

Growth of Higher Education and Its Relationship with Per Capita Gross Domestic Product in Cambodia

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Abstract

The study attempts to assess the growth of higher education in general and province-wise disparities in the growth of higher education in particular in the Kingdom of Cambodia over the period 1999-2000 to 2008-09. Further, the study examines the relationship between the gross enrollment ratio (GER) in higher education and the per capita gross domestic product (GDP) at constant prices. In addition, an attempt is made to know the impact of per capita GDP on the total enrollment in higher education in the Kingdom over the study period 2000-2009. The study reveals that higher education in Cambodia during the last decade has witnessed phenomenal expansion. This has brought spectacular changes in terms of size, enrollment and number of teachers, etc. However, wide variations are observed in several indicators of educational development among the provinces in the country. The correlation coefficient between the gross enrollment ratio (GER) in higher education and the per capita gross domestic product is 0.992, which suggests that the two are positively correlated. Finally, from the regression analysis it is also revealed that the per capita GDP has significant positive impact on the growth of total enrollment in higher education in the country. Against the findings of the study, it is suggested that public policy should be towards expansion of higher education in the country and to derive utmost benefits from higher education both by individuals and society at large, variations in the development of higher education among the provinces in the country should be eliminated.

Key Words: Higher Education; Higher Education Institutions; Gross Enrollment Ratio; Per Capita Gross Domestic Product.

1. Introduction

In the global knowledge-based economy, education in general and higher education in particular is universally recognized as a form of investment in human capital that yields economic returns and contributes to nation's future wealth. Higher education, besides inculcating necessary skills and competence for achieving both personal and social goals, is also a means to generate larger personal and social wealth. In the present global context, the significance of higher education has increased manifold and it is strongly believed that the quality of higher education ensures the pace of economic and social development of a country. Though it is well recognized by planners and policy makers that higher education is a means of strengthening the human resource base of an economy, but unfortunately a low level of educational achievement in a large number of economies in the world acts as a drag in fostering economic development and social change in such economies. The Kingdom of Cambodia is one of the least developed countries (LDCs) in the world located in the South-east Asian region. The turbulent past of the country has included many transitions which have implications for several aspects of the economy including its education. However, the political stability of the country for more than a decade and the increasing attention given to the development of higher education by both the government and private sector has brought spectacular changes in terms of size, enrolment and expenditure of higher education.

Thus during the last one decade, higher education in the country has witnessed phenomenal expansion. However, it is noticed that the expansion of higher education in the country has not been taken place evenly and as a result this leads to variations in the inter-province development of higher education. It is against this backdrop, a modest attempt is made in this paper to analyze the growth of higher education in the Kingdom over the last one decade (1999-2000 to 2008-09) along with the inter-province variations in the development of higher education. In addition, the present paper examines the relationship between gross enrollment ratio (GER) in higher education and the per capita gross domestic product (GDP) of Cambodia over the period 2000 to 2009 along with the impact of per capita GDP on the total enrollment in higher education in the country.

2. Objectives

The main objectives of the paper are as follows:

- i. To analyze the growth of higher education in the Kingdom of Cambodia over the period 1999-2000 to 2008-09.
- ii. To assess the inter-province disparities in higher education in the country over the last decade.
- iii. To examine the relationship between gross enrollment ratio (GER) in higher education and the per capita gross domestic product (GDP) of Cambodia over the period 2000 to 2009.
- iv. To know the impact of per capita gross domestic product (GDP) on the total enrollment in higher education in the country over the period of study.

3. Methodology

To analyze the growth of higher education in the country over the period 1999-2000 to 2008-09 along with inter-province variations in the development of higher education, secondary data are used which are collected from the Ministry of Education, Youth and Sports of the Royal Government of Cambodia. Besides, data relating to the per capita GDP at constant prices of Cambodia over the study period are taken from the publications of National Institute of Statistics, Ministry of Planning, Royal Government of Cambodia. Several indicators of the growth of higher education, such as number of institutions, number of enrollment, number of teachers, gross enrollment ratio and pupil-teacher ratio are taken into consideration and the following model is used to assess the growth of higher education over the period of study.

$$y = ab^t$$

Where,

y = The variable for which the growth rate of higher education is estimated;

t = Time period under study; and

a and b = Constants, where,

b = 1 + r, and r = the rate of growth of the concerned variable under study.

To know the relationship between GER in higher education and the per capita GDP (at constant prices) of Cambodia over the period of study, correlation analysis has been undertaken by using the following formula.

$$r = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sqrt{\sum (x - \bar{x})^2 \sum (y - \bar{y})^2}}$$

Where,

r = Correlation coefficient;

x = Gross enrollment ratio (GER) in higher education;

y = Per capita GDP at constant prices;

\bar{x} = Mean of x; and

\bar{y} = Mean of y.

y

To assess the impact of per capita gross domestic product (GDP) at constant prices on the total enrollment in higher education over the period of study, simple regression analysis has been carried out with the help of the following model.

$$TEH = \alpha + \beta_1 PCGDP + U$$

TEH = Total enrollment in higher education;

PCGDP = Per capita gross domestic product at constant prices;
 α = Intercept; and
 U = Error term.

4. Analysis of Empirical Results

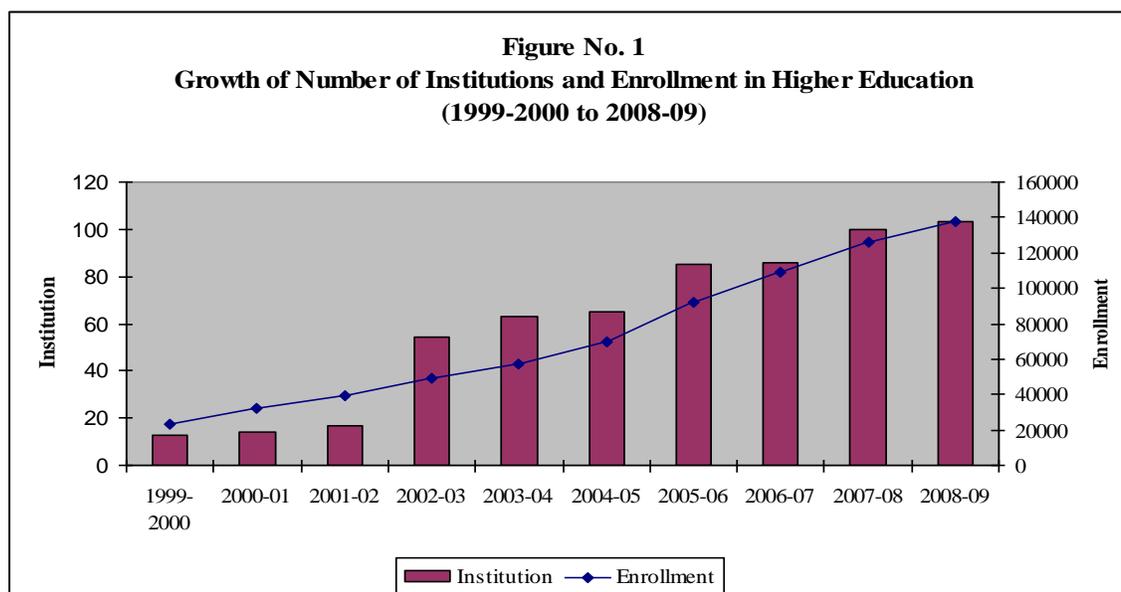
Over the last one decade (1999-2000 to 2008-09), there has been a tremendous increase in the number of higher education providers in the country. Due to the privatization of higher education, since the year 2000, many higher education providers have entered the market. The number of higher education institutions which was only 13 in the year 1999-2000, has increased to 103 in 2008-09 representing an annual compound growth rate of 28.90 per cent as shown in both Table 1 and Figure 1.

Table No. 1
Growth of Higher Education in Cambodia*
(1999-2000 to 2008-09)

Sl. No.	Year	Number of Universities/HEIs	Number of Enrollment	Number of Teachers	Pupil Teacher Ratio
1	1999-2000	13	23,192	2,574	9.01
2	2000-01	14	31,896	2,925	10.90
3	2001-02	17	38,938	3,251	11.98
4	2002-03	54	49,575	3,661	13.54
5	2003-04	63	57,024	4,121	13.84
6	2004-05	65	70,094	4,598	15.24
7	2005-06	85	91,941	5,231	17.58
8	2006-07	86	108,620	5,930	18.32
9	2007-08	100	125,645	6,140	20.46
10	2008-09	103	137,253	6,598	20.80
Average Annual Compound Growth Rate (Per cent)		28.90	21.98	11.41	9.48

Note: * Data on higher education include all types and levels of higher education in the country.

Source: i. Ministry of Education, Youth and Sports, Royal Government of Cambodia.
 ii. Own Computation.



A similar growth in total enrollment at higher education level has been observed during the same period. Enrollment at all levels and types of higher education had reached 137,253 in 2008-09 from 23,192 in 1999-2000, representing thereby an average annual compound growth rate of 21.98 per cent as shown in both Table 1 and Figure 1. Corresponding to the increase in number of higher education institutions along with the enrollment, there has been a continuous rise in the number of teachers in the higher education institutions in the whole Kingdom. The average annual compound growth rate of teachers is estimated to be 11.41 per cent over the period of the study, as the total number of teachers has reached 6,598 in 2008-09 from 2,574 in 1999-2000. Further, over the period of study, the average annual compound growth rate of pupil teacher ratio was 9.48 per cent as shown in Table 1.

The province-wise growth of universities/higher education institutions over the period of study is shown in Table 2. As revealed, near about 50 per cent of the higher education institutions are located in the capital city of the country during the period 2005-06 to 2008-09. In many provinces in the country, only the presence of single institution is seen over the period of several years. Further, in some provinces in the country, higher education providers have started operating very recently with their negligible presence. Total enrollment at higher education for all types and levels over the study period for all the provinces is presented in Table 3. As highest number of institutions is concentrated in the capital city of the country (Phnom Penh), it is quite natural to see the highest percentage of enrollment to total enrollment of the country in the city itself. In Phnom Penh, the percentage of enrollment to total enrollment of the country has fallen from 98 in 1999-2000 to around 85 in 2008-09. This may be due to the establishment of number of institutions in other provinces in the country over the period, though their presence is negligible. In many provinces, the percentage of enrollment to total number of enrollment of the country is found to be less than one per cent. As a result, disparities were found among the provinces so far enrollment at higher educational level is concerned.

Table No. 2
Province-wise Universities/Higher Education Institutions in Cambodia
(1999-2000 to 2008-09)

Sl. No.	Province	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009
1	Banteay Meanchey	-	-	-	1 (1.85)	3 (4.76)	3 (4.62)	3 (3.53)	4 (4.65)	5 (5.00)	5 (4.85)
2	Battambang	1 (7.69)	2 (14.29)	1 (5.88)	3 (5.56)	3 (4.76)	4 (6.15)	7 (8.24)	7 (8.14)	1 (10.00)	1 (9.07)
3	Kampong Cham	-	-	1 (5.88)	4 (7.41)	4 (6.35)	4 (6.15)	6 (7.06)	6 (6.98)	6 (6.00)	6 (5.83)
4	Kampong Chhnang	-	-	-	-	-	-	-	-	3 (3.00)	3 (2.91)
5	Kampong Speu	-	-	-	-	-	1 (1.54)	2 (2.35)	2 (2.33)	2 (2.00)	3 (2.91)
6	Kampong Thom	-	-	-	2 (3.70)	2 (3.17)	2 (3.08)	2 (2.35)	2 (2.33)	1 (1.00)	2 (1.94)
7	Kampot	-	-	-	2 (3.70)	2 (3.17)	2 (3.08)	2 (2.35)	2 (2.33)	2 (2.00)	2 (1.94)
8	Koh Kong	-	-	-	-	-	-	-	-	1 (1.00)	1 (0.97)
9	Kratie	-	-	-	-	-	-	-	-	1 (1.00)	1 (0.97)
10	Phnom Penh	1 (84.61)	1 (78.57)	1 (70.52)	3 (59.22)	3 (60.38)	3 (56.97)	4 (52.95)	4 (52.35)	4 (47.07)	4 (45.67)
11	Prey Veng	1 (7.69)	1 (7.14)	1 (5.88)	1 (1.85)	2 (3.17)	2 (3.08)	3 (3.53)	3 (3.49)	4 (4.00)	4 (3.88)
12	Pursat	-	-	-	1 (1.85)	1 (1.59)	1 (1.54)	3 (3.53)	3 (3.49)	3 (3.00)	3 (2.91)
13	Ratanak Kiri	-	-	-	1 (1.85)	1 (1.59)	1 (1.54)	1 (1.18)	1 (1.16)	1 (1.00)	1 (0.97)
14	Siemreap	-	-	1 (5.88)	4 (7.41)	4 (6.35)	5 (7.69)	5 (5.88)	5 (5.81)	5 (5.00)	5 (4.85)
15	Preah Sihanouk	-	-	1 (5.88)	3 (5.56)	3 (4.76)	3 (4.62)	3 (3.53)	3 (3.49)	3 (3.00)	3 (2.91)
16	Stung Treng	-	-	-	-	-	-	-	-	-	1 (0.97)
17	Svay Rieng	-	-	-	-	-	-	1 (1.18)	1 (1.16)	3 (3.00)	3 (2.91)
18	Takeo	-	-	-	-	-	-	2 (2.35)	2 (2.33)	3 (3.00)	3 (2.91)
	Whole Kingdom	1 (100.300)	1 (100.040)	1 (100.700)	5 (100.400)	6 (100.300)	6 (100.500)	8 (100.500)	8 (100.600)	10 (100.000)	10 (100.300)

No i. Some provinces, such as Kandal, Kep, Monduliri, Otdar Meanchey, Pailin and Preah Vihear do not have any University/HEI
te: and therefore not given in the list.

ii. The number of University/HEI includes all types and levels of higher education institutions.

iii. '-' represents non-existence of University/HEI in that particular year.

iv. Figures in the parentheses represent percentage to total of the given year.

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e: i. Ministry of Education, Youth and Sports, Royal Government of Cambodia.

ii. Own Computation.

Table No. 3
Province-wise Growth of Enrollment in Higher Education
(1999-2000 to 2008-09)

Sl No.	Province	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009
1	Banteay Meanchey	-	-	-	-	119 (0.21)	672 (0.96)	1387 (1.51)	1465 (1.35)	2124 (1.69)	3262 (2.38)
2	Battambang	-	604 (1.89)	376 (0.97)	1068 (2.15)	1803 (3.16)	2900 (4.14)	3628 (3.95)	4878 (4.49)	5722 (4.55)	7426 (5.41)
3	Kampong Cham	-	-	390 (1.00)	645 (1.30)	1056 (1.85)	954 (1.36)	2147 (2.34)	2309 (2.13)	2878 (2.29)	3292 (2.40)
4	Kampong Chhnang	-	-	-	-	-	-	-	-	102 (0.08)	157 (0.11)
5	Kampong Speu	-	-	-	-	-	479 (0.68)	586 (0.64)	274 (0.25)	491 (0.39)	656 (0.48)
6	Kampong Thom	-	-	-	123 (0.25)	134 (0.23)	206 (0.29)	299 (0.33)	366 (0.34)	499 (0.40)	870 (0.63)
7	Kampot	-	-	-	520 (1.05)	499 (0.88)	591 (0.84)	553 (0.60)	740 (0.68)	265 (0.21)	602 (0.44)
8	Koh Kong	-	-	-	-	-	-	-	-	154 (0.12)	213 (0.16)
9	Kratie	-	-	-	-	-	-	-	-	141 (0.11)	201 (0.15)
10	Phnom Penh	22718 (97.96)	30755 (96.42)	37081 (95.23)	44078 (88.91)	49325 (86.50)	58584 (83.58)	74927 (81.49)	87371 (80.44)	99131 (78.90)	116854 (85.14)
11	Prey Veng	474 (2.04)	537 (1.68)	761 (1.95)	1055 (2.13)	1235 (2.17)	1675 (2.39)	1417 (1.54)	1670 (1.54)	2080 (1.66)	2157 (1.57)
12	Pursat	-	-	-	286 (0.58)	390 (0.68)	358 (0.51)	726 (0.79)	540 (0.50)	924 (0.74)	1417 (1.03)
13	Ratanak Kiri	-	-	-	46 (0.09)	63 (0.11)	117 (0.17)	290 (0.32)	233 (0.21)	302 (0.24)	277 (0.20)
14	Siemreap	-	-	88 (0.23)	1192 (2.40)	1714 (3.01)	2399 (3.42)	3001 (3.26)	4620 (4.25)	5793 (4.61)	7686 (5.60)
15	Preah Sihanouk	-	-	242 (0.62)	562 (1.13)	686 (1.20)	1159 (1.65)	959 (1.04)	1386 (1.28)	1971 (1.57)	2275 (1.66)
16	Svay Rieng	-	-	-	-	-	-	1012 (1.10)	1376 (1.27)	1910 (1.52)	2201 (1.60)
17	Takeo	-	-	-	-	-	-	1009 (1.10)	1392 (1.28)	1158 (0.92)	4386 (3.20)
	Whole Kingdom	23192 (100.00)	31896 (100.00)	38938 (100.00)	49575 (100.00)	57024 (100.00)	70094 (100.00)	91941 (100.00)	108620 (100.00)	125645 (100.00)	137253 (100.00)

Note: i. Province-wise enrollment in higher education represents total enrollment of different types and levels of enrollment in higher education.
ii. Figures in the parentheses represent percentage to total of the given year.

Source: i. Ministry of Education, Youth and Sports, Royal Government of Cambodia.
ii. Own Computation.

The province-wise growth of teachers in higher education at all levels and types over the period 1999-2000 to 2008-09 is presented in Table 4. In all the years under study, the percentage of teachers engaged in higher education in Phnom Penh to total number of teachers in the country has been more than 70. Of course, it was around 99 per cent in 1999-2000 which has fallen to around 78 per cent in 2008-09. Contrary to this, in many provinces of the country, the number of teachers to total number of teachers in the country is less than one per cent irrespective to the years of introduction of higher education in those provinces. Therefore, variations in the number of teachers have been seen among the provinces over the period of study.

There has been a continuous increase in the pupil teacher ratio in higher education in the whole country over the period of study as shown in Table 5. In case of Phnom Penh, the ratio which was 8.93 in 1999-2000 has reached to 22.85 in 2008-09. Considering all the provinces in the country, wide differences have been observed in pupil teacher ratio at higher education level.

Table No. 4
Province-wise Growth of Teachers in Higher Education
(1999-2000 to 2008-09)

Sl. No.	Province	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009
1	Banteay Meanchey	-	-	-	-	27 (0.66)	63 (1.37)	74 (1.41)	90 (1.52)	154 (2.51)	220 (3.33)
2	Battambang	-	61 (2.09)	67 (2.06)	86 (2.35)	118 (2.86)	182 (3.96)	225 (4.30)	220 (3.71)	353 (5.75)	523 (7.93)
3	Kampong Cham	-	-	79 (2.43)	113 (3.09)	208 (5.05)	212 (4.61)	273 (5.22)	267 (4.50)	198 (3.22)	358 (5.43)
4	Kampong Chhnang	-	-	-	-	-	-	-	-	21 (0.34)	45 (0.68)
5	Kampong Speu	-	-	-	-	-	40 (0.87)	86 (1.64)	90 (1.52)	51 (0.83)	
6	Kampong Thom	-	-	-	-	16 (0.39)	26 (0.57)	28 (0.54)	12 (0.20)	41 (0.67)	62 (0.94)
7	Kampot	-	-	-	-	38 (0.92)	54 (1.17)	53 (1.01)	37 (0.62)	59 (0.96)	111 (1.68)
8	Koh Kong	-	-	-	-	-	-	-	-	26 (0.42)	32 (0.48)
9	Kratie	-	-	-	-	-	-	-	-	16 (0.26)	67 (1.02)
10	Phnom Penh	2545 (98.87)	2831 (96.79)	3016 (92.77)	3259 (89.02)	3468 (84.15)	3693 (80.32)	3931 (75.15)	4561 (76.91)	4375 (71.25)	5114 (77.51)
11	Prey Veng	29 (1.13)	33 (1.13)	35 (1.08)	48 (1.31)	56 (1.36)	79 (1.72)	123 (2.35)	107 (1.80)	112 (1.82)	136 (2.06)
12	Pursat	-	-	-	26 (0.71)	30 (0.73)	31 (0.67)	72 (1.38)	53 (0.89)	115 (1.87)	232 (3.52)
13	Ratanak Kiri	-	-	-	8 (0.22)	8 (0.19)	9 (0.20)	11 (0.21)	18 (0.30)	14 (0.23)	18 (0.27)
14	Siemreap	-	-	25 (0.77)	69 (1.88)	88 (2.14)	131 (2.85)	155 (2.96)	227 (3.83)	240 (3.91)	363 (5.50)
15	Preah Sihanouk	-	-	29 (0.89)	52 (1.42)	64 (1.55)	78 (1.70)	81 (1.55)	104 (1.75)	125 (2.04)	215 (3.26)
16	Svay Rieng	-	-	-	-	-	-	21 (0.40)	34 (0.57)	79 (1.29)	47 (0.71)
17	Takeo	-	-	-	-	-	-	98 (1.87)	110 (1.85)	161 (2.62)	201 (3.05)
	Whole Kingdom	2574 (100.00)	2925 (100.00)	3251 (100.00)	3661 (100.00)	4121 (100.00)	4598 (100.00)	5231 (100.00)	5930 (100.00)	6140 (100.00)	6598 (100.00)

Note: i. Province-wise teachers in higher education include teachers in all types and levels of higher education.
ii. Figures in the parantheses represent percentage to total of the given year.
iii. Data on number of teachers in Kampong Speu province was not available in 2008-09.

Source: i. Ministry of Education, Youth and Sports, Royal Government of Cambodia.
ii. Own Computation.

Table No. 5
Province-wise Growth of Pupil Teacher Ratio in Higher Education
(1999-2000 to 2008-09)

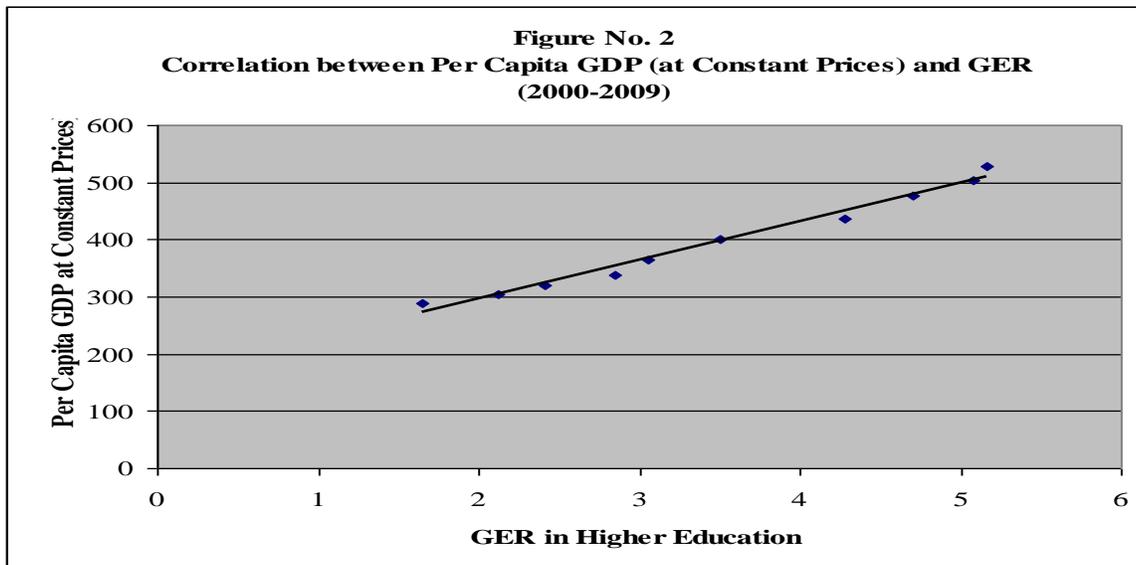
Sl. No.	Province	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009
1	Banteay Meanchey	-	-	-	-	4.41	10.67	18.74	16.28	13.79	14.83
2	Battambang	-	9.90	5.61	12.42	15.28	15.93	16.12	22.17	16.21	14.20
3	Kampong Cham	-	-	4.94	5.71	5.08	4.50	7.86	8.65	14.54	9.20
4	Kampong Chhnang	-	-	-	-	-	-	-	-	4.86	3.49
5	Kampong Speu	-	-	-	-	-	11.98	6.81	3.04	9.63	-
6	Kampong Thom	-	-	-	-	8.38	7.92	10.68	30.50	12.17	14.03
7	Kampot	-	-	-	-	13.13	10.94	10.43	20.00	4.49	5.42
8	Koh Kong	-	-	-	-	-	-	-	-	5.92	6.66
9	Kratie	-	-	-	-	-	-	-	-	8.81	3.00
10	Phnom Penh	8.93	10.86	12.29	13.53	14.22	15.86	19.06	19.16	22.66	22.85
11	Prey Veng	16.34	16.27	21.74	21.98	22.05	21.20	11.52	15.61	18.57	15.86
12	Pursat	-	-	-	11.00	13.00	11.55	10.08	10.19	8.03	6.11
13	Ratanak Kiri	-	-	-	5.75	7.88	13.00	26.36	12.94	21.57	15.39
14	Siem Reap	-	-	3.52	17.28	19.48	18.31	19.36	20.35	24.14	21.17
15	Preah Sihanouk	-	-	8.34	10.81	10.72	14.86	11.84	13.33	15.77	10.58
16	Svay Rieng	-	-	-	-	-	-	48.19	40.47	24.18	46.83
17	Takeo	-	-	-	-	-	-	10.30	12.65	7.19	21.82
	Whole Kingdom	9.01	10.90	11.98	13.54	13.84	15.24	17.58	18.32	20.46	20.80

Note: Province-wise pupil teacher ratio in higher education includes all types and levels of higher education.

Source: i. Ministry of Education, Youth and Sports, Royal Government of Cambodia.
ii. Own Computation.

The relationship between gross enrollment ratio (GER) in higher education and the per capita gross domestic product (GDP) at constant prices¹ over the period 2000-2009 is shown in Figure 2. The coefficient of correlation between them is 0.992, which suggests that the two are highly and positively correlated and the relationship is significant at one per cent level of significance. To assess the impact of per capita GDP at constant prices on the total enrollment of students in higher education during the period 2000-2009, a simple regression analysis has been carried out, the result of which reveals that the value of $R^2 = 0.9961$ and the regression as a whole is significant ($F = 2048.879$, $P = 6.27E -11$). The regression coefficient of per capita GDP at constant prices is 465.6629 which is significant at one per cent level of significance ($t = 45.2646$, $P = 6.27E-11$). This indicates that if the per capita GDP at constant prices increase by one dollar, the total enrollment in higher education would increase by about 466 in number.

¹ Per capita GDP at constant prices is based on the year 2000 prices as provided by National Institute of Statistics, Royal Government of Cambodia. For detail, see www.nis.gov.kh/nis/NA/NA2008.pdf.



5. Conclusion

The analysis carried out in this paper clearly reveals that higher education in the Kingdom of Cambodia during the last decade (1999-2000 to 2008-09) has witnessed phenomenal expansion. However, the growth of higher education in terms of size, enrollment, number of teachers, etc. in the country has not been taken place evenly among different provinces and as a result, inter-province disparities are widely observed. It is further revealed that gross enrollment ratio in higher education and the per capita GDP at constant prices over the period 2000-2009 are highly and positively correlated. Finally, the per capita GDP at constant prices over the study period has a significant positive impact on the total enrollment in higher education in the country. In the light of the above discussions, it is suggested that public policy should be directed towards expansion of higher education in the country. However, to ensure the benefits of higher education among all sections of the society irrespective to their place of habitation, the wide variations in the development of higher education among the provinces in the country should be eliminated by a coordinated effort of both government and other stakeholders' commitment.

6. References

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