Chatbots in Malaysia –A Balanced Scorecard Approach

[1]Lai Wen Jyng, [2]Geetha A Rubasundram

Abstract--This research provides an insight of the adoption of chatbots among businesses in Malaysia. With technological advancements, there has been a growth in the adoption of chatbots by firms. Businesses and individuals are more receptive towards the idea of using chatbots as their communication and service tool for basic or repetitive information. However, since it is still at an initial stage, assessing the impact of the chatbot adoption may not be prevalent in terms of financial performance only. Hence, this research uses the Balanced Scorecard angle of assessing the non-financial angles (Stakeholders, Internal Process and Learning & Growth) against the Financial Performance of a firm. Questionnaires were sent out to Malaysian firms to assess their experience with the chatbot adoption. The results reflected a positive attitude from stakeholders towards the firms adoption of chatbots. It also highlighted that key decisions and information pertaining towards the decision to adopt chatbots may not have been strongly discussed with shareholders or with the support of directors. It also revealed that due to the chatbot implementation still being at an infancy stage, key impacts towards employees such as unemployment or retraining was not yet worrying. Overall, the performance was perceived to have improved after the implementation of chatbots in the firm, though certain areas of improvements were also highlighted

Keywords--Chatbots, Balanced Scorecard, Financial Performance, Stakeholder, Internal Process, Learning and Growth, Adoption, Technology Advancement

I. INTRODUCTION

Technology has disrupted the business environment and the way firms run. One such technology is chatbot, a software system, which can interact or chat with human users in natural language (Shawar and Atwell, 2007) to solve user issues (Piccolo et al, 2018). This has several implications. First, the level of acceptance of the chatbot based service by customers depend on the quality of answers provided, the level of understanding and the promptness of response. A Swedish research reported a growth of 45% in its general health practice when using chatbot as its Virtual Doctor, giving patients a cheaper and time saving option(Belton, 2019). However, there is a possibility that chatbots may not be able to process clients' inquiries(Noordin, 2017)**.** The machine learning characteristic should allow the chatbot to develop automatically after each interaction, however, this may not be consistent since the human speech is not always precise. The Facebook Chatbot was only able to achieve 30% of human request without the presence of humans agents, as the Facebook chatbot was unable to understand human

[1] *Research Scholar, Asia Pacific University of Technology &Innovation, Jalan Teknologi 5,57000 Wilayah Persekutuan Kuala Lumpur, Malaysia. jess_jyng95@hotmail.com*
[2] *Senior Lecturer, Asia Pacific University of Technology &Innovation, Jalan Teknologi 5,57000 Wilayah Persekutuan Kuala Lumpur, Malaysia. geetha@apu.edu.my*

requests indicating that the software wasn't sufficiently developed(Orlowski, 2017). Countries like Malaysia with multi slangs and dialects may also face added complexities where the chatbot is unable to communicate effectively to the firm's customers.

Certain issues pertaining to trust, security and the ability of the customer to rely on the new addition should be addressed. Babylon Health, an interactive symptom checker is under investigation after a doctor noticed that the apps had wrongly diagnosed a 66 year old male's complaint of sudden chest pain as panic attack, ignoring the symptoms and risk based on the fact that the male was obese and also a smoker. This questions the accuracy of the apps, the legal perspectives of a wrong diagnosis and ultimately, the matter of life and death of a patient especially if immediate medical attention is not given appropriately(Ram & Neville, 2018).

A firm should also consider the internal changes that a firm would face. If applied successfully, the chatbot provides an option for firms to replace customer service departments when dealing with repetitive or basic questions. This could cause human resource issues such as retrenchment and other negative perceptions about a company as well.

The adoption of chatbot should also be considered in line with the firm's business model and other integrated technologies. As an example, TMY.GRL received negative feedback from frustrated consumers due to the need to switch between two browsers to communicate with the chatbot and the mobile web browser for the shopping experience, in addition to the inability to for the chatbot to understand questions and answer beyond "yes" or "no" (Parlo, 2016). The user friendliness of the overall experience would definitely be a priority for customers.

Hence, this is an important strategic decision and technological advancement by a firm that impacts every aspect of a business from reporting to measurement procedures, human resource management etc. with the ultimate aim to remain competitive and sustainable in the market with challenging margins (Lashbrooke, 2017). Just like any other advancement, chatbots change the way firms do business, the structure, business model and the redistribution of profits, including the balance between capital and revenue expenditure i.e. preference of choosing the chatbot over human resources. This would in turn provide better pricing options and market leadership if applied correctly.

It is important for firms who propose to adopt a chatbot should consider all factors prior to embarking on the journey. Technology adoption plays a huge role in shaping the business world today. Technology usage is unavoidable and a priority in business management and business interaction tool. Business success is no longer just measured by financial indicators, with a greater emphasis on non-financial indicators involving stakeholders such as employees, customer satisfaction and others that contribute to the success of a business(Kappel, 2017). However, there are concerns on the acceptability of chatbots by customers due to the vagueness of the chatbots performance measure (Piccolo, et al., 2018). It should be linked to the firm's strategy and should be considered with both financial and non-financial measures. Non-financial indicators play an important role in decision making as it provides more detailed information on the standing of the business.

A tool that provides a more holistic performance perspective is the Balanced Scorecard (BSC). BSC is a model developed by Kaplan and Norton in 1992. This model was developed to measure performance with the

overall strategy of a business organization (Kaplan & Norton, 2002)**.** Researchers have found that management prefer to rely on common measures instead of making decision on the basis of a variety of metrics. This is supported in the overall model of the BSC(Slovic&MacPhillamy, 1974)**,** where the model measures four perspectives of stakeholders, internal process, learning and growth and financial perspective. These measures broaden the information used for decision making by management enabling better solution(Eisenberg, 2016)**.**

Therefore, this research aims to evaluate the impact of chatbot adoption by Malaysian businesses using the BSC elements of stakeholders, internal process and learning & growth as compared to the firm's financial performance.

Chatbot Adoption in Malaysia

Chatbots are at a very early stage of development. The adoption of digital technology in Malaysia is lower compared to its neighbouring countries. According to the World Bank, Malaysia's adoption rate lags behind countries like Indonesia and Thailand(Damdharan&Afsal, 2018)**.** A recent survey conducted by International Data Corporation (IDC) found that Malaysia adoption rate is the lowest among the neighbouring countries at 8.1% as compared to Indonesia the leader at the adoption of new technology at the rate of 24.6% (Cai & Chua, 2018)**.**

Further analysis is required to assess the returns of investing in chatbots and the impact on the business model. As an example, if the chatbot is deemed to be a successful investment, firms may choose to reduce staff in the particular department over the medium to long term. Although, there are detractors that scoff at the idea of a chatbot taking over the jobs of humans, the concept of machines taking over simple repetitive work sounds amazing. The Internal Federation of Robotics reported an average of 74 robots per 10,000 employees compared to 66 robots in 2015(Wall, 2018)**,** with chatbots replacing jobs or changing job portfolios(Lashbrooke, 2017). However, as discussed in the above section, a firm must be cautious about the gap between expectation and reality, especially when there is a risk of reputation loss. It is crucial that firms remind themselves that chatbots can also fail. Research has found that the high failure rate is caused by the poor requirement design for chatbots, with the scope being broad and generic (Xiaofeng, 2017)**.**

The issue of wrong diagnosis or advice can also plague a firm's reputation. The use of Artificial Intelligence and Machine Learning embedded technology have also earned a flipside reputation of data falsification (Kaneshige& Hong, 2018), which is expected since it is the output from human intellectual programming. It has been predicted that about 60% of chatbots deployed in 2019 does not have live-agent safety nets attached to web chat sessions(Kaneshige& Hong, 2018). The effectiveness, dependence and level of trust towards the chatbot to perform have to be monitored.

Performance Measurement of the Chatbot and the Balanced Scorecard (BSC)

There have been many research studies on chatbots and the benefits it brings to the business of those who adopt the technology. Most researchers highlight the percentage of expected growth the chatbot adoption could bring for a business, promoting the idea of chatbots being virtual employees to a business(Roe, 2019). The measures used are mainly financial with a noted lack of focus on non-financial indicators. Ayoup et al (2016) recommends a

balance between internal and external perspectives as well as financial and non-financial indicators. Some examples of non-financial indicators include company reputation, competitiveness against industry competitors, innovation of the technology and also customer influence which can be considered as performance measures when considering the adoption of chatbots (Wunderlich &Paluch, 2017). However, this may be vague or subjective since ideal levels of chatbot performance have not been identified (Ayoup, et al., 2016).

BSC, the performance measurement tool, is used in this research as there is a gap between what is to be measured and what is actually measured (Meyer, 2002). BSC has balanced weightage of linkage between the drivers of performance and the alignment of strategy for people and performance measures as how a financial perspective has direct impact on the overall performance of the business(Dilla&Steinbart, 2005). This changes many things which would also include the basis of performance measurement used in appraisal for employees. This would then impact the business internal processes, as well as its stakeholder's perception and the learning and growth capability of the firm, which would eventually impact the financial performance of the firm.

The financial perspective plays an important role regardless of what critics may have to say. In business, the financial component focuses on the measurement of profitability related to indicators relevant to investment measures. The financial component is acknowledged by the usage of traditional financial data for accurate and timely financial advice that ensures businesses have a smooth and efficient direction to make adequate and timely decisions in the right moment (Malagwi&Dahiru, 2014). The financial performance perspective most commonly used is the Return on Investment (ROI) and Residual Income (RI)(Fitzgerald, 2007). Applying this to performance of chatbots, the Forrester Research Survey (2017) and Grand View Research (2017) estimate the ROI of chatbots to be 24% by the year 2025.

The internal process views the business performance through the level of quality and efficiency that the business is providing to users in terms of its processes. When adopting innovation, the aim of the firm would be to improve efficiency and increase competitiveness over the perceived useful life of the asset, in line with the goals of the firm. The improvement of business management with technology like machine learning chatbots have to address concerns such as trust, privacy and security.

Learning and growth is critical for the development of business and is essential to promote growth in the overall business environment. This factor views the firm's performance through the lenses of human capital, the culture in term of motivation and capacities toward new technology. Chatbot advancement is a combination of deep learning algorithms(Goebel, 2018)where the chatbot identifies pattern in speech signals to perfection. This is all done with the function of training data. The amount of data available today is more than sufficient to train the chatbot to be smarter. The theory behind machine learning and deep learning algorithm is to achieve higher recognition in terms of accuracy compared to humans. Chatbot development is an on-going process. Google's latest addition is Google Duplex. Duplex involves a process of synthesis of technology that allows chatbots to mimic human speech. Google is optimistic that this convenient features will free up time as it is design to make calls and booking dinner reservations(Panko, 2019). However, not all endeavours have been successful. In 2016, Microsoft launched an artificial intelligence bot known as Tay. Tay's live encounter online on Twitter was short lived as Tay

was shut down less than 24 hours after its launch(Liu, 2017). Tay was easily manipulated because of the activation of the feature "repeat after me", which online users misused to turn Tay into a racist bot. This raised concerns on the reputational damage and security issues that are evident even with supervision and management learning features(Debecker, 2017). On the other hand, Artificial Intelligence (AI) powered technology will create many new jobs but will also destroy existing roles(Heath, 2018). According to the Economic World Report (2018), automation and growth in robot technology like chatbot will are set to create new job growth from 16% today to 27% by 2022(Ratcheve& Leopold, 2018). Hence, another angle that firms should consider is the re-training and re-tasking of their existing employees. Human workforce will continue to be necessary. The addition of chatbots in a business will not replace humans, it will however shift the contents of work and new position will emerge. These training for human workforce will focus on higher thinking skill job scope.

The firm should also consider the impact on other stakeholders of the firm. Chatbot technology is a significant innovation that will change the way business connects and will indirectly shift the relationship of stakeholders and the business (Rosenblatt, 2016). Chatbot technology ranges from virtual personal assistants that can be found on almost every smart device to chatbots that are helping to change the healthcare industry like virtual doctors and symptom checkers that diagnoses the user's potential illness based on symptoms. Technology is in transitioning into a new reality where a business organization are becoming increasingly automated. Applying this to the BSC model, the key stakeholder is the customer since they logically sustain the business through revenue. The BSC measures the satisfaction of customers using time, quality, performance and cost(Casey & Peck, 2004). Integrating chatbot into a firm's business environment increases customer satisfaction level by 68%, however consumers still prefer to communicate via telephone calls (46%) and emails (40%) (Bourne, 2018).

II.   RESEARCH METHODOLOGY

The study collected primary data using questionnaires targeting firms that had experience in adopting Chatbots. The questions designed in the questionnaire were related to demographics, opinion and acceptance of the respondents towards Chatbots using a 5 point Likert Scale. There is no statistics that clearly mention the number of firms that have adopted Chatbots. The researcher carried out an online search to identify firms that had adopted Chatbots, and sent questionnaires to its management. Based on this, 170 responses were received. However, due to the lack of information in some responses, only 125 responses fulfilled the requirement of the research and was used for analysis in this study. A total number of 32 questions was asked in the survey. The breakdown is given in Table 1.

Table 1: Classification of the number of questions

Section	Descriptions	Number of Questions
A	Demographic Information	5
B	Adoption of Chatbots	3
C	Stakeholders	8
D	Internal Process	7

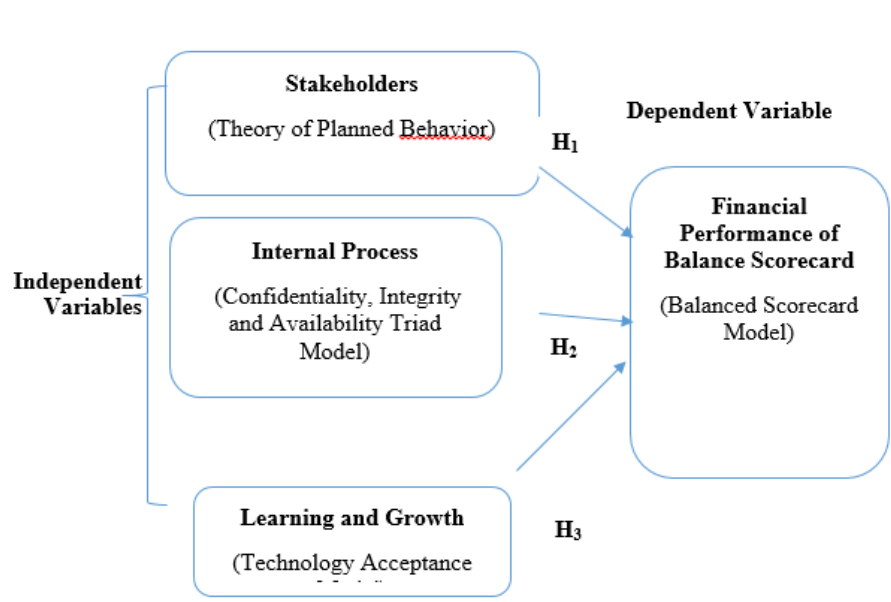| E | Learning and Growth | 5 |
| F | Financial Performance of Balanced Scorecard | 4 |

Research Framework

Figure 1: Research Framework

Source: Self Authored

III.   RESULTS AND DISCUSSION

A total of 125 respondents with the pre-requisite of having the experience of adopting chatbots in their firms answered the survey completely. There was a total of 66 males (52.8%) and 59 females (47.2%).

A crucial indicator was the duration of adoption of chatbots by the firms. A total of 57 (45.6%) of the respondents stated that the chatbot has been adopted for 6-12 months. Another 37 (29.6%) of the respondents stated that chatbot has been adopted for a period of 13-18 months. The rest of the respondents accounted for 0-5 months in adoption of chatbot with 18 responses, 19-24 months with 11 responses and more than 24 months with 2 responses.

Another crucial information is the average period of time taken by the firm to plan and discuss prior to the implementation process.8.8% took 0 to 5 months, 44% took 6 to 12 months, 41.6% took 13 to 18 months, 4.8% took 19 to 24 months and 0.8% took more than 24 months.

A multiple regression analysis was run to assess the relationship between the dependent variable (Financial Performance of the Balanced Scorecard) and independent variables (Stakeholders, Internal Process and Learning and Growth) using $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X3_{+\varepsilon}$

Y= Financial Performance of Balanced Scorecard

X_1= Stakeholders

X_2= Internal Process

X_3= Learning and Growth

Table 2: Multiple Regression Analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.483[a]	.233	.214	.506

Predictors: (Constant), Stakeholders, Internal Process, Learning and Growth

The table above shows that there is a positive moderate correlation (r=0.483) between stakeholders, internal process, learning and growth towards the financial performance of Balanced Scorecard. Thus, this can be explained that the financial performance of Balanced Scorecard is significantly associated with the stakeholders, internal process and learning and growth. Furthermore, as for the coefficient of determination (R^2), result shows that there is 23.3% variation of financial performance of Balanced Scorecard can be explained by three independent variables in this study which are stakeholders, internal process and learning and growth.

Table 3: Coefficients

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.790	.417		4.297	.000	.965	2.615
	Stakeholders	.169	.050	.279	3.410	.001	.071	.267
	Internal Process	.205	.066	.257	3.097	.002	.074	.337
	Learning and Growth	.161	.083	.161	1.932	.056	-.004	.326

a. Dependent Variable: Financial Performance of Balanced Scorecard

$$Y= \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

$$\hat{Y}= 1.790 + .169\ X_1 + .205\ X_2 + .161\ X_3$$

According to the coefficients table, t-test column indicates the relationship of all the independent variables to have strong positive value where stakeholder leads with (t= 3.410), internal process (t= 3.097), and learning and growth (t= 1.932). There are two variables that have significance to performance measurement the Balanced Scorecard where stakeholders (0.001) and internal process (0.002). As for learning and growth (0.056) is greater than the significance value of less than 0.05.

From the financial perspective, 65.6% agree that new channel of interaction like chatbots have the potential of converting conversations into sales figures. Researchers have found that by the year 2023, chatbots are set to bring $11 billion in saving giving business higher profit figure with the usage of chatbots(Alaimo, 2018). Another 71.2% of respondents agree that adoption of chatbots will result in a huge cost saving plan for the business in the next 5 years. Researchers have pointed out the benefits and the features of chatbots as a tool to reduce cost and still achieve the maximum amount of profit for the business. Juniper Research (2017) predicts the usage of chatbots will prevent customers from leaving. The research mentions that losing customers can be costly and the usage of chatbots can significantly lower the cost of traditional interaction methods like calling where the cost of interaction with chatbots can be significantly be lowered to just $0.70 per interaction by 2022(Reddy, 2017).

The stakeholder perspective report that 17.6% of responses disagree that there had been resistance or concern amongst employees concerning their job security. Respondents felt that there had been no high or alarming levels of turnover since the notification of chatbot adoption is announced. The respondents implied that they did not feel threatened however, this could also be caused by early stages of adoption in Malaysia whereby employees are still needed to ensure the smooth transition of human to chatbots. It was heartening to note that 52% of the respondents praised their firms for taking pro-active steps to reassure employees of their job security and provided alternative scopes and learning options. This proactive step is a way to ensure productivity and influence the management have on employees is translated into customer satisfaction(Matzler, et al., 2004). 60% of respondents also agreed that chatbots were able to handle and fulfil various level of satisfaction to users of all ages and background. This is consistent with the research of Bourne (2018) which indicated that the adoption of chatbots will be able to give to customers higher level of satisfaction with an expected increase in revenue by 68% just by using chatbots(Bourne, 2018). It was also highlighted that a possible factor to consider would be to train the customers to ask questions in a particular manner to optimise the efficiency of the chatbot. However, this may defeat the purpose of having the chatbot in the first place. 17.6% of the respondent also disagreed that announcement of chatbot adoption is discussed and approved by shareholders in Annual General Meeting, reflecting the possible lack of communication between shareholders and the management of a business. Governance problem could arise if issues like these are not discussed and made known to shareholders.

In terms of the internal process, 56% of the respondents agreed that the directors and management played a supporting role to adopt chatbots for the business. All considerations including the risk of adoption were discussed, which included quality issues, efficiency measurement, security and privacy concerns. 49.6% of the respondents agrees that firms are motivated to adopt a new technology, even with the likelihood of cyberattacks happening since

it is perceived to be within the control of the management. 52% of the respondents reported of hiccups in the initial stages however were confident that enhancements would take place.

The Learning & Growth perspective also saw 53.6% of respondents agrees that the adoption of chatbots has enabled business to transfer human resources to departments that requires higher level of thinking and analytical skills. This is in line with the many new job opportunities that will be created with the growth of automation and robot technology with an expected growth of 16% new job opportunities to 27% increase in job opportunities by 2022(Ratcheve& Leopold, 2018). Different skills need to be developed, with 58.4% of the respondents prepared for the impact of the trial and error process as part of the learning process.

IV. CONCLUSION

Since the adoption of chatbots are costly to a business, it would be expected that top management and relevant stakeholders play an important role in the decision making. Chatbots are a growing technology that can make a huge difference for business in the future as compared to the traditional method of how business is conducted. It is undeniable that the need for new technology like chatbots to be incorporated into today's business environment as chatbots are taking over the frontline of businesses and leaving a good impression with an experience that will be able to keep customers satisfied and happy. The Malaysian perspective seem to be positive with employees feeling secure in their job scopes and with positive feedback from stakeholders on the adoption of chatbots. The positive role of the human resource department in terms of reskilling and repositioning the staff is also noted. However, it would be recommended that firms continue to monitor the performance of the firm, as well as the life cycle of the chatbot implementation to assess longer term impacts.

REFERENCES

1. Alaimo, D., 2018. Chatbots To Talk Up %11B in Cost Saving By 2023. [Online] Available at: https://www.retaildive.com/news/chatbots-to-talk-up-11b-in-cost-savings-by-2023/527125/ [Accessed 23 January 2019].
2. Ayoup, H., Omar, N. & Rahman, I. K. A., 2016. Balanced Scorecard and Strategic Alignment: A Malaysian Case. International Journal of Economics and Financial Issues, 6(4), pp. 85-95.
3. Belton, P., 2019. Would You Be Happy To See Your Doctor Online. [Online] Availableat: https://www.bbc.com/news/business-47196286[Accessed 13 February 2019].
4. Bourne, V., 2018. LogMeIn 2018 AI Customer Experience Report: Impact Of Chatbots And AI On The Customer Journey, UK: OVUM.
5. Cai, J. D. & Chua, C. K., 2018. IDC Asia/Pacific (Excluding Japan) Artificial Intelligence Enterprise Adoption Survey 2018, Farmingham : IDC.
6. Casey, W. & Peck, W., 2004. A Balanced View of Balanced Scorecard. The Leadership Lighthouse Series: White Paper, pp. 1-7.
7. Damdharan, R. &Afsal, M., 2018. AI Is Not For Me...Think Again. [Online] Available at: https://www.thestar.com.my/business/smebiz/2018/12/24/ai-is-not-for-me-think-again/[Accessed 13 January 2019].
8. Debecker, A., 2017. Chatbot Tay: Story Of A PR Disaster. [Online] Available at: https://blog.ubisend.com/discover-chatbots/chatbot-tay[Accessed 24 January 2019].
9. Dilla, W. N. &Steinbart, P. J., 2005. Relative Weighting of Common and Unique Balanced Scorecard Measures by Knowledgeable Decision Makers. Behavioral Research in Accounting, 17(1), pp. 43-53.
10. Eisenberg, P., 2016. The Balanced Scorecard and Beyond - Applying Theories of Performance Measurement, Employement and Reward in Management Accounting Education. International Research Journal Of Management Sciences, 4(7), pp. 483-491.

11. Fitzgerald, L., 2007. Management Performance Measurement in Service Business. International Journal Of Operation & Production Management , 8(3), pp. 34-36.

12. Goebel, T., 2018. Google Duplex's Conversational AI Shows A Path to Better Customer Service. [Online] Available at: https://www.cmswire.com/customer-experience/google-duplexs-conversational-ai-shows-a-path-to-better-customer-service/
[Accessed 30th January 2019].

13. Heath, N., 2018. AI And Jobs: Retraining Will Become A 'Lifelong Necessity. [Online] Available at: https://www.techrepublic.com/article/ai-and-jobs-retraining-will-become-a-lifelong-necessity-warns-report/
[Accessed 17 February 2019].

14. Kaneshige, T. & Hong, D., 2018. This Is The Year To Invest In Humans, As Backlash Against Chatbots And AI Begins. [Online] Available at: https://www.forbes.com/sites/forrester/2018/11/29/this-is-the-year-to-invest-in-humans-as-backlash-against-chatbots-and-ai-begins/#64916d2b48aa
[Accessed 24 January 2018].

15. Kaplan, R. & Norton, D., 2002. The Strategy-Focused Organization: How Balanced Scorecard Companies Thrive In The New Business Environment. Internal Auditor, 59(1), pp. 33-59.

16. Kaplan, R. S., 2010. COnceptual Foundations Of The Balanced Scorecard. Harvard Business School Working Paper, 10(74), p. 3.

17. Kappel, M., 2017. 6 Ways To Measure Small Business Success. [Online] Available at: https://www.forbes.com/sites/mikekappel/2017/03/08/6-ways-to-measure-smallbusinesssuccess/#36f1b9f618f4[Accessed 24 January 2019].

18. Lashbrooke, B., 2017. How Technological Advancement Translate To Entrepreneurial Success. [Online] Available at: https://www.bizjournals.com/bizjournals/how-to/technology/2016/07/technological-advancements-entrepreneurial-success.html[Accessed 24 January 2019].

19. Liu, Y., 2017. The Accountability of AI—Case Study: Microsoft's Tay Experiment. [Online] Available at: https://chatbotslife.com/the-accountability-of-ai-case-study-microsofts-tay-experiment-ad577015181fMalagwi, A. A. &Dahiru, H., 2014. Balanced Scorecard Financial Measurement Of Organizational Performance: A Review. Journal Of Economics And Finance , 4(6), pp. 1-10.

20. Matzler, K., Fuchs, M. & Schubert, A. K., 2004. Employee Satisfaction: Does Kano's Model Apply. Total Quality Management, 15(9), pp. 1179-1198.

21. Meyer, M. W., 2002. Rethinking Performance Measurement: Beyond The Balanced Scorecard. Cambridge University Press, pp. 81-113.

22. Noordin, K. A., 2017. The Edge SME Forum 2017: The Rise Of The Chatbots. [Online] Available at: https://www.theedgemarkets.com/article/edge-sme-forum-2017-rise-chatbots[Accessed 24January 2019].

23. Orlowski, A., 2017. Facebook Scale Back AI Flagship After Chatbots Hit 70% Failure Rate. [Online] Available at: https://www.theregister.co.uk/2017/02/22/facebook_ai_fail/[Accessed 24 January 2019].

24. Panko, R., 2019. Google Duplex: Inside Google's Latest Voice Technology and What It Means For AI. [Online]
Available at: https://www.techiexpert.com/google-duplex-inside-googles-latest-voice-technology-and-what-it-means-for-ai/[Accessed 28 January 2019].

25. Parlo, 2016. Tommy Hilfiger Bot: Artificial Intelligence Gone Wrong. [Online] Available at: https://chatbotslife.com/tommy-hilfiger-bot-artificial-intelligence-gone-wrong-90a545ac9a20
[Accessed 24 January 2019].

26. Piccolo, L. S., Roberts, S., Losif, A. & Alani, H., 2018. Designing Chatbots for Crises: A Case Study Contrasting Potential and Reality. Proceeding of British HCI Conference , pp. 1-10.

27. Ram, A. & Neville, S., 2018. High-profile Health App Under Scrutiny After Doctors' Complaints. [Online] Available at: https://www.ft.com/content/19dc6b7e-8529-11e8-96dd-fa565ec55929[Accessed 24 January 2019].

28. Ratcheve, V. S. & Leopold, T., 2018. 5 Things To Know About The Future Of Jobs. [Online] Available at: www.weforurm.org/agenda/2018/09/future-of-jobs-2018-things-to-know
[Accessed 10 February 2019].

29. Reddy, T., 2017. How Chatbots Can Help Reduce Customer Service Cost By 30%. [Online] Available at: https://www.ibm.com/blogs/watson/2017/10/how-chatbots-reduce-customer-service-costs-by-30-percent/[Accessed 9 January 2019].

30. Research, G. V., 2017. Chatbot Market Size To Reach $1.25 Billion By 2025 | CAGR: 24.3, California :s.n.

31.   Roe, D., 2019. AI Adoption is Increasing But Challenges Remain. [Online] Available at: https://www.cmswire.com/digital-workplace/ai-adoption-is-increasing-but-challenges-remain/ [Accessed 12 February 2019].

32.   Rosenblatt, G., 2016. How The Chatbot Changes Our Relationship With Organizations. [Online] Available at: https://www.the-vital-edge.com/chatbot-organizations/[Accessed 24th January 2019].

33.   Slovic, P. &MacPhillamy, D., 1974. Dimensional Commensurability And Cue Utilisation In Comparative Judgement. Organizational Behavior and Human Performance , 11(2), pp. 172-194.

34.   Wall, M., 2018. Adapt Or Die: How To Cope When The Bots Take Your Jobs. [Online] Available at: https://www.bbc.com/news/business-43259906[Accessed 17 January 2019].

35.   Wunderlich, N. &Paluch, S., 2017. A Nice and Friendly Chat with a Bot: User Perceptions of AI-Based Service Agents. ICIS, 3(2), pp. 2-10.

36.   Xiaofeng, W., 2017. Why AI-Based Chatbots Are Failing Worldwide. [Online] Available at: https://tech.economictimes.indiatimes.com/news/technology/why-ai-based-chatbots-are-failingworldwide/58944087[Accessed 24 January 2019].