Investigating the Role of Industrial Engineering in Process Improvement in the Banking Industry: A Case Study of Bank Y

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Abstract

With increasing operational costs in banking industries, changing banking policies, procedures and processes, changing staffing framework, changing value chain; banking industries are currently going through a lot of major transformations of improving productivity, reducing costs by implementing Business Process Management projects. Process improvement in the banking industry helps to make sure that policies and procedures comply according to the banking regulatory bodies. The banking industry can benefit a lot when they deploy process mapping as "best practice" and by also adopting or benchmarking the experiences of other industries who have implemented similar tools and methods. This paper aims to investigate the roles of Industrial Engineering in driving process modelling and improvement in the banking industry. Define-Measure-Analyze-Improve and Control (DMAIC) methodology was used to investigate the roles of Industrial Engineering in running process improvement projects. Interviews and a questionnaire survey were used as methods of collecting data in one of the banking organizations in Botswana. Major findings suggest that the role of an Industrial Engineer is very key from the start of the process improvement projects, measuring process maturity, measuring process capability, and cost-benefits of process improvements. Recommendations are made that each segment should hire an Industrial Engineer(s) as they mostly provide technical and business advice concerning procedures, policies, processes, and process re-engineering. Improvements observed in Bank Y are improved process maturity by 10% in eight months (0% to 10%), improved process consistency and increased process audit ratings by 5% (per financial year).

Keywords: Business Process Management, Industrial Engineering, strategy implementation, process improvement, DMAIC, HRBP

1. Introduction

Good strategies that support process improvements are needed to adopt best practices to meet growing pressures on innovation, productivity, cost, process reliability, and service quality assurance. The opportunity for improving processes is noticed when there are various roles that are considered in the site. Most industries have embarked on running process improvement projects, and banking is one of the industries that have considered process improvement projects for operational sustainability and for standardization. Most banking organizations that embarked on business process improvement were focused around processes and improving customer satisfaction, the evidence indicates significant impact related to quality, cost and time and even satisfaction of both staff and customers. Currently, there are a lot of drawbacks caused by poor banking services especially for the long-term time for consumers waiting and queuing (Zhuo, 2019). Mainly banks strengthen banking business process management through Six Sigma management, to shorten customer waiting time and improve bank customer satisfaction (Alexander, 2001). The author further stated that Six Sigma management methodology reduces customer operating costs and cycles, improves customer satisfaction and enhances the profitability of an organization by improving the quality of its operations. Business Process Improvement is defined as a methodology that is designed to bring about step function improvements in administrative and support processes using approaches such as process benchmarking, process redesign and process reengineering (Harrington et al., 1997 cited in Adesola and Baines, 2005).

2. Literature review

Literature cited in this paper investigate the role of Industrial Engineering in the banking industry. A process is no more than the steps and decisions involved in the way work is accomplished. According to (Saraf, 2015), Industrial engineering can find application in banking as process analysis for various banking processes like loan approval process. For example, we can list down the sub-processes associated with loan approval process (say, file preparation, documents gathering, sorting of loan files according to types, submitting the loan files for approval, communicate decisions to the customers). Then we can do a time study for each sub-process (we can break down the processes further, if required). Then each process will have a specific timeframe associated with it. We can make a database of these time standards and minimize the process time by eliminating lags and unnecessary sub-processes. This will help minimize the total processing time for a loan file and we can calibrate the standard times every quarter to raise/lower the standards. Moreover (McNamara, 2016), stated that Industrial engineers have less of a technical focus and more of a business focus. They are involved with operational efficiency and quality management. Industrial Engineers work to make things better such as, products or systems, Board (2013). Moreover, the author stated that the following focus areas of Industrial Engineering in a banking industry include project management, productivity process re-engineering, quality measurement and improvement, program management, ergonomics/human factors, technology development and transfer, strategic planning, change management, management of change, financial engineering.

2.1 Business process improvement strategy framework

Business process improvement is also known as a continual or continuous improvement process. It's an ongoing process to improve the products, services or processes of an organization (Ray, 2018). The improvements sought can be incremental over time or achieved with a breakthrough moment. Moreover, the author stated that the delivery of those processes is in constant evaluation and change, so further improvements can be developed and applied. The ruler to measure these changes is the efficiency, effectiveness and flexibility of these processes.

Some see continuous improvement as a meta-process, such as W. Edwards Deming, an early proponent, who saw it as part of a larger system of organizational goals. But a bigger definition considers continuous improvement as a gradual and never-ending process that tries to increase effectiveness and efficiencies to fulfill a company's objectives. It is guided by a framework and strategies that allow easy implementation (Chevron Corporation, 2018). Figure 1 illustrate worldwide best practices that most companies use in their journey to sustainable operations management and continuous improvement.

Figure 1: Worldwide best practice framework (Source: Center for Industrial Effectiveness, 2019)

Center for Industrial Effectiveness; TCIE (2019) emphasized that there are tools, methods, models and techniques that help achieve continuous improvement and operations management. These tools include concepts, models, practices, methodologies and techniques includes Kaizen and Toyota Production System, Lean manufacturing tools. Concepts includes Value Stream Mapping, Total Quality Management (TQM) and Continuous Improvement. Methodologies and techniques include lean manufacturing, Six sigma, and Kaizen. Other practices, tools and models include PDCA, DMAIC and seven basic tools of quality.

2.2 DMAIC

Define, measure, analyze, improve, and control (DMAIC) is a data-driven quality strategy used to improve processes (ASQ: Excellence through quality, 2020). Furthermore, the author explained that DMAIC helps to further refine the projects and deliver quantifiable, sustainable results especially when the project has been selected and signed off for implementation. According to (Desai, 2012), Define phase in a banking industry helps to define the flow chart of the banking service and the needs of the customer. Moreover, this phase includes project plan where you set goals, define scope, division of labour and collaboration of team members. Measure phase describes the whole process based on the SIPOC diagram where data collection and sample collection plans are developed (Zhuo, 2019). This phase also includes measuring process capabilities by identifying key quality characteristics that affect process performance (Desai, 2012). Moreover, Desai (2012) stated that measurement content mainly includes two aspects: the service efficiency of the banking outlets and the customer service of the banking outlets. According to Amazon & AWS (2018), the Analyse phase helps to select evaluation indicators, identify the measurement objects and develop a data collection plan and verify process measurement systems. This phase takes place after making the conditions of the project clear according to the customer's requirements. Improvement phase is a phase where suggestions for improvement are proposed based on facts and data, and improvement plans are determined (Alexander, 2001). According to Benadie J. (2010), Control phase is the last phase where improvements are incorporated into daily management and measured accordingly and carry out lean and traditional control of banking business processes by establishing work performance appraisal standards and improving incentive measures. The author further added that control activities enable the organization to continue to maintain the initial improvement activities of the project team and ensure that continuous improvement is achieved after the unit is disbanded. Figure 2 shows a DMAIC Methodology that is mostly used by Industrial engineers when driving process improvement projects.

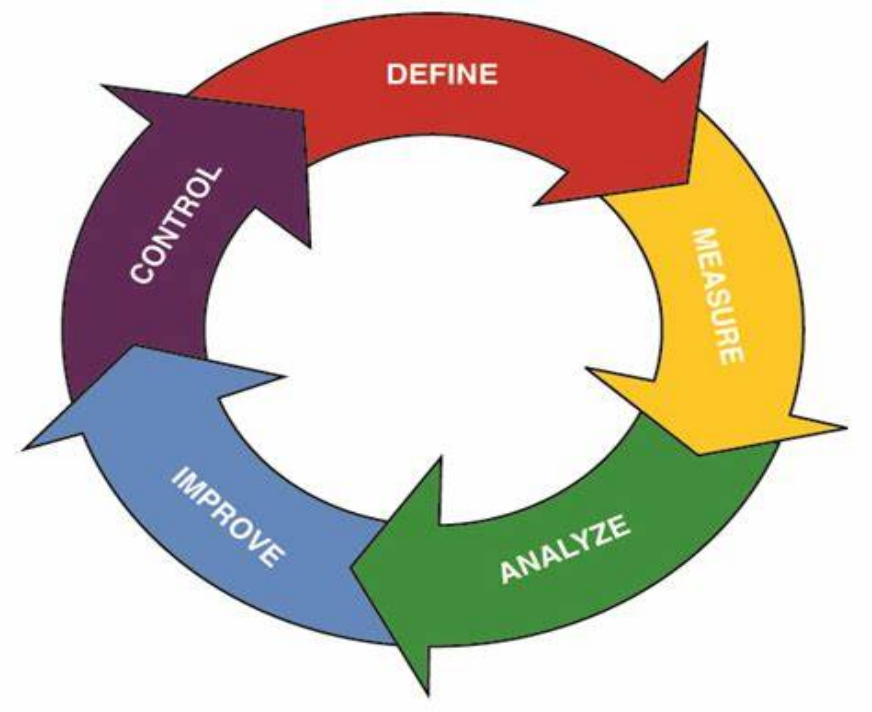

Figure 2: DMAIC (Source: Benadie J. ,2010)

2.3 Business process re-engineering

Al-Mashari and Zairi, (2000) defined BPR as a way of redesigning business processes using
an enabled approach to organisational change. Moreover Radnor (2010) stated that the required change evolves from the recognition that the long-established ways an organisation conducts business and the way they are likely to change in today's competitive environment. Business Process Improvement (BPI) is also used interchangeably with Business Process Re-engineering (BPR), although it is argued that BPI is less radical than BPR (Adesola and Baines, 2005). James H Harrington et al., (2015 added that BPR is a methodology that is designed to bring about step-function improvements in administrative and support processes using approaches such as process benchmarking, process redesign and process reengineering.

2.4 PDCA Model

It is also known as a Deming cycle and Charantimath (2006) defined the PDCA cycle as a problem-solving process adopted by firms engaged in continuous improvement. Moreover, Shewhart (2012) explained that before continuous improvement process begins; testing function needs to be performed, gathering planning steps to understand the development project objectives, current status, project plans, function specification, and risks. Once these plans have been finalized, it is implemented (Liker & Franz, 2011). Furthermore, the author explained that the implementation is also checked for anticipated improvement. When the experiment is successful, a final action such as methodological standardization is put in practice to ensure that new methods will be continuously sustained for improvement.

2.5 Key Performance Indicators (KPI)

Drucker (2010) defined Key Performance Indicator as a value that is used to measure and monitor effectiveness. Reh (2019) further explains that it is not possible to manage what you cannot control thus explaining the definition of Key Performance Indicators. Moreover, Karlson (2018) defined Key Performance Indicator as a measurable value that shows the progress of a company's business goals and they indicate whether an organization has attained its goals in a specific time frame. Key performance indicators are essential as they estimate the process improvements in banks or organizations and can improve the efficiency and performance (Silica, 2008). Saeed & Nasar (2016) explained that Key Performance Indicators has been used between the macro and micro level in process improvement deployment model as a control node. The author added that; these indicators are used to tell the execution of the organization strategic approach and KPI system in terms of the providing signal notification for the organizational strategic

approach and plan variations. (Plenert, 2011) added that all the steps included in the KPI procedure should be visited again in the same way to make it sure that the organizations are moving forward in the right direction.

2.6 Process design in a banking Industry

Process design in a banking industry always revolve around customer satisfaction and loyalty. Firstly, the bank needs to identify and design its product, service, system value chain flow. The bank's service flow is plotted using Six Sigma Theory and Supplier-Input-Process-Output-Customer (SIPOC) diagram. According to Corporate (2010) a Process Design is an activity of determining the workflow, equipment needs, and implementation requirements for a process. Moreover, Chevron Corporation (2018) added that process design typically uses several tools including flowcharting, process simulation software, and scale models.

3. Methods and materials

This is both a qualitative and quantitative research that seeks understanding as well as to extrapolate findings. It relies on statistical data collected from the HRBP of Bank Y. Survey questionnaire and interviews were used as methods of collecting data. To avoid biasness the same questions were asked, and Likert scale was used to prepare interview questions.

a) Interview

Interviews – Data collection of this paper began with several objectives as the forefront, the first of which involved a broad question; the role of an Industrial Engineer in Bank Y. HRBP of various departments were interviewed so as to understand how many Industrial Engineers they have hired, their roles, and contributions towards the bank. . The author chose semi – structured interviews. Table 1 shows the list of interview participants in Bank Y.

Table 1: Number of people interviewed

Department	Number of people interviewed
Commercial HRBP	2
Operations HRBP	2
Credit HRPB	1
Retail HRBP	1
Channels HRBP	1
Information Technology HRBP	1

b) Questionnaire

A questionnaire was also used and distributed within Bank Y to boost the responses and seek various opinions. Likert scale was used when preparing the questionnaire to avoid biasness and to also get better results. A survey questionnaire was given in each department suggested by the Director of Human Resources in Bank Y. Table 2 shows the HRBP targeted to complete the question per department. The sample questionnaire used is shown below in Table 3.

Table 2: Number of participants targeted

Department	Number of people
Commercial HRBP	2
Operations HRBP	2
Credit HRPB	1
Retail HRBP	1
Channels HRBP	1
Information Technology HRBP	1

Table 3: Sample questionnaire used

Questions	**Answers**				
	Strongly agree	**Agree**	**Undecided**	**Disagree**	**Strongly disagree**
How many Industrial Engineers do you have in your department					
What are the skills they possess					
Are they bringing any shape in terms of your departmental directions					
Are the good in mapping processes					
Are they good in information and diagramming flow					
Are they good in operations auditing					
Comparing the organizational operations from the time they were not there to the time you have one can you see any improvement in process improvement and optimization					
Do you think time study that Industrial Engineering do in process mapping help to achieve process improvement					
Can you recommend Industrial Engineering as a key role in Bank Y for operations sustainability and process re-engineering					
Are the following skills helping Industrial Engineers to be good in Process Improvement; good math skills, Strong time management skills, Good common sense, A strong desire for organization and efficiency, Excellent communication, Creative problem solving, Quantitative skills, Technical competency, Continuous drive for improvement, Resourcefulness, Listening skills, Negotiation skills, Diplomacy, Patience, Ability to adapt to many environments, wear many hats and interact with a diverse group of individuals, Continuous desire to learn, Leadership skills and Passion for improvement					

4. Results

This is the result that were collected from HRBP of Bank Y. The results were analyzed according to the information got from the interview and the survey questionnaire distributed.

4.1 Interview and questionnaire respondents

Since survey questionnaire and interviews were conducted, Table 4, shows number of HRBP's who participated in this exercise.

Table 4: Interview and questionnaire respondents

Method of data collection method	**Number of HRBP targeted**	**Number of HRBP participated**

Interview	8	6
Questionnaire	8	6

Figure 3 shows the HRBP participants. From the eight participants identified to be the potential participant in the interview exercise, only six participated and gave the researcher time to respond to the interviews conducted. From the questionnaire distributed, there were eight participants that were identified to be the respondent of the questionnaire and only 6 participated. All these shows a 75% participation.

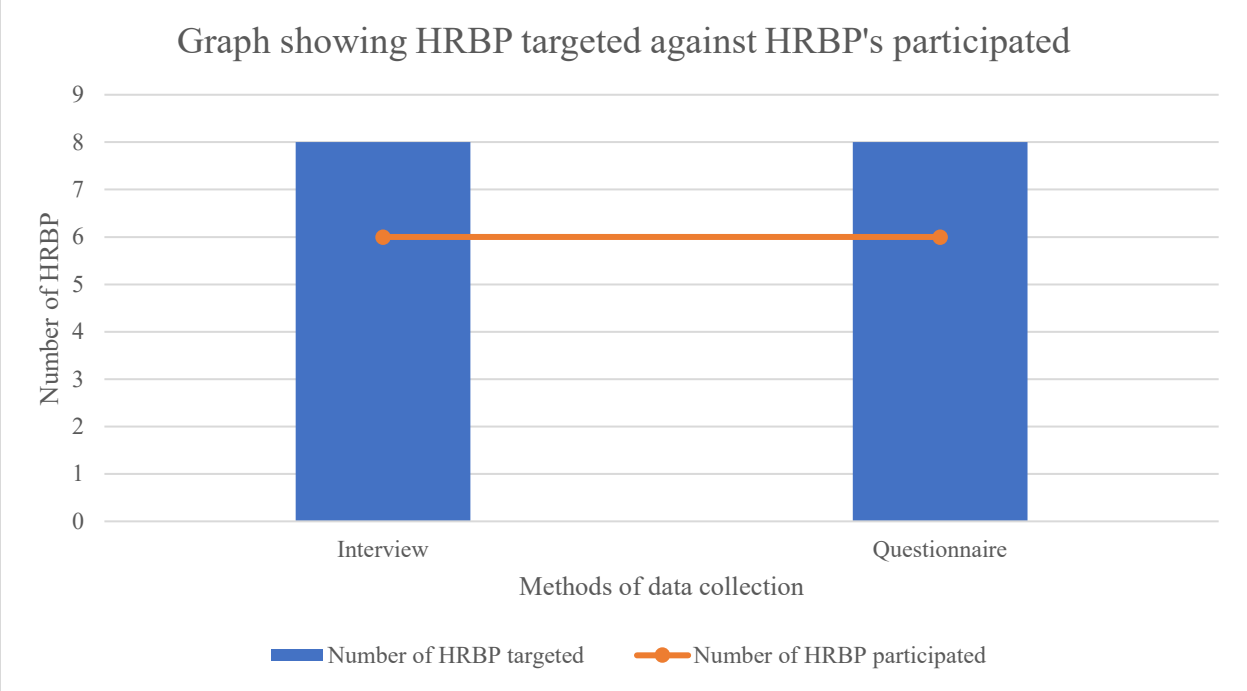

Figure 3: Participation rate

4.2 Skills that Industrial Engineers poses

From the questionnaire survey, the results indicated that Industrial Engineers poses skills that help them to map process, advise on process improvement, process re-engineering and continuous process improvement. Most HRPB strongly agreed that the following are skills that an Industrial Engineering poses that helps them to be good in process improvement, and this skills are good math skills, Strong time management skills, A strong desire for organization effectiveness and efficiency, Creative problem solving, Quantitative skills, Technical competency, Continuous drive for improvement, Resourcefulness, Listening skills, Negotiation skills, Diplomacy, Patience, Continuous desire to learn, Leadership skills and Passion for improvement. According to the questionnaire the following pie chart shows HRBP that agreed with the skills that Industrial Engineers poses. Prior to this information provided, there was a skills audit conducted in 2018 by an external consultant. Table 5 illustrates the respondents, out of 6 who participated, this were their response. Out of 6 participants, six strongly agreed that an Industrial Engineer has passion for continuous improvement, obviously no agreed, no undecided and no disagreement.

Table 5: Skills possessed by an Industrial Engineer

Skills	Strongly agree	Agree	Undecided	Disagree
Continuous drive for improvement	6	0	0	0
Listening skills	6	0		
Continuous desire to learn	6	0	0	0
Passion for improvement	6	0	0	0
A strong desire for organization effectiveness and efficiency	5	1	0	0
Negotiation skills	5	0	1	0
Strong time management skills	5	0	1	0
Good math skills	4	1	1	0
Creative problem solving	4	0	0	0
Technical competency	4	2	0	0
Resourcefulness	4	1	0	1
Excellent communication	3	1	1	1
Quantitative skills	3	2	1	0
Leadership skills	0	1	4	1

From the analysis, Industrial Engineers have a strong technique in continuous drive for improvement, patience since they mostly deal with internal and external stakeholders for process improvement. 50% of respondents strongly agreed that an Industrial Engineer has continuous drive for improvement, have good listening skill, have a good desire for organization effectiveness and efficiency, have goo math skills and strong creative problem solving. Most HRBP were undecided that an Industrial Engineer poses good leadership skill.

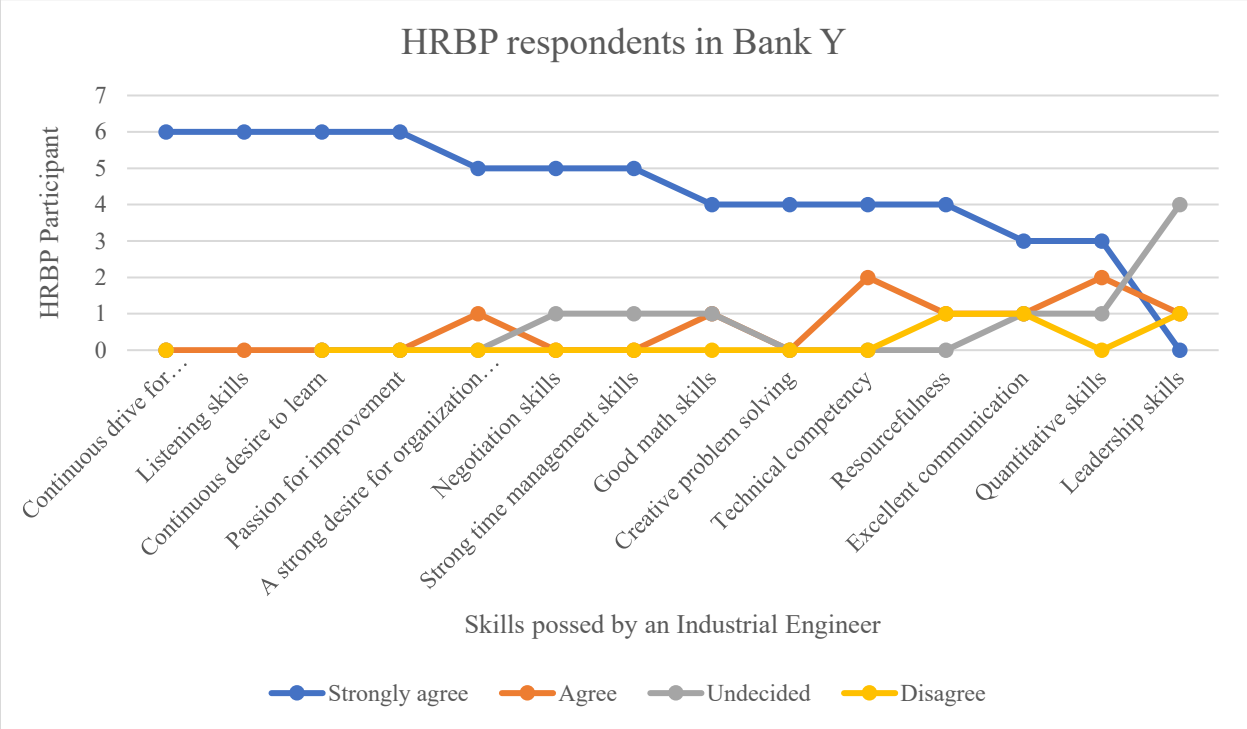

Figure 4: Skills that an Industrial Engineer poses

From the interview and survey questionnaire distributed in bank Y, it shows that most HRBP outlined that the following are the roles that Industrial Engineering have played in terms of process improvement.

Table 6: Roles of an Industrial Engineer in Bank Y

Roles	Strongly agree	Agree	Undecided	Disagree
Productivity and process engineering	6	0	0	0
Quality Measurement and Improvement	5	1	0	0
Process lifecycle management	4	1	1	0
Management of change	4	0	1	1
Strategic planning	3	2	1	0

From the analysis in Figure 5 below, Industrial Engineering roles in Bank Y are managing process lifecycle, driving productivity projects, preparing business cases for process re-engineering, managing all process changes and taking part in strategic planning especially strategies that promote business process management. 50% of HRBP respondents agreed that these are the five roles that they have standardized in their recruitment processes when recruiting for an Industrial Engineering role in Bank Y.

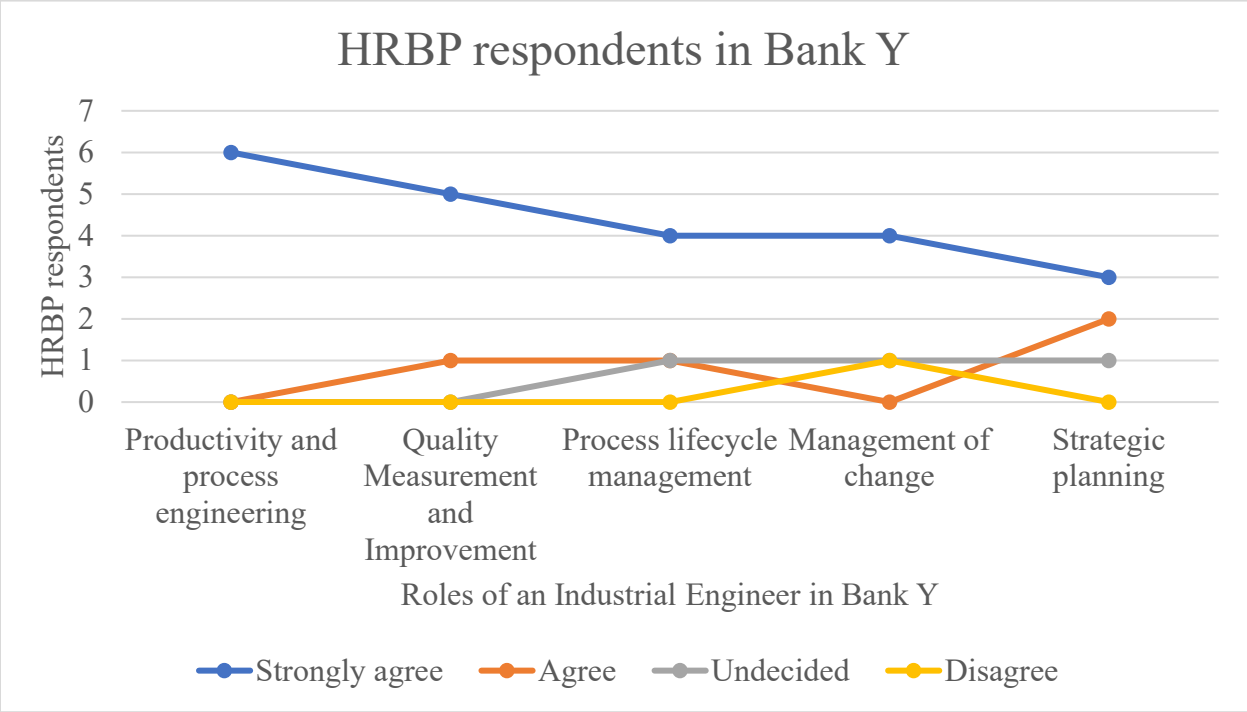

Figure 5: Roles of an Industrial Engineer in Bank Y

4.3 Process life cycle

In Bank Y, Industrial Engineer are leaders in reviewing process lifecycle, where they have also developed a framework that they are for internal usage. The process lifecycle that the Industrial Engineers have developed help to set a standard for process modelling. Bank Y measure the process lifecycle using the DMAIC methodology. This process lifecycle enables them to evaluate the process capability and even know its capability using the Six Sigma methodology. Within that process lifecycle, they use time study techniques to time activities, flow diagramming, and flow charts for mapping a clear workflow Ishioka/ Fishbone analysis to investigate bottlenecks or pain points. Three of the HRBPs

attested that seven quality tools and other Industrial techniques are being used in these by process life cycle. Figure 6 shows a trial mode that was designed by an Industrial Engineer at Bank Y and they are following it. Improvements noticed in process mapping/ review are being compiled, consolidated and used to prepare a business case for productivity stream projects. This process lifecycle was designed by an Industrial Engineer in Bank Y, for internal usage.

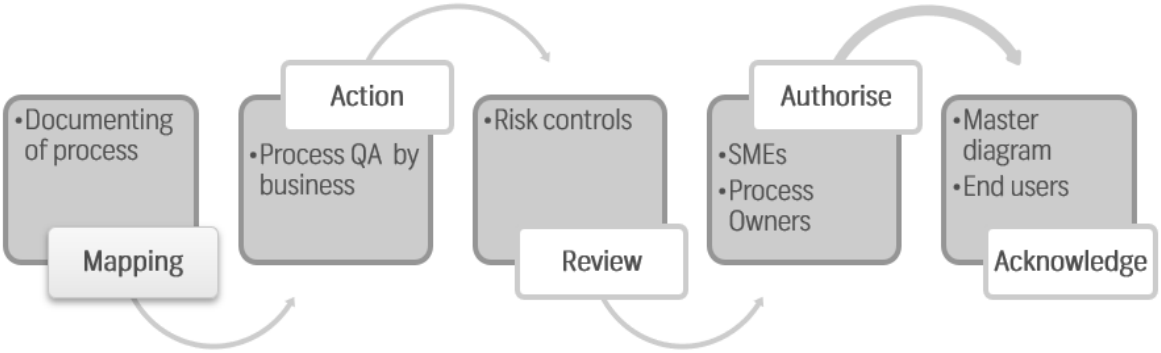

Figure 6: Process lifecycle developed by an Industrial Engineer

The following had been provided by HRBP when requesting the information from the Director of Human Resources concerning projects and initiatives that Industrial Engineering has been engaged on since they first hired them in Bank Y. Table 7, shows the roles that HRBP included in their recruitment policy for an Industrial Engineering role. As Bank Y kept on reviewing their HR manual policy, they kept on extending and including the coverage of an Industrial Engineering role and thus forming part of the advisement objective of that role. Inclusive means it was packaged to be part of roles that an Industrial Engineer will be tasked in Bank Y whenever recruited. Exclusive meant that it was part of the recruitment role or objective that any hired Industrial Engineer will not be tasked with.

Table 7: Role of Industrial Engineering in Bank Y

Process lifecycle management roles of an Industrial Engineer	**2016-2017**	**2017-2018**	**2018-2020**
Productivity and process engineering	Inclusive	Inclusive	Inclusive
Good common sense	Inclusive	Inclusive	Inclusive
Quality Measurement and Improvement	Inclusive	Inclusive	Inclusive
Management of change	Inclusive	Inclusive	Inclusive
Strategic planning	Inclusive	Inclusive	Inclusive
Driving process re-engineering projects	Excluded	Inclusive	Inclusive
Creating standard Operating procedures	Excluded	Inclusive	Inclusive
Driving process changes	Excluded	Excluded	Inclusive
Document “AS-IS” and “TO-BE” process	Excluded	Excluded	Inclusive
Robotics Process Automation	Excluded	Excluded	Inclusive

From Table 7, it can be observed that more roles were extended per year and this shows how capable an Industrial Engineer is, in a bank industry. It also implies that they are very keen in problem solving and more skilled in a continuous improvement set-up such as in driving process mapping, process design, process changes. Figure 7 below shows how Industrial Engineering roles increased continuously from the year they started recruiting them. At

first, they only tasked an Industrial Engineer with five roles, which later increased by two the following year, third year they added three more roles. In totals, the roles of an Industrial Engineer increased by almost 35% yearly.

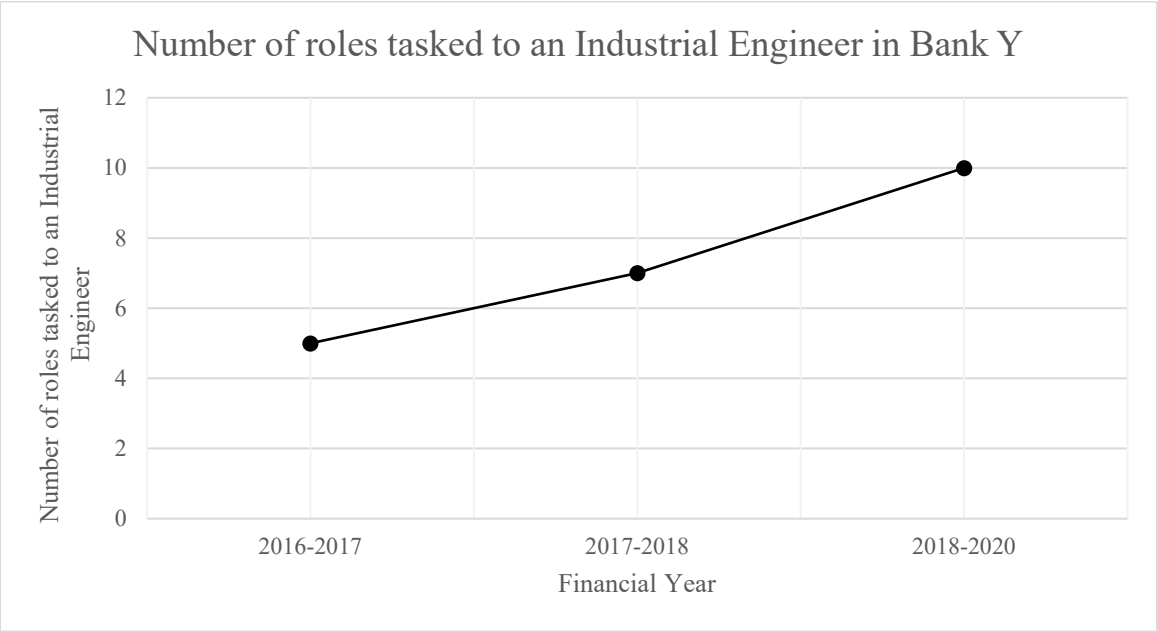

Figure 7: Number of roles tasked to an Industrial Engineer in Bank Y, according to their financial year

From the findings got from the HRBP they first hired an Industrial Engineering role in 2015, where they trained that person on various areas especially on Operations Management. The number increased by two from 2016 to 2018, then from 2018 till date they recruited seven. From the total of those ten, one is working as a business analyst performing the same roles as Industrial Engineers, and the rest have been titled; Business Process Analyst. Their roles are mapping processes, identifying process improvement opportunities, preparing business case for productivity, process re-engineering initiatives and monitoring process risk maturity. Figure 8, shows the firsthand information provided by the Director of Human Resource in Bank Y.

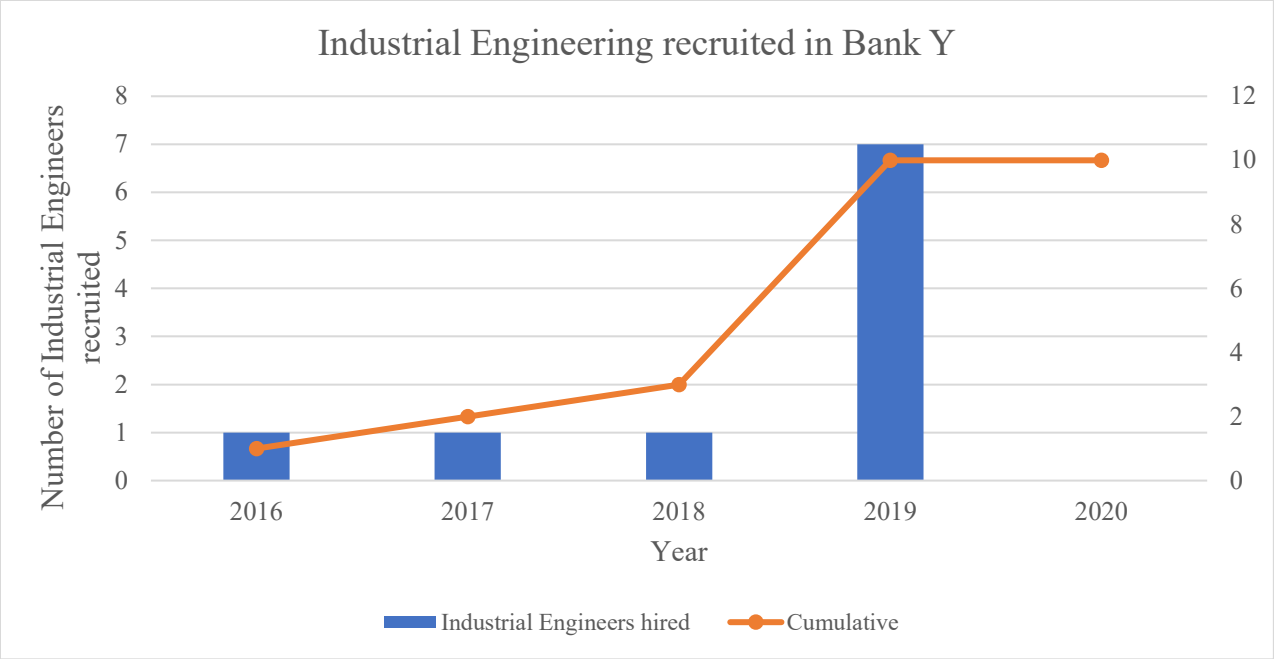

Figure 8: Industrial Engineers recruited from 2016 till now

5. Discussion and Recommendations

From the analysis provided, which were based on interviews conducted in Bank Y, Industrial Engineering roles are very important in driving process improvement projects. It was observed that Industrial Engineers in Bank Y are the ones developing business process improvement strategies, driving process improvement lifecycle, facilitating process improvement techniques, driving process pilot projects and they have also managed to increase process risk maturity of the bank by about 10%. This shows how Industrial Engineers are powerful in driving banks operational efficiency and its customer satisfaction using Industrial Engineering techniques such as Lean Six Sigma, DMAIC and PDCA. It is recommended that Industrial Engineers should be hired in each segment, since that is not yet the case in Bank Y.

6. Conclusion

Process improvement in Bank Y has been entrusted to an Industrial Engineer who poses analytical, quantitative skills, listening and negotiation skills. An Industrial Engineering role is very important in a Banking industries looking at the way the technology is growing and there is a need for them to drive projects from process modelling till those processes get automated, since they are eligible for that -looking at the techniques that they use when solving day -to-day business operations. The research reaches to the conclusions that the implementation of process improvement by An Industrial Engineer reap more benefits for process consistency. Industrial Engineer are also comfortable with implementing the DMAIC methodology which seeks to improve processes

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Biography

Babedi Kufigwa received his bachelor's degree in Industrial Engineering from the University of Botswana, (Botswana). He has completed a Master of Engineering in Industrial and Manufacturing Engineering at the Botswana International University of Science & Technology, (BIUST). His research was with Botswana Private Beef Abattoir, Palapye (Botswana), titled, "Implementation of lean manufacturing tools in an abattoir: A case study of Botswana Private Beef Abattoir". His main research areas are business process improvements, process optimization, productivity improvement initiatives and developing cost effective measures for manufacturing, businesses, industries, production fields and service industries. He is a member of Industrial Engineering and Operations Management (IEOM), Society of Botswana and Chartered Institute of Procurement and Supply, (CIPS) with British council Board. He is currently employed the First National Bank of Botswana (FNB), responsible for Business Process Analysis.

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