

DEVELOPING PERSONAL FINANCES HEALTH MEASUREMENT INDEX AND CALCULATOR FOR YOUNG ADULTS BASED ON FINANCIAL AND EMOTIONAL ASPECTS

(Membangunkan Indeks Pengukuran Kesihatan Kewangan Peribadi dan Kalkulator untuk Golongan Belia Berdasarkan Aspek Kewangan dan Emosi)

NURULHUDA MUHAMAD, MASNITA MISIRAN*, HASIMAH SAPIRI,
ZAHAYU MD YUSOF, NOR IDAYU MAHAT & ZAINAL AKLA SHAMSUDIN

ABSTRACT

Measurement of healthy personal finances is mostly centered on the tangible assets and liabilities assessments, without considering of the emotional aspects that may lead young adults to save (or spend) money based on impulses and other emotional driving factors. This study aims to develop a measurement index to form a personal finances scorecard and calculator that can provide assessment on financial performance among young adults, from the tangible and emotional aspects. The balanced scorecard introduced by Kaplan and Norton (1992) and Yang *et al.* (2010) will be extended into a proposed personal financial balanced scorecard (PFBSC) to achieve the objective. A financial measurement quadrant is constructed with color-coded scorecard to improve visualization and give better understanding of the result. The findings suggest that the developed scorecard and calculator is easy to use, suitable for young adults, and able to capture both the tangible and emotional aspects of personal finances indicators.

Keywords: balanced scorecard; financial literacy; personal finances measurement index; sustainable lifestyle

ABSTRAK

Pengukuran kewangan peribadi yang sihat kebanyakannya tertumpu pada penilaian aset dan liabiliti ketara, tanpa mengambil kira aspek emosi yang boleh menyebabkan golongan belia menyimpan (atau membelanjakan) wang berdasarkan dorongan dan faktor pemacu emosi yang lain. Kajian ini bertujuan untuk membangunkan indeks pengukuran untuk membentuk kad skor kewangan peribadi dan kalkulator yang boleh memberikan penilaian prestasi kewangan di kalangan orang muda, dari aspek yang ketara serta aspek emosi. Kad skor seimbang yang diperkenalkan oleh Kaplan dan Norton (1992) dan Yang *et al.* (2010) akan diperluaskan ke dalam cadangan kad skor seimbang kewangan peribadi (PFBSC) untuk mencapai objektif kajian. Kuadran pengukuran kewangan dibina dengan kad skor berkod warna untuk meningkatkan visualisasi dan memberikan pemahaman yang lebih baik tentang hasilnya. Penemuan menunjukkan bahawa kad skor dan kalkulator yang dibangunkan mudah digunakan, sesuai untuk golongan muda, dan dapat mengenalpasti kedua-dua aspek ketara dan emosi dalam penunjuk kewangan peribadi.

Kata kunci: kad skor seimbang; celik kewangan; indeks pengukuran kewangan peribadi; gaya hidup mampan

1. Introduction

In recent years, there has been a sharp rise in the wealth gap between the rich and the poor. Poor money management can lead to financial failure, particularly for young adults. In Malaysia, personal financial management is considered taboo and awareness on financial management

and literacy is still low. In 2021, more than 11,000 people were declared bankrupt due to the pandemic, and more than 46,000 people have been declared bankrupt since the movement control order. The pandemic has also caused significant distress on personal finances, with nearly 100,000 Malaysians losing their jobs since the beginning of the pandemic Covid-19 (Chelliah *et al.* 2023).

Improving personal finances requires financial management, financial literacy, financial knowledge and education. Financial literacy is an understanding of financial terms and concepts to better understand one's own financial situation and make financial decisions. Financial health is essential to ensure financial sustainability and should be imparted at a young age. Understanding personal finances will motivate people to set up an emergency fund and make future financial plans and savings for retirement. This article will use tangible and emotional assets and liabilities to quantify assets and liabilities indicators.

1.1. Assets and liabilities

1.1.1. Tangible assets and liabilities

Assets and liabilities are essential for financial health. The things that a person possesses or owes are referred as assets. An asset raises the worth of one's own finances or stock (Erkins 2015). Liability, on the other hand, is a debt that a person owed to another party that may grows with time. Figure 1 illustrates the financial health proposed by Robert Kiyosaki. Kiyosaki argued that wealthy people spend their money on assets they acquire (and expenses they incur) in order to generate cash flow, which in turn generates additional revenue for them (Kiyosaki 2017), rather than acquiring the liabilities in their collection.

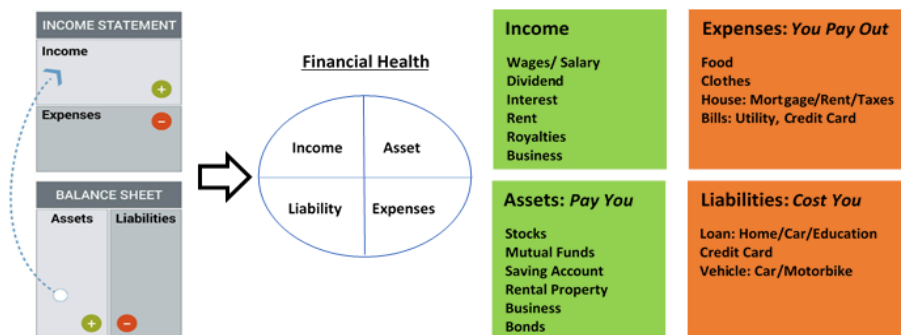


Figure 1: Financial health assessments (Kiyosaki 2017)

Personal assets are items with current or potential worth that belong to an individual or family (Folger 2021). Personal property includes boats, collectibles, furniture, jewellery, and automobiles. Investments include stocks, bonds, life insurance policy cash values, mutual funds, pensions, and retirement plans. Liabilities consist of current debts, unpaid amounts on credit cards, other loans, and some assets like vehicles and houses (Morah 2021). Net worth is displayed on a personal financial statement, which shows a negative net worth if liabilities exceed assets (Mitchell 2019).

1.1.2. Emotional assets and liabilities

Psychologists claim that 80% of the decisions we make during our lives are influenced by our emotions. Abeysekera (2004) defines emotional assets as those that activate both intellectual and accounting assets, while emotional liabilities are those that deactivate both intellectual and

tangible assets. Research has shown that family conflict has an impact on compulsive and impulsive purchasing behaviour (Frieze & Koenig 1993; Masud *et al.* 2004), and that compulsive behaviour is linked to unfavourable childhood events like punishment, high expectations, the repression of expressed emotions, the withdrawal of love, death, and divorce (Hira 1997; Masud *et al.* 2004). This has shown that the lifestyles of compulsive spenders are affected by their family backgrounds. These aspects will be utilized as fundamentals to the development of financial scorecard in this article.

1.2. Balanced scorecard

The Balanced Scorecard (BSC) is a performance-measurement approach that uses both financial and nonfinancial measures to evaluate all aspects of an organization's operations in an integrated fashion. It was first introduced by Kaplan and Norton (1992) and refined in later publications (Kaplan & Norton, 1993; 1996a, 1996b, 2000). In general, the scorecard for organization were based on vision, mission and objectives, followed by four different perspectives which are: financial, internal, external, and learning and growth process). The BSC model has been successfully applied in non-profit organizations while being widely used in various for-profit organizations since it was first created. Additionally, the Personal Balanced Scorecard (PBSC) is used as a method of self-performance measurement of one's own employees. Kaplan and Norton (1996c) claimed that the number of perspectives in the BSC is optional and that, as a result, one or more additional perspectives may be added depending on industry conditions and a business unit's strategy. Many researchers included one or more additional perspectives in their research according to their objectives of the study. For instance, in order to evaluate the performance of Jordanian contracting firms, Alanati (2004), expanded the traditional BSC to include "community development service" and "general safety" perspectives.

In a narrower perspective, balance scorecard can be used to identify personal achievement. It can determine one's financial performance in terms of their amount of income in relation to their level of expenses, including whether it is good, moderate, or at risk. However, in order to determine financial performance, the measurement of personal finances must be identified.

The image shows a web-based calculator for home loan eligibility. On the left, there is a form with the following fields: 'How much do you earn?' with a sub-field 'Monthly Net Income (After Tax / EPF / SOCSO)' set to RM 2500; 'How much is your monthly commitment?' with sub-fields 'Outstanding Credit Card Balance' (RM 1000) and 'Existing Monthly Loan Repayment' (RM 500); 'Loan Tenure' set to 10 years; and 'Annual Interest Rate' set to 5%. A large orange 'Calculate' button is at the bottom of the form. Below the button is a disclaimer: 'All loan amounts shown are indicative according to criteria provided by banks and do not constitute a guarantee of bank approval or loan amount obtainable. All loans are still subject to final approval from banks.' On the right side, the results are displayed in a green box: 'You are eligible for an amount of up to RM 128,694.04', 'With a monthly payment of RM 538.46', and 'You can afford a monthly payment of up to RM 1,365.00'. Below this is a section titled 'Get MyCTOS Score Report' with a sub-header 'Applying for a home loan? Know your credit score to improve your chances of getting approved.' It features a 'ctos Score' gauge showing a score of approximately 750. At the bottom right, there is a list of four tips: 'Take control of your financial health', 'Understand how you might look to a lender/bank', 'Detect signs of identity theft early', and 'Get access to the best financial products for you'.

Figure 2: CTOS home loan eligibility calculator (Source: CTOS (2018))

Personal financial measurement is essential for tracking financial health and is based on net worth, income and credit score. Malaysia's Credit Tip-Off Service (CTOS) report is an example of this. CTOS was established in 1990, it is Malaysia's leading Credit Reporting Agency (CRA) under the purview of the Registrar Office of Credit Reporting Agencies, Ministry of Finance and regulated under the Credit Reporting Agencies Act 2010. This is one of the efforts provides by Malaysian government for tracking the financial health. Figure 2 illustrates the CTOS home loan eligibility calculator and CTOS score.

Note that, CTOS credit report's measurement indicators are based solely on data pertaining to financial health and do not include any indicators to measure emotional health (emotional asset and emotional liabilities). We will extend this calculator by introducing the emotional assets and liabilities, with emphasis to young adults' category. The measurement on the emotional health will be adopted from the developed survey instruments in (Sapiri *et al.* 2023). The scoring of items will be translated into a color-coded scorecard with visualized quadrant.

1.3. Financial measurement quadrant

The idea of financial measurement quadrant in this study is extended from Robert Kiyosaki. The ESBI (Employee, Self-Employed, Business owner, Investor) Quadrant is an effective tool that shows how one's potential to build wealth and attain financial independence can be significantly impacted by the nature of their income.

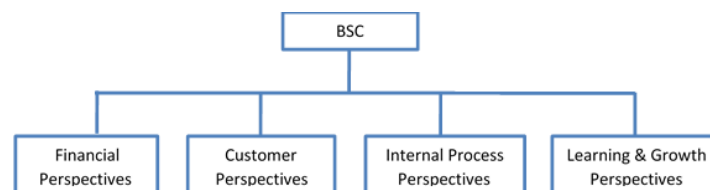


Figure 3: The BSC financial factors

Kiyosaki (2022) argued that there are positive and negative cash flow patterns that relate to the balance sheet and financial statement. Positive aspects include income and assets, whereas negative aspects include costs and liabilities. Here, it can be seen that while liabilities and expenses lower the value of money, income and assets increase it. This article will construct a quadrant that can capture four categories: tangible asset, tangible liabilities, emotional asset, and emotional liabilities. The PFBSC can provide a tool for people to understand their current position in a financial management environment.

2. Methodology

In this study, three phases will be considered – Developing Metrics, Constructing PFBSC, Visualizing PFBSC as visualized in Figure 4.



Figure 4: Flow of financial health measurement

2.1. Phase 1: Developing metrics

This study will use secondary data to evaluate the tangible and emotional health of young adults by adopting instruments for tangible aspects in Kiyosaki (2017) and emotional aspects in Sapiri *et al.* (2023). For the tangible aspect, the items included are the questions that will identify the young adults' awareness of financial knowledge, their assets and liabilities, including monthly income and monthly commitments, while for the emotional aspect, the adopted items will be Likert-scale questions for measuring the emotional health of young adults.

2.2. Phase 2: Constructing PFBSC

Users will fill in data on tangible asset and liability, calculate scores, and use scoring technique to determine financial health for both tangible and emotional aspects. For tangible, most probably the number that need to fill in depend on value term. The proposed list of items for tangible aspects are listed in Table 3. Then we will standardize or scale down using scoring technique to get the final results. Based on the results, the real quadrant will be used to determine the financial health for both tangible and emotional aspects of the users, whether it is "healthy," "unhealthy," or so on.

Figure 5 is an original framework of balance scorecard development by Yang *et al.* (2010). Basically, there are four traditional perspectives of balanced scorecard which are Financial Perspectives, Customer Perspectives, Internal Process Perspectives and Learning & Growth Perspectives. In this study, we adopted the standard framework and aims to develop a new modified version of financial balance scorecard framework.

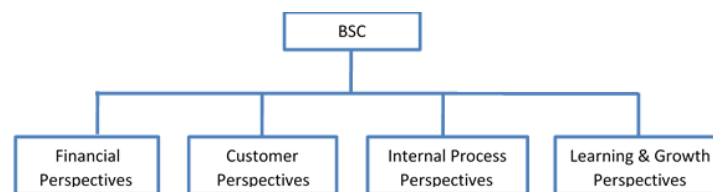


Figure 5: The original balance scorecard framework

Nikolaou and Tsalis (2013) improvised the framework and proposed a scoring model to gives values to the scorecard. They change “customer perspectives” from Yang *et al.* (2010) into “stakeholder perspectives”. The proposed scoring model is as follows:

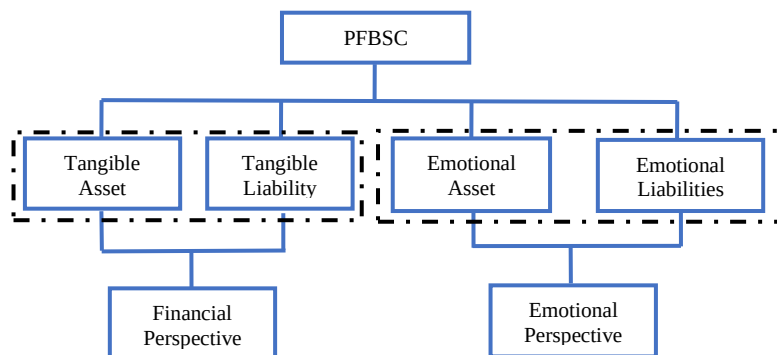


Figure 6. The proposed balance scorecard framework

In this study, we extend the original framework, by adding four elements that were added under the original financial perspectives. The new proposed framework is illustrated in Figure 5 as follows.

Based on Figure 6, the primary topic of discussion in this study will be financial perspectives and emotional perspectives, which include Asset, Liability, Emotional Asset, and Emotional Liability. To assess the financial and emotional health of young adults, these four components will be divided into two categories: tangible (assets and liabilities) and emotional (emotional assets and liabilities).

$$SBSC_{\text{scoring index}} = \text{Accountability}_{\text{indicator}} + \text{Performance}_{\text{indicator}} \quad (1)$$

where $0 \leq SBSC_{\text{scoring indicator}} \leq 31.6$,

$$\text{Accountability}_{\text{indicator}} = \text{AFin}_{\text{indicator}} + \text{AStak}_{\text{indicator}} + \text{AIP}_{\text{indicator}} + \text{AL\&G}_{\text{indicator}} \quad (2)$$

where $0 \leq \text{Accountability}_{\text{indicator}} \leq 158$, and

$$\text{Performance}_{\text{indicator}} = \text{PFin}_{\text{indicator}} + \text{PStak}_{\text{indicator}} + \text{PIP}_{\text{indicator}} + \text{PL\&G}_{\text{indicator}} \quad (3)$$

where $0 \leq \text{Performance}_{\text{indicator}} \leq 158$.

The scoring model above is the mathematical formula used to calculate the overall sustainability performance score. Eq. (1) comprise of two sub-indices which is accountability and performance. Eq. (2) is a mathematical formula made up to calculate overall score for accountability indicator that ranges from 0 to 158 points. Particularly, Eq. (2) is the sum of four sub-indicators: accountability financial indicator ($\text{AFin}_{\text{indicator}}$), accountability stakeholder indicator ($\text{AStak}_{\text{indicator}}$), accountability internal process indicator ($\text{AIP}_{\text{indicator}}$), accountability learning & growth indicator ($\text{AL\&G}_{\text{indicator}}$). Similarly, Eq. (3) is the mathematical formula to calculate the performance indicator where it is the sum of performance financial indicator ($\text{PFin}_{\text{indicator}}$), performance stakeholder indicator ($\text{PStak}_{\text{indicator}}$), performance internal process indicator ($\text{PIP}_{\text{indicator}}$), and performance learning & growth indicator ($\text{PL\&G}_{\text{indicator}}$).

The scoring model is used to measure the financial status of young adults and classify them into four financial health quadrants: young adults with healthy tangible aspects (assets and liabilities), young adults with unhealthy tangible aspects (assets and liabilities), young adults with healthy emotional aspects (emotional assets and emotional liabilities) and young adults with unhealthy emotional aspects (emotional assets and emotional liabilities). The original formula from study conducted by Nikolaou and Tsalis (2013) matched up with this study and the proposed scoring model or mathematical formula are as follows:

$$PFBSC_{\text{scoring indicator}} = \text{Tangible}_{\text{indicator}} + \text{Emotional}_{\text{indicator}} \quad (4)$$

$$\text{Tangible}_{\text{indicator}} = \text{Current Saving} + \text{Assets} + \text{Liabilities} + (\text{Income} - \text{Expenses}) \quad (5)$$

$$\text{Emotional}_{\text{indicator}} = \frac{\sum_{i=1}^n x_i}{n} \quad (6)$$

The proposed scoring model is the mathematical formula used in this study to calculate the overall personal financial score. Eq. (4) comprise of two sub-indices which is tangible and emotional. Eq. (5) is a mathematical formula made up to calculate overall score for tangible indicator. Eq. (5) is the sum of four sub-indicators: current saving, assets, liabilities, and (income-expenses). Similarly, Eq. (6) is the mathematical formula to calculate the emotional indicator where it is the result from the sum of all emotional items divided with the number of

emotional items. x_i refer to emotional items, consist of emotional assets and emotional liabilities and n is the number of emotional items.

Adopting Key Performance Indicators (KPIs) for financial goals is essential to help people stay on track and within spending limits. These KPIs include credit score, savings rate, discretionary spending, net worth, financial health index, and financial independence number.

Table 1: Tangible and emotional indicators

Tangible Indicators	Emotional Indicators
Income	Emotional Asset
Expenses	Emotional Liability

Based on Table 1 above, tangible indicators consist of income and expenses. For this study, income indicators involved the sources of income that the young adults obtained from a variety of sources. University students, for example, may receive their allowance from sources such as PTPTN or other loans, scholarships, money from parents, the salary from a part-time job, a monthly salary, and many more. Meanwhile, expenses involving monthly commitments that covers loans, bills, fees, foods, cloths, etc. However, for emotional indicators, it involves a person's tendency toward buying habits such as impulsive and compulsive buying and also on financial planning. This aspect involves the interaction of young adults' psychological and emotional states.

2.3. Phase 3: Visualizing PFBSC

The last phase in this chapter is the financial measurement quadrant. The level of measurement on financial in this study is based on the improvement of idea of cashflow quadrant proposed by Robert Kiyosaki.

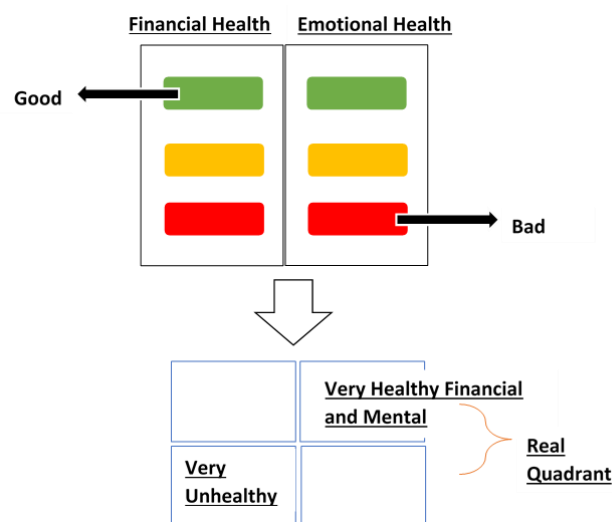


Figure 7: Tangible health and emotional health quadrants

The financial measurement quadrant can be used to determine if a person is in a good financial and mental state or not, depending on the degree of score. Based on Figure 7, a

scenario can be used to show how the financial measuring quadrant is applied. For instance, if our financial condition is in the green scoring area while our emotional position is in the red category due to impulsive purchasing, we want to determine whether we are vulnerable in this situation. Imagine if our emotional and financial health were both rated in the red; in that case, anything could drive us to spend the remaining money.

Table 2: Weighted criteria of personal financial performance of young adults

Color	Value Range	Criteria	Description
Green	[8, 10]	Good	Strength or progress and need to maintain
Yellow	[4, 7]	Moderate	Weakness and the need for corrective action
Red	[0, 3]	Poor	Major weakness or high risk and the need for immediate corrective attention

Table 2 is the weighted criteria of personal financial performance of young adults. The value ranges from 0 – 10 will determine the performance of personal financial whether good, moderate or poor. If the young adults score between 8 to 10, the scorecard color will be green which indicates that he/she has good financial performance (strength or progress and need to maintain). Meanwhile, if they score between 4 to 7, it shows yellow scorecard's color which mean they are moderate in financial performance but still denoted in weakness phase and need for corrective action. For value 0 to 3, the scorecard color will be red and it shows that they have poor performance of financial or in the state of major weakness/high risk and need for immediate corrective attention (Kohl & White, 1998).

3. Results and Findings

3.1. Metrics for tangible and emotional health

This study will measure tangible health based on asset and liability accounts of young adults, using net worth as a personal finance KPI. The assets owned by the students could be in terms of income obtained from a part-time job or scholarships. Meanwhile, the liabilities students owe come from the educational loan and the expenses they incur. Items for tangible health will be based on Yes/No questions on monetary concepts. Table 3 is the proposed list of financial health items.

Table 3: Proposed list of tangible health items

No.	Items	Note
1	I am aware of my financial situation	Yes/No questions
2	I have strong financial sources	Yes/No questions
3	Current Saving	Input by young adults
4	Monthly Income	Input by young adults
5	Monthly Commitments/Expenses	Input by young adults
6	Net Worth (Asset – Liability)	Auto-calculation
7	Asset:	Yes/No questions
	- Cash	
	- Saving	
	- Allowance	
	- Investment	
8	Liability:	Yes/No questions
	- Credit Card	
	- Car Loan	
	- Education Loan	
	- Mortgage/House Loan	
	- Bills	

The emotional health of young adults will be measured using a questionnaire adopted from a study on financial literacy by Sapiri *et al.* (2023). The emotional health among young adults whether impulsive or compulsive buying will be determined based on the questionnaire rated by the respondents on interval scale: 1 – strongly disagree and 5 – strongly agree. The proposed list of items to be included in the emotional aspects are shown in the Table 4 below.

Table 4: Proposed list of emotional health items (Adopted from Sapiri *et al.* (2023))

No.	Items
1	I have prepared to spend my own money to make an investment
2	I have made an investment with trusted parties
3	I have some friends that I can discuss about financial knowledge
4	I always been exposed on importance of financial management
5	I understand that having poor financial planning can affect my career planning.
6	I'm practicing saving since childhood
7	I have my own financial plan
8	I save the money every month consistently
9	I put my money aside for savings, future purchases or emergencies
10	I know how to differentiate between fixed deposit and saving account
11	I will record all my spending
12	I have made a choice of financial products after I have done my survey
13	I am able to make good decisions by weighing options and informed choices based on my financial situation
14	I am able to solve any financial problem
15	I have financial plan for future living expenses to avoid excess in spending more than my income
16	My spending habit may change from time to time depends on economic condition
17	Before I buy something, I carefully consider whether I can afford it or not
18	I know how to differentiate between needs and desire when spending money
19	I pay my bills on time every month
20	I have knowledge on interest rate
21	I have knowledge on credit terms

Based on Table 3 and Table 4, a set of questions for tangible aspects and emotional aspects are listed separately. The questions for tangible aspects involve awareness of financial performance, compulsory information in RM units, and Yes/No questions for assets and liabilities. Meanwhile, for emotional aspects, the questions use a rating scale, in which young adults must scale the statement from 1 to 5, with the list of questions or items adopted from previous research. The value of the answer in the scorecard is shown in Figure 7.

3.2. Personal Financial Balanced Scorecard (PFBSC) Construction

Figure 8 below is the scoring value for a set of questions for tangible and emotional items. The scoring value for a set of questions for tangible and emotional items will determine financial performance of young adults, whether good, moderate, or poor. Scales of emotional items represent emotional assets and liabilities. Based on the scales on emotional items (1 – strongly disagree and 5 – strongly agree), scale 1 and 2 indicates emotional liabilities, while 4 and 5 indicates emotional assets. Whereas, 3 indicates in between of both two aspects.

Scoring value	
Yes/No	Awareness Statement & Asset
Yes	: 1
No	: 0
Yes/No	Liability
Yes	: -1
No	: 0
Current Saving	
Less than and equal to 6000	: 0
More than 6000	: 1
Monthly Salary/Income	
Amount provided by young adults	: RM
Monthly Spending/Expenses	
Amount provided by young adults	: RM
Net worth	
: Income - Expenses	
Less than 0 / (-ve)	: 0
0 to 500	: 1
More than 500	: 2
Scales	
1 & 2	: 0
3	: 1
4 & 5	: 2

Figure 8: Scoring value

3.2.1. Scales

For the Yes/No questions on awareness statement and asset, the answer 'Yes' will represent '1' and 'No' as '0'. Meanwhile, if young adults answer 'Yes' for liability items, it will represent as '-1', and if 'No' will represent as '0'. Next for current saving, the value will represent either '0' or '1' depend on the value input by the user. The value will be '0' if the current saving is less than and equal to 6000, and the score will be '1' if the current saving is more than 6000. The value for current saving is based on the monthly income multiple with three months for emergency savings (if the person is single). For example, assuming the monthly income for young adults is RM2000 multiple with three months and the total will be RM6000. The value for both monthly salary/income and monthly spending/expenses will be input in Ringgit Malaysia (RM) unit by user. For the net worth, there will be auto-calculation for value of income minus with expenses. The final total of net worth whether less than 0/(-ve), 0 to 500, and more than 500 will represent '0', '1' and '2', respectively. Assume that if the value of net worth they got is deficit value, we can say that they probably have credit card or any other concept of credit such as purchasing the product that used platform 'Buy Now, Pay Later'.

To reduce the calculation for the data of adopted items, the rating scales on the items are classified into three groups: scales 1 and 2 are denoted as 0, scale 3 as 1, and scales 4 and 5 as 2. Therefore, the value that will be used for the scoring technique for the emotional items will be 0, 1, or 2, depending on the scale chosen by the young adults on the scorecard. The calculation for the emotional aspect will involve the average of all the emotional items. The details of the calculation will be explained in detail in the next section.

Once the scorecard is ready, its function is then simulated in three cases:

Case 1: Poor financial management knowledge.

Case 2: Moderate financial management knowledge.

Case 3: Good financial management knowledge.

3.3. Quadrant development

From the calculation of both scores on tangible and emotional aspects, the quadrant is then developed. Each score will be plotted on a graph, where the coordinates of the plotted point

will represent the quadrant score those young adults are currently at. Next, the represented quadrant score will reveal whether the financial performance of young adults is good, moderate, or poor. The following case-based illustrations demonstrate how the scorecard and quadrants actually function.

3.3.1. Case-based illustrations

Based on the mathematical formula shown above, a scorecard can now be constructed for each of the individual cases: Case 1, Case 2, and Case 3. The general score range is from 0 to 10, which indicates that 0 is poor and 10 is good. Each case involves the illustration of the scorecard with the potential answers from young adults, as well as the score that follows. However, to ease the calculation to improve the visualizations, we transform the original tangible indicators scale (9 → 5) and the original emotional indicators scale (2 → 5). The new tangible indicator and emotional is, $\hat{T}_a = \frac{T_a}{9} \times 5$ and $\hat{E}_a = \frac{E_a}{2} \times 5$, respectively. The results are as follows:

(a) Case 1: Poor financial management knowledge

This case is an example of someone with little to no exposure to financial literacy or knowledge. Person A is the type of person who is unaware of or ignores his or her financial performance. Person A is a single person with a monthly income of RM2500 and monthly commitments of around RM2000 that cover a car loan, an education loan, bills, personal expenses, and others. Basically, Person A's monthly savings is around RM500, and the current savings for emergencies is enough for himself or herself. Person A, on the other hand, did not have any financial budgeting plan and whose emotional aspect for purchasing behaviour is impulsive, despite having a credit card. Due to this, he or she will face a greater burden if Person A is married. Based on the scoring value, the result for tangible is 0, while emotional is 2.381 and the overall score is 2.381. This situation will worsen if he or she does not manage or control the trigger of their purchasing habits, in which case they may go bankrupt at an early age.

Table 5: Hypothetical scorecard

Tangible Aspects:	
I am aware of my financial situation	No
I have strong financial sources	No
Your current saving	10000
Your Monthly Income	2500
Your Monthly Commitments/Expenses	2000
Asset:	
- Cash	Yes
- Saving	Yes
- Allowance	Yes
- Investment	No
Liability:	
- Credit Card	Yes
- Car Loan	Yes
- Education Loan	Yes
- Mortgage/House Loan	No
- Bills	Yes

Table 6: Emotional aspect

Emotional Aspects:	Scale
I will record all my spending	4
I have prepared to spend my own money to make an investment	2
I have made a choice of financial products after I have done my survey	4
I have made an investment with trusted parties	2
I am able to make good decisions by weighing options and informed choices based on my financial situation	3
I have some friends that I can discuss about financial knowledge	2
I am able to solve any financial problem	3
I always been exposed on importance of financial management	3
I understand that having poor financial planning can affect my career planning.	5
I have financial plan for future living expenses to avoid excess in spending more than my income	3
My spending habit may change from time to time depends on economic condition	3
Before I buy something, I carefully consider whether I can afford it or not	2
I know how to differentiate between needs and desire when spending money	2
I'm practicing saving since childhood	3
I have my own financial plan	3
I save the money every month consistently	5
I put my money aside for savings, future purchases or emergencies	3
I pay my bills on time every month	3
I know how to differentiate between fixed deposit and saving account	2
I have knowledge on interest rate	3
I have knowledge on credit terms	4

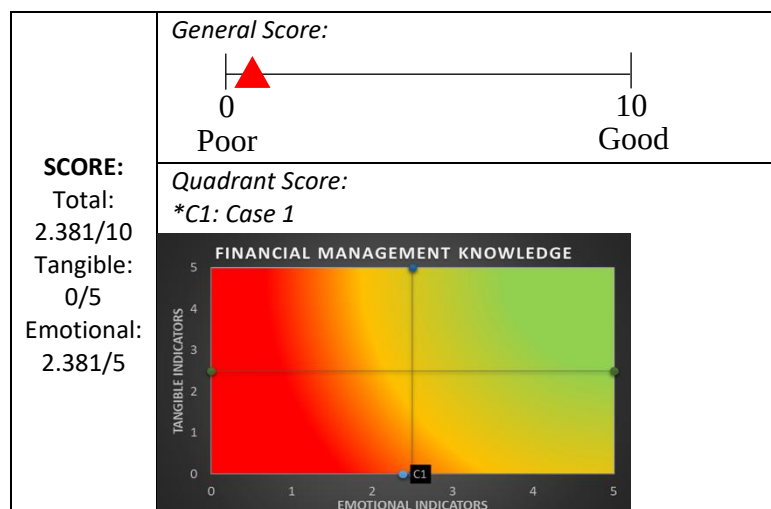


Figure 9: PFBSC score

(b) Case 2: Moderate financial management knowledge

This case is an example of someone with sufficient exposure to financial literacy or knowledge. Person B is aware of his or her financial situation and tends to have a moderate financial plan. With his or her monthly income of RM2500 and monthly commitments of only RM1600, Person B could save around RM900 per month. Person B's emotions on purchasing behavior, on the other hand, are compulsive, but they can trigger to impulsive buying if not managed

properly. With the current savings, Person B could survive in an emergency even though he or she is married. The result for tangible is 2.2222, and the emotional score is 3.9285, so the total score is 6.1507. With the current score, this type of person might fall into critical financial health if their purchasing behaviour turns to impulsive, even if no credit card is used.

Table 7: Hypothetical scorecard

Tangible Aspects:	
I am aware of my financial situation	Yes
I have strong financial sources	No
Your current saving	15000
Your Monthly Income	2500
Your Monthly Commitments/Expenses	1600
Asset:	
- Cash	Yes
- Saving	Yes
- Allowance	Yes
- Investment	No
Liability:	
- Credit Card	No
- Car Loan	Yes
- Education Loan	Yes
- Mortgage/House Loan	No
- Bills	Yes

Table 8: Emotional aspect

Emotional Aspects:	Scale
I will record all my spending	4
I have prepared to spend my own money to make an investment	3
I have made a choice of financial products after I have done my survey	4
I have made an investment with trusted parties	2
I am able to make good decisions by weighing options and informed choices based on my financial situation	4
I have some friends that I can discuss about financial knowledge	3
I am able to solve any financial problem	3
I always been exposed on importance of financial management	5
I understand that having poor financial planning can affect my career planning.	5
I have financial plan for future living expenses to avoid excess in spending more than my income	3
My spending habit may change from time to time depends on economic condition	3
Before I buy something, I carefully consider whether I can afford it or not	5
I know how to differentiate between needs and desire when spending money	4
I'm practicing saving since childhood	4
I have my own financial plan	4
I save the money every month consistently	4
I put my money aside for savings, future purchases or emergencies	4
I pay my bills on time every month	3
I know how to differentiate between fixed deposit and saving account	3
I have knowledge on interest rate	4
I have knowledge on credit terms	4

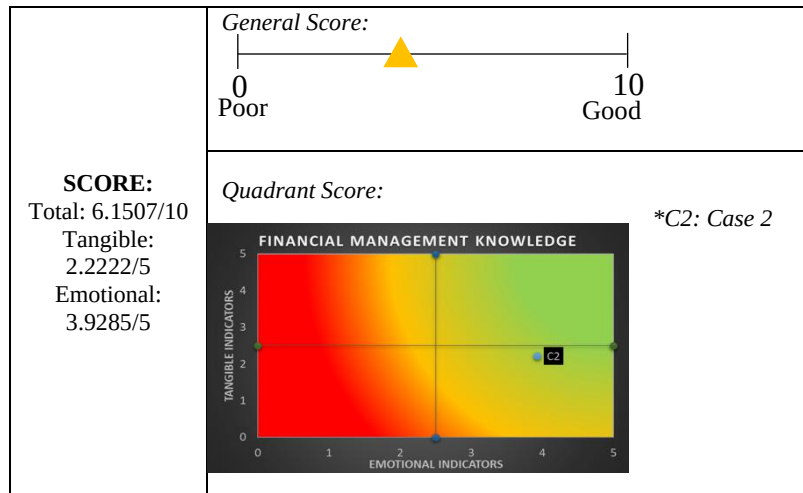


Figure 10: PFBSC score

(c) Case 3: Good financial management knowledge

This case is an example of someone with good exposure to financial literacy or knowledge. Person C is aware of his or her financial situation and has a proper financial plan with strong financial sources from which to make investments. Person C's monthly income is RM2500 and her monthly commitments are RM1600; with that, Person C could save around RM900 per month. Person B's emotions on purchasing behaviour are compulsive, whereas this person makes a proper choice on buying things. With the current savings and good buying habits, Person C has more than enough to survive in an emergency, even though he or she is married. The result of tangible in this case is 3.3333, and emotional is 5, so the total score is 8.3333. In other words, this person has strong financial knowledge and financial sources. More importantly, he or she is good at managing their buying habits. Even though they have credit cards, their spending is still within their financial reach.

Table 9: Hypothetical scorecard

Tangible Aspects:	
I am aware of my financial situation	Yes
I have strong financial sources	No
Your current saving	15000
Your Monthly Income	2500
Your Monthly Commitments/Expenses	1600
Asset:	
- Cash	Yes
- Saving	Yes
- Allowance	Yes
- Investment	Yes
Liability:	
- Credit Card	No
- Car Loan	Yes
- Education Loan	Yes
- Mortgage/House Loan	No
- Bills	Yes

Table 10: Emotional aspect

Emotional Aspects:	Scale
I will record all my spending	4
I have prepared to spend my own money to make an investment	5
I have made a choice of financial products after I have done my survey	5
I have made an investment with trusted parties	5
I am able to make good decisions by weighing options and informed choices based on my financial situation	4
I have some friends that I can discuss about financial knowledge	4
I am able to solve any financial problem	4
I always been exposed on importance of financial management	5
I understand that having poor financial planning can affect my career planning.	5
I have financial plan for future living expenses to avoid excess in spending more than my income	5
My spending habit may change from time to time depends on economic condition	5
Before I buy something, I carefully consider whether I can afford it or not	4
I know how to differentiate between needs and desire when spending money	4
I'm practicing saving since childhood	5
I have my own financial plan	5
I save the money every month consistently	5
I put my money aside for savings, future purchases or emergencies	5
I pay my bills on time every month	4
I know how to differentiate between fixed deposit and saving account	4
I have knowledge on interest rate	5
I have knowledge on credit terms	5

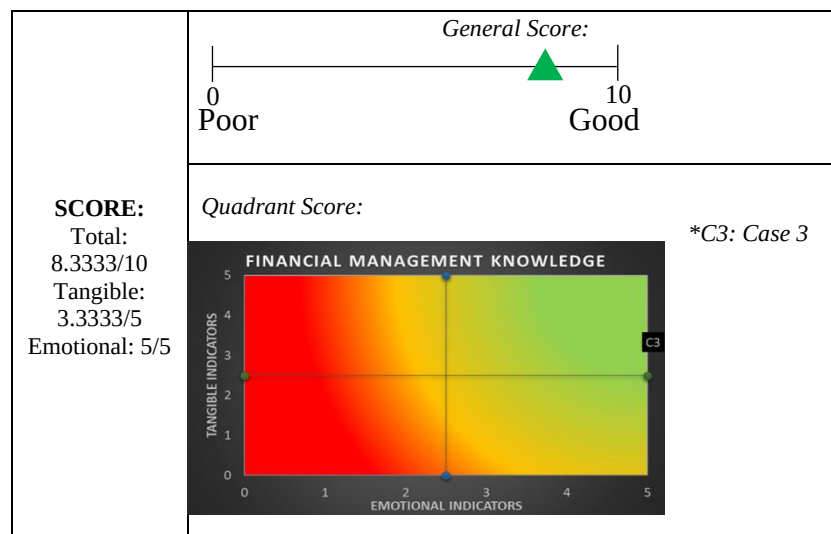


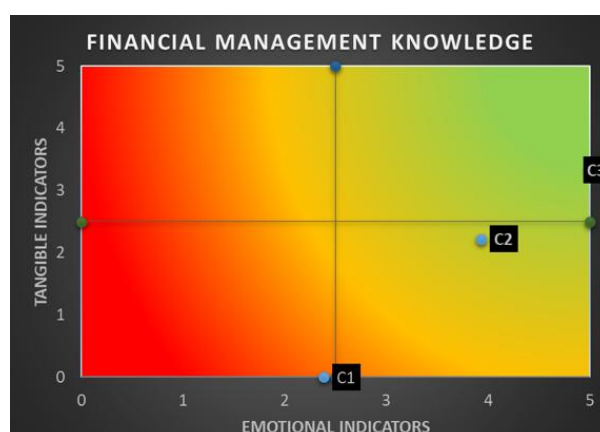
Figure 11: PFBSC Score

Cases Summary

Based on the weighted criteria of the personal financial performance of young adults, the results from each case can now be identified in terms of value, colour, criteria, and descriptions, as shown in Table 12 below.

Table 11: Results on individual cases

Case	Value	Colour	Criteria	Description
1	2.381	Red	Poor	Major weakness or high risk and the need for immediate corrective attention
2	6.1507	Yellow	Moderate	Weakness and the need for corrective action
3	8.3333	Green	Good	Strength or progress and need to maintain



*C1: Case1, C2: Case2, C3:Case 3

Figure 12: Overall cases quadrant scorecard

Based on the score for all three cases using the scoring technique, Figure 12 shows the overall case quadrants. The figure above is an illustration of overall cases based on the transformation of the value of tangible indicators. Case 1 (C1) is in red on the scorecard, indicating that the young adults have poor knowledge of financial management. They are at high risk since their tangible and emotional aspects are extremely unhealthy. Therefore, they need immediate corrective action. Meanwhile, Case 2 (C2) has a yellow scorecard, indicating that they have a moderate level of financial management knowledge. This has shown that young adults are moderate in tangible aspects, but their emotional aspects are still under control. However, they are triggered to fall into the "red" category easily if they fail to manage their emotional aspects properly. For Case 3 (C3), the green color of the scorecard indicates that young adults who are good at financial management knowledge and have a strong financial base where both their tangible and emotional aspects are healthy.

3.4. Calculator development

Based on the constructed personal financial balanced scorecard and scoring value, a PFBSC calculator is developed in an Excel template workbook. Figure 13 and Figure 14 show the layout of the calculator as well as instructions on how to use it.

PERSONAL FINANCIAL BALANCED SCORECARD (PFBSC) CALCULATOR	
Tangible Aspects:	Value
I am aware of my financial situation	yes
I have strong financial sources	yes
Your current saving	10000
Your Monthly Income	5000
Your Monthly Commitments/Expenses	3000
- Cash	yes
- Saving	yes
- Allowance	yes
- Investment	no
- Credit Card	yes
- Car Loan	yes
- Education Loan	yes
- Mortgage/House Loan	yes
- Bills	yes
Emotional Aspects:	Scale
I will record all my spending	2
I have prepared to spend my own money to make an investment	3
I have made a choice of financial products after I have done my	4
I have made an investment with trusted parties	5
I am able to make good decisions by weighing options and informed choices based on my financial situation	5
I have some friends that I can discuss about financial knowledge	5
I am able to solve any financial problem	5
I always been exposed on importance of financial management	1
I understand that having poor financial planning can affect my career planning.	2
I have financial plan for future living expenses to avoid excess in spending more than my income	3
My spending habit may change from time to time depends on economic condition	5
Before I buy something, I carefully consider whether I can afford it or	5
I know how to differentiate between needs and desire when spending	5
I'm practicing saving since childhood	5
I have my own financial plan	5
I save the money every month consistently	3
I put my money aside for savings, future purchases or emergencies	4
I pay my bills on time every month	5
I know how to differentiate between fixed deposit and saving account	5
I have knowledge on interest rate	5
I have knowledge on credit terms	5

GENERAL SCORE

5.595238095

0 2 4 6 8 10

QUADRANT SCORECARD

FINANCIAL MANAGEMENT KNOWLEDGE

Emotional Indicators Rating	Tangible Indicators Rating
3.928571429	1.666666667
Total	
5.595238095	

GENERAL SCORE

5.595238095

0 2 4 6 8 10

QUADRANT SCORECARD

FINANCIAL MANAGEMENT KNOWLEDGE

Emotional Indicators Rating	Tangible Indicators Rating
3.928571429	1.666666667
Total	
5.595238095	

Figure 13: Personal Financial Balanced Scorecard (PFBSC) calculator

Figure 13 is the interface of the PFBSC calculator that the users will see. There will be two sections: Section 1 is the scorecard view, and Section 2 is the result view. The scorecard view on the left side consists of tangible aspects and emotional aspects, which the users (young adults) need to fill in. Fill in the column "Value" for the answer to the tangible aspect, and the column "Scale" for the answer to the emotional aspect. When users enter a value, the result is automatically displayed in the result view. The result view on the right side of the interface will visualize the general score, quadrant scorecard, the value of tangible rating indicators, the value of emotional rating indicators, and the overall total of tangible and emotional indicators.

A set of instructions or guidelines on how to use the PFBSC calculator is provided to assist users in using the calculator. The users are encouraged to refer to the guideline. The details of the guidelines are depicted in Figure 14.

HOW TO USE THE CALCULATOR	
🔑	This calculator aims to measure your personal financial health performance financially and emotionally.
🔑	The questions consist of tangible and emotional aspects of finance. Please answer each question/statement as honestly as possible. All answers are confidential.
🔑	The purpose of this calculator is to capture your psychological (emotional and tangible) health in personal finance. The results will illustrate whether you have poor, moderate, or good financial management knowledge.
🔑	We hope you are having a wonderful experience using it. Enjoy the calculator!
🔑	Color-code Indicators:
	Good! You are in a healthy position!
	Moderate! You need to be improved!
	Poor! You need to be very aware on your finances!

Figure 14: Instruction of using PFBSC calculator

4. Conclusion

This study proposes a scorecard model and calculator to measure young adults' financial performance. It captures an individual's financial knowledge and behaviours (compulsive or impulsive) and helps them address the root cause of their poor financial management problems. It also proposes a financial measurement quadrant to measure the financial health of young adults, which can be used as a reference for future research. In the future, the programmer or app developer can use this research as a foundation to create a web-based application that will measure both the performance of tangible and emotional health.

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*School of Quantitative Sciences,
Universiti Utara Malaysia
06010 Sintok
Kedah, MALAYSIA*

E-mail: huda03.muhamad@gmail.com, masnita@uum.edu.my, hasimah@uum.edu.my,
zahayu@uum.edu.my, noridayu@uum.edu.my, zainal.akla@gmail.com*

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*Corresponding author