**Managing the move to the cloud: analyzing the risks and opportunities of cloud-based account information systems**

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# Executive Summary

Cloud computing is one of the paradigms shift in the information technology from the old main frame technology since 1950s. Technology has been evolving and improving since then. In 1997, a professor from Emory University, Professor Ramnath Chellapa, described cloud computing as a technology where the boundaries of computing will be determined by not only the technical limits but also the economics reasoning. In 1999, Salesforces started adopting cloud computing technology, and in 2006, Amazon started introducing its Elastic Computer Cloud (EC2 and Simple Storage Service (S3). Cloud computing provides three main service models, such as Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS), with four deployment models, such as public, private, hybrid, and community cloud. According to the study conducted by the Cloud Accounting Institute in 2015, Accounting and Financial Management was one of the top areas which deployed cloud solutions, and 74% of those moving their AIS to cloud chose SaaS solutions. With the number of businesses outsourcing their accounting information systems growing, a small pharmacy company called Kluuvin Apteekki, operated in the downtown of Helsinki, Finland, was in dilemma if it should outsource its accounting systems to cloud. The owner of the company, Pia Moksi, has been hearing the good things about moving to the cloud from her friends and advertisements. She also learned success stories about migrating to the clouds from an event she attended. She would like to try the service; however, there were many questions she could not find the answers regarding to the cloud-based services.

Pia Moksi has been operating Kluuvin Apteekki pharmacy for four years with 16 employees, nine of them are part-timers. The pharmacy business in Helsinki was extremely competitive because of the government's strict regulation on prescription. Pia has 20 years' experience working as a pharmacist before operating her own business. Pia was responsible for all the administrative tasks and operations of the company. Most of her time was occupied by the bookkeeping, accounting, and reporting. Pia did not have time to strategically work on the long-term goals and objectives of the company, such as expanding and growing the business. Pia tried to reflect on herself as the business grew and realized that the accounting tasks were taking up a lot of her time that she could not focus on other important tasks.

To grow the business, she understood that she must do something about the accounting tasks that consumed so much of her time. She tried to gather information, from friends and the advertisements, to figure out the best way to handle her problems. She found out that cloud-based accounting information systems (AIS) could be her way out. However, she had no clue about cloud technology. She did a lot of research about cloud computing and met a few cloud service providers representatives, and she knew that cloud-based systems could be her solution. Still, she was not sure about many things, such as if there are any hidden costs, if her data would be secure, or what kind of systems she should implement.

# Introduction

Cloud-based services disrupted the information technology industry because of the many benefits such as measured pricing, fast deployment, reliability, and so on. Pia, the owner of the Kluuvin Apteekki pharmacy company, was thinking of migrating her accounting tasks into cloud. Kluuvin Apteekki’s accounting systems consisted of five main tasks which are sales, purchases, payments, reporting, and payroll. These five big tasks were further broken down into 22 accounting tasks. Even though those accounting tasks were identical in the industry, the problems each company encounters would be different depending on its context. Therefore, when considering moving to cloud-based systems, the strategy and systems that worked for one company might not be applicable to the other company. Choosing the most efficient accounting system was not an easy job when there were so many services to choose from in the market. Pia was facing the same scenario where she was not sure which cloud-based accounting system would be best for her pharmacy company. Even though she put in a lot of effort doing research to learn more about the cloud, she could not make up her mind which account tasks to outsource and migrate into cloud partly because it was not her area of expertise.

To help identify the best cloud-based accounting information system for Kluuvin Apteekki, our team will make the analysis of the business and the systems being used to first point out the main problems faced by Kluuvin Apteekki. Meanwhile, our team will also conduct the risk analysis by listing out the assets, threats, vulnerabilities, and controls to learn more about the risks that could impact the company and how moving to cloud would mitigate the impact. Pia has done a lot of research on cloud services and mentioned the advantages and disadvantages of each accounting service company. Our team will utilize the information collected by her and incorporate it with our analysis to produce the best solution. Moreover, this paper will include the recommendations based on the need of the company at that time, and we will also gather information on the current cloud-based accounting information systems and share our perspective on the up-to-date systems that could be relevant to Kluuvin Apteekki.

Overall, our main objective is to assist Pia and her company migrate their accounting tasks and systems into cloud. Our team will do business and systems analysis of Kluuvin Apteekki to come up with the current issues faced by the company. Also, we will do risk analysis to identify the risks and mitigation plan by setting up proper controls. Lastly, we will provide our recommendation on which cloud-based accounting company would be best suited for Kluuvin Apteekki for their migration into cloud.

# Core Problems

The main issue with Pia and her pharmacy company Kluuvin Apteekki was the decision to choose what to outsource for the current accounting system and tasks so that Pia had more time to focus on the strategic management and the growth of the company. Pia knew that cloud-based AIS was the way to go because of the many benefits it brought. Pia learned about the pros and cons from the Pharmacy Day event where she met many other companies that made use of cloud solutions. The reasons Pia could not decide which cloud-based solution should be used were the lack of trust in modern technology and her background being non-IT person. Additionally, she was a perfectionist who wanted to have a perfect system with no tolerance of fault when migrating to cloud which raised the doubt and uncertainty of what to choose. Pia had done very comprehensive research on the cloud-based AIS solution and produced a list of three AIS systems provided by different companies with the focus services on user interface, integration capabilities, modularity, and price.

From her research, one of the benefits of using cloud is to reduce cost and pay-per-use model would be something she could use. However, Pia already invested in the acquisition of accounting software in-house; therefore, she thought the cloud-based pay-per-use would add up the overall cost. She was also concerned about the hidden costs that might arise later, such as the cost of the accountant. Even though the cloud service provider suggested that the pay-per-use would be cost efficient for a small company like Kluuvin Apteekki eventually, she could not make up her mind because she was doubting there could be issues around the service level agreement between CSP, accountant, and her company, and expecting unpleasant surprises.

Pia also figured out other cloud benefits such as scalability, flexibility, and availability; however, she had concerns about data security and overall cost. On one hand, the advantages, such as scalability and flexibility, could enable Kluuvin Apteekki to start using the cloud solution at a minimal pace while Pia was working to expand the business and scaling the service up as the business grew. On the other hand, Pia thought if cloud services with their huge data center and so on would be suitable for her small company without having to pay more for the service – too good to be true for her. Moreover, availability means Pia could be on top of things because she could check into the system and work with her accountant wherever and whenever she wants, providing she has a stable internet connection, and this would only possible if her AIS was migrated to cloud, her current in-house systems did not have connectivity and thus could be accessed from anywhere except from her physical office. But then, Pia had concerns about her data security because all her company information would be stored in the cloud, and she was not sure how safe it would be in the cloud after hearing data breaches stories in the news.

To summarize, the core problem of Pia regarding Kluuvin Apteekki was the decision to choose the best cloud-based account information system so that Pia could put more time on the growth of the company. After doing thorough research and coming up with three options to choose the solution from, Pia was overwhelmed by the information she gathered, and she could not make up her mind. As Pia wanted a smooth migration without any faults, she could not put her trust entirely on the information provided by the cloud service provider and the research she did, and that she wanted a professional guidance to move forward.

# Solutions/Preventions

Pia, the owner of the Kluuvin Apteekki, had gone through a lot of information regarding

moving her accounting systems to cloud. Our role as a strategy and transformation consultant is to analyze the current business processes and its accounting systems, the data gathered by the owner of the company, and provide a recommendation moving forward. Pia already produced three viable accounting systems for Kluuvin Apteekki, and we could use that information as a starting point. Therefore, we will analyze the current business processes and systems, we will compare them against the three systems that Pia found from her research, and then we will provide our recommendation that would be best suited for Kluuvin Apteekki in term of cost, systems integration, and migration.

Kluuvin Apteekki had an inhouse accounting system that power the whole business processes such as bookkeeping and reporting. The system was not connected to the internet, and all the processes were operated offline. The company has 16 employees, of which 9 of them are part-timers. The system generated 680 outgoing sales invoices annually, of which all of them were manually produced and managed on paper. The company also had 840 purchases invoices of which 92% are on paper, 5% with email attachments, and 3% with e-invoice. The company had the same suppliers with almost the same number of purchases every year, making it extremely easy to manage. The company had five main accounting processes, such as sales, purchases, payroll, reporting, and payment, in which they could be broken down into 22 sub-processes. We can conclude that the processes were simple, and most of them are managed offline manually and on paper.

According to the information presented above, the company is small, and the processes are not complicated. From the available cloud-based services, Kluuvin Apteekki should be using software-as-a-service (SaaS) instead of either infrastructure-as-a-service (IaaS) or platform-as-a-service (PaaS). One may argue that Kluuvin Apteekki could use PaaS because the company already invested in the accounting software, and they could be migrated and integrated using PaaS. However, we need to think about the compatibility of the software in the cloud, the security issues such as system maintenance and patching, and the cost associated to them. The fact that the company is small, and it does not have enough IT experts, SaaS is the best option because all the underlying IT infrastructure and the security issues will be managed by the service provider. In term of cost effectiveness, Kluuvin Apteekki must pay according to the amount of resources utilized, meaning pay less when the company is small and more as the company grows.

From the three feasible accounting systems that Pia presented because of her research, system 3 is the best for Kluuvin Apteekki. With 150 Euro monthly, the system provides almost everything without additional cost - the only variable cost is the accountant fees in which the company provided 2 hours monthly already and Kluuvin Apteekki must only pay the additional hours of usage. The accountancy services are tied with the package; therefore, Kluuvin Apteekki need not worry about looking for one. Unlike system 1 and 2, there is no additional transaction cost with system 3 which accounted for about 120 Euro monthly. As business grows, Kluuvin Apteekki does not need to worry about the additional number of transactions being generated under system 3. In term migration, system 3 also support third party enterprise integration upon request which Kluuvin Apteekki could make use of for the smooth and speedy migration. As a result, system 3 is the most suitable for Kluuvin Apteekki.

All in all, it is recommended that Pia choose software-as-a-service cloud-based service model because this will make sure that the service provider will take care of the IT infrastructure and platforms including the information security- this will ensure Pia’s doubt on the data security issue even though she still needs to make sure of the access level security controls. Out of the three systems Pia gathered from her research, system 3 is the best for Kluuvin Apteekki in term of cost in the long run, and the smooth and speedy system migration to the cloud.

Risk Analysis (Threat, Vulnerability, Assets, Control)

|  |  |
| --- | --- |
| **Assets**   * Company full-time and par-time employees * Accounting data * Specialized Systems for Pharmacy * Local Servers * Servers with non-sensitive data * Web applications * Employee’s workstations * Employee sensitive data | **Threats**   * Phishing * Zero-Day Exploits * DDoS * Malware/Ransomware * Hacking of Email Accounts |
| **Vulnerabilities**   * No mandate for passwords * Unpatched systems * Legacy systems * Weak Passwords * Lack of multi-factor authentication (MFA) * Failure of Intrusion Detection Systems (IDS) | **Controls**   * Strict Password Policy * Strict Patching Policy * Encryption (Cryptography) * Stronger Firewalls * Phishing Training Programs (all employees) * Continuous Risk Audit/Analysis * Cyber Security Insurance |

**Qualitative Risk Analysis (Current AIS)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Threats | Business Impact | Probability of Attack | Cost of Fix | Difficulty to Fix | Risk Level |
| Malware/ Ransomware | High | High | High | Medium | High |
| Email Account Hacking | Low | Medium | Low | Low | Low |
| Phishing | Medium | High | Medium | Low | Medium |
| DDoS | Low | High | Medium | Low | Low |

According to the qualitative risk analysis table, our group assumed that the Kluuvin Apteekki’s current accounting information systems highest risk is the ransomware. The current in-house systems do not link with the internet for data transmission and storing, and the information risks related to network and internet are very unlikely. However, the workstation that operates the AIS has access to the internet where it is the door for attacks. It was also reported that ransomware was one of the rising threats in those days. A small and growing company like Kluuvin Apteekki could be an easy target. With the in-house accounting information systems and limited IT experts, the possibility that the workstation and software were outdated was very high. That could provide a way for the attacker to sneak into the systems through the unpatched software. Even though the company is small, the business processing systems data were important for the business to operate, for example, the supplier's information, the payment information, the sales system, and so on. If backup of those data had not been done, and the attacker could get hold of the system, they could encrypt the whole systems so that business will not be able to operate until a ransom is paid. DDoS and Email account hacking is low because they are not directly related to the day-to-day business operation. DDoS could only target its website which was used only for presenting information. Phishing is medium because it could be one of the doors for attackers to spread malware. Since Kluuvin Apteekki was planning to migrate its accounting information systems to cloud, it was eliminating the company’s highest risk, malware/ransomware, because the cloud service provider will be responsible for system patching and the data stored in the cloud. However, the customer will still have to make sure of the proper identity and access management to make sure that access credentials are not compromised.

# New Risks and Countermeasures

**Poor Identity and Access Management**

Access management is a solution which organizations use to authenticate, authorize, and audit access to the organization's information systems. By implementing access management solutions, companies, despite their size, will fortify security and minimize risk to IT infrastructure. For Pia, having proper identity and access management will stop unauthorized individuals or intruders from accessing sensitive accounting data, company financial information, restrict data, and resources. In recent years poor access management has led to data breaches, and what we can learn from Target and Equifax, who have fallen victim to unauthorized parties gaining access to sensitive data. One thing to suggest to Pia switching to the cloud by itself is not a threat but placing robust access management control such as multifactor authentication and password reduces the risk.

**Data Breach**

Data breaches are referred to as unauthorized access to sensitive information which occurred out of negligence, insecure API, weak password, and human error. Migrating to cloud involves three parties: the business owner (Pia), CSP/the accounting service provider (utility), and the Pia customers, and it is Pia's fear of who will be responsible for a data breach. In the event of a data breach, it will affect the company, its reputation, its customers, and the CSP. Since Pia operates in Finland, data storage and sharing are regulated by the information commissioner's office, and cloud service providers must follow GDPR legislation. Both parties will be responsible during the data breach, depending on who is at fault. If Pia follows data protection regulations and puts in place suitable information security and privacy measures, fear of data breach alone should not be a reason not to move to the cloud.

The best way to counter data breaches is to set an effective security model which contains multifactor authentication and encryption, which will deny any unauthorized access to protected data such as customer, employee, and financial information.

**Vendor Lock-in**

The vendor lock-in problem in cloud computing is where customers are dependent (i.e., locked-in) on a single cloud service provider (CSP) technology implementation and cannot quickly move to a different vendor without substantial costs or technical incompatibilities. Pia's biggest fear of moving to the cloud is vendor lock-in due to the associated risk of working with a single cloud service provider. Pia is afraid of what would happen to data transfer; she asks if it is easy to move to another CSP, application transfer concerning accounting software, infrastructure transfer, and human resource knowledge risk. Many service providers lock the customer into 3 to 5-year Enterprise License Agreements and facilitate migration into and out of platforms. To avoid future lock-in, Pia needs to conduct proper due diligence and include every detail in the service level agreement (SLA).

# Key Questions

**Q1. Which Cloud Accounting information system should select and why?**

To move to the cloud, Pia evaluates available options based on the user interface, integrability, capability, modularity, and price. We recommend Pai select system three over the other two systems as per the information provided. Even if system three had a higher starting fee than the other two, it had a better package with no transaction fee and 2-hour free accounting services. Numerically Pia will save 130 euros a month on average by selecting system 3 plus 0.95/per transaction. In addition, system 3 provides integration with third-party reporting and payment services which Pia required and offered limited integration with third-party enterprise systems and customization upon request. Regarding data security, Pia will be less worried about data security since the service provider originated in Finland and the company has a strong track record in the business with 30-year experience.

**Q2. Should Pia be worried about possible lock-in with either accountant or system provider?**

Vendor lock-in refers to a situation where the cost of switching to a different vendor is so high that the customer is stuck with the original vendor. Because of financial pressures, an insufficient workforce, or the need to avoid interruptions to business operations, the customer is "locked in" to what may be an inferior product or service. Like any organization, worrying about the “locked in” scenario is very natural before selecting cloud accounting software and service provider, but a proper due diligence is necessary before making any decision. Pia needs a clear answer regarding data breaches and cyber-attacks, switching to another vendor when the service provider fails to meet SLA, and moving data when the service provider gets out of business. Pia should be reassured about accounting software since all data and tools are in the cloud. Pia can leave at any given moment. However, Pia should put in enough time and effort when dealing with due diligence concerning cloud providers regarding vendor lock-in. Eventually, the pharmacy will start collecting a high volume of data when the Pia business grows. Corporate data will be too massive to migrate, and you may be lock-in to your service provider. More importantly, it is advisable to move to the cloud for Pia to increase its competitive advantage and expand the business. With proper due diligence and service level agreement terms, Pia should not be too worried about being lock-in with a single service provider.

**Q3. How should Pia Mitigate** **Possible data security Risks?**

Data is an asset that are generated, acquired, saved, and exchanged for any company. Protecting it from internal or external corruption and illegal access will ensure a company of monetary loss, reputational harm, consumer trust degradation, and brand erosion. Whether Pia moved to the cloud or not, we cannot eliminate risks. As a business owner, Pia is hesitant to move to the cloud because of the risk associated with privacy and data security, cost, and so on. Data breaches or cyber-attacks might arise from internal or external or anywhere; to mitigate risks, Pia needs to tackle multiple vulnerabilities and threats that will put the business at risk by implementing possible risks control mechanisms.

Recommended risks controls are as follows:

* Secure all workstations
* Update and upgrade accounting software and any other, if available
* Assess inside threats and address insider threats
* Limit and control account access
* Implement defense against cyberattack
* Reinforce data security

**Q4. Is price an important factor when choosing the system?**

Price is unquestionably a crucial consideration when selecting a system. Since the entire service is run on the service provider's servers, cloud computing is associated with lower prices. Additionally, cloud-based solutions are offered as SaaS, which eliminates the need for expensive software license investments and allows users to just pay for what they use. For a small business like this, the demand for accounting services varies substantially, thus paying for them per user would result in significant long-term savings compared to paying fixed costs.

Cost savings appear to be another important driving force behind outsourcing. Pia wouldn't be able to afford higher service rates, and accounting firms serve many different clients. Considering the available information, we advise Pai to choose System 3 instead of the other two systems. Even though System 3 started off more expensive than the other two, it offered a better bundle with no transaction fees and complimentary 2-hour accounting services. Pia will save 130 Euros a month on average if she chooses system 3 plus 0.95 each transaction. System 3 also offers customization and integration with third-party reporting and payment services, which Pia requested. It also offered limited connection with third-party corporate systems. Given that the service provider is Finnish and has a 30-year history in the industry, Pia won't need to worry as much about data security.

**Q5. What is the optimal division of work between Pia and the accountant? Should Pia outsource all the account tasks, use selective outsourcing, or keep all tasks to herself? Evaluate each accounting task on their suitability to outsourcing in the cloud context. Use Table 3 provided in Appendix 1 and discuss the implications of your choices.**

Giving the accountant the responsibility of handling the invoices will be the best way for Pia and the accountant to divide up the work. We think Pia shouldn't outsource all the account tasks and instead start slowly by outsourcing a few processes and then continue to work on others by herself for a while. As per our analysis, if Pia potentially leaves the invoicing to the third party it will be beneficial as it will buy her some time to invest in the strategies. It will also give her some certainty about the reliability of the accountant, and she can outsource the other accounting tasks later based on her requirements. Besides as they are opting for cloud-based solutions, Pia could opt for minimal services at the beginning but scale her usage at any point of time as per her needs. For example, from the five main accounting tasks, anything related to the purchases should still be handled by Pia because suppliers do not change and that the tasks do not need much effort to deal with. By excluding all the five sub-tasks under purchases task, Pia will reduce the cost associated with the accountant. Meanwhile, it will not take much of Pia time because the tasks are similar every year.

If we evaluate the accounting duties based on their suitability, we can contract out the invoicing chores, such as managing sales invoices, sending sales invoices, and receiving and handling sales invoices, payroll, and reporting to a third party. As the company grows, Pia will still have a chance to adjust what tasks to outsource, and what to keep in-house.

**Q6. How to ensure a good fit between the selected system and the work arrangement?**

One way to ensure that systems number three is a good fit is to first implement the cloud solution with the selected accounting tasks. After the new systems are up and running, we can conduct the systems analysis to see if the implementation meets the objectives. For example, the main reason for deploying the cloud solution is for Pia to have more time focusing on the company growth and expansion; meanwhile, to have a more efficient accounting system in terms of cost, convenience, and agility. If the cloud-based accounting information systems produce results that meet the objectives, it is a good fit for Pia and her company.

**Q7. What are the transaction costs incurred by the decision?**

Even though System 3 started off more expensive than the other two, it offered a better bundle with no transaction fees and complimentary 2-hour accounting services. Pia will save 130 euros a month on average if she chooses system 3 plus 0.95 each transaction.

**Q8. What about long term strategy? Reflect on the implications of your choices in the future.**

It is advised that Pia select the software-as-a-service cloud-based service model since it will ensure that the service provider will take care of the IT infrastructure and platforms, including the information security. This will ensure Pia's doubt on the data security issue even if she still needs to ensure the access level security controls. System 3 is the best option for Kluuvin Apteekki out of the three systems Pia discovered throughout her investigation in terms of long-term costs and a quick and painless system migration to the cloud.

Also, as stated above, as the company is small, and it is Pia’s interest to expand the business by outsourcing the accounting tasks. However, not all the tasks should be outsourced because some of them do not require much effort such as the number of suppliers. However, as the company grows, Pia may need to adjust her outsourcing strategy along the way to maximize the benefits against her time doing the in-house task. And that is one of the beauties of being in the cloud, the ability to adjust things as needed. Therefore, as the business is growing, Pia will need to adjust the accounting tasks to reflect the time invested and the benefits from the changes.

# Conclusion and Recommendations

Based on our case study on Kluuvin Apteekki, the software-as-a-service cloud-based service model is advised for Pia because it will ensure that the service provider will take care of the IT infrastructure and platforms, including the information security. This will end Pia's doubt on the data security issue even though she still needs to ensure that the access level security controls are in place. System number three was recommended as the best solution for Pia because of the efficient cost, availability of third-party system integration, and the maturity of the company being in the AIS business for 30 years. We also suggested that Pia keep the purchases tasks because the suppliers are the same every year and the invoices and payment are routine; therefore, it will not take lot of Pia’s time and it would also save additional money because Pia will not need to pay accountant related to the purchase’s tasks. Finally, by migrating to cloud Pia can rest assure that her data is safe because the CSP will take care of it mostly, and Pia only needs to make sure of proper identity and access management is in place.

We did our research on different accounting tools available on today’s market and we came up with a couple of recommendations that can be beneficial for any small business, such as Kluuvin Apteekki, who are seeking cloud accounting solutions. The cloud-based accounting program QuickBooks Online was created with small businesses, independent contractors, start-ups, and bookkeepers in mind. The array of features included in this feature-rich accounting software solution includes those for managing invoices, keeping track of expenses, calculating taxes, and monitoring sales.

Because of the sophisticated and well-recognized security measures used by this program, Pia can always be sure that her accounting data is safe. Pia may work with her accountant and other stakeholders in the cloud, view and manage your financial data from any device at any time. Real-time data allows you to quickly make decisions for your organization and gain new insights.

QuickBooks Online interfaces without difficulty with other Intuit products as well as other third-party programs like Shopify and PayPal. Pia can utilize QuickBooks with Bill.com, Method CRM, and other apps to increase the functionality of the platform. For new microbusinesses and independent contractors, the monthly cost of QuickBooks is $8. The next tier is $12 per month for three users plus an accountant and is designed for expanding enterprises.

The cost is feasible considering a small farm like Kluuvin Apteekki. Besides, Quickbook streamlines your workflow. Data collection is automated by ensuring that your accounting records are continuously updated. Instant data collection makes it easier to quickly collect crucial information that can inform your most essential decisions.

You may access QuickBooks Online from any device, at any time, because it is entirely web-based. Using your smartphone, you may create reports or perform a quick cash flow check. This is something hugely convenient for someone like Pia who wants to access her resources from anywhere. With QuickBooks Online, Kluuvin Apteekki’s financial information is secure since this program has user-friendly security features. Pia’s books are safeguarded by cutting-edge, business-recognized security measures that will keep the farm’s financial information private.

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# Appendix

Table

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Figure 1 The three-accounting systems Pia came up with

Table

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Figure 2 The accounting tasks of Kluuvin Apteekki

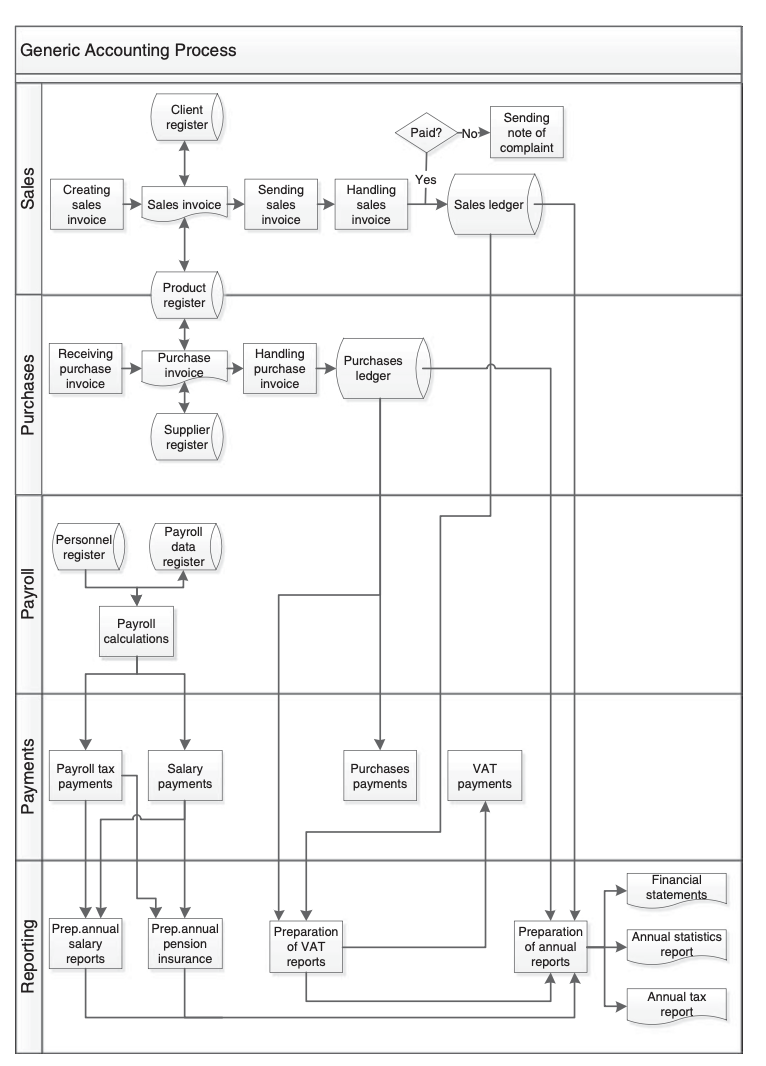


Figure 3 The generic accounting processes of SMEs in Finland