

Research Article

Accounting for Household Formal Education Budget Shares in the Ashanti Region of Ghana: The Statistical Evidence

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Abstract

The socioeconomic regional factors influencing households spending on education are examined in this study using a Tobit model and data gathered from the seventh round of the Ghana Living Standards Survey (GLSS VII) in 2017. The results showed that households in the Ashanti region increased their spending on education in all three of the categories covered by the data and taking into account household undefined education expenditure, 57.1 percent of household total spending on education went toward basic education, 30 percent went toward secondary and post-secondary education, and 12.6 percent went toward tertiary education. The annual amount that households spend on education is positively impacted by the number of female heads of household and the size of the family. This study may help officials involved in the development of the Ashanti region's education sector create better plans by recognizing the contributions of households as significant players in funding education in the Ashanti Region. This is especially important given the region's declining public spending on education. To support the implementation of SDG4 and the African Union Agenda 2063, the Ashanti Regional Coordinating Council must take policy action to guarantee that households do not spend more than half of their total annual household spending on education on basic education.

Keywords

Ghana, Ashanti Region, Tobit Model, Household, Education Expenditure, Economic Development, Conditional Marginal Effects

1. Background of the Study

Education has been seen as a catalyst for structural change, national development and economic growth in Ghana's economy since colonial times, [2, 8, 4, 9, 25]. This fact is consistent with [34, 60, 63] studies which considered education as a catalyst for human capital development and national economic development. This fact also confirms [67] human

capital hypothesis that investments in family education are likely to increase the future productivity and income of family members. The efforts of the Central Government of Ghana (CGOG) to promote education more are seen through the country's international commitment to education and the signatories to the SDG 4 goals. The CGOG provision of ed-

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educational investments applies to the whole country, [27, 41, 51, 56, 49]. A number of household survey-based studies that have used covariates to determine the education expenditure of Ghanaian households have been conducted at the country level, [4, 11, 12, 15, 28, 29].

The earliest investment in education in Ghana came in the form of schools founded by Western Christian missionaries to produce interpreters for their Christian evangelism and agents to facilitate their commercial activities as early as 1776 [47, 32, 27]. Families always spend primarily on education, and families, along with religious institutions, are seen as private entities that promote education in Ghana alongside the public body. As a result, it has been claimed that investment in education in Ghana has long been a dual partnership with private entities on the one hand and the Ghanaian government, public sector, central government or institutions on the other. They are all committed to promoting the social welfare and economic development expected in Ghana. This idea confirms the school of thought that argues that household and public investment in education is complementary goods, and if the two distinct investments do not match, it would be a futile endeavour [2, 4, 5, 29, 36-39, 19, 50].

Funding of public expenditure on education in Ghana began with sole the CGOG funding in the post-independence era, migrating to the cost-sharing era in the 1980s–1990s before entering this current era of privatization [4, 46, 65, 13, 56, 55, 74]. Recent developments in public investment in education in Ghana include participation in and signing of international agreements and protocols on education development and delivery and expanding the scope of free education from basic education to secondary education in 2018 under the Free High School Policy. All of these public investments in education have been recorded in the books of the CGOG by its CGOG agency, the Ministry of Education.

However, publications on household education expenditure in Ghana began with the earlier studies commissioned by [78, 79], and have been limited in research since then. Because public education and private household education investments are deemed as complementary goods, a lack of examining the factors of private household expenditure on education is a problem worth investigating. This study thus attempt providing an empirical examination of some factors of annual private household education expenditures in the Ashanti regional level in Ghana, a problem which had received no research attention, and will therefore make an empirical contribution to the education policy planning of the Ashanti region.

2. Ghana Education in Context

The study focused on the Ashanti region of Ghana. The population of Ghana increased five-fold from 6,726,815 in 1960 to 30,832,019 in 2021, [30]. The Ashanti region, which

accounts for 17.6 percent of the country's population, lost its status as the most populous region in 2021 and is now the second most populous region in Ghana after Greater Accra (17.7 percent), [30]. The CGOG is the main contributor to modern education investment and spending, accounting for 78 percent of national education spending in 2015 and 87 percent of national education spending in 2012. Public investments in education in the Ashanti region come in the form of educational policies such as the Education Strategic Plan (ESP) 2018-2030, which sets out the vision and policies to achieve the goal of transforming the Ashanti region into a highly educated region.

The Portuguese were the first Europeans to arrive on the Gold Coast in 1470 and built their Elmina Castle in 1472. This event led to later Europeans, the English, Danes and Dutch, following suit until the 19th century. Among these Europeans were their Christian missionaries, who from 1776 instituted and issued formal education known as the schools of the castles to train agents for commercial purposes and translators for their Christian evangelism [47, 32, 27]. Recordings of public expenditure on education in the Ashanti region began in the 19th century when the British extended their control over the Ashanti territory. Public spending on education in the Ashanti region also increased during the Gordon Guggisberg era (1919-1927) through the sixteen principles of education policy he initiated, and also since the introduction in 1951, of the Accelerated Development Plan and a decade later, the Education Act of 1961, which encouraged a massive injection of public investment throughout Ghana in general, and in the Ashanti region in particular [4, 35, 13, 56, 47, 32, 27].

3. Methods

3.1. Data

The latest data from the Seventh Ghana Living Standards Survey (GLSSVII) [31], is analyzed with permission from the Ghana Statistical Service. GLSS VII is a national household survey with a survey period of 12 calendar months. It is financially and technically supported by CGOG, DFID and the World Bank and processes a lot of detailed socio-economic information about households in Ghana. The study used a sample size of 1,735 Ashanti region households extracted from national data of 14,009 households and is therefore considered to be of high quality and representative of the entire Ashanti region.

3.2. Description of Variables

The variables used to examine the model are described in Table 1.

Table 1. Description of variables used in the study.

Variable	Description
AshEdy _i	Total household _i expenditure on education in the Ashanti region in cedis in a year.
Ashyinc _i	Total household _i real expenditure in cedis, served as a proxy for total household _i real income the Ashanti region in a year.
expBASIC _i	Total household _i expenditure on pre-primary and primary & JSS education in cedis in the Ashanti region in a year.
expSECPOSTSEC _i	Total household _i expenditure on SSS and post-secondary but non-tertiary education on in cedis in the Ashanti region in a year.
expTERTIAR _i	Total household _i expenditure on tertiary education in cedis in the Ashanti region in a year.
expedundefin _i	Total household _i expenditure on education in cedis which cannot be defined in the Ashanti region. It serves as the base for the education category.
ashURBAN _i	Location of household in the Ashanti region = 1, if in an urban area, = 0, if in a rural area.
Ashhsize _i	Size of household _i in the Ashanti region.
Ashinternet _i	Household _i connection to the internet in the Ashanti region, =1 if household _i is connected the internet, 0 otherwise.
AshHHsex _i	Female household _i head in the Ashanti region.
ASHOWN _i	Household _i head owns the house =1, 0 otherwise, in the Ashanti region.

3.3. Empirical Model and Expectations

The empirical model estimated in this paper aligns with some of the theoretical considerations outlined in this section and provides context for applications in the Ashanti region; it also has some very specific properties. In addition, the availability of data also affects the type of empirical relationships examined. Given the above, in modelling the determinants of household expenditure on education in the Ashanti region, a very general model of broadly categorized individual household characteristics can be expressed as follows:

$$\text{AshEdy}_i = \beta_0 + \omega_1 \text{Ashyinc}_i + \omega_2 \text{expBASIC}_i + \omega_3 \text{expSECPOSTSEC}_i + \omega_4 \text{expTERTIAR}_i + \omega_5 \text{ashURBAN}_i + \omega_6 \text{Ashhsize}_i + \omega_7 \text{Ashinternet}_i + \omega_8 \text{AshHHsex}_i + \omega_9 \text{ASHOWN}_i + \psi_i$$

Household education expenditures in the Ashanti region include basic, secondary and post-secondary, and tertiary education, which represent the three categories of education studies captured by the GLSS VII data in Ghana. However, looking at household expenditure on education literature reveals that the level of household expenditure on education varies and depends on socioeconomic background indicators such as gender of household head, household income, household size, parental education and other household indicators including the location of the household as in a rural or in an urban area, particularly in developing countries, coupled with other institutional factors that make up, among others, the complex set of factors that are often identified [6, 4, 10, 40, 20, 38, 7, 44, 52, 17].

Nonetheless, this paper makes a novel attempt to empirically examine the determinants of household expenditure on education in the Ashanti region of Ghana, a developing economy of about 31 million people [30], in western sub-Saharan Africa. Theoretical underpinnings that identify household income as one of the most critical factors in determining household educational expenditure are well known. Several studies have found a positive relationship between household expenditure on education and household income, including the works of [10, 16, 17, 18, 6, 11, 29, 68, 43, 58]. The expectation in this paper is that, $\delta \text{AshEdy}_i / \delta \text{Ashyinc}_i > 0$

ceteris paribus.

In the Ashanti region, the household expenditures for the three educational categories according to the data are viz; basic, secondary and post-secondary, and tertiary programs are all likely to be positive because of their different abilities to increase future household income [4, 52, 67, 70, 72, 74].

Therefore, in the Ashanti region, household education expenditures for basic, secondary, post-secondary and tertiary levels are expected to be as follows: $\delta \text{AshEdy}_i / \delta \text{expBASIC}_i > 0$, $\delta \text{AshEdy}_i / \delta \text{expSECPOSTSEC}_i > 0$, $\delta \text{AshEdy}_i / \delta \text{expTERTIAR}_i > 0$, *ceteris paribus*, respectively, [1, 21, 16, 26, 40, 55, 68].

In the literature on household education expenditure, theoretical observations about household location affecting education expenditure in developing countries are documented by [4, 20, 38, 10, 59]. These authors assert that urban households investment in education is more than their rural household counterparts in developing countries. In the Ashanti region in a developing economy of Ghana,

where the majority of wealthy households are in the urban areas and the urban population has increased from 50.9% to 56.7% from 2010 to 2021, with only two regions, Greater Accra and Ashanti, representing 47.8% of urban households in Ghana [30], urban households in the Ashanti region are expected, *ceteris paribus*, to show a positive correlation with education spending. Consequently $\delta AshEdy_i / \delta ashURBAN_i > 0$.

Household family size in the Ashanti region has the potential to positively influence spending on education, all things being equal, and this is the expectation of the study. Hence, $\delta AshEdy_i / \delta Ashinternet_i > 0$, [4, 24, 61, 65, 66, 78, 79]. Household internet use in Ghana has recently increased, and 68.2% of households aged 6 and over were involved in internet use [30]. Internet use serves as a proxy for raising household heads awareness of education in a global world, and is expected to positively influence regional households educational spending on their children's education. As a proxy for global awareness of the family, the results contradict the views of [69], study on Malaysia suggesting that heads of families' awareness of globalization in relation to their family's education is also an important factor in households' expenditure on education.

As the number of females in urban areas continues to increase [30], in a patriarchal society like the Ashanti region, female heads of households are expected to have a positive impact on household education expenditure [23, 36, 37, 57, 59, 71], and the expectation of this study is that $\delta AshEdy_i / \delta AshHHsex_i > 0$ *ceteris paribus*.

Private householders in Ghana who own housing units could rent them out or part of them to generate income that could be invested in annual household education. Owning a

private home in Ghana is a social safety net [35]. The expectations are that $\delta AshEdy_i / \delta ASHOWN_i > 0$, *ceteris paribus*.

3.4. Estimation Specification

It is important to consider the censored nature of the dependent variable as not all households in the Ashanti region spent on education during the year.

A Tobin [73], also referred to as the Tobit specification of the form is applied as:

$$AshEdy_i^* = x_i' \omega + \psi_i \quad (1)$$

$$\psi_i | x_i \sim N(0, \sigma^2), \quad (2)$$

Where $AshEdy_i^*$ is the censored dependent variable since not all the household in the Ashanti region spend on education in a given year, this is considered latent, and x_i is a row vector of explanatory variables, and ψ_i is an error term. Actual Household educational expenditure $AshEdy_i$ is observed, if $AshEdy_i^* = x_i' \omega + \psi_i > 0$, and $AshEdy_i$ is not observed if $AshEdy_i^* = x_i' \omega + \psi_i \leq 0$, and $i = 1, \dots, 1,735$, and ψ_i is an error term [4, 37, 71].

Since household income was not collected in the GLSS VII data, this study uses household expenditure as a proxy for household income. [2, 3, 23, 54], studies used household expenditure as a proxy for household income, reflecting the fact that when using such household survey data in a developing country, household expenditure data are more reliable than income.

4. Discussion

4.1. Descriptive Analysis

Table 2. Summary statistics of the model variables in the paper.

Variable	Mean	Std. Dev.	Min	Max	Obs
AshEdy _i	1396.832	2601.319	0	28175	1,735
Ashyinc _i	12178.78	11383.41	486.223	217238.6	1,735
expBASIC _i	798.6874	1457.337	0	14560	1,735
expSECPOSTSEC _i	418.3295	1558.055	0	21875	1,735
expTERTIAR _i	176.1601	1073.897	0	19550	1,735
expedundefin _i	3.654697	23.25702	0	345	1,735
ashURBAN _i	0.6005764	0.4899212	0	1	1,735
Ashhsize _i	3.24611	2.180694	1	13	1,735
Ashinternet _i	53.5415	83.91235	0	1537.5	1,735

Variable	Mean	Std. Dev.	Min	Max	Obs
AsHHsex _i	0.378098	0.4850521	0	1	1,735
ASHOWN _i	0.3066282	0.4612266	0	1	1,735

Source: Author's computation based on the GLSS VII Data.

The mean statistics of the variables used are reported in Table 2.

The statistical means of the education variables as a percentage of the households total education average expenditure are shown in Table 3.

Table 3. Education variables means as mean percentages of household education expenditures in the Ashanti region.

Variable	% AshEdy _i Mean
expBASIC _i	57.1
expSECPOSTSEC _i	30
expTERTIAR _i	12.6
expedundefin _i	0.3

Source: Author's computation based on the GLSS VII Data

From Table 3, the average household spending on education in the Ashanti region is reported to be around 1,397 cedis per year. 57.1 percent of the total average household spending on education in the Ashanti region was spent by households on basic education. It represents the highest average household expenditure on education in the Ashanti region. Again, average household expenditure on secondary and post-secondary education in the Ashanti region accounts for 30 percent of total average household expenditure on education, while household expenditure on higher education in the Ashanti-Region accounts for 12.6 percent of total average household spending on education. Household expenditure on education undefined in the Ashanti region, which serves as the baseline category of the education variable, accounts for 0.3 percent of total Ashanti region average household expenditure on education.

Generating cross-sectional data from survey data on living standards in developing countries like the Ashanti region is a daunting task. Survey administrators most often deal with variable measurement errors and the presence of outliers in household expenditure surveys resulting from difficulties in retrospective recall and sometimes fading of some respondents' memories, misunderstanding of a survey item, among others [4, 33]. When fitting for any potential heteroscedasticity inherent in the data set, White Heteroscedasticity consistent, standard error robust option [76], is applied in this

study, by the use of the STATA software to generate the conditional marginal estimates. The results are shown in Table 4.

Table 4. Ashanti region household education expenditure conditional marginal mean estimates.

Variable	conditional marginal mean estimates
Ashyinc _i	0.000393* (2.02)
expBASIC _i	1.003*** (1219.83)
expSECPOSTSEC _i	1.001*** (1408.17)
expTERTIAR _i	1.005*** (439.96)
ashURBAN _i	3.018 (1.80)
Ashhsize _i	6.021*** (8.46)
Ashinternet _i	-0.0279* (-2.06)
AsHHsex _i	8.895*** (4.46)
ASHOWN	1.336 (0.69)
Censored observations = 822	
Uncensored observations = 913	
Number of observations = 1,735	

t statistics in parentheses.

*Significant at the 0.05 level.

***Significant at the 0.001 level.

Source: Author's computations based on the GLSS VII Data

From Table 4, there were 822 households in the Ashanti region surveyed, accounting for 47 percent of the sample data that did not actually spend on education. 913 uncensored observations were reported, indicating that 53 percent of households surveyed actually spent on education in the year survey.

4.2. Household Income

The Ashanti region's marginal estimate of household income is correctly signed and statistically significant at the 5 percent level. It is estimated that a small increase in household income in the Ashanti region would also increase actual household spending on education by an average of 3.93 cedis, all things being equal. The statistical significance of the conditional marginal estimate of Ashanti household income for household education expenditure is consistent with the study of [37] on Ghana and the results of [75] that household income [28] is an important determinant of household education expenditure in Plateau State in Nigeria and [42], study on Greece.

4.3. Education Categories

A small increase in household spending on education in the Ashanti region increases actual household spending on basic education by an average of 1,003 cedis more than household spending on education which cannot be defined in a year. The estimate is statistically highly significant at the 1 percent level. A small increase in household expenditure on education in the Ashanti region increases actual household expenditure on secondary and post-secondary education by an average of 1,001 cedis more than household education expenditure, which cannot be defined, and the estimate is highly statistically significant at the 1 percent level. A small increase in total household expenditure on education in the Ashanti region increased household expenditure on tertiary education by 1,005 cedis, which is on average higher than the undefined household expenditure on education per year. The conditional marginal estimates of household education expenditure in the Ashanti region for the basic, secondary and post-secondary and tertiary education variables are all correctly signed. This finding confirms the findings of [4, 24, 37, 38, 39, 43, 75].

4.4. Urban Households

Ashanti region urban household variable conditional marginal effect estimate has the correct sign and is statistically significant at the 1 percent level. Urban households in the region spend 3,018 cedis more per year on education than rural households. The World Bank [78], estimates that a rural child's education expenditure is three times less than an urban child's education expenditure in a developing economy. [4, 13, 61] studies also confirmed that rural households in Ghana consistently spend less on education than urban households, and the Ashanti region is no exception. The estimate is not statistically significant. A small change in household size in

Ashanti increases household spending on education by an average of 6,021 cedis more in actual education and *ceteris paribus*. The conditional marginal estimate is correctly signed and statistically significant at the 1 percent level. It confirms [57], household survey data on education expenditure from Nigeria showing a positive relationship between household size and education expenditure and [4] study on Ghana, and [48] study on China.

4.5. Households with Internet Connectivity

A small change in the number of households connected to the Internet in Ashanti reduces household education spending by an average of 279 cedis less than actual household annual spending on education, all things being equal. The conditional marginal estimate is not correctly signed, but is statistically significant at the 5 percent level. It is conceivable that Ghanaian households spend more money on online entertainment than on global awareness, which has a positive correlation with household education spending [69].

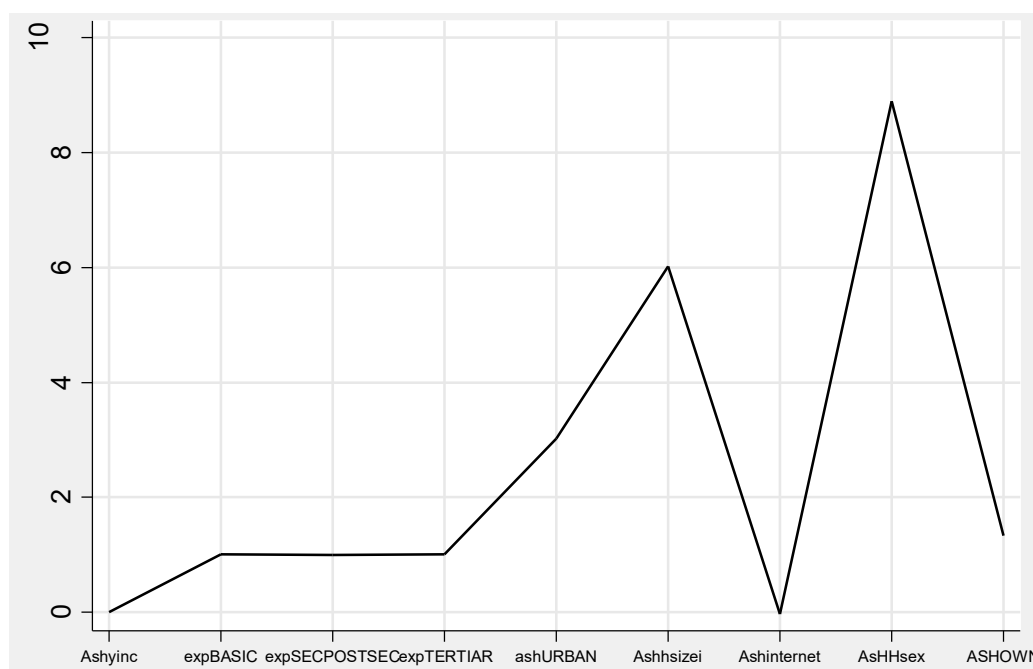
4.6. Female Household Heads

The annual education expenditure of female householders is 8,895 cedis more for actual annual household education expenditure in Ghana, and the marginal effect is statistically significant at the 1 percent level. This finding supports [4, 23, 37, 39, 57, 64, 71, 77] studies showing that female heads of households tend to spend more money on education than male householders.

4.7. Ownership of House

Another regional household attribute studied is home ownership. As the extended family system in Ghana continues to deteriorate, the nuclear family structure is increasing and nuclear family households that own their dwelling properties are expected to spend more on investments in family education than extended family households where the dwelling properties are jointly owned, [62], *ceteris paribus*. Robust marginal effect estimate shows that homeowners spend 1,336 cedis more on actual investments in family education in one year than household heads that do not own the properties. Heads of household in Ghana who own their homes can rent out part of it to generate income that can be invested in household education. Home ownership in Ghana is a social safety net. The estimate is correctly signed but not statistically significant.

The plotting of the conditional marginal effects is presented in Figure 1.



Source: From GLSS VII Data

Figure 1. The Ashanti region household education expenditure conditional marginal effects graphical plot.

5. Conclusion and Recommendations

The aim of this study is to examine some socioeconomic determinants of household education spending in the Ashanti region of Ghana. Using household-level data sourced from the GLSS VII in the Ashanti region. The study notes that households in the region spend around 57.1 percent of their annual education spending on basic education. The main results can first be best summarized by reporting that the variable household income showed statistical significance and positively correlates with education spending. Households in the region have positive spending on education for all three categories of education in the region, as household spending on education is an integral part of the household budget at any point in modern times [4, 58]. The education expenditures of urban households in the Ashanti region are positive and the household size in the region has a positive impact on education expenditures. In the Ashanti region, households with internet access spend less on annual education expenses than households without internet access. Heads of households who own their homes education expenditure estimated conditional marginal effect estimate could be taken as a proxy for the permanent income hypothesis as its positive estimate could confirm this.

However, there may be several other important factors driving household spending on education in the Ashanti region that could not be accounted for in the current study. For example, the household spending function in the Ashanti region could have been better estimated if factors such as school quality, type of educational institutions, institutional

governance and infrastructure, supply-side factors such as school choice and course, and institutional factors, as suggested by [4, 20]. The gender bias in household spending on education has also been a recent research topic, particularly in developing countries [15, 22, 39, 44, 77, 16, 45, 64] studies established that the sex of the household child is one of the most critical factors determining household educational expenditure in the context of developing countries.

However, the GLSS VII survey data used was not configured to test these estimates of household expenditure on education in the Ashanti region. Another limitation is that this is a regional case study and therefore does not provide a national comparison as such. Therefore, regional studies using similar variables are of great importance for the future research agenda from which more useful empirical statistics can be provided. Nonetheless, this study makes a valuable contribution to the existing literature as there is hardly any study on the Ashanti region examining the extent of household investment in education, although education is considered to be one of the main drivers of socio-economic development in the economy of the Ashanti region in Ghana.

This study could help the CGOG and the African Union Commission Agenda 2063, [14], the [53] implementation and other stakeholders involved in the development of the education sector in the Ashanti region to formulate better strategies, especially in light of the decreasing public budget for education by considering the contributions of households as key players in education investment in the Ashanti region. In policy terms, the Ashanti Regional Coordinating Council (ARCC) must take action to ensure that household spending is minimized from more than half of their total household edu-

cation expenditure on basic education only. With the availability of data, an important area of complementary research examining the changing relationships between estimates of maternal education, private tuition, and gender bias in household education spending in the Ashanti region is welcome.

Abbreviations

SDG	Sustainable Development Goals
CGOG	Central Government of Ghana
ARCC	Ashanti Regional Coordinating Council
GLSS VII	The Seventh Ghana Living Standards Survey

Author Contributions

Isaac Addai is the sole author. The author read and approved the final manuscript.

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Data Availability Statement

Data is available at a request to the Ghana Statistical Service.

Conflicts of Interest

The author declares no conflicts of interest.

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