Assessing Financial Vulnerability of Cooperative

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Abstract
Financial ratios and prediction models have been used since the 1960s to evaluate financial health in profit-oriented organization. However, very few studies were devoted to cooperatives, which is looked upon like an *enigma* for regulators, business managers and academicians alike. With 1 billion cooperative members worldwide and counting, serious attention should be given to finding and developing tools to help the stakeholders maneuver cooperatives towards. This article explores the utilization of Tuckman-Chang Model to predict financial vulnerability in cooperative settings. This model was originally intended for charitable organizations (NPO) without profit-distributing characteristics. However, our finding implies that the utilization of such model in profit-distributing organizations such as cooperatives is applicable.
Keyword: Financial Vulnerability, Financial Distress Prediction, Financial Oversight, Cooperative

1. Introduction

The earliest record of a co-operative can be traced to Fenwick, Scotland known as the Fenwick Weaver Society. The cooperative was formed in 14 March 1761, providing discounted oatmeal to its members. Cooperative has been growing rapidly since then and gain substantial impact on economy and employment market.

As at 2011, UN General Assembly (2011) reported that 1 billion of the world's population are members of cooperatives. The report estimate that more than 100 million people are employed by cooperatives. On top of that, cooperative activities account for 3% to 10% of national GDP. The report recognize cooperative contribution to the development of socioeconomic and call for (among others) intensive research on its operation and contribution.

In Malaysia, cooperatives have been identified as an engine for national growth. As at December 2011, there are 9,074 registered cooperatives generating RM23 billion of revenue. Cooperatives received special attention from the government of Malaysia under the Cooperative Development Master Plan 2011 – 2020 which was introduced in 2011 to coordinate the development of cooperative in Malaysia. Its key objective is to increase cooperatives contribution to the national GDP to 10% by 2020.

Cooperatives in Malaysia are governed by the Cooperative Society Act 1993 and the Cooperative Commission Act 2007. Both Acts empower Cooperative Commission of Malaysia to act as registrar and regulator of cooperatives. The income Tax Act 1967 recognized Malaysian cooperatives as tax-exempted entity.

Similar to other economic entities, cooperatives are exposed to business risks, fraud risks, and economic risks. Recent financial crises rise stakeholders' interests especially regulator and board of directors on early warning indicators of financial distress. With ever increasing business complexity and challenges, financial oversight is viewed as a vital part of cooperative governance. However, stakeholders often face changing tasks when evaluating the financial performance of non-profit organization such as cooperatives due to its unique nature which place less emphasis on profit making. As such, the existing tools employed by profit oriented entity on financial oversight may not be suitable for NPOs.

Improper evaluation tools and models may put stakeholders at risk when making strategic decisions. Currently, most NPOs gauge their financial health by analyzing deviation of budgeted expenses which consumed significant directors' and managers' time and effort (Greenlee and Tuckman, 2007). As a result, the board's role in financial oversight and strategic planning has been shifted to deciding on administrative and operational matters. This in turn limit board effectiveness in cooperative governance.

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Table 1. Cooperatives Profile in Malaysia as at 31 December 2011.

#	Function	Frequency	Membership (Thousand)	Capital (RM'million)	Asset (RM'million)	Revenue (RM'million)	P&L (RM'million)
1	Banking	2	986	2,599	73,389	5,182	1,537
2	Credit	589	1913	4,763	9,914	1,285	271
3	Agriculture	1798	416	426	2,357	858	158
4	Housing	134	148	175	755	67	29
5	Industry	162	13	2	47	29	2
	Consumer	1920	540	240	960	697	41
6	Consumer-School	2216	2087	20	225	264	34
7	Construction	151	112	25	139	85	12
8	Transportation	418	138	57	272	558	22
9	Services	1684	686	2178	4,742	14,064	513
	Total	9,074	7,040	10,486	92,801	23,088	2,619

Source: Statistic published by Cooperative Commission of Malaysia

2. Literature Review

The assessment of an organization's financial health capture the interest of business communities and academicians in the late 1960s following Beaver, (1966) and Altman (1968) works in predicting business failure. Since then, ratio analysis (accounting and market ratios) and prediction models have been widely used exclusively in the corporate realm as health monitoring tools. Realizing a dearth of such tools and research in non-profit sector, Tuckman & Chang (1991) proposed four financial indicators in evaluating the financial health of non-profit organizations.

In the early years, financial health of an organization (profit-oriented) is associated with bankruptcy. Beaver (1966), Altman (1968), and Ohlson (1980) proposed that an organization is financially unhealthy if it is eventually being liquidated. However, such definitions were criticized as not all profit oriented organizations ceased business due to financial reasons. Although profit maximization was the main objective of those organizations, Franks & Torous (1989) found evidence of financially sound companies being liquidated for reasons other than finance-related. Alternatively, Gilbert, Menon, & Schwartz, (1990) (among others) defined financially unhealthy organization when net loss were reported in three consecutive years.

It is worth to note that the terms "vulnerability" and "unhealthy" were used interchangeably by researchers in defining financially impaired organizations.

Tuckman & Chang (1991) associated financial vulnerability in non-profit organization with lack of financial flexibility which lead to inability to withstand financial shock. Equity ratio, revenue concentration index, administrative cost to total cost ratio, and net profit (surplus) to total revenue ratio were employed to measure financial flexibility of 4,730 sample of not profit organizations. The result were ranked into quintile and two level of risks were assigned to the samples. Organizations with at least one ratio at the lowest quintile are labelled as "at risk" while the one with all ratio at the lowest quintile are labelled as "severely at risk".

Greenlee & Trussel (2000), Hager (2001), Trussel (2002) and Trussel & Greenlee (2004) expanded Tuckman & Chang's (1991) works by developing predictor model of financial vulnerability in non-profit organization. Contrary to Tuckman & Chang (1991), Greenlee and Trussel associate financial vulnerability with a decline in program expenses (2000) and decline in net assets (2002 and 2004). Hager (2001) cautioned that Tuckman and Chang Model may not be suitable for all industry. Following Hager (2001), Trussel & Greenlee (2004) modified the earlier prediction model to include size and industry factor. In general all the authors agree on the ability of the model to predict financial vulnerability with reasonable accuracy.

We acknowledge that applicability of Tuckman and Chang model in a cooperative setting is debatable. Arguably, researchers has long been indecisive in grouping cooperative into the second or the third economic sector. The advocates of Salamon & Anheier (1997) may argue on profit distribution characteristic of

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cooperative which disqualify cooperative as part of the third sector (NPO approach[35]). However, the latest report published by European Economy and Social Committee recognized cooperative as part of the third sector based on social economy (SE) approach[36]. Unlike NPO approach which is strictly confine on charitable and philanthropic principle in defining Third Sector (TS), the Social Economic (SE) approach focus on solidarities among members, democratic decision making, and the priority of people over capital.

3. Financial Vulnerability Model

The hypothesis of this study is developed in line with the findings made by Tuckman and Chang in 1991. They suggested four indicators can be used to predict Financial Vulnerability in non-profit organization. Tuckman & Chang (1991) associates financially vulnerable organization with the lack of financial flexibility. Less financially flexible organization is expected to experience inadequate equity balance, concentrated revenue, low administrative cost, and low or negative operating margin. As the result, the organization is unable to withstand financial shock. Throughout their article, Tuckman and Chang portrayed financial shock as unexpected loss in income. Since income is a net-off between revenue and expenses, loss in income may arise from an unexpected decrease in revenue and increase in expenses. For example, the break-down of main manufacturing machine and occurrence of major fraudulent case.

When experiencing unexpected income disruption, cooperatives may opt to meet its immediate financial obligation in five ways, ie (1) utilizing unrestricted fund (in the form of liquid assets), (2) disposal of long term assets, (3) seeking external financing, (4) issuance of shares, and (5) reducing administrative cost.

Table 2. Financial Vulnerability Indicator Developed by Tuckman and Chang (1991)

Indicator	Formula
Equity Ratio (EQT)	$\dfrac{Total\ Quity}{Total\ Revenue}$
Revenue Concentration Index (RCI)	$\sum \left(\dfrac{Revenue\ Source_i}{Total\ Revenue}\right)^2$
Administrative Cost Ratio (ADM)	$\dfrac{Administrative\ Expenses}{Total\ Revenue}$
Operating (or NPAT*) Margin (NPM)	$\dfrac{Total\ Revenues - Total\ Expenses}{Total\ Revenues}$

*Net profit after tax.

3.1 Inadequate Equity Balance

When experiencing financial difficulty such as disruption of revenue, cooperatives with larger equity have better chances to survive by temporarily absorbing the loss revenue. Equity or net worth of cooperative can be computed by subtracting assets to liability (net assets). It can be held in restrictive and unrestrictive account (or reserve) and in the form of current or long term assets. Restrictive account dictate on how the fund is being utilized and vice versa. For example, fund under education reserve (restrictive account) can only be utilized for educational purpose.

On top of that, due to the difficulty of getting external financing, cooperatives in Malaysia heavily relied on internal funding to continue and expand their operation. Hence the need to retain more profit.

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[35] Structural Operational Definition of NPO: (1) *organization*, (2) *private*, (3) *self-governing*, (4) *non-profit distributing*, (5) *voluntary*.
[36] Social Economy Approach comprise Non-profit, democracy, and people centered criterion. Surplus distributed to member a regarded as refund instead of profit distribution, making cooperative and other profit-distributing NPO as part of the third sector (Chaves Ávila & Monzón Campos, 2007).

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Adequacy of equity can be measured using equity to revenue ratio. An equity ratio of 1 times using year-end financial data can be interpreted as the ability or the organization to meet its financial obligation for another year without any revenue. This means, equity ratio is inversely related to financial vulnerability risk.

3.2 Concentrated Revenue

Organizations generating income from multiple sources of revenue are less vulnerable during financial shock (Tuckman and Chang, 1991; Carroll & Stater, 2009). On the other hand, organization with single or less sources of revenue may not be able to rely on alternative source when one of its main revenue were disrupted. Revenue concentration can be measured using Herfindahl index by summing the squared percentage of each source of revenue. Concentration index for single source of revenue is one. The index moves towards zero with additional sources added to its revenue profile.

3.3 Low Administrative Cost

Since administration cost is discretionary in nature, it can be reduced accordingly when experiencing disruption in income. Administrative activity is assumed as a non-essential part of an organization's operation which can be reduced accordingly without affecting output. Hence, an organization with high admin cost is viewed as less vulnerable. Tuckman and Chang (1991) employed administrative expenses to total expenses ratio as measuring tools. Result of their test implied that administrative cost to total cost ratio is inversely related to the risk of financial vulnerability.

3.4 Low or Negative Operating Margin (or net profit margin)

Tuckman and Chang (1991) defines operating margin as total revenue minus total expenses divided by total revenue. In a cooperatives setting, such ratio is also known as net profit margin. Profit margin represent potential surplus that can be plough back into a cooperatives' equity. Contrary to other NPO, cooperatives are allowed to distribute the surplus to its member in the form of dividend. The Malaysian Cooperative Society Act 1993 regulates the manner cooperative surplus can be utilized;

   a. Statutory reserve fund which include Education Trust Fund and Cooperative Development Trust Fund not less than 15% of net profit.
   b. Payment of rebate on patronage and return on deposit taken from members.
   c. Payment of dividend to members and honoraria to board of director subject to approval from the registrar.
   d. Payment for charitable purpose not exceeding 10% of net profit.

Nordin et. al. (2012) concluded that Malaysian cooperatives are incline to allocate dividend and benefit to its member than practicing patronage rebates. Average dividend payment reported by them is around 15.75%.

4. Empirical Analysis

The objective of this exploratory study is to demonstrate an application of Tuckman-Chang Model to predict financial vulnerability in cooperatives. 30 samples of the latest cooperatives' annual report were randomly selected from a list of annual reports voluntarily deposited at Cooperative Collage of Malaysia. The sample of cooperative can be classified into 4 main industries as follows based on their main source of revenue.

Table 3. Distribution of Sample According to Industry

Industry	Number of Sample	Description of Industry
Agriculture	7	Cooperative formed to own and manage rubber and palm oil plantation and/or to act as farmer's "trade union".
Credit	10	Provides deposit and loan services to its member.
Consumer Goods	6	Convenience store, bookstore, and fuel station.
Others	7	Cooperative without significant physical operation where most of its revenue are generated from long investment in quoted shares and mutual fund, deposit, and rental income.

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5. Result, Analysis and Discussion

The Tuckman-Chang test out-turn an interesting result. Average Equity to Turnover Ratio (EQT) is fairly high as the result of heavy regulation on the manner of net profit being distributed.

Table 4. Descriptive Statistic: Summary of result

Variable	Minimum	Maximum	Mean	Std. Deviation
EQT	0.0240	24.1905	7.7387	7.2621
RCI	0.2869	0.9917	0.5860	0.2280
ADM	0.0133	0.9787	0.3248	0.2431
NPM	0.0012	0.8127	0.3222	0.2538

The variance between minimum and maximum point of the four variable are significantly large due to mixture of cooperative in various industries. For instance, the agriculture cooperative acting as trader between small-holding palm oil plantation and miller will report significantly high revenue but earned the lowest profit since there's no value added to the product. On top of that, they do not require heavy investment on assets and they do not keep stock as palm oil need to be processed immediately after being harvested. Hence, the need for internal funding is lower. Such business will report lower Equity to Revenue Ratio and Net Profit Margin.

On the other hand, the operation of credit cooperatives is capital intensive. They need to raise RM1 of equity in order to extend RM1 of loan. Revenue derived from interest paid on loan does not involved direct expenses. Hence, such business report higher Net Profit Margin and Higher Equity to Revenue Ratio.

Noordin et. al. (2012) reported that capital structure of Malaysian cooperative is significantly varied as shown in the following table:

Table 5. Percentage of member capital to total equity

Function	Percentage of Share Capital
Credit	72 %
Agriculture	16 %
Housing	31 %
Consumer	38 %
Construction	14 %
Transportation	35 %
Services	83%

From Noordin et. al.'s (2012) work, we can conclude that the balance sheet profile of cooperatives is varied significantly across industries. This conclusion is supported by Hager (2001) and Trussel and Greenlee (2004) which point out that result of Tuckman and Chang Model may be distorted by industry.

5.1 Financial Vulnerability Test

We have modified the original Tuckman-Chang's methodology in two ways. First, the result of Tuckman-Chang's indicators were ranked into tertiles instead of quintiles due to limited number of samples. Second, three level of risk (ie "Low", "medium", and "high") were assigned to the samples instead of two level of risk (ie at risk and severely at risk).

The result of Tuckman and Chang's indicators were tabulated and ranked accordingly. Then, the ordered test results were equally divided into three quantiles (tertiles). The sample cooperatives were categorized into three level of financial vulnerability risk, ie low, medium, and high. Cooperative with one or more indicator at the lowest tertiles were categorized at "medium risk" while the one with all indicators at the lowest tertiles were categorized at "highest risk". The remaining of the sample were grouped into low risk category.

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Table 6. Classification of Sample According to Level of Financial Vulnerability Risk

Level of Risk	Selection Criteria	Test Result
Low	None on the indicators at the lowest quintile	11
Medium	At least one indicator at the lowest quintile	16
High	All indicator at the lowest quintile	3

Table 7. Distribution of Cooperative based on Industry and level of risk.

Level of Risk	Agriculture		Credit		Consumer Goods		Others	
Low	0	--%	8	80 %	1	17 %	2	29 %
Medium	4	57 %	2	20 %	5	83 %	5	71 %
High	3	43 %	0	-- %	0	-- %	0	-- %
Total	7	100 %	10	100 %	6	100 %	7	100 %

From table 7, we notice a distinctive vulnerability risk profile across industries. Agriculture is the most vulnerable industry and credit is the least vulnerable. Most of cooperatives in the agriculture industry are acting as a trade union for its members who are the smallholders of palm oil and rubber. The cooperative combines input requirement from its member, creating economies of scale. Members acquire plantation input (such as fertilizer) from the cooperative at discounted price, reducing operational surplus. The operation of such cooperative is also geographically bound. The cooperative only serves its member who reside in the vicinity of the cooperative. Given the scarcity of land, the members do not have the opportunity to expand their plantation, hence, affecting the growth of the cooperative. As such, agricultural cooperative is financially vulnerable.

In Malaysia, credit cooperatives is allowed to offers loan only to its members, who mostly are government servants. Almost all credit cooperatives in Malaysia are a member of Angkasa, a *national umbrella* cooperative which has been solely granted the right to deduct loan installments directly from government employees' salary. This means that, credit cooperative are collecting their loan repayment directly from members' salaries via Angkasa's auto deduction. As such, repayment risks are kept at minimum. On top of that, some credit cooperatives require their members to make a monthly contribution to its capital in the form of shares. As the result of premium pricing, steady monthly inflow of capital, low collection risk, credit cooperative in Malaysia are ranked as the least vulnerable.

The ability of Tuckman and Chang Model to recognize different risk profile in credit cooperative and agriculture cooperatives suggest its applicability in cooperative setting. We present our final results and categorize it according to the level of risk in Table 8. This allows further analysis on the direction of relationship between level of risk and result of the four indicators.

6. Conclusion, Limitation, and Recommendation

The objective of this exploratory study is to demonstrate the utilization of Tuckman-Chang Financial Vulnerability Model in Cooperative setting. The result of this study (relationship between level of risk and financial vulnerability indicators) conform to with Tuckman and Chang's findings in 1991 which implies that their model can also be used in cooperative setting.

It is important to note the sample size (30 cooperatives) is not sufficient for the purpose of generalization. This study is a mere pilot test with the intention to gain interest of researcher and stakeholder of cooperative in this area of studies.

This studies is limited by geographical area and access to proprietary data held by the regulator. A collaborative cross-border research with large data set and access to regulator's data are required in order to conduct a comprehensive testing on this subject, leading to a more conclusive output.

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Table 8. Relationship between Level of Risk and Four Indicator Proposed by Tuckman and Chang (1991)

Level of Risk	Mean	Std. Dev	Relationship
Equity to Revenue Ratio			
Low	13.4134	6.0022	Equity Ratio is negatively related with level of financial vulnerability risk.
Medium	5.2594	5.9196	
High	0.1539	0.0924	
Total Sample	7.7387	7.2621	
Revenue Concentration Index			
Low	0.4167	0.0708	Revenue Concentration Index is positively related with the level of financial vulnerability risk.
Medium	0.6459	0.0708	
High	0.8874	0.0477	
Total Sample	0.5860	0.2280	
Administrative Expenses to Revenue Ratio			
Low	0.4209	0.1656	Administrative Ratio is negatively related with the level of financial vulnerability risk.
Medium	0.3148	0.2622	
High	0.0259	0.0092	
Total Sample	0.3248	0.2431	
Net Profit Margin			
Low	0.4640	0.1762	Net Profit Margin is negatively related with the level of financial vulnerability risk.
Medium	0.2829	0.2569	
High	0.3222	0.2538	
Total Sample	0.3222	0.2538	

Table 8 shows that the direction of relationship between level of risk and Financial Vulnerability Indicator are in line with Tuckman and Chang (1991)'s findings which indicate that this model can be used in cooperative setting.

Acknowledgement

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