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Improving sales analysis using Excel: A business solution

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Improving sales analysis using Excel: A business solution

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The thesis project was commissioned by a company that owns several shops selling different products, such as food, tool, and cloth. The purpose of this thesis is to get insights into the process in the information flow in the shops, for the target company to record and analyse complicated sales data using Excel in a more effective manner.

As the case company is tightly connected with different tour guides and travel agencies, sales data becomes rather complicated due to the varying data inserted into the commission system. Knowledge base required in the project includes business process, business process modelling, Excel spreadsheet. To better understand the background of the data flow, the project is planned and structured based on system analysis and design principles, involving planning, analysing, designing, implementing and maintenance phase. Interviews and questionnaires were used to assess the user experience and determine the points of improvements in the current tool.

The result of the project is an improved tool for the employees to use. The aim was to improve their work efficiency with an easier to use and learn solution. At the end of the project the company successfully implemented the provided solution.

Keywords: Excel, SDLC, sales analysis, pivot table, business process

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1 Introduction

The thesis project was commissioned by a travel agency-based company which owns three shops selling different products. The purpose of the thesis is to address their inconsistent and insufficient recording system using Excel as the tool.

1.1 Project Background

The target company is a small-sized travel agency-based company which owns three shops which are selling food, bags, and cloth. The main customers are tourists. As cooperated tour agencies and tour guides are bringing tourists to the shop, the shops are paying commissions to those in return. Therefore, sales analysis and especially the commission calculation becomes rather critical for the target company.

Recently, it was discovered that inconsistent and insufficient recording system becomes an urgent problem for the company. High error rate on commission calculation and messy format turned out to be a significant issue that requires to be resolved. The client company is eager to quickly improve the practice on sales analysis system to fulfil all shops essential needs with the most affordable budget.

Considering the amount of sensitive information is revealed in this report, the case company requires to withhold thesis report from being published.

1.2 Objectives and research questions

The purpose of this thesis is to get insight of the information flow process in the travel agency-based shops and for the target company to record complicated sales data in a more effective manner. The outcomes of the study are expected to be:

- a) Interpreting the sales information process diagram
- b) Creating new Excel format for sales report
- c) Evaluating new sales report

Correspondingly, the main research question is: How to help business process improvement using Excel in three daughter companies of the target company?

The author believes understanding what the users demand is of high importance. To achieve the best result that fulfils company's real need, the following sub-questions are set:

- a) What is the user experience of the current sales recording system?

- b) What are the challenges of the current system?
- c) What are the expectations from the new system?

1.3 Structure of the study

The thesis follows system analysis and design principles, and the main content is divided into corresponding sections.

First section includes an introduction of the thesis topic, the background information of the commissioned company, thesis objectives, and related research questions.

The second section covers knowledge base on tools and concepts that are applied in the study. To improve the sales data analysis for the case company, it is necessary to understand the business process of the shops. A strong knowledge base about Excel will assist the author to develop a sales report with best practice, fulfilling the company's needs. The concept of system analysis and design helps to build a clear structure of the study. The third section introduces research methods applied in the study, explaining the approaches of information gathering and analysis.

In the fourth section - the planning phase, the author explains the business process in the target shops and the background of the data flow. This section also provides the basis of how the current reporting system works in different retail shops. In addition, benchmarking was done to find out what sales recording tools are used in other similar shops, and what other solutions can be applied for the target company.

The fifth section analysed user experiences on the current sales recording system via interviews and questionnaires. It consists of the advantages as well as the most affecting challenges of the current systems. The company's expectations are taken into account.

In the sixth section, solutions are designed according to the specific requirements among different shops. The section explains what has been changed in the new sales analysis system into detail, what is different from other shops. Additionally, pivot table is also introduced to users as a new feature.

Section 7 includes feedbacks from the company. After using the new sales recording system for more than 6 months, users were asked to do the same questionnaires. Comparison was done between the old and new system to check if problems are addressed. Section 8 provides a conclusion for the whole project.

2 Tools & Concepts

2.1 Business Process

Gartner (2017) defines that “Business process as an event-driven, end-to-end processing path that starts with a customer request and ends with a result for the customer. Business processes often cross departmental and even organizational boundaries”.

To be more specific, a business process involves a collection of related activities or tasks that are conducted by organization resources (human or physical equipment) to accomplish predefined goals, such as a specific product or service. It allows the reader to understand when, how, who, where and what occurs to achieve a pre-determined end-goal. With the steps laid out in a simple format, the process can be improved or changed. A process diagram can also be used as a training tool for new employees, standardizing business practices within the company or auditing (Lucidchart).

A business process could have individual or automated activities which include multiple input data, that are affected by various elements and hence generating different output. To have a better understanding of a business process, a visualized workflow depending on specific rules is applied to display these activities and connections.

The tool used for modelling during this project is QPR Enterprise Architect. It offers a wide range of tools for different kinds of modelling needs and can be tailored for the company. The ease of use and access from school was the reason to choose this software.

2.2 Excel spreadsheet

Microsoft Excel is a tool for making tables and handling the data within. Excel is easy to use and offers a large variety of tools to process the data and with practice, can be used in an advanced manner with functions and macros to customize the way a person can utilize it.

Depending on how the software is used, the result can be brilliant or harmful to work productivity. Later in this paper will be explained how much of a difference can there be.

2.3 System analysis and design

Information is used as a weapon in the battle to increase productivity, deliver quality service and make sound decisions. In today’s economy with fierce competition, information technology is regarded as the key element between success and failure. System analysis and design,

a step-by-step process for developing high-quality information system, is advocated (Shelly, Rosenblatt, 2010).

Shelly and Rosenblatt (2010) pointed out that system development life cycle (SDLC) is a structured analysis to the system development process, uses a series of phases to plan, analysis, design, implement and support an information system. The five steps are interpreted using the waterfall model below:

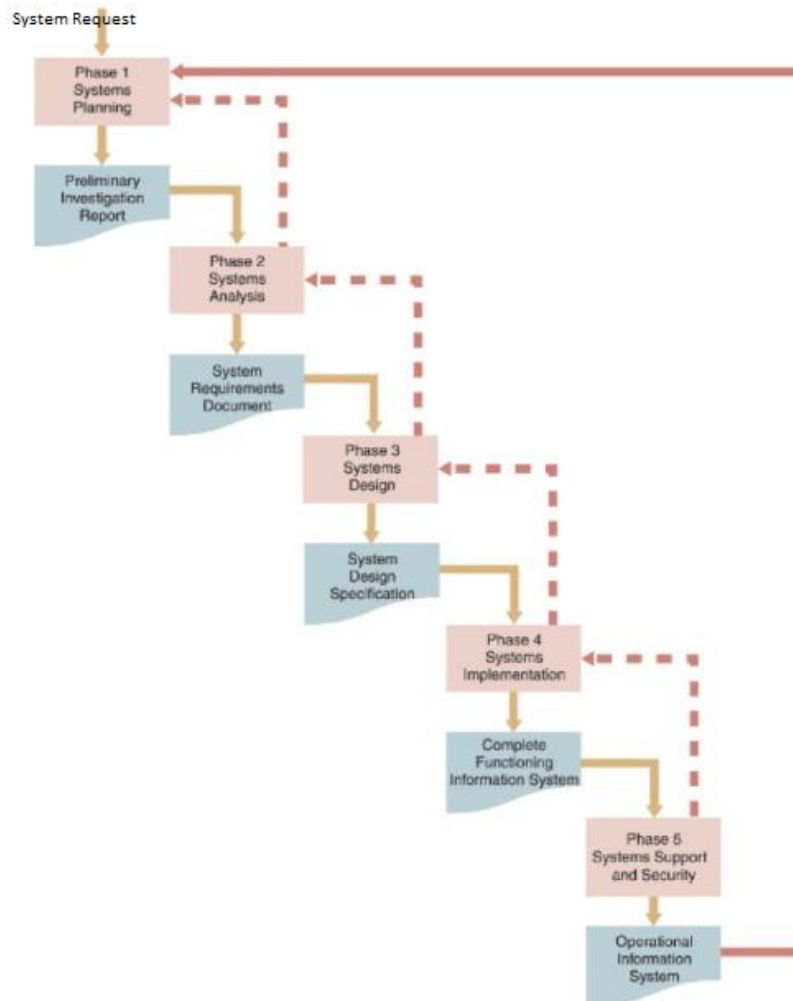


Figure 1: Waterfall Model of SDLC (Shelly, Rosenblatt, 2010)

- **Systems Planning:** the objective of the planning phase is to perform a preliminary investigation to evaluate an IT-related business opportunity or problem. As illustrated in the waterfall model, system planning usually starts with describing issues or desired improvements in an information system or a business process. This is known as a system request and is delivered to the IT departments.
- **Systems Analysis:** building a logical model of the new system is the main objective of the systems analysis phase. For the sake of better understanding the system, interviews, surveys, observation, are usually used as fact-finding techniques. According to

the results from fact-finding, the system requirement document can be delivered to describe user requirements, benefits, and outlines alternative development strategies.

- **Systems Design:** the purpose of this phase is to build a physical model that fulfils all documented requirements for the system. The deliverable system design specification will be presented to management and users for review and approval.
- **Systems Implementation:** during systems implementation phase is established. The purpose of this stage is to deliver a completely functioning and documented information system. The new system is ready for use at the conclusion of this phase. In addition, assessment is also included in this section.
- **System Support and security:** during the systems support and security stage, the IT staff maintains, enhances, and protects the system. (Shelly, Rosenblatt, 2010)

3 Methodology

3.1 Research Methods

In this study, the author aims to develop the effectiveness of information recording and analysis for the case company. Considering the oriented beneficiaries are from the case company who have already background basis and experiences, it is significant to hear what they want, need, and understand more about their expectations. For the sake of a realistic views, interviews, questionnaires, and benchmarking are conducted as the research methods in the project.

3.2 In-depth interviews

In-depth interview is a method of qualitative research technique that involves interviews with individuals or a group of participants to explore their perspectives on a particular matter, idea or situation (Boyce, Neale, 2006). According to Liamputtong (2002), in-depth interviews refer to focused interviews, unstructured interviews, non-directive interviews, and semi-structured interviews. The different names are basically toward to the same meaning in in depth interviews with only small differences.

The interview objects are classified into three groups: shop assistants, store managers and accountant. These interviews were conducted face-to-face with the respondents, who were asked experiences and concerns about the current sales analysis system, the thoughts and expectations regarding to the future improvements. The in-depth interviews brought valuable and detailed information which helped the author to build the final solution.

3.3 Questionnaire

Questionnaires can be divided as both quantitative and qualitative methods regarding the specific nature of the questions (Dudovskiy, 2018). A questionnaire is a research method consisting of a series of question aiming to gather information from respondents. Questionnaires can be a sufficient approach of measuring the behavior, attitudes, preferences, and opinions of related subjects.

In this study, identical well-designed questionnaire was sent to the target group twice, seeking for both the before and after opinions from the same users. Questionnaires were conducted through Google form, which allows online responses.

4 Planning - Current business model investigation

Alcan (2015) deems that planning phase is the most critical step in developing a successful system, during this stage it is possible to determine exactly what the objective of the company is and what the problems needed to be addressed are:

- Defining the objectives, the nature and the scope of the problems under study
- Propose alternative resolutions after meeting with employees, clients, and consultants
- Resolve how to make better solutions than the competitors'

This section begins with the description of the business process of the case company, then the current reporting system is explained in detail. With this we obtain a better understanding of the project background and thus alternative solutions can be proposed. Benchmarking is also done of companies with similar businesses, with the purpose of finding out what do the other similar companies use for their reporting system, and what is the best solution for the target company. In the end of this section, a preliminary investigation conclusion will be made.

4.1 Business process in the shop

An evident business process provides comprehensive background knowledge on why a well-designed reporting system is required by the company. Anupindi, Chopra, Deshmukh, Mieghem and Zemel (2012, 5) state that process activities are connected, one flow unit that has completed with one activity can become a starting point of next activity.

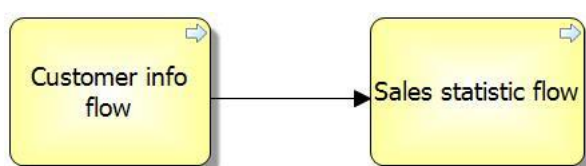


Figure 2: Business process in the shop

As can be seen from Figure 2, the information process in the shop is divided by two related processes - the customer information flow and sales statistics flow. The customer information is processed and transferred to the shops already before purchase, while the actual sales statistics are transformed during and after purchase. Because sales data usually involves customer info, it is rather important to have customers' passport information at hand in advance. The most significant part - inserting sales data happens during and after customers' purchase, will be interpreted in to detail hereinbelow.

Figure 3 illustrates a customer information process. The process starts with a tourist, who provides personal information, such as a passport number to a travel agency. After assembling a tour group, passport information of all tour members (involving the corresponding tour guide), travel routes and dates will be gathered by the cooperate travel agency and emailed to communication manager from the shop side. The communication manager is responsible for downloading and sorting all the name lists according to their arrival date at Finland, after which name lists will then be distributed to shops on the date of arrival. Therefore, all shops can view which groups will come on that day. The customer information has successfully transferred from China to the case company in Finland, and will continuing to flow during their purchase, even after their departure.

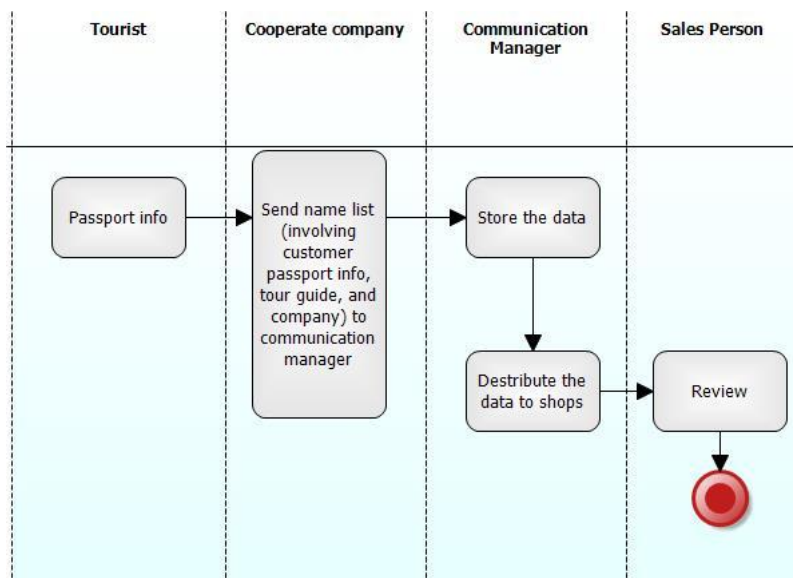


Figure 3: Customer information flow - before purchase

When it comes to Figure 3, a closer look is taken to the sales information process, beginning with purchase in shops and ended by completing commission payment.

When customers arrive to the shops and complete a purchase, passport information is always asked at the cashier in order to get valid tax refund receipts. At this stage, all required information for the sales report, including customer passport info, purchase amount, group name list, are in readiness.

As passport information and sales amount are involved in the tax refund form, salespeople start to match them to corresponding name list, mark with tour guide's name and tour agency. After that, it is time to insert the sale data to an Excel sales file, and then calculate commissions for each tour leader and agency. Detailed process and format of the current sales statistic recording in Excel report will be discussed in section 4.2.

Given that sales are recorded, the store manager is then responsible to recheck sales report, ensuring that all commission amounts are correct. If everything is confirmed, accountant will pay the premium to related tour leaders and agencies, and then close the process. However, once an error is found, normally either wrong sales value or wrong tour guide, the erroneous data will be returned to sales person. After correcting the incorrect entry, store manager will recheck it again and send the corrected ones to accountant for payment. Nevertheless, it is possible that some sales cannot be linked to any given tour guides, in this case, the sales will stay open until the right guide come and claim for the commission.

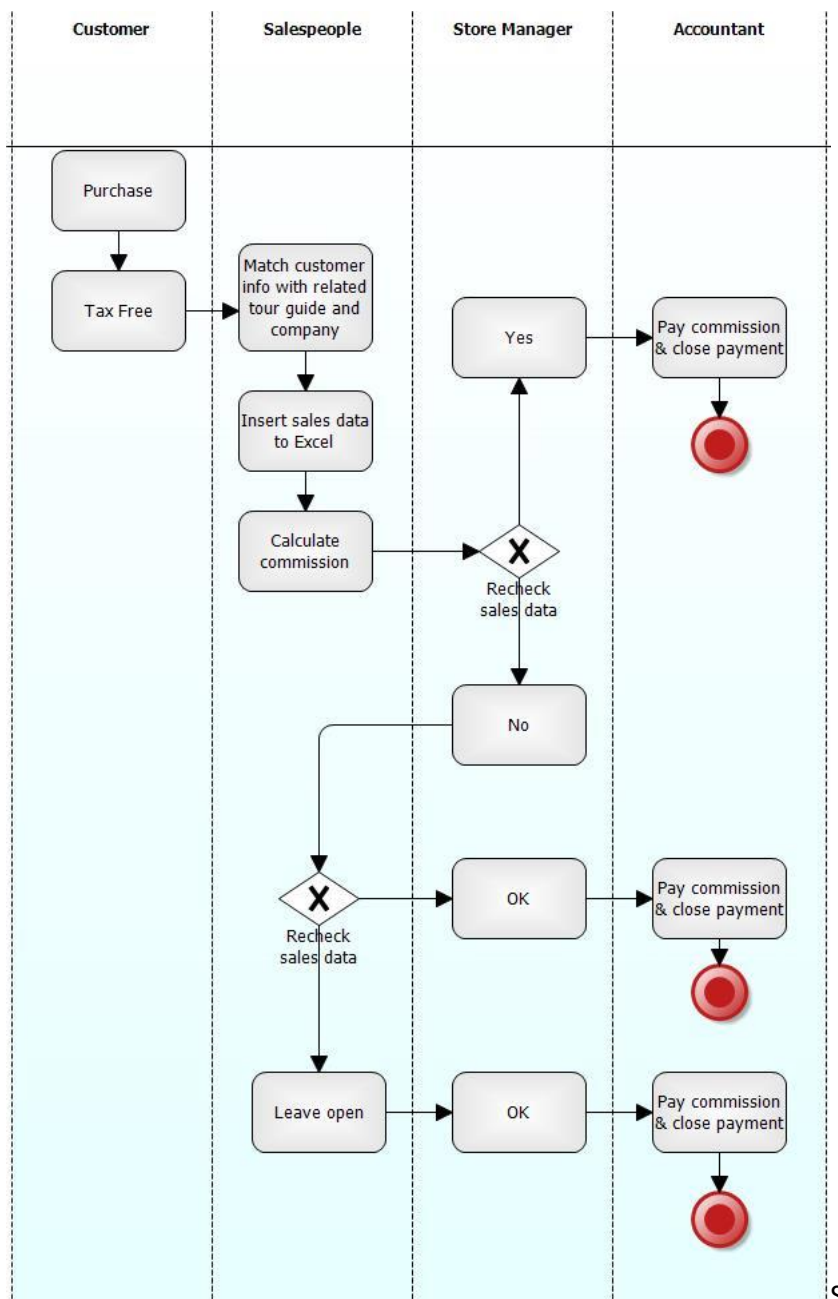


Figure 4: Sales statistics flow - while and after purchase

4.2 How does the current system function

As mentioned above, the case company owns three shops selling different products, and are utilizing different format of sales recording. However, the most concerned elements, such as sales, tour guide, travel agency and related commission, are basically the same. Microsoft Excel worksheet has been chosen in the case company as main method on data recording.

Considering July is a typical peak month that contains the most information flow and demands the most work hours for sales statistics, the author will take July sales report as a typically illustration.

4.2.1 Food shop

<	>	Jan	feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
---	---	-----	-----	-----	-----	-----	-----	------------	-----	-----	-----	-----	-----

Figure 5: Current report - food shop 2

As shown in Figure 5 & 6, the sales report that food shop is applying contains abundant information with a distinct style. The report consists of twelve sheets, involving sales details for each month.

	Cash	Card	Sales (before VAT)	Sales (after VAT)	Tour guide	Comm.	Payment Status	Company	Company Comm.	Payment Status
Total:	105	50	155.00	135.96	Jack 5%	6.80		Aurinko	4.08	
	114		114.00	100.00	Jack 8%	8.00		Aurinko	3.00	
5,199.85	122		122.00	107.02	Tom 5%	5.35		Unitour	3.21	
	12.85	143.00	143.00	125.44	Tom 10%	12.54		Unitour	3.76	
		35	47.85	41.97	No comm.					
		100	100.00	87.72	Jessy 5%	4.39		EU Travel	2.63	
		320	320.00	280.70	Jessy 8%	22.46		EU Travel	8.42	
Cash :	81	1120	1,201.00	1,053.51	Jessy 10%	105.35		EU Travel	31.61	
2224.85	1216	332	1,548.00	1,357.89	Lancy 10%	135.79		Fast Travel	40.74	
		108	108.00	94.74	Unkown					
	102		102.00	89.47	Lucy 8%	7.16		Fast Travel	2.68	
Card :		313	313.00	274.56	Vivi 8%	21.96		EU Travel	8.24	
2975	112		112.00	98.25	Vivi 10%	9.82		EU Travel	2.95	
	360		360.00	315.79	Doris 5%	15.79		Nordic Trip	9.47	
1. Jul		454	454.00	398.25	Doris 10%	39.82		Nordic Trip	11.95	

On Duty : Jessica, Daniel,

Figure 6: Current report - food shop (Jul)

According to the shop assistants from food shop, storing basic information, such as date, people on duty, into sales report is usually the first thing of the day. After sorting the tax refund form by tour guides' names, salesperson starts to insert cash and card sales into the daily sales report by different commission level.

The author emphasized that the food shop has products with tax rate 14% and 24%. Care must be taken while salesperson calculates the correct net sales. Normally they set a formula with tax rate 14% to the whole column and change the rate to 24% if needed. As commission level for tour leaders differs, shop assistants are required to create formulas manually when it comes to guides' commission calculation. Company commission, however, is fixed, so that only copy and paste pre-set formula is needed.

4.2.2 Bag shop

Different from the previous sheet, Figure 7 reveals that the separates the data into agencies, bag instead of months. Each month has its own file, rather than having everything in a yearly sheet.

Daily Sales	Aurinko	EU travel	Nordic Trip	Unitour	Fast travel	Others
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Figure 7: Current report - bag shop 1

When it comes to daily statistic recording, the author found that method of sorting and inserting data is the same as that in the food shop. However, despite of calculating tour leaders' commission manually, bag shop creates respective formula according to commission levels (Figure 8). In other words, shop assistants need only to input guide's name, company name, cash and card sales, commissions will be calculated simply by pasting the corresponding formula to the right cell.

Bag shop – July										
	Guide names	cash	card	Before tax	After tax	Comm. 2%	Comm. 5%	Comm. 8%	Company	Company Comm.
Total:	Jessy 5%	45		45	36.29		1.8		EU Travel	0.7
521.6	Lancy 5%	25	25	50	40.32		2.0		Fast Travel	0.8
Cash:	Unkown	115		115	92.74			7.4		
226	Lucy 8%		20.6	20.6	16.61				Fast Travel	0.3
Card:	Vivi 8%	41		41	33.06				EU Travel	0.7
295.6	Vivi 10%		225	225	181.45			14.5	EU Travel	3.6
	Doris 5%		25	25	20.16		1.0		Nordic Trip	0.4
1. Jul										Sales: Antonio, Jenny
Total:	Kevin 2%	145	321	466	375.81	7.5			Nordic Trip	7.5
1564.72	Kevin 5%	50		50	40.32		2.0		Nordic Trip	0.8
Cash:	William 5%	21	140	161	129.84		6.5		Nordic Trip	2.6
391.8	William 8%		138	138	111.29			8.9	Nordic Trip	2.2
Card:	No comm.		118.32	118.32	95.42					
1172.92	Kimi 5%		40	40	32.26		1.6		Fast Travel	0.6
	Kimi 8%		195	195	157.26			12.6	Fast Travel	3.1
	John 5%	116		116	93.55		4.7		EU Travel	1.9
	Jack 2%	59.8		59.8	48.23	1.0			Aurinko	1.0
	Jack 8%		26.6	26.6	21.45			1.7	Aurinko	0.4
	Unkown		194	194	156.45					
2. Jul										Sales: Jenny, Sani

Figure 8: Current report - bag shop (Daily sales)

Figure 9 illustrates a monthly sales statement for a specific cooperate tour agency, which is usually filled by salesperson and supervised by the store manager. The format is duplicated from daily sales sheet, whereas statistics for only the specific company is displayed. As told by the store manager, this sheet is filled constantly by salesperson during the month and will be verified by the shop manager at end of each month.

Nordic Trip sales & comm. - July										
	Guide names	cash	card	Before tax	After tax	Comm. 2%	Comm. 5%	Comm. 8%	Company	Company comm.
Jul.1	Doris 5%		25	25	20.16	0.4			Nordic Trip	0.4
Jul.2	Kevin 2%	145	321	466	375.81		18.8		Nordic Trip	7.5
Jul.2	Kevin 5%	50		50	40.32			3.2	Nordic Trip	0.8
Jul.2	William 5%	21	140	161	129.84		6.5		Nordic Trip	2.6
Jul.2	William 8%		138	138	111.29			8.9	Nordic Trip	2.2
Jul.3	Jason 5%	25	25	50	40.32		2.0		Nordic Trip	0.8
Jul.3	Wang 5%	76		76	61.29		3.1		Nordic Trip	1.2
Jul.3	Wang 8%	435		435	350.81			28.1	Nordic Trip	7.0
Jul.6	Mark 2%	128	245	373	300.81	6.0			Nordic Trip	6.0
Jul.6	Mark 5%		267.1	267.1	215.40		10.8		Nordic Trip	4.3
Jul.8	Kevin 5%	50	24	74	59.68		3.0		Nordic Trip	1.2
Jul.9	Kevin 8%		152	152	122.58			9.8	Nordic Trip	2.5
Jul.17	Doris 8%		249	249	200.81			16.1	Nordic Trip	4.0
Jul.17	Jason 5%	38	55	93	75.00		3.8		Nordic Trip	1.5
Jul.17	Kevin 2%	26.32	438.32	464.64	374.71	7.5			Nordic Trip	7.5
Jul.22	Kevin 8%		12	12	9.68			0.8	Nordic Trip	0.2
Jul.22	Jerry 2%	295.08		295.08	237.97	4.8			Nordic Trip	4.8
Jul.22	Jerry 5%	422		422	340.32		17.0		Nordic Trip	6.8
Jul.23	Jerry 8%	453.9	179.4	633.3	510.73			40.9	Nordic Trip	10.2
Total		2165.3	2270.82	4436.12	3577.52	18.7	64.9	107.7		71.6

Figure 9: Current report - bag shop (Nordic Trip)

It is notable that only guide and company name, cash and card sales can be copied from the daily report in order to reduce error rate. The idea is that salespeople paste the commissions formula to the corresponding cells, and compare if the commission amount is the same as what has been calculated in the daily sheet.

4.2.3 Cloth shop

Cloth shop owns a very simple report compare to the other two shops. The sales statement contains only main sales table and daily table (Figure 10). Cloth shop also has separate sales report for each month, however, instead of having agencies' sales statistics, a daily table is found in the report.

Main sales table	Daily table
-------------------------	-------------

Figure 10: Current report - Cloth shop

Even though basic information is the same, the main sales table, in other words, daily sales sheet, is very different from what the other two shops have. General data inserting process is the same, tour guide, company, cash and card data are put into the sheet. As cloth shop has only one commission level for both tour leaders, commissions are able to be calculated simply by copying and pasting the existing formula. It should be emphasized that the cloth only pays equivalent commission level to certain cooperate agencies, the remaining companies - Nordic

travel and Aurinko as illustration, are not getting paid. Figure 11 indicates that total sales as well as salesperson on duty are not inserted in the main sales table.

Date	Tour guide	Company	Cash	Card	Sales (incl.vat)	Sales (excl.vat)	Company com	Guide comm	Status
1	John	EU Travel	120	45	165	133.1	2.7	6.7	
	Yuri	Nordic travel		278	278	224.2		11.2	
	Jessy	EU Travel	41	1210	1251	1008.9	20.2	50.4	
	Vivi	EU Travel	122		122	98.4	2.0	4.9	
2	John	EU Travel	179	1654	1833	1478.2	29.6	73.9	
	Doris	Aurinko	1321		1321	1065.3		53.3	
	Kevin	Nordic Trip		25	25	20.2	0.4	1.0	
	William	Nordic Trip	234		234	188.7	3.8	9.4	
	Unkown		123	85	208	167.7			
	No Comm.		621	10	631	508.9			
3	No Comm.			130	130	104.8			
	No Comm.			90	90	72.6			
	Vivi	EU Travel		213	213	171.8	3.4	13.7	
	Mike	Aurinko	61	78	139	112.1		9.0	
	Jack	Aurinko	245	215	460	371.0		29.7	
	Jin	Wetravel	154		154	124.2	2.5	9.9	
	Unkown		113		113	91.1	1.8		

Figure 11: Current report - Cloth shop (Main sales table)

Unlike the other two shops, cloth shop uses a separate daily table to display sales details (See figure 12). In this sheet sales (Incl. vat), sales (excl. vat), company commission and guide commission are normally fixed formulas prepared in advance. Calculations are made automatically after copying sales data (Tour guide, company, cash and card) from the main sales table. In addition, salespeople are also responsible to put the correct date, as well as their names to the daily table.

Daily table - 2016.7.1								
Sales (Incl. vat):	1816							Michelle
Sales (excl. vat):	1464.52							Lassi
Cash:	283							Becca
Card:	1533							
Tour guide	Company	Cash	Card	Sales (incl.vat)	Sales(excl.vat)	Company comm.	Guide comm.	
John	EU Travel	120	45	165	133.1	3.99	10.65	
Yuri	Nordic travel		278	278	224.2			
Jessy	EU Travel	41	1210	1251	1008.9	30.27	80.71	
Vivi	EU Travel	122		122	98.4	2.95	7.87	

Figure 12: Current report - Cloth shop (Daily table)

4.3 Benchmarking with other similar business problems and solutions

The users expect the most efficient solution possible, meanwhile the owner requires the most economic and fastest solution possible. Benchmarking was done to find out what sales recording tools are used in other similar shops, and what other solutions can be applied for the target company.

Metric (1-3) (bad-good)	Excel	Software
Quality	2	3

Time	2	3
Cost	3	1

Table 1: Benchmarking between Excel and customized financial software

Excel spreadsheet has been the main recoding tool for many small shops. Chain stores, or some bigger shops usually use specialized software for their financial recording. The table above represents the assessment of the benchmarking between the excel sheet and customized financial software.

A specialized financial recording application was brought up to the company, because it requires less work force, less time resource, and contributes more stable and accurate calculations. However, for the food shop has two different tax rates with also different commission levels that most default financial software is not able to fulfil, a customized design should be involved to address this issue, which simply means extra investment. In addition, making a customized software not only asks for longer development time, training, troubleshooting, and updating are also required. This is occasionally a problem due to delays between the service request and action from the developer.

By contrast, Excel spreadsheet has been used for sales recording the past two years in the shops. Improving the current Excel report rather than purchase a customized financial software is considered as a better choice for the case company due to the following reasons:

- Free
- Users are familiar with Excel
- Less time required for the improvement
- Training is easy
- Easy approach on trouble shooting and further improvement

To summarize, even though the values of the benchmarking are even, the cost and time factors are what the company values the most and thus dictates the outcome. These are the reasons that proposal of optimizing current excel sheet is eventually accepted by the company.

5 User experiences analysis

Interviews and questionnaires were conducted to shop assistants, store managers and accountant. It gives the author a comprehensive understanding on how do different groups of employees like the current report system.

The chart below reveals that the current reporting system is generally not difficult to use for all shops. As indicated in the chart, sales report in food shop is relatively complicated compare to the other two shops, the possibility of making mistakes has been the highest among

three shops as well. In contrast, users found it is easy to work with the reporting system in the bag shop, the error rate is also discovered to be the lowest. The usability and error rate in cloth shop are both average.



Figure 13: Current report - satisfaction assessment

The table below illustrates information about the time spent on filling sales reports, and on error corrections. As can be seen evidently in the table, the food shop takes the longest time to fill the form (usually 1.5-2 hours). Once mistakes are found, it also requires the most effort to resolve the issues, usually more than one hour is spent on mistake corrections. It is normally enough to allocate 45-60 minutes on inserting statistics in the cloth and bag shops. According to the information from the managers, only the cloth shop has a single commission level for all tour leaders. However, the table indicates that even though the cloth shop has a single commission level, they spend more time on error fixing than the bag shop.

	Food	Cloth	Bag
How much time spent on filling the form?	1.5-2 hours	45 min - 1 hour	45 min - 1 hour
How long does it take to correct errors?	More than 1 hour	30-45 min	15-30 min

Table 2: Current report - time assessment

In addition to the general analysis, the author sorts out the users' requirements by analysing advantages and issues of the current sales reporting system through the real user experiences. It is found that each report has features that users are willing to retain; meanwhile, challenges are also occurring on all reports and are waiting to be addressed.

5.1 Advantages

Through interviews with the shop assistants, the idea that a summary of total sales presented on the sheet is determined as the most appreciated feature. Salesperson gets a daily sales receipt form the cash system at the end of the day, which has the information of total sales and sales separated to cash and card. They usually check both the sales worksheet and the receipt to ensure that the data matches. Once certain statistic doesn't match, due to all the details listed, it is also easy to find problem from the sales report. With this the shop assistants understand the fine details that form the total amount.

Bag shop manager pointed out that their sales report is based on food's, that's why their overall layout is similar. However, unlike food store, the commission columns are separated by different commission level in the bag shop (Figure 7), which has been mentioned by majority users during the interview. Most of them claim that the commission calculation process is much more efficient in bag store because different commissions levels are listed evidently, additionally, no manual calculation is required. Store manager affirmed this view, saying that classified commission makes the rechecking process clearer and easier.

The general layout has also received favour by most users from the food and bag shop. The accountant agrees it is overall easy to capture needed information from these two shops. Critical information, for example, on which day how much sales (cash & card) were made, can be obtained easily from the first column.

Overall, according to users' preference, three main features should be taken into consideration when creating the new format: summary of daily sales, commission calculation columns, report layout of the food and bag shop.

5.2 Issues

The issues of the forms are mostly unique to the companies in questions. Therefore, the issues will be outlined on a company to company basis. Understanding the problems of each company gives a solid base to build a unified sheet as old issues will be avoided.

5.2.1 Food shop - issues

Insufficient commission calculation is claimed to be the main issue in Food shop. The following aspects have been discussed the most in the interview:

- Time consuming
- Manual work
- High error rate
- Difficult for reviewing the content

	A	B	C	D	E	F	G	H	I
1		Cash	Card	Sales (before VAT)	Sales (after VAT)	Tour guide	Comm.	Payment Status	Company
2	Total:	105	50	155.00	135.96	Jack 5%	6.80		Aurinko
3		114		114.00	91.94	Jack 8%	7.35		Aurinko
4	5,199.85	122		122.00	107.02	Tom 5%	5.35		Unitour
5			143.00	143.00	125.44	Tom 10%	12.54		Unitour
6		12.85	35	47.85	41.97	No comm.			

Figure 14: Food shop - issues

As commission level and VAT rate varies, users are not able to copy and paste single formula. Instead, they'd need to correct formula manually every time according to the actual level (Figure 14). Jack, for instance, earns reward with two levels, which contains products with VAT also in two rates. Shop assistant first creates formula “=D2/1.14” and “=E2*0.05” to calculate the commission he earns from level 5%, VAT 14%, then changes the formula to “D3/1.24” and “=E2*0.08” to get the other amount. It increases the workload during reviewing the sales report due to the varying content. In addition, this causes problems as likelihood of human error increases for example due to copy and paste mistakes. The end results may differ from the sale receipts and requires a lot of effort to detect where the mistake has occurred. This process is manual, and the work effort could be spent elsewhere.

5.2.2 Bag shop - issues

The bag store has similar issues as the other shops (Figure 15). First, bad design of daily sales breakdown is considered as it is easy to mix sales with other dates. Secondly, even though separated commission columns increased the accuracy of commission calculation, the columns make the report too wide for the current monitor in use.

	Guide names	cash	card	Before tax	After tax	Comm. 2%	Comm. 5%	Comm. 8%	Company	Company Comm.
Total:	Jessy 5%	45		45	36.29		1.8		EU Travel	0.7
	Lancy 5%	25	25	50	40.32		2.0		Fast Travel	0.8
Cash:	Unkown	115		115	92.74			7.4		
	Lucy 8%		20.6	20.6	16.61				Fast Travel	0.3
Card:	Vivi 8%	41		41	33.06				EU Travel	0.7
	Vivi 10%		225	225	181.45			14.5	EU Travel	3.6
	Doris 5%		25	25	20.16		1.0		Nordic Trip	0.4
1.Jul										Sales: Antonio, Jenny
Total:	Kevin 2%	145	321	466	375.81	7.5			Nordic Trip	7.5
	Kevin 5%	50		50	40.32		2.0		Nordic Trip	0.8
Cash:	William 5%	21	140	161	129.84		6.5		Nordic Trip	2.6
	William 8%		138	138	111.29			8.9	Nordic Trip	2.2
Card:	No comm.		118.32	118.32	95.42					
	Kimi 5%		40	40	32.26		1.6		Fast Travel	0.6
	Kimi 8%		195	195	157.26			12.6	Fast Travel	3.1

Figure 15: Bag shop - issues

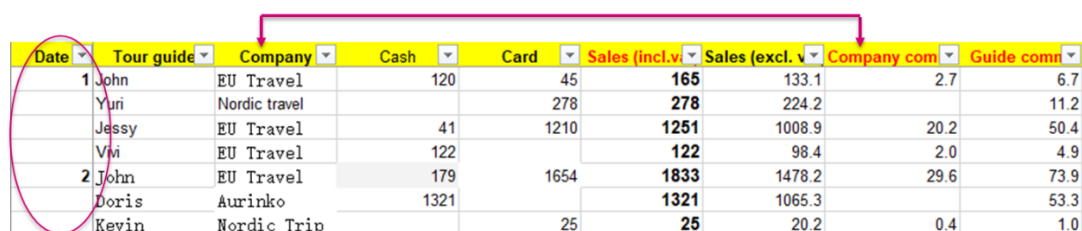
5.2.3 Cloth shop - issues

According to the interviews with users in cloth shop, even though their report is easy to use, the statistics accuracy and the process of reviewing is still unsatisfactory.

Issues	Impacts
Date represented improperly	Causes confusions to the numbers
No breakdown between daily sales	Easy to mix sales with other dates
Company name is far away from company commission	Increases the risk of miscalculating company commissions to uncooperative agencies
Daily table and main report are separated	Increases workload; Unable to review previous sales and responsible personnel

Table 3: Cloth shop - issues and impacts

As shown in the figure 16, the fact that the cloth shop uses single digital number to represent a date makes the sales report less formal. No breakdown is applied between different daily sales causes troubles for users to separate sales to other dates. Moreover, the assistant has mentioned that since the company name and company commission is far away from each other, it is more likely to miscalculate commissions to un-cooperated companies.



Date	Tour guide	Company	Cash	Card	Sales (incl.v)	Sales (excl.v)	Company com	Guide com
1	John	EU Travel	120	45	165	133.1	2.7	6.7
	Yuri	Nordic travel		278	278	224.2		11.2
	Jessy	EU Travel	41	1210	1251	1008.9	20.2	50.4
	Vvi	EU Travel	122		122	98.4	2.0	4.9
2	John	EU Travel	179	1654	1833	1478.2	29.6	73.9
	Doris	Aurinko	1321		1321	1065.3		53.3
	Kevin	Nordic Trip		25	25	20.2	0.4	1.0

Figure 16: Cloth shop main report- issues

In addition, as can be seen in the following figure, instead of having sales, date, personnel information in a single sheet as the other two shops, the cloth shop owns a separated daily table. To be specific, users are required update the date every day, add their names to the daily table and copy and paste the sales data from the main report. It is not only increases their workload, but also makes it more difficult to review the previous sales and responsible personnel.

Daily table - 2016.7.1							
Sales (Incl. vat):	1816						
Sales (excl. vat):	1464.52						
Cash:	283						
Card:	1533						
Tour guide	Company	Cash	Card	Sales (incl.vat)	Sales(excl.vat)	Company comm.	Guide comm.
John	EU Travel	120	45	165	133.1	3.99	10.65
Yuri	Nordic travel		278	278	224.2		
Jessy	EU Travel	41	1210	1251	1008.9	30.27	80.71
Vivi	EU Travel	122		122	98.4	2.95	7.87

Figure 17: Cloth shop daily table- issues

5.3 Company expectations

The company has expressed their desires on how the result should be. The company wishes that:

- The new format should improve the work efficiency
- The new format fulfils all shops' needs
- The format is standardized and optimized
- The format is applied as soon as possible
- The solution is affordable

6 Design new solutions

The aim of the system is for the users to use the Excel spreadsheet in a more effective manner. The users insert data into the Excel file, which converts the values according to the requirements as determined by each shop. The data becomes calculated and formatted in a manner that can be used as a financial report (Figure 18).

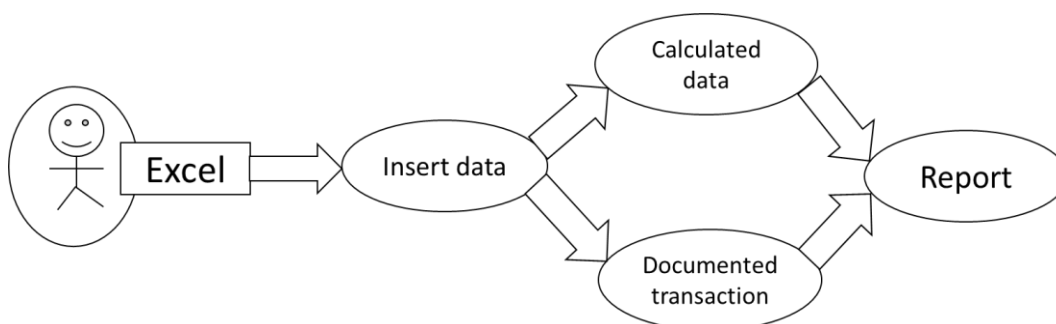


Figure 18: System design diagram

The specialized financial software is considered expensive and time consuming, whereas Excel is more familiar to the users, more affordable and can fulfil most of the company's needs. Therefore, Excel is chosen to be the tool of bookkeeping.

Taking into consideration the wishes of the shop staff and after analyzing the issues in current report sheets, a standardized daily sales report is designed. In addition, pivot table is introduced to make the work easier.

6.1 Daily sales format

The end goal is to standardize the bookkeeping report format, the author is trying to make the reports between shops as similar as possible. Main changes are applied to all three reports, including:

- Adding formula to the report
- Adding a header to specify which company and time frame the report belongs to
- Adding summary of daily sales, date, and staff on duty
- Adding breakdown line

However, there are some different variations between the shops' formats due to differences in commission and VAT percentages. As the cloth shop has the most common requirements for bookkeeping, the author will take cloth shop's report as an example to discuss the general changes, and then explain special improvements for reports for other shops.

6.1.1 Cloth shop - new design

The figure below is the new designed sales report for the cloth shop. The new solution brings many small improvements to make the bookkeeping easier. It also borrowed and improved some features from the old sheet.

		Formula	0.00	0.00	0.0					
2017-7 Cloth daily sale										
Date & Sales person	Summary	Guide names	Cash	Card	Sales (Incl. VAT)	Sales (VAT 0)	Guide Comm.	Company	Company Comm.	Status
Jul. 1	Total:	John	120.00	45.00	165.00	133.06	13.3	EU Travel	4.0	
		Yuri		278.00	278.00	224.19	22.4	Nordic travel		
	Cash:	Jessy	41.00	1210.00	1251.00	1008.87	100.9	EU Travel	30.3	
Michelle Lassi Becca		Vivi	122.00		122.00	98.39	9.8	EU Travel	3.0	
	Card:									
	1533.00									
Jul. 2	Total:	John	179.00	1654.00	1833.00	1478.23	147.8	EU Travel	44.3	
		Doris	1321.00		1321.00	1065.32	106.5	Aurinko		
	Cash:	Kevin		25.00	25.00	20.16	2.0	Nordic Trip	0.6	
Lasi Becca		William	234.00		234.00	188.71	18.9	Nordic Trip	5.7	
	Card:	Unkown	123.00	85.00	208.00	167.74				
		No Comm.	621.00	10.00	631.00	508.87				
	1774.00									
	1774.00									
6月3日	Total:	No Comm.		130.00	130.00	104.84				
		No Comm.		90.00	90.00	72.58				
	Cash:	Vivi		213.00	213.00	171.77	17.2	EU Travel	5.2	
Lucy Yan		Mike	61.00	78.00	139.00	112.10	11.2	Aurinko		
	Card:	Jack	245.00	215.00	460.00	370.97	37.1	Aurinko		
			726.00							

Figure 19: Cloth shop - new design

Start with common improvements, the author applies different main colours to represent different shops. Bright blue and orange are chosen for the cloth shop. To distinguish the shop responsible and the period of the sales report immediately, a header is also added in the new sheet. For minimizing copy and paste mistakes, standard formulas are listed in the first line. As a summary of sales is determined to be valuable, the author retains this idea to the new report, with the personnel on duty and dates moved next to it. To do so, the essential data of sales becomes more concise. Another small improvement is the breakdown line between daily sales, which makes the whole report more clear and readable.

Moreover, to address the complain about the far distance between company and company commission columns. The author simply moved the two columns together. In this case, the possibility of miscalculating commissions to un-cooperated companies will be reduced effectively.

6.1.2 Bag shop - new design

As revealed in the figure 20, orange and pink are decided to be main color of bag shop. Common changes, such as the formula, header, summary, breakdown line and the separate comm. column are also applied to the bag store.

Template --						0.00	0.00	0.0		0.00	
2017-7 Bag daily sale											
Date & Sales person	Summary	Guide names	Comm %	Cash	Card	Sales (Incl. VAT)	Sales (VAT 0)	Guide Comm.	Company	Company Comm.	Status
Antonio Jenny	617.8	Lucy	8%		20.6	20.6	16.61	1.3	Fast Travel	0.03	
	Card:	Vivi	8%	41		41	33.06	2.6	EU Travel	0.05	
	1468.52	Vivi	10%		225	225	181.45	18.1	EU Travel	0.36	
		Doris	5%		25	25	20.16	1.0	Nordic Trip	0.02	
Jul. 2	Total :	Kevin	2%	145	321	466.00	375.81	7.5	Nordic Trip	0.15	
	2221.32	Kevin	5%	50		50.00	40.32	2.0	Nordic Trip	0.04	
	Cash:	William	5%	21	140	161.00	129.84	6.5	Nordic Trip	0.13	
	870.7	William	8%		138	138.00	111.29	8.9	Nordic Trip	0.18	
Jenny Sani	Card:	No comm.			118.32	118.32	95.42	0.0		0.00	
	1350.62	Kimi	5%		40	40.00	32.26	1.6	Fast Travel	0.03	
		Kimi	8%		195	195.00	157.26	12.6	Fast Travel	0.25	
		John	5%	116		116.00	93.55	4.7	EU Travel	0.09	
		Jack	2%	59.8		59.80	48.23	1.0	Aurinko	0.02	
		Jack	8%		26.6	26.60	21.45	1.7	Aurinko	0.03	
		Unkown			194	194.00	156.45	0.0		0.00	

Figure 20: Bag shop - new format

However, even though some users are satisfied with the old separate commission level columns, they admit that it makes the report too wide for monitor. The issue is addressed by creating a separate commission percentage column. To be more specific, tour leader Vivi has

commissions in different levels - 8% and 10%. Shop assistant is now required to insert 8% and 10% to the comm.% column and the sales respectively. Afterwards, the only thing they need to do is to copy and paste the readymade formulas from the formula line, and guide commissions will be calculated automatically.

6.1.3 Food shop- new design

The food sales report applies all features from the other two shops. Green and yellow is determined to be the representing colors. What differs is the separated VAT rates for different sorts of products. To avoid manual calculation on VAT, the same idea of commission level calculation is utilized here. A separate column is also created for sales person to insert different VAT rate to, then copy and paste the readymade formula. The separate columns for commission level and VAT rate not only save more work time, it also helps to reduce the error rate of calculations.

		Formula				0.00	1%	0.00	0.0	0.0		
2017-7 Food daily sales												
Date & Sales person	Summary	Guide names	Comm. %	Cash	Card	Sales (Incl.VAT)	VAT%	Sales (VAT0)	Guide Comm.	Company Comm.	Company	Status
Jul. 3	Total :	Jack	5%	105	10	115.00	14%	821.43	0.0	0.0	Aurinko	
	4448.85	Jack	8%	114		114.00	24%	475.00	38.0	47.5	Aurinko	
	Cash:	Tapani	5%	540		540.00	14%	3857.14	192.9	385.7	Unitour	
Jessica Daniel	2388.85	Tapano	10%		143	143.00	14%	1021.43	102.1	102.1	Unitour	
	Card:	No comm.		12.85	35	47.85	14%	341.79	0.0			
	2060.00	Jessy	5%		100	100.00	14%	714.29	35.7	71.4	EU Travel	
		Jessy	8%	320	320	640.00	14%	4571.43	365.7	457.1	EU Travel	
		Lucy	10%	81	1120	1201.00	14%	8578.57	857.9	857.9	EU Travel	
		Lancy	10%	1216	332	1548.00	14%	11057.14	1105.7	1105.7	Fast Travel	
Jul. 4	Total :	Jack	5%	105	50	155.00	14%	1107.14	0.0	0.0	Aurinko	
	3750.85	Jack	8%	114		114.00	24%	475.00	38.0	47.5	Aurinko	
	Cash:	Tom	5%	122		122.00	14%	871.43	43.6	87.1	Unitour	
Jessica Daniel	1650.85	Tom	10%		143	143.00	14%	1021.43	102.1	102.1	Unitour	
	Card:	No comm.		12.85	35	47.85	14%	341.79	0.0			
	2100.00	Jessy	5%		100	100.00	14%	714.29	35.7	71.4	EU Travel	
		Jessy	8%		320	320.00	14%	2285.71	182.9	228.6	EU Travel	
		Jessy	10%	81	1120	1201.00	14%	8578.57	857.9	857.9	EU Travel	
		Lancy	10%	1216	332	1548.00	14%	11057.14	1105.7	1105.7	Fast Travel	

Figure 21: Food shop - new format

6.2 The pivot tables

Pivot table, one of the most prominent new features, is introduced to the shops. The managers are very willing to summarize monthly sales for cooperating tour agencies and the best sales tour guides. Pivot table is found to be a decent tool to analyse, summarize, explore and present a large amount of worksheet data in a very quick and easy manner, and can help to make better business decisions.

Pivot tables are flexible enough and are easily adjustable according to the desired results display. Pivot charts can also be created based on pivot tables, which will update data automatically along with the pivot tables.

Take food shop as an example (see figure below). Daily sales report is selected, after creating a pivot table, users are allowed to pick up the statistics they are interested in. For instance, the manager would like to know the guides who have the best sales. Guide name, sum of sales (incl. VAT) are then selected and dragged to different areas. A table is thus displayed automatically. What users need to do is only to format cells and sort the numbers as they wish. To easily compare the figures, creating a corresponding pivot chart is highly recommended. With a pivot chart, you can visualise the statistics and understand them better and faster. Lancy, for example, can be distinguished immediately to be the best sales tour guide in July of 2017.

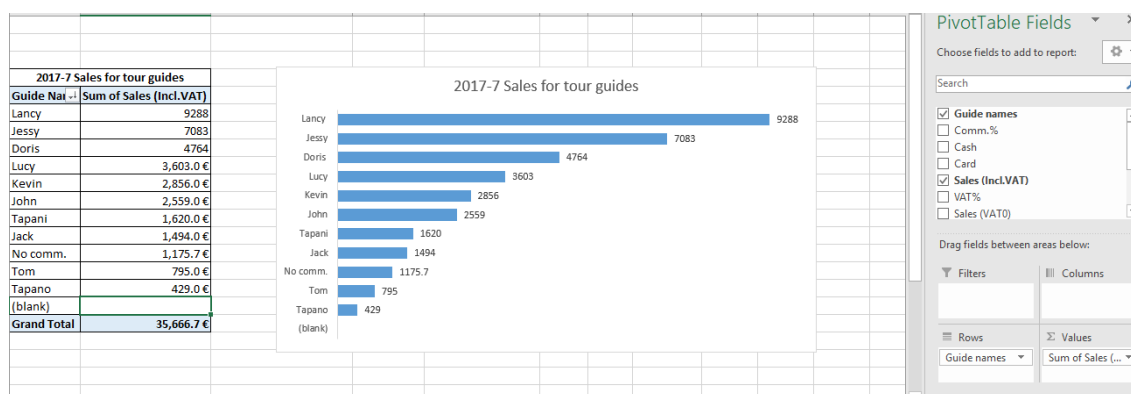


Figure 22: Pivot table - food shop

7 User feedback and Effectiveness

The solution has been implemented as of April 2017 and feedback has been gathered. The solution overall fulfils companies' requirements, which gained positive feedbacks. The users admit that the standardized sales report on Excel has a nice and clear layout, which makes the form filling and reviewing becomes more effective and time saving. Since the complicated calculation has been replaced by simple formula copy and paste, error rate has decreased dramatically in shops, especially in the food shop. Pivot table, as a new function, has been used the past months and was liked by shop managers.

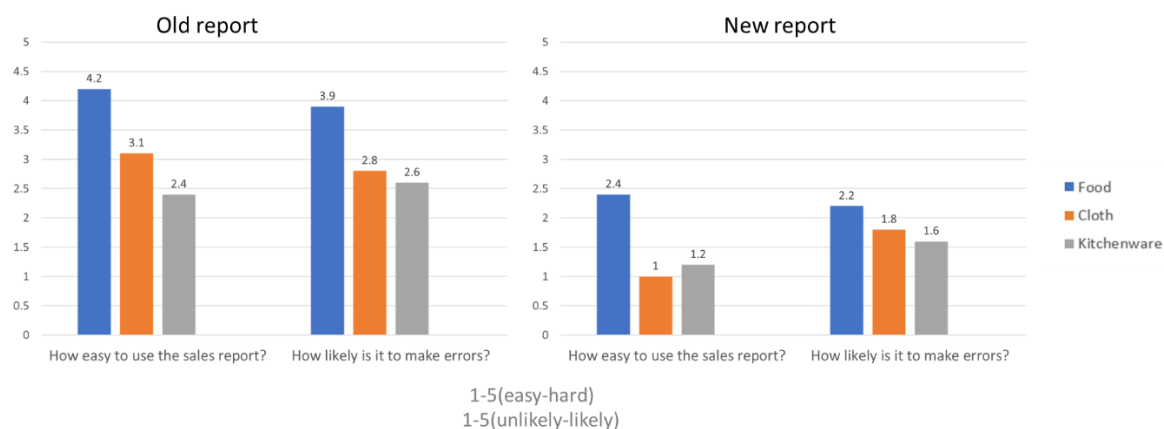


Figure 23: Feedback from company - satisfaction assessment

The method of gathering feedback is identical as to the initial analysis of the old format. The result of the old and new formats are compared to understand the difference in effectiveness and user experience. According to the comparison of the difficulty and error rate of the old and new reports via questionnaires, it is evident that new sales report is now considered to be very easy to use. New users should be able to learn to use it in a very short time. The figure above reveals that the error rate on recording has declined considerably in all three shops. Food shop shows their preference on the new design of separated commission level column, saying that it reduces their calculation mistakes effectively.

	Food	Cloth	Bag
How much time spent on filling the form?	1.5-2 h 0.5-1h	45 min-1h ~30min	45 min-1h ~30min
How long does it take to correct errors?	>1 30-45min	30-45 min <15min	15-30 min <15min

Figure 24: Feedback from company - time assessment

After the new report came into use, more time has been saved from the form filling and errors correction among all three shops (See Figure 24). The food shop gets the most benefit of it, as it saved about half of the time on same duty. As for the cloth and bag shop, the standardized reporting format saved about 15-30 minutes on form filling and about 15 minutes on correcting mistakes. Both shop assistants and managers admit that reviewing and correcting errors became easier since the format is so clear and statistics are allocated in the right place.

However, there are still some requirements Excel cannot fully achieve the company's needs. For instance, allow more automated work and thus reduce human work in order to effectively

increase work efficiency and also reduce human resource, which will in a long run decrease expenses. Therefore, a more professional and more catering software or application is still recommended to the company when it has more budget or time.

8 Conclusion

The project was completed successfully, results are accepted and applied to the target company. New Excel report, as a fast and free solution, has been taken into use and addressed the company's urgent issues. Project objectives were all met. However, the project time was longer than expected. Project schedule should be more well-planned and operate in the future. Overall, the project was a good practice, and plenty was learned.

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Appendix 1: Questionnaire

Questionnaire

1. **What is your occupation in the company?**

Mark only one oval.

- Accountant
- Store manager
- Shop assistant

2. **Which store are you working for ?**

Mark only one oval.

- Food shop
- Bag shop
- Cloth shop

3. **How easy is it to learn to use the reporting system?**

Mark only one oval.

	1	2	3	4	5	
easy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	hard

4. **How easy is it to use the sales report?**

Mark only one oval.

	1	2	3	4	5	
easy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	hard

5. **How much time do you usually spend on filling the form?**

Mark only one oval.

- about 30 mins
- about 45 mins
- about 1 hour
- about 1.5 hours
- more than 2 hours

7. When errors occurred, how long does it take to correct them?

Mark only one oval.

- 15 mins
- 30 mins
- 45 mins
- more than 1 hour

8. How good is the sales report tool?

Mark only one oval.

	1	2	3	4	5	
bad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	good

9. What is good in the sales report?

10. What is bad in the sales report?
