Human Capital and Its Impact on Total Productivity within Malian Enterprises: Case of the Enterprise PRIMA

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Abstract This study highlights the benefit of human capital as generator of the competitiveness for an enterprise. Its overall objective is to set a sufficient guideline for Malian enterprises to implement the impact of human capital on the total productivity. The recommendations could serve as guidelines for Malian companies. Qualitative and quantitative methods, primary and secondary data are used. Secondary data was collected from books, school archives, articles on the internet. Primary data are collected by interview, survey questionnaires and observations. The framework of this research was analyzed using the multiple regression models. Hypothesis tests are used to reject or accept a hypothesis. The student test is used for the individual coefficients evaluation and the Fisher test for the overall evaluation of the model. Excel software was used to calculate p-values and coefficients of determination. The results of the research confirmed that: human capital is a generator of competitiveness for an enterprise. Those results suggest that human capital has a significant impact on an enterprise's total productivity. The workers can improve their total productivity through voluntary investment in human capital. This study has improved the existing theory of human capital and productivity. A great understanding of the relationship between human capital and the total productivity of an enterprise was made. The theoretical model developed in this study can be used by another enterprise taking into account its specificity. Through this model an enterprise can easily identify its weak points and make the necessary improvements. The enterprise PRIMA needs a substantial investment in health and especially in the training of its workers. The theoretical model is applicable in practice.

Keywords: human capital, total productivity, competitiveness, multiple regressions

Cite This Article: Tiédian Fané, and Toumani Bagayoko, "Human Capital and Its Impact on Total Productivity within Malian Enterprises: Case of the Enterprise PRIMA." *Journal of Business and Management Sciences*, vol. 7, no. 1 (2019): 25-30. doi: 10.12691/jbms-7-1-4.

1. Introduction

Globalization, deregulation, and trade liberalization are leading to the vulnerability of Malian enterprises in international competition. That is why one of the missions assigned to the new Malian government is human capital. In Mali, the failure of health and education systems makes labor costly in terms of workers level qualification. The competitive advantage is not only induced by material investments such as the purchase of land, buildings, the purchase of machinery and manufacturing equipment, easy access to raw materials, attractive taxation, but also a highly skilled and healthy workforce that generates high productivity. Healthy educated workforce is more productive than illiterate and ill labor in the same conditions, and is more capable of assimilating foreign technology. A business traditionally uses two types of production factors, physical capital (machinery and equipment, land, energy) and labor. The growth of a company does not only depend on the increase in the number of these factors (number of machines and equipment, number of workers), but also on the efficiency with which these factors are used in the production process. The total productivity is affected by the quality of the factors of production.

In this study we are particularly interested in the quality of the labor factors expressed through the concept of human capital that can depend on the average level of education, the health conditions but also the experience acquired by all workers. Increasing the total productivity of the enterprise in this context consists of: producing more with the same amount of physical capital or producing as much with less physical capital.

The enterprise can improve their total productivity through voluntary investment in education, especially staff training to maximize the return on physical investments. In short, it is about improving human capital.

Human capital is the set of skills, talents, qualifications, experiences accumulated by an individual and which partly determine his ability to work or produce for himself

or for others [1]. Thus, the fact that we now consider that human capital represents between 2/3 and 3/4 of total capital [2] and that spending on education has increased exceptionally over the last 50 years, the question of human capital is at the heart of contemporary economic analysis. At the level of enterprises in Mali investing in human capital is no longer an option but an imperative to obtain better total productivity. Productivity is intended to measure the degree of contribution of one or more factors of production [3].

Is investing in human capital an effective way to increase the total productivity within Malian enterprises?

1.1. Research Objectives

- The overall objective of this study is to draw a sufficient guideline for Malian enterprises to implement the impact of human capital on the total productivity. This study focused on the present impact of human capital on the total productivity of the Malian enterprise PRIMA has the following specific objectives:
- Achieve the effects of implementing the impact of human capital on total productivity in the Malian firm PRIMA;
- Produce a theoretical model of implementation of the impact of human capital on total productivity for Malian companies;
- Specify and test the assumptions of the implementation model of the impact of human capital on total productivity derived from their theoretical foundations;
- Provide new knowledge of human capital taking into account the specificity of Malian enterprises.

1.2. Research Questions

Based on the literature review, informal discussions with human resource managers and research objectives, the following research questions are proposed:

Question 1: What is human capital?

Question 2: What is the total productivity of the company?

Question 3: Is investing in human capital an effective way to increase the productivity of Malian companies?

Question 4: What kind of theoretical model of implementation of human capital and productivity to develop to guide Malian companies?

Question 5: What is the magnitude of the relationship between human capital and the total productivity of the firm?

Question 6: How can this theoretical model of human capital and total productivity be demonstrated in practice?

2. Literature Review

The first, second and third research questions- "What is human capital?", "What is the total productivity of the company?" and "Investing in human capital is an effective way to increase the total productivity of Malian enterprises are descriptive." In the current literature review on the human capital and total productivity of the enterprise, different researchers give different definitions and different theoretical frameworks of human capital and total productivity of the enterprise according to their own understandings and their research objectives. In the field of vocational training and more broadly of human resources management the theories of capital human capital is also the subject of applications and reinterpretations. Human capital is "the accumulated skill set and experience that makes employees more productive" [2]. Human capital refers to "the body of knowledge, skills, competences and individual characteristics that facilitate the creation of personal, social and economic well-being" [4]. Improving the skills of employees is a fundamental source of economic progress [5]. Since Adam Smith, most economists have recognized that of a country's labor force is one of its most important competitive assets. "Human capital is an intangible good that can advance or sustain productivity, innovation and employability" [4] proposed their theoretical and empirical investment in human capital and remuneration. Yet education remains the linchpin of human capital formation, putting it at the heart of human capital analysis. Member countries of the organization of economics and commerce development (OECD) agree that investing in human capital works for economic prosperity, employment and social cohesion by promoting people's well-being [6].

3. Theoretical Model of the Impact of Human Capital on the Total Productivity of the Enterprise

The research question 4: "What kind of theoretical model of implementation of human capital and productivity to develop to guide the Malian enterprises?" Will be answered. This model is based on the fact that human capital has an impact on the total productivity of the enterprise.

The human capital implementation constructs: the average level of education of all workers, their health conditions, and the experiences of all workers.

Those conjectures must be confirmed using data collected by questionnaires survey in the enterprise PRIMA. Based on these conjectures; a theoretical model of implementation of the impact of human capital on the total productivity of the enterprises will be developed.

In this study the determinants of human capital: the average level of education of all workers, their health conditions, and the experiences acquired by all workers are the independent variables (causes) and the total productivity of the workers (effect).

The following hypotheses are proposed: H1: The average level of education of all workers has a positive impact on the total productivity of the enterprise. H2: The health conditions of all workers have a positive impact on the total productivity of the enterprise. H3: The experiences gained by all workers have a positive impact on the total productivity of the enterprise.
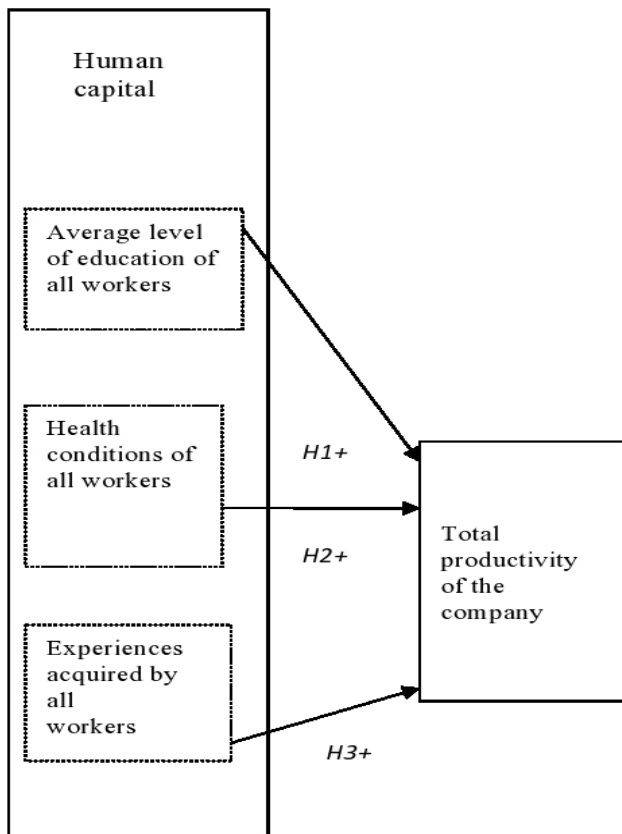
Figure 1. Theoretical model of the impact of human capital on the total productivity of the firm

4. Methodology of the Case Study

The sixth research question is "How can this theoretical model of human capital and total productivity be demonstrated in practice?" Indeed; the model was developed to find how in the Malian enterprise PRIMA, human capital impacts total productivity.

According to [7], case studies are the preferred strategies when "How" or "why" are the questions asked.

The Malian enterprise PRIMA is putting this model into practice and can provide a better understanding of this model.

4.1. A Brief Introduction to the Enterprise PRIMA

The case study was conducted in a small size industry. It products insect killers and has functional organizational structure, located in the "Zone industrielle", district of Bamako in Mali.

4.2. Data Collection

Primary and secondary data were used.

4.2.1. Secondary Data

Secondary data were collected from books, school archives, articles on the internet to constitute the literature review.

4.2.2. Primary Data Sources

"Primary data are information collected directly by the researcher when secondary data are unavailable or unable to contribute to research objectives" [8].

a. Interviews and observations

The interviews were conducted; the managers, the supervisors, and observations were made about workers s.

b. Survey Questionnaire

• Human Capital Survey (Independent variable)

The research question "How strong is the relationship between human capital and total business productivity?" will be answered.

The human capital implementation constructs will be used in the following items: "The enterprise attaches importance to workers training «(X1)", the health of the staff is a priority of the organization "(X2)". The seniority of the worker is a cardinal value in this organization "(X3)".

The respondents(workers) to those items are asked to rate the enterprise at the scale of Likert from 1 to 5 as follows: 1 to 2 very insufficient, 2 to 3 insufficient, 3 to 4 satisfactory, 4 to 5 very satisfactory.

• Total company productivity survey (dependent variable)

The enterprise management is invited to make an annual general average of productivity (Y) of all workers that is converted to the Likert scale as follows: 1 to 2 very insufficient, 2 to 3 insufficient, 3 to 4 Satisfactory, 4 at 5 very satisfactory.

4.3. Case study Questions

Only the enterprise PRIMA was selected to lead the case study.

The following three questions were asked in the case study:

Question 1: What are the strengths of the implementation of human capital and total productivity in PRIMA?

It is a descriptive question about the strengths of human capital and total productivity in this enterprise compared to the model proposed by this study. After the comparison, the strengths of the enterprise are identified.

Question 2: What are the weaknesses of the implementation of human capital and total productivity in PRIMA?

The weaknesses of human capital and total productivity in this enterprise are compared to the model proposed by this study. The weak points are identified. These weak points could be used by the enterprise to establish actions of improvement and finally to develop a plan of improvement.

Question 3: What kind of model is more suitable to implement by the company?

5. Data Analysis

The multiple linear regression model is the most commonly used statistical tool for the study of multidimensional data. A quantitative variable Y called to explain (or else, response, exogenous, dependent) is put in

relation with p quantitative variables X1, ..., X p called explanatory (or control, endogenous, independent, regressors) [9].

Table 1. Data on human capital and total productivity

Years	Y	X1	X2	X3
2001	3	3	4	2
2002	3	3	3	3
2003	3	3	4	3
2004	3	3	3	3
2005	4	4	4	4
2006	4	3	4	4
2007	3	3	3	3
2008	4	4	4	4
2009	3	3	3	3
2010	3	3	2	3
2011	4	4	4	4
2012	4	4	4	4
2013	4	4	4	5
2014	4	4	3	5
2015	4	4	5	5
Averages	3 ,6	3,4666	3,6000	3,6666

Source: primary data 2019.

5.1. Equation of Multiple Linear Regression

In the multi-variant case, when there are several independent variables, we could construct a linear equation with all these variables. In general, multiple regression procedures will estimate a linear equation of the form:

$$Y=a+b1*X1+b2*X2+ ... +bp*Xp \ [10].$$

Any coefficient of Xj close to 0 can be eliminated from the equation because it has no considerable impact on Y.

Table 2. individual significant of the variables

Descriptive	0	1	2	3
	Intercept	X1	X2	X3
b	0 ,2972	0 ,1748	0 ,3182	0,4231
S(b)	0,42612	0,20658	0,0919	0,1118
t	0,69747	0,84628	3,4639	3,7849
p	0,5000	0,4154	0,0053	0,0030

Source: Excel output results 2019.

The multiple regression equation is:
The total productivity of the company PRIMA is $Y = 0.2972 + 0.1748X1 + 0.3182X2 + 0.4231X3$.

Hence X1: the average level of education of all workers; X2: the health conditions of all workers; X3: the experiences acquired by all workers.

5.1.1. Interpretation of the Linear Multiple Regression Equation

• The total productivity of the PRIMA firm will increase, on average ,by 0.1748 point per year for each increase to 1point level of education of all workers; score, net of the effects of changes due to the other human capital implementation constructs.

• The total productivity of PRIMA will increase, on average, by 0.3182 point per year for each increase to

1point level of health conditions of all workers; score, net of the effects of changes due to the other human capital implementation constructs.

• The productivity of PRIMA will increase, on average, by 0.4231 point per year for each increase to 1point level of all workers experiences; score, net of the effects of changes due to the other human capital implementation constructs.

• The predicted value of Y is: 0.2972 + 0.1748 * 3.4666 + 0.3182 * 3.6 + 0.4231 * 3.6666 = 0.2972 + 0.6059 + 1.1455 + 1.5513 = 3.6599.

5.2. Overall Assessment of the Regression

5.2.1. Analysis of Variance Table and Coefficient of Determination R^2

• If the value of the coefficient of determination is close to 1, the model is interesting.

• If the value of the coefficient of determination is close to 0, the model is bad.

Table 3. ANOVA table

Source	SS	df	MS	F	F-crit	p-value
Regn	5,08951	3	1,6965	36,556	3,5874	0,0000
Error	0,51049	11	0,0464	_	_	_
Total	5 ,6	14	0,4	_	R^2=0,9088	R^2adj=0,884

Source: Excel output results.

The Coefficient of Determination R^2 expresses the proportion of variation of the dependent variable Y caused by the variations of the independent variables together.

R^2 = 0.9088 means that 90.88% of the changes in total productivity can be explained by changes in the average level of education of all workers; the health conditions of all workers and the experiences of all workers.

R^2 adjusted = 0.884 means that 88.40% of the changes in productivity are due to changes in the average level of education of all workers; the health conditions of all workers and the experiences of all workers, considering the sample size and the number of independent variables.

Conclusion: the model is interesting

5.2.2. Test Associated with the Overall Evaluation of the Model: Fischer Test (F-test)

a) Some formulations of the global "significance" test:

• Is the model relevant to explaining the values of Y?

• Is the linear connection Y / x1, X2, X3 lawful?

• Hypothesis test

It is a matter of accepting or rejecting a hypothesis, H0 is the null hypothesis and H1 is the alternative hypothesis.

Hypotheses: H0: $\beta j = 0$ (absence of linear relation) H1: $\beta j \neq 0$ (existence of linear relation between xj and y).

b) Test statistics

• At a given statistical level 5%, compare the F-calculated with the F-theoretical provided by the table.

• Compare the P-value with the level of significance the

P-value is the probability that any event is the mere act of chance. Arbitrarily, it is generally considered that "statistically significant" values of p less than one chance in twenty (20), ie the probability that a value is due to chance does not exceed 5%. A P value less than 0.05 is statistically significant otherwise it is not. We speak of a

highly significant value if p-value is less than a chance in a hundred (100) or p-value less than 0.01.

F = 36.556 and its critical value is 3.5874 with a degree of freedom equal to 3. Its P-value being equal to 0.0000. P - value is highly significant because it is less than 0.01.

Conclusion: The hypotheses H1, H2, H3 for which human capital has a positive impact on total productivity are valid hypotheses (Table 3).

5.3. Individual Evaluation of the Coefficients

5.3.1. Statistics of the Test

Does a variable contribute significantly to the model?

At a given level of meaning 5% it is a matter of comparing t-calculated with t-theoretical provided by the student table or comparing the p-value with the level of significance.

A p-value less than 0.05, is significant and less than 0.01 is highly significant. On the other hand, a p-value greater than 0,5 is not significant.
- For X1; p-value = 0.4154, this value being greater than 0.05, is not significant (Table 2);
- For X2, p-value = 0.0053 and for X3 p-value = 0.0030, these p-values are highly significant with their P-values less than 0.01 (Table 2).

3.3.2. Associated Hypothesis Test

H0; aj = 0, H0 is verified means that the variable can be removed from the model without damaging the explanatory power.

Conclusion: H1, H2 and H3 are valid hypotheses.

5.4. Results Discussion: Human Capital and Total Productivity

The results of the multiple regression showed that an investment in human capital has a significant impact on productivity. An experienced, well educated and healthy workforce generates high productivity. It may be for this reason that the literature on business management places a high value on human capital.

5.5. Suggestions

Following the observations, formal and informal interviews with professionals in enterprise management and education, the following recommendations are made:
- In terms of training, the enterprise must not wait for the golden opportunity but must instead create them, that is to say organize training courses run by senior experienced workers ;
- Each worker must be registered with the compulsory health insurance (AMO) and paid by the employer;
- Allow each worker to draw up a monthly health check taken out by the employer;
- To fight against the phenomenon of presenteeism, which consists in being always present at work despite its degraded state of health?
- Experienced workers are less expensive than inexperienced workers in terms of their skill levels and deserve special attention when recruiting;

- Give seniority bonuses to workers to motivate them to stay in the company.

5.6. Contributions / Limitation and Future Research Perspectives

This study contributes to enriching research and theory on human capital and total productivity. A good understanding of human capital and total productivity derived from the relationship between human capital and total productivity was facilitated.

As a limitation, the case study was run in one company. Strictly speaking, the generalization of its conclusions is limited. Enterprises have different characteristics, different stories, different technologies, different maturity of human capital implementation and employ people with different levels of education ... Different enterprises have to use different approaches to human capital implementation. There is no universal standard for implementing this model.

In prospect of a new research the case study will be directed in different types of enterprises. It will be more interesting to include in the model moderating and mediating variables.

6. Conclusion

In conclusion, the main aim of this study is the investigation of the relations between human capital and the total productivity of the enterprise as perceived in Mali.

A number of conclusions were found. Indeed, a theory of human capital relative to Mali was developed. The measurement instruments for implementing human capital and total productivity are reliable and valid and can be used by other researchers to test the effects of human capital on total productivity. Several conclusions were removed from the theoretical model: human capital has a positive impact on total productivity, the average level of education of all workers has a positive impact on the total productivity of the enterprise, the health conditions of all workers have a positive impact on the total productivity of the company, the experiences gained by all workers has a positive impact on the total productivity of the enterprise. The theoretical model developed in this study is applicable in practice. This theoretical model can be applied by other Malian companies to support their efforts to implement the effects of human capital on the total productivity of the company.

With this model the company can easily identify its weaknesses and remedy them. Indeed resources can be allocated rationally.

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