	20	Monthly	Costa Rica	13	Monthly
Kazakhstan	12	Quarterly	Namibia	15	Bi-monthly
Aruba	1.5	Monthly	Croatia	25	Monthly
Kenya	16	Monthly	Netherlands	21	Monthly*
Australia	10	Monthly	Curucao	6	Monthly*
Korea, South	10	Quarterly	New Zealand	15	Monthly*
Austria	18	Monthly	Cyprus	19	Quarterly
Kosovo	16	Monthly	Nicaragua	15	Monthly*
Azerbaijan	18	Monthly	Czech rep	21	Monthly*
Latvia	21	Monthly	Nigeria	5	Monthly
Bahamas	7.5	Monthly*	Denmark	25	Monthly*
Lebanon	10	Quarterly	Norway	25	
Barbados	7.5	Monthly*	Dominican Rep	18	Monthly
Lithuania	21	Monthly*	Pakistan	15-17	Monthly*
Belarus	20	Monthly*	Ecuador	12	Monthly
Luxembourg	17	Monthly*	Panama	7	Monthly
Belgium	21	Monthly*	Egypt	10	Monthly
Macedonia	18	Monthly*	Papua New Guinea	10	Monthly*
Bolivia	13	Monthly	El Salvador	13	Monthly
Madagascar	20	Monthly	Paraguay	10	Monthly
Bonaire, Sint			Estonia	20	Monthly
Eustatius &Saba	4~8	Monthly	Peru	18	Monthly
Malaysia	6	Monthly	Finland	24	Monthly*
Botswana	12	Monthly*	Philippines	12	Monthly
Malta	18	Quarterly	France	20	Monthly*
Brazil	0-35	Monthly	Poland	23	Monthly
Mauritius	15	Monthly*	Georgia	18	Monthly
Bulgaria	20	Monthly	Portugal	23	Monthly*
Mexico	16	Monthly	Germany	19	Monthly*
Canada	5	Monthly*	Puerto Rico	7	Monthly
Moldova	20	Monthly	Chana	15	Monthly
Chile	19	Monthly	Romania	24	Monthly
Mongolia	10	Monthly	Greece	23	Monthly

Country	STD. VAT	Period	Country	STD. VAT	Period
Russia	18	Quarterly	Spain	21	Monthly*
Guatemala	12	Monthly	Japan	8	Monthly
Rwanda	18	Monthly	Suriname	8	Monthly
Honduras	15	Monthly*	Sweden	25	Monthly
Saint Lucia	15	Monthly	Switzerland	8	Quarterly
Hungary	27	Monthly*	Taiwan	5	Bi-monthly
Serbia	20	Monthly	Tanzania	18	Monthly
Iceland	24	Bi-monthly	Thailand	7	Monthly
Seychelles	15	Monthly*	Trinidad and Tobago	15	Bi-monthly
India	12.5-15	Monthly*	Tunisia	18	Monthly
Singapore	7	Monthly*	Turkey	18	Monthly
Indonesia	10	Monthly Sint	Uganda	18	Monthly
Maarten	5	Monthly	Ukraine	20	Monthly
Ireland	23	Bi-monthly	United kingdom	20	Quarterly
Slovakia	20	Monthly	United States	2.9-7	
Isle of man	20	Monthly*	Uruguay	22	Monthly
Slovenia	22	Monthly	Venezuela	12	Monthly
Israel	18	Monthly*	Vietnam	10	Monthly
South Africa	14	Monthly*	Zambia	16	Monthly
Italy	22	Annual	Zimbabwe	15	Monthly

Source: EY 2015 Worldwide VAT, GST and sales tax Guide

* Means other return period may apply if certain conditions are fulfilled