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Research Article

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A Datametric Analysis of the Human Occupational Health and Safety (OHS) Managerial Concerns of Beaconsfield Mine Via an Investment Correlation of Capital Asset Pricing, Portfolio Returns and Risk Performance Ratios

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Abstract

The report discusses the case study subject of "The Beaconsfield Mine" adapted from De Ceiri (2008) and its occupational health and safety (OHS) management aspect. It is noted that the organization sees this as a secondary concern when the perspective of operating costs of business are highlighted by the owners and senior management. The technical paper will elaborate how such an approach may have serious adverse consequences and will explain the lessons HR managers can learn. In view of the case, a discussion underpinning a strategic approach to human resources management (HRM) will be conducted. The intent of this paper is to posit that the strategic approach of HRM investment in OHS can reduce mining accidents.

Readings from the case study literature has been done and datametric analysis can be made to conclude that OHS management is important where costs involving OHS is primary and not secondary. These findings are also supported by secondary research involving research done on databases through the examination of the concepts of capital assets pricing, portfolio returns and risk. It will address two capital asset portfolios that will demonstrate that risk can be reduced to zero with perfect negative relation. It will also explain why this is not necessarily convincing explanation for effects. It will also discuss the reason why there is little or no portfolio effect with positive relations. We will also see how this correlation of capital assets are applied to the performance ratios.

Keywords: Occupational Health & Safety Management, Media Fragmentation, Stakeholder Empowerment, OHS Safety Culture, Human Capital Strategies, Reward Safety Programme, Capital Asset Pricing Model, Portfolio Performance, Portfolio Securities, Risk Returns, Risk Performance Ratios, Securities Diversification, Positive Correlation, Negative Correlation, Close to Zero Investment, Profitablly Ratio, Liquidity Ratio, Activity Ratio, Coverage Analysis

1. Introduction to Consequences of OHS Being a Secondary Concern

I would like to highlight that in any organization conducting high risk activities such as mining, there are always negative effects if such occupational health and safety concerns are secondary. The possibilities that negative consequences can arise due to a lack of OHS observation include accidents, confusion and little confidence with companies, deteriorating performance and little accountability, depreciation in share value of companies as well as becoming self-deluded and self-prescriptive without further investigation or research into this function. Because Beaconsfield mining company had no one who understood OHS safety, when OHS related risks occur, it threatens to have an impact on creating accidents in the workplaces It is not in effect the diseases by itself that contributes to occupational accidents, but the workplace environment preceding the manifestation of the diseases. According to the most prominent ones of these risks leading to the occupational illnesses are especially muscular and skeleton diseases [1].

In Beaconsfield mine, there is little concern for health and safety aspects since the management sees this as a secondary concern. They perceive little for investment in this area since there are no workers trained in safety. When there is a lack of training, there is obviously a lack in proper procedures and communication. Meetings and miner participation for such avoidance of danger was also lacking. The resulting impacts for neglecting these aspects usually lead to a deteriorating performance. In the case quoted, accidents leading to death usually occurs in the mining area without adhering to OHS regulations. Death of workers would mean a full investigation with bans for 6 months to a year of operations. Accountability from the directors is required, and punishment will be meted out through fine or jail sentences. Carmichael (1986) elaborates this:

Any failures to adhere to OHS issues can result in shareholder implications. In one instance, for example, Fry and Lee (1989) show that US listed firm value decreases around the date that Occupational Safety and Health Administration (OSHA) sanctions are reported in the Wall Street Journal. They find that the decrease in value is considerably larger than the direct cost arising from the OSHA sanctions. Thus, organizational value drops when authorities act. However, although the intention of safety regulation is good, it is arguable that no amount of OHS can prevent diseases or accidents from resulting, leading to disastrous costs. However, a lack of it is definitely not a good mitigating factor.

In Beaconsfield's case, the official regulator for safety standards is the Workplace Standards of Tasmania, Australia. Where the mining accident occurred, there needs to be higher levels of scrutiny standards. However, such regulations are usually self-prescriptive, i.e., the regulations have to be ensured by the mining companies themselves. All organizations are noted to reduce costs without doing more investigation in OHS. For instance, there is lack of investigation of the environment circumventing the mines. In the desolate areas of Australia where the mines reside, according to Eddington (2006) and Gratton (2007), it is possible that the appropriate authorities (government, OH & S consultants) have not gone to the sites to conduct in-depth physical inspections in order to make incisive recommendations because these personnel believed the areas of operation were too primitive. They mention a prevalence of infectious diseases in the region or because there were long distances to travel. This explains a lack of responsibility toward OHS and the organizations 'employees.

2. Lessons to be Learnt

There are many lessons to be learnt from the mining incident at Beaconsfield.

2.1 Change of Stakeholder Empowerment from Employers to Employees

Accidents are usually a result derived from human attitudes and behavior. Accidents maybe controlled or non-controlled, but accidents can be prevented with the correct attitudes and behavior, with the employees given more power to co-create ideas to prevent accidents. Cullen, Matthews and Teske (2008) posit that, an organization may reap various benefits from the implementation of a management system that is focused on issues pertaining to workers 'occupational health and safety. As an example, through augmenting worker job satisfaction, an increase in productivity may be obtained, which can imply greater efficiency and protection for the organization.

2.2 Complex Changes in the Workplaces

From a macro perspective, urban growth in Asia accounts for 70% [2]. Some of the biggest cities in Asia are facing complex challenges in OHS simply due to the massive population of workers. Australian mining industry provide a good model of example to lead the OHS field. It must be understood that in order to lead, legislation is not sufficient. There is a requirement to enforce the development of national standards and enforcement processes, otherwise it would seem tokenistic to just allow companies to enforce these standards.

2.3 Media Fragmentation

The media today exposes all kinds of incidences. This may usually strengthen the collective bargaining stance from the trade unions and workers instead of companies having the final say. The mining industry today does not just function with a company running its own business. This would also augment the relations between OHS institutions, of Australia and Asia-pacific nations, facilitate the training and education, and enhancement of domestic arrangements through bills in parliament. Any form of deviation from the OHS regulations will mean that the company will not be able to survive long under the scrutiny of the media.

3. Inadequate Knowledge of Human Capital and OHS Integration

Adequate management of occupational health and safety would, thus, also bring a positive influence in shareholders' interest and value, and consequently in the organization's suppliers, given the opportunities for business. Workers are not just numbers. They are emotional beings.

Consumers on the receiving end of the mining products would not relish purchasing products which are derived from causalities.

In comparison with Americans for instance, highlighting the importance of safety and work injuries to organizations and employees, the National Safety Council (2008) reported that American work injuries cost $164.7 billion in the year 2006 alone. Despite this enormous cost, Barling et al. (2002) noted that less than 1% of organizational research published in top journals has focused on workplace safety. There needs to be more investigative studies in this area for some other nations. It certainly maybe the result of having a different OHS culture and climate in different nations.

3.1 Using a Capital Financial Model

In interpreting OHS systems to be beneficial to Beaconsfield, I have used the financial modelling theory of the capital asset pricing model (CAPM) to determine a theoretically appropriate required rate of return of an asset, if that asset is to be added to an already well-diversified portfolio, given that asset's non-diversifiable risk [3]. The model considers the asset's sensitivity to non-diversifiable risk (also known as systematic risk or market risk), often represented by the quantity beta (β) in the financial industry, as well as the expected return of the market and the expected return of a theoretical risk-free asset.

The risk of a portfolio comprises systematic risk, also known as undiversifiable risk, and unsystematic risk which is also known as idiosyncratic risk or diversifiable risk. Systematic risk refers to the risk common to all securities - i.e. market risk. Unsystematic risk is the risk associated with individual assets [4]. Unsystematic risk can be diversified away to smaller levels by including a greater number of assets in the portfolio (specific risks "average out"). The same is not possible for systematic risk within one market.

4. Correlation Implications of Two Asset Portfolios

In finance, the correlation between two portfolio securities

is a statistical measure of the relationship between the price movements of the two portfolios securities. This relationship, which is expressed by what is known as the correlation coefficient, is represented by a value within the range of -1.00 to +1.00. A correlation coefficient of +1.00 indicates that two securities move in the same direction at all times. If security A gains in value, we would expect security B to gain as well. A correlation coefficient of 0 indicates that the price movements are totally random. A gain by security A provides no insight into the expected movement of security B. A correlation coefficient of -1.00 indicates that two securities move in the opposite direction at all times. If security A gains. in value, we would expect security B to decline in value.

A rational investor should not take on any diversifiable risk, as only no diversifiable risks are rewarded within the scope of this model. Therefore, the required return on an asset, that is, the return that compensates for risk taken, must be linked to its riskiness in a portfolio securities context - i.e. its contribution to overall portfolio securities riskiness - as opposed to its "stand alone riskiness." In the CAPM context, portfolio securities risk is represented by higher variance i.e. less predictability. In other words, the beta of the portfolio securities is the defining factor in rewarding the systematic exposure taken by an investor [5]. Most investors do not hold stocks in isolation. Instead, they choose to hold a portfolio of several stocks. When this is the case, a portion of an individual stock's risk can be eliminated, i.e., diversified away [6].

Let us now assume investments can be combined into a two-asset portfolio. The risk-return relationship will now be measured in terms of the portfolios expected return and the portfolios standard deviation. The following tables give information about four investments: A plc, B plc, C plc and D plc. Assume that a two-asset portfolio and that has already decided to invest 50% of the funds in A plc. He is currently trying to decide which one of the other three investments he will invest the remaining 50% of his funds.

4.1 Perfect Negative Correlation

Portfolio A + C {perfect negative correlation}

The returns of A and C move in equal but opposite ways (when the return on A goes up to 30%, the return on C goes down to 10%, when the return on A goes down to 10%, the return on C goes up to 30%). But the returns in the portfolio A+C together will ensure a standard deviation of zeroyou are guaranteed $20, no matter what. Even though the two individual investments are risky, there is absolutely no risk and no fluctuations associated with the diversified portfolio. However, this is not the case if the two stock prices are related in a different Manner

4.2 Close to Zero Investment

The zero-investment portfolio is a financial portfolio that is composed completely or mainly by securities that cumulatively result in a net value of zero. In some instances, some portfolios are considered to be zero investment portfolios when the resulting net value is almost zero. Generally, an investor will attempt to achieve a zero-investment portfolio for reasons relating to the rules of arbitrage. The result of these zero net values will be little to no interest income that is subject to taxes, a high degree of financial safety for the investor, and the potential to consider riskier investments at a later date. The most diversified portfolio consists of securities with the greatest negative correlation. However, a negative coefficient indicates a negative association. There is no risk but no returns. A greater-than-expected outcome for one variable is likely to be associated with a smaller-than-expected outcome for the other while a smaller-than- expected outcome for one is likely to be associated with a greater-than-expected outcome for the other. In reality the correlation coefficient between returns on investments tends to lie between 0 and +1. It is the norm in a two-asset portfolio to achieve a partial reduction of risk Therefore we will need a new formula to calculate the risk (standard deviation of returns) on a two-asset portfolio. The formula will obviously consider the risk (standard deviation of returns) of both investments but will also need to incorporate a measure of coverability as this influences the level of risk reduction. Thus, in the formula one can see there is a difference of 0.12%

4.3 Portfolios Return on Investments (%)

Market Conditions	Probability	A plc	B plc	C plc	D plc
Boom	0.1	30	30	10	11.06
Normal	0.8	20	20	20	22.24
Recession	0.1	10	10	30	11.06
Expected Return		20	20	20	20
Standard Deviation		4.47	4.47	4.47	4.47

The expected return of a portfolio (R port) is simply a weighted average of the expected returns of the individual investments.

5. Perfect Positive Correlation

Portfolio A + B {perfect positive correlation}

In the next example, suppose that Alpha and Beta's stock prices always move together. That is, if everything is normal, both stock prices rise to a certain amount. If everything is below normal, both prices remain at $1. The total returns from the different investment options would look something like this:

Unlike scenario one, the diversified portfolio in this case is no less risky than either of the two individual investment possibilities. The problem is that the stock prices of the two companies are perfectly positively correlated. A perfect positive correlation means that the value of two assets moves in the same direction, by the same percentage, at the same time. It must be known that risk reduction cannot be achieved through diversification if the returns on two or more assets are perfectly positively correlated. However, diversification provides benefit if the returns are not perfectly positively correlated.

6. Critical Examples of Risk Performance Ratios

A company based on risk analysis and assessment performed highlighting the strengths and weaknesses of each risk performance ratio as well as the risk returns

6.1 Profitability Ratio

The gross profit margin looks at net income over net sales. The larger the gross profit margin, the better for the company. There

has only been a marginal increase of income $1700 (0.01%) from 2006 to 2007. Net sales dropped by $8200, which requires more understanding why this had happened. Could net sales in 2007 be due to cheaper bulk sales per unit, which led to the wide increase? Or simply more distributors with higher operating costs? However, this does not consider long term health in terms of assets. In return of assets, the higher the percentage, the better, because that means the company is doing a good job using its assets to generate sales and earning adequate income. In year 2006 and the preceding 2005, there had been a great jump from $135,695 to $61,572, but in year 2007, this was $138014, which meant asset possessed had declined and generated less income due to more selling of business units. Although only marginal, between 2006 and 2007, one must inquire the huge difference between 2005 and 2006. This show a huge reliance on assets to generate income rather than on pure retail sales.

Gross margin = Net income / Net sales
2007 - Gross margin = $10,340 / $76,476 = 0.14
2006 - Gross margin= $ 8,684 / $ 68,222 = 0.13
Return on assets = Net income / Average total assets
2007 - Return on assets = $10,340 / [($138,014 + $135,695) / 2] = 0.08
2006 - Return on assets = $ 8,684 / [$ (135,695 + $61,572) / 2] = 0.09

The overall risk returns are higher due to high volatile of sales and income in the later years

6.2 Liquidity Ratio

This means that the firm can meet its current (short-term) debt obligations 0.78 times over in 2007. In order to stay solvent, the firm must have a current ratio of at least 1.0 X, which means it can exactly meet its current debt obligations. It did achieve this in 2006, so, this firm was then solvent. In 2007 P&G has a bit of current debt obligations with a 30% increase in liability, and may face credit risks or even expropriation of assets in order to meet this liability. Low liquidity can be seen here. However, this ratio does not account for P&G's long-term assets and liabilities. There could be more debtors chasing for payments, lack of payments from P&G's suppliers.

In this case, however, the firm will have to sell inventory to pay its short-term debt. If you calculate the quick ratio for 2007, you will see that it was 0.458 X. It was slightly better in 2006 at 0.68x. Short term securities in 2007 meant that there is less of such exercise options to raise funds since it is possible long-term bonds could have overtaken short term securities. So, the firm improved its liquidity by 2008 which, is good since it is operating with low liquidity. It needs to improve its quick ratio to above 1.0 X so it will have to continue have to trade securities in public for more funds to meet its short-term debt obligations.

Current ratio = Current assets / Current liabilities
2007 - Current ratio = $ 24,031 / 30,717 = 0.78
2006 - Current ratio = $ 24,329 / 19,985 = 1.22
Quick ratio = cash+ marketable securities+ receivables(net) / current liabilities
2007 - Quick ratio = ($ 5,354 + $ 202 +$ 6,629) / 30,717 = 0.40
2006 - Quick ratio = ($ 6,693+$1,133+$5,725) / 19,985 = 0.68

The overall risk returns are quite low due to volatile liabilities in the later years

7. Activity Ratio

The higher the total asset turnover ratio, the better. Average assets have grown from $135,695 to 138,014 between 2006 to 2007 which sowed 76476 against $61,527 from the low of 2006. The differences in sales between the 2 years is only 8200. This ratio is a better measure than the net income through average assets. It shows that the assets can generate sales through retail stores, rather than leases or rents to achieve income. Although still lower than optimum, it is good to knowing your position regarding the efficiency of using assets crucial to the success of your firm. However, one should also depend on the creative and innovative aspects.

Inventory turnover is calculated as follows: This means that you divide net sales from the income statement from the inventory figure and get a number that is a number of times. That number signifies the number of times inventory is sold and restocked each year. Little differences of 0.5% between the 2 years. If the number is high, you may be in danger of stockouts because of more reorders. More reorders may not be bad if your stocks can be sold quickly to recover investment. If restocking is slow, watch out for decline fads in the stocks eating up warehouse space.

Asset turnover = Net sales / Average total assets
2007 - Asset turnover = $76,476 / [($138,014 + $135,695) / 2] = 0.56
2006 - Asset turnover = $68,222 / {($135,695 = $ 61,527) / 2} = 0.69

Inventory turnover ratio = Net sales / Average inventory
2007 Inventory turnover ratio = $ 36,686 / [($6819 =$ 6,291) / 2] = 5.60
2006 Inventory turnover ratio = $ 33,125 / [($ 6,291 + $ 6,674) / 2] = 5.11

The overall risk returns are quite low due to poorer sales from assets like rental and high costs in the later years

8. Coverage Analysis

Free cash flow measures how much money a company makes after deducting capital expenditure and dividends. This allows valuation of the existing business. There is an increment of approximate $1280 from 2006 to 2007. It is healthier in 2007. Possible to benefit managers as well as shareholders if cash can be used to expand operations. But this is a poor valuation method for companies wishing to impress others or pumping up the real value also means that it will overvalue companies which are sufficiently badly run.

Free cash flow = Net cash provided by operating activities -capital expenditures –dividends
2007 Free cash flow = $ 13,435 - $ 2,945- $ 4,209 = 6,281
2006 Free cash flow = $ 11,375 - $ 2,667 - $ 3,703 = 5005

Debt to total assets = Total debt / Total assets
2007 Debt to total assets = $ 71,254 / $ 138,014 = 0.51
2006 Debt to total assets = $ 72,787 / 135,695 = 0.54

8.1 Recommendations of Human Capital Strategies to OHS

OHS plays an important role. Human resources must implement long-term organizational restructuring strategies that will include OHS to reduce accidents and diseases.

8.2 Mine Reward Safety Programmed

In Beaconsfield mine incident, there should be a "mine reward for safety programmed" that stresses on avoiding a participatory facade theme. This would mean asking for employee suggestions for improving workplace safety, which will only be effective if the suggestions are implemented in a timely fashion. If the ideas provided by workers are ignored or implementation is postponed, when they are eventually implemented, the workers will not be motivated to support them [7]. This organizational restructuring strategies must include safety subculture and behavior among work teams.

The programmed must be followed not just a talk and no walk session. All the important actors in the company must be aware of this programmed. Anybody who flouts the regulations will be severely dealt with. And although in Beaconsfield case, the employees should suggest that there should not be intimidation through punishment, but rewards for employees who follow closely mining procedures and regulations.

8.3 Establishing Rules and Regulations

It is however preposterous to provide more rewards for employees as this means additional costs. But could this mean a trade-off between following regulations closely and rewarding for following regulations? It is always critical for employees especially in mining, to address, report and suggest incidents and recommendations in their fields of expertise. This is because as according to Cullen et al (2008), mines develop policies and procedures in response to their own unique environments that are often more stringent than federal standards. Regulations found in guides developed by authorities do not always cover everything.

8.4 Delivering an OHS Safety Culture and Climate

There needs to be a creation of an OHS safety culture and climate from the top to the bottom. It is of no use if the top management personnel support OHS in a vague manner, expressing little concern for it. This poses a difficult challenge to the employees as it would be difficult to identify a certain safety culture. Van Maanen and Barley (1984; 287) defines this safety culture as "occupational culture." These cultures can be identified as, "a group of people who consider themselves to be engaged in the same sort of work; whose identity is drawn from the work; who share with one another a set of values, norms and perspectives" Once that occupational culture is set, it would be difficult to deviate from it. Behavioral practices via training is often perceived in this manner by workers, thus the strategy employed must ensure a leader that understands this bond. If there is a lack of bond ship, no amount of communication and coordination will be successful. Van Maanen and Barley continues to express, "

> Danger . . . invites work involvement and a sense of fraternity. . . . Recognition that one's work entails danger heightens the contrast between one's own work and the work of others, and encourages comparison of self with those who share one's work situation. Attitudes, behaviors, and self-images for coping physically and psychologically with threat become part of an occupational role appreciated best, it is thought, only by one's fellow workers. (301)

Ground level understanding is required from the top directors. Essentially, the directors in Beaconsfield had to be held accountable for the deaths. Putting them in jail or a mandatory death penalty need not always be the case if such an occupational culture was built in the first place. It is to no surprise that the trade union seemed more interested in the case. How can this occupational culture be built then? There is a need to integrate other components apart from the internal culture of the organization. The trade union and workplace standards of Tasmania must also be involved in order to apply pressure on the directors to implement a suitable occupational culture.

9. The Adoption of Using Close to Zero Coverage analysis as a Strategic Factor to Implement OHS

The debt to total assets ratio is an indicator of financial leverage. It tells you the percentage of total assets that were financed by creditors, liabilities, debt. In this example of 2007, the debt to total assets ratio tells you that 51% of the corporation's assets are financed by the creditors or debt and 49% financed by owners. A higher percentage indicates more leverage through creditors and debts and more risk. There was slightly more debt to be financed by assets in 2006 against 2007 by 0.03%. This will mean using more creditors such as insurance cooperatives and lending company's assurance to finance other forms of non-OHS spending. This leads to more cash outlay to invest in OHS culture and systems which companies can then cash in on reimbursement incentives from the government which will lead to an almost close to zero cash investment.

10. Designing Job Scope

Additionally, there must be thorough knowledge understanding about the job design scope and mining apart from following regulations. A lack of mining work standards with a mismatch with workers' capabilities should not be tolerated. According to Ferguson (2001), Knowledge of risk factors has a preventive function. To improve safety, one must:

11. Integrate Knowledge through the Practical Application of Information

The experience and knowledge sets should be applied to older workers, especially if the miners are doing part-time work. Older workers do bring in some advantages when they are slow. They tend to be more careful and awareness of safety standards. It would be redundant if such knowledge not be used during the most critical time. It is one thing to know, but another thing to do. In the Beaconsfield incident, steel meshes were not enhanced to contain the blast of the rocks. Many injuries occur because workers do not adhere to safety procedures suggested by Bennett (2003).

12. Eradicate Rotten Thinking

One reason worker does not follow safety procedures is a belief that they reflect an ideal type of safety rather than real-life experience. Without workers' confidence, procedures fail to provide workers with a sense of control. Thus, integrating knowledge is not just about a sense of inputing some information into the workers' mind about safety, but there is a need to actually persuade and motivate workers to use that knowledge to effective use in a chaotic environment.

13. Justification of HRM Strategies Employed

The justifications for the abovementioned HRM strategical approaches are as
follows:

• Increase in safety and health for workers, leading to a quality relevant company that people adore

• Long term investment in OHS from HRM perspective will reduce less costs for the company in terms of incessant legal suits.

• More employees are willing to serve the company longer, reducing costs in hiring.

• Exchanges of skills and knowledge from OHS experts will lead to other related industries, organizations and staffs to be more conscious about OHS

• OHS can be a developing industry by itself and a revenue generation tool through training for Beaconsfield.

• Prevention is always better than cure, and policies put in place can ensure that no fines will be imposed on the company.

• Having OHS culture can be a form of brand building activitiy that can enhance the stockholding value of the company.

14. Conclusion

OHS is an important aspect in every organization to ensure that workers are capable of functioning at optimum level. There is also truth that implementing and adhering to OHS can reduce mining accidents and improve the organization's overall well-being. Without the implementation and concern for OHS, this will lead to more risks in deaths and poorer performance. There are also national standards of rules and regulations for organizations to follow, where organization's top management will have to take note of. Lessons to be learnt will mean having to take a lead role where OHS lessons can be learnt or taught, especially so when Asia is facing the most challenges with Australia being one of the leaders in OHS. The OHS restructuring strategies in the organization will be the most critical part that involve job design, rewards programmed, mining regulations and procedures and safety culture and climate elements.

It is also critical to interpreted OHS systems using the financial modelling theory of the capital asset pricing model to determine feasibility of implementing OHS culture and systems which are exposited through the correlation models and data metrics to close to zero which in a theoretically appropriate required rate of return on performance ratios, given that asset's non-diversifiable risk

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