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The impact of energy efficiency on performance in service sector

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Abstract: In this paper the emphasis is put on the specifics of energy efficiency impact on the profitability of the service sector, with special insight into trade. The theoretical and methodological presentations are illustrated by applying the comparative approach, on the original empirical data of the European Union and Serbia. To a certain extent, so as to thoroughly analyse the problem, we used the data from the surveys conducted in the United States of America, Canada and Russia. The results of empirical research show that energy efficiency in the service sector in Serbia is considerably lower than in the European Union and other countries with developed market economy. Given that, it is necessary to introduce appropriate measures to improve energy efficiency of the service sector in Serbia in the future. These are: modern energy technologies, increase of renewable energy share in total final energy consumption, reduction of energy consumption throughout the entire supply chain, reduction of carbon dioxide emissions related to the energy consumption, construction of energy efficient office buildings and retail facilities, and improvement of the existing. The ultimate effects of this are to improve profitability in the service sector in Serbia.

Keywords: energy intensity, renewable energy sources, energy management, green energy, final energy consumption

JEL codes: Q40, Q44, Q32, Q57

1. Introduction

In recent years considerable attention is paid to the impact of energy efficiency on the profitability of all companies, including service. It is quite understandable when one bears in mind the fact that energy savings, reduction of water consumption, reduction of emissions carbon dioxide with respect to power consumption, and waste treatment are major problems on the global level. Great attention is paid to the improvement of environmental protection in the context of sustainable development, and final energy consumption. Hence, from the standpoint of sustainable

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development we lay emphasis on specifics of the impact of energy efficiency on the performance in service sector. This theoretical and methodological research is conducted on the example of original empirical data of selected countries of the European Union and Serbia, as well as the United States, Canada and Russia.

In the context of the analysis of the impact of energy efficiency on the performance in service sector, special attention is given to the specifics of the trade energy efficiency, primarily the leading global food retailers, such as Tesco. In order to increase customer satisfaction, profits, and to achieve greater application of the concept of sustainable development, global food retailers develop special strategies for improving energy efficiency management, (water consumption, carbon dioxide emissions and food waste treatment). In order to achieve fully integrated accounting information system reports, special public reporting known as - sustainable reporting became a business practice in recent years. Sustainable reporting of the global food retailers (e. g. Wal-Mart) is increasingly becoming an integrated part of their annual reporting for which the public is interested in.

The research subjects presented in this paper are specific features and determinants of energy efficiency in the service sector. The aim of the work is thoroughly explore these issues, primarily on the example of selected countries. The emphasis is on food trade as one specific and important service activity.

There is growing body of literature on energy efficiency analysis in recent years. It is understandable when one takes into account the fact that energy efficiency is a key factor in the profitability of all companies. Nevertheless, existing literature dedicated primarily to the issues of energy efficiency in the service sector, with particular reference to food trade is not extensive. All relevant issues are still not sufficiently theoretically, methodologically and empirically researched. In that we find the scientific and professional opportunity for writing this article. It seeks to draw attention to most significant aspects of managing energy in the service sector, with special insight into food trade. In order to draw attention to the researched issues, theoretical and methodological presentations are illustrated with original empirical data from different countries. The research conducted in this and other studies show that the efficient management of energy can significantly reduce costs (total costs and energy costs), and thus increase profits in the service sector, including trade.

The paper presented hypothesis that efficient energy management significantly affects the improvement of the profitability of the companies, including service and trading. Consequently, it is suggested that special responsibility centre for energy management in all service companies should be organized. It would deal not only with the problems of energy efficiency, but also with the reduction of water consumption, carbon dioxide emissions related to the consumption of energy and, in broader sense, food waste treatment (in retail). A special report on energy efficiency should be compiled and it should be an integral part of the total annual reports of enterprises in the service sector. This is especially important for all trading enterprises, especially food. Its design could significantly improve the profitability of the service (trade) companies.

The research methodology of issues in this paper is based on the theory, norm and, in particular, comparative analysis of empirical data (indicators) of service sector energy efficiency, with a special insight into food trade of selected countries with developed market economy and Serbia. Within the applied research methodologies, indicators of energy intensity are very important, and to some extent specific to the service sector. Based on their comparative analysis it is very easy to perceive the energy efficiency and its impact on the profitability of the observed service companies, for example, food retailers (such as Wal-Mart or Tesco).

The empirical data were collected from different sources: literature, Eurostat, annual reports and other relevant statistics. To some extent, they undergo secondary processing in accordance with the aim of the research issues.

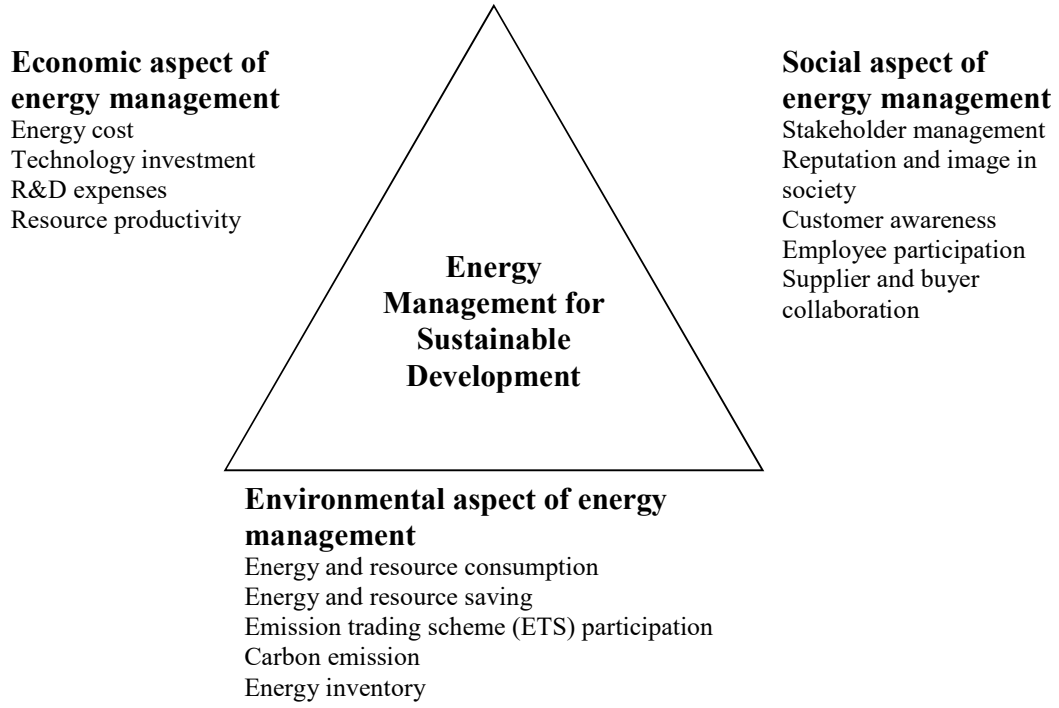
The limitation of this study is that empirical data on energy efficiency of service sector in selected countries are not comparable due to the unequal application of the methodology of production and the relevant regulatory frameworks. Nevertheless, it does not significantly diminish its importance. In its actuality, content and the treated manner, it should provide complete picture of the characteristics and trends of energy efficiency in the service sector, with special emphasis on trade at the global level and in Serbia. On this basis, we proposed appropriate measures to improve energy efficiency as a key factor in the profitability of service companies, especially food trade in the future. In that we find its scientific and professional contribution to the field of energy and sustainable development in the service sector.

2. Managing energy in the context of sustainable development

Considerable attention of the service sector is lately directed to improvement of energy efficiency management in the framework of sustainable development (Lukic, 2014d; Christina et al., 2015), and the emission of carbon-dioxide in the context of energy consumption. Energy management is increasingly treated as a separate centre of responsibility in all enterprises, including service (Lukic, 2011, 2012, 2013a, 2013b, 2014a, 2014b, 2014c, 2014d, 2015a, 2015b, 2015c, 2015d, 2015e, 2016; Vojteski Kljenak et al., 2015).

Figure 1 presents three aspects of energy efficiency and energy management in the context of sustainable development.

Figure 1. Energy management in sustainable development



Source: Lee, 2015.

In the context of sustainable development in the service sector, so-called “Green energy" significantly affects improving of the energy efficiency (AT Kearney, 2012).

The participation of the commercial sector in total final energy consumption is significant. It can be derived from the data on energy consumption in individual economic sectors in California in 2011: commercial 42%, agriculture 7%, residential buildings 33%, street lighting 1%, industry 14%, mining and construction 3% (Papamichael et al., 2015).

Also, the share of commercial sector in carbon dioxide emissions with greenhouse effect is very significant. It reached 10% in the United Kingdom in 2013 (Westminster Sustainable Business Forum and Carbon Connect, 2013).

3. Energy efficiency in the services sector of the European Union

In the recent years the European Union devotes significant attention to the development and application of the concept of sustainable development. In this regard, many published studies directed considerable attention to the analysis of energy efficiency. The goal of sustainable growth in the European Union for 2020 is 20% reduction of gas emissions which produce the greenhouse effect, compared to 1990; increased participation of renewable energy consumption up to 20%; and increased energy efficiency by 20% (Eurostat, 2015a) In line with this objective within the energy industry, a global strategy and policy of efficient use of available energy resources was defined.

The final energy consumption differs among sectors. Table 1 is an illustration and it shows final energy consumption by sector (in % of the total) in the European Union (EU - 28) for 1990 and 2013.

Table 1. Final energy consumption by sector (in % of the total) in the European Union (EU-28), 1990 and 2013

Sector	1990	2013
Industry	34,1	25,1
Transportation	26,3	31,6
Residential buildings	25,4	26,8
Agriculture/Forestry	2,9	2,2
Services	10,1	13,8
Other	1,2	0,5

Source: Eurostat, 2015a.

According to the data presented, service sector participates with over 10% in the European Union in the structure of final energy consumption. It can be significantly reduced by application of new

energy technologies and the use of solar energy. This will certainly have a positive impact on increasing the profitability of the service sector in the European Union.

4. Energy efficiency in the service sector in Serbia

The total primary energy production in Serbia in 2013 amounted 789.7 (in mtoe). As we observe it by energy type, it participated as follows: solid fuels 67.4%, oil 10.8%, gas 3.7%, nuclear energy 0.0%, renewable sources 18.1% and waste (non-renewable) 0, 0%. It is interesting that Serbia has significantly lower share of renewable energy in total primary energy production in relation to all EU countries (except the Netherlands and the United Kingdom in 2013) and neighbouring countries, with an expected tendency of their increase in the future (Eurostat, 2016a). It will definitely have a positive impact on increasing energy efficiency in all economy sectors, including service.

In Serbia considerable attention is in recent years paid to improving energy efficiency in all economic sectors. Table 2 shows comparative final energy consumption by sector in selected countries in the European Union and Serbia in 2013.

Table 2. Final energy consumption by sector in selected countries in the European Union and Serbia in 2013 (1,000 tons of oil equivalent)

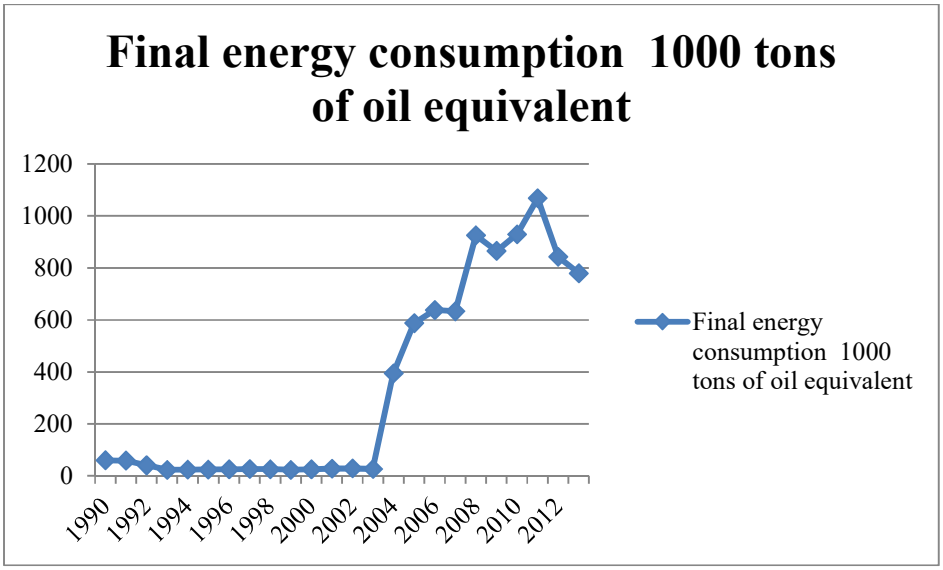
	Final energy consumption - total	**Industry**	**Transportation**	**Residential buildings**	**Agriculture / Forestry**	**Services**	**Other**
EU (28 countries)	1,103,813,3	276,637,6 25,1%	348,548,1 31,6%	295,876,5 26,8%	23,898,2 2,2%	152,541,3 13,8%	5,177,5 0,5%
Germany	217,251,4	60,736,6 27,6%	62,621,1 28,6%	59,697,9 27,2%	0 0%	34,049 15,7%	145,8 0,1%
France	152,056,5	30,025,3 19,7%	49,263 32,2%	43,678,9 28,3%	4,318,9 2,6%	22,997,3 14,5%	1,472,8 0,6%
Croatia	5,812,5	1,116,2 19,9%	2,037,9 34,9%	1,719,3 29,6%	197,5 3,3%	712 12,2%	0 0%
Slovenia	4,798,3	1,196,4 24,9%	1,865,4 38,9%	1,156,6 24,1%	74,7 1,5%	486,5 10,1%	18,7 0,4%
United Kingdom	136,432,4	25,709,9 18,4%	50,476,5 36,7%	40,208,3 29,4%	872,8 0,6%	17,667,3 12,5%	1,497,6 1,1%
Serbia 2013 - % 1990 - %	8,314,5	2,477,4 29,8% 38,9%	2,004,7 24,1% 14,1%	2,869,8 34,5% 24,8%	182,9 2,2% 0,6%	779,8 9,3% 0,5%	0 0% 21,1%

Note: Calculation of the percentage structure for Serbia performed by the Author
Source: Eurostat, 2016b.

The share of services sector in total final energy consumption in Serbia, as the data in the table show, is considerably lower than the European Union, Germany and France. It is also much lower in relation to comparable countries of the region - Croatia and Slovenia. In 2013, it amounted to 9, 3% and only 0.5% in 1990. Therefore, final energy consumption in the service sector in Serbia increased (Eurostat, 2016b).

In order to acquire the best perspective on the movement of final energy consumption in the service sector in Serbia**,** Figure 2 shows data for the period 1990 - 2013.

Figure 2. Final energy consumption in the service sector in Serbia 1990 – 2013



Note: The author's picture on the database - Final energy consumption by sector
Source: Eurostat, 2016b.

The Figure 2 show that during the observed period, final energy consumption in the service sector in Serbia has significant increase in recent years compared to previous. It is evident from Figure 4. The increase in energy consumption in the service sector in Serbia is causing an increase in energy costs and reduction in profits (at equivalent income). Given this, it is necessary to apply relevant measures, above all sustainable development (green energy) to improve energy management of the service sector in Serbia so as to increase their profitability in the future.

In addition to the quantitative component (kWh) price also affects energy expenses. The price of energy (electricity and natural gas) differs among countries. This is indicated by the data in Table 3.

Table 3. The cost of energy for industrial consumers in selected countries of the European Union, 2014

	Electricity price (kWh/euro)	Gas prices (kWh/euro)
EU-28	0,120	0,037
Germany	0,152	0,040
France	0,091	0,038
Croatia	0,092	0,040
Slovenia	0,085	0,044
United Kingdom	0,134	0,035
Serbia	0,067	0,038

Note: Kilowatt hour - kWh
Source: Eurostat, 2015b.

The price of electric power in Serbia is lower in relation to the (average) of the European Union and each of its observed members. The price of natural gas is slightly higher than the average of the European Union, France and the United Kingdom, but is lower compared to other observed countries. Such movement of energy prices for industrial consumers in Serbia is the result of very low economic activity (i.e. very high rates of underdevelopment of the economy compared to developed market economies, such as Germany, France and the United Kingdom, and many others in transition). In Serbia, as in other countries, there is a developed action plan for energy efficiency (Energy Community, 2014).

The energy savings in Serbia in the period 2010 - 2012 were 1.22% (Energy Community, 2014). It is expected that it will amount 4, 7% in 2015, with a tendency of increase in the coming years. The focus of energy efficiency is the use of modern energy technologies, significant increase of renewable energy sources in total final energy consumption (in 2020 by 27% compared to 21.2% in 2009), construction of energy-efficient office buildings, and improving conditions of the existing, so called “green buildings" (Energy Community, 2014). This will have a positive impact on increasing energy efficiency in all economic sectors, including service in which there are great opportunities for business under the principles of "green economy”, especially in the trade sector as its very important integral part.

Energy intensity indicator is used to measure energy efficiency. Energy intensity indicates how much (primary and secondary) energy is consumed per unit of the gross domestic product per capita of a country or area. Smaller energy intensity means - better use of energy and vice versa

(Gvozdenac et al., 2012, 2014). Table 4 shows indicators of energy efficiency and carbon dioxide emissions in the service sector for selected countries of the European Union and Serbia in 2013.

Table 4. Indicators of energy efficiency and carbon dioxide emissions in the service sector of selected countries in the European Union and Serbia in 2013

	Energy intensity (in terms of added value) (at purchasing power parity), unit koe per/$2005ppp	Electrical intensity (in terms of added value) (at purchasing power parity), unit kWh/k$2005ppp	CO_2 intensity (in terms of added value) (at purchasing power parity), unit kCO_2/2005ppp
European Union	0,016	89,5	0,018
Germany	0,018	77,4	0,026
France	0,016	98,9	0,017
United Kingdom	0,012	65,4	0,014
Croatia	0,018	133	0,013
Slovenia	0,015	114	0,011
Serbia	0,020	126	n.a

Note: Engl. at purchase power parity - ppp. Kilograms of oil equivalents – koe
Source: Economic Commission for Europe, 2014.

The data in the table illustrate that the energy intensity in the service sector in Serbia is significantly higher (lower energy utilization) in comparison to other EU and countries of the region. Annual growth: In 2013 it (0.020 koe / $2005ppp) increased by 0.8% compared to 2000 (0,018 koe / $ 2005ppp) (Economic Commission for Europe, 2014). Likewise, Germany, Slovenia, the United Kingdom and other comparable countries it is necessary to adopt appropriate measures so as to improve energy efficiency (reduction of energy intensity) in the service sector in Serbia in the future. Table 5 gives us deep insight into a given issue, shows the dynamics of energy efficiency and carbon dioxide emissions in the services sector in Serbia for the period 1990 - 2013.

Table 5. Dynamics of energy efficiency and emissions of carbon dioxide in the service sector in Serbia 1990 – 2013

	Unit	2000	2005	2009	2010	2011	2012	2013	2000/13 (%/year
Energy intensity (in terms of added value) (at purchasing power parity) – ppp)	Koe / $2006 ppp	0,018	0,019	0,024	0,025	0,028	0,022	0,020	0,8
Electrical intensity (in terms of added value) (at purchasing power parity) – ppp)	kWh / k$200 5ppp	178	160	134	134	133	131	126	-2,6
CO_2 intensity (in terms of added value) (at purchasing power parity) – ppp)	kCO_2	0,010	0,011	0,031	0,037	0,050	0,028	n.a.	n.a

Source: Economic Commission for Europe, 2014.

The data in the table show that in the service sector in Serbia energy intensity increased from year to year for the period 1990 – 2013 what, in other words, means that the use of energy was not at a satisfactory level. In the context of sustainable development appropriate measures should be taken in the future in order to improve energy efficiency in the service sector in Serbia.

In the reporting period, the electrical intensity in the service sector in Serbia has been decreasing from year to year, which means that electrical efficiency improved gradually. This growing trend should be continued in the future.

In the service sector in Serbia, carbon dioxide increased from year to year during observed time period. Considering this, effective ecological measures should be implemented in the future in order to reduce its emission.

5. Energy efficiency in trade

Very significant energy costs in retail. Thus, for example, "*approximately 657,000 retail buildings (stand-alone facilities, stripmalls, and enclosed malls) in the US consume more than $20 billion of energy each year*" (Jamieson, 2014). By replacing the existing technology and applying best energy management practices, annual energy consumption can be reduced by 3 billion dollars (Jamieson, 2014). Almost all research studies came to similar results in terms of energy consumption by

segment in the retail sector. Thus, for example, according to one study, the average percentage of energy consumption by segment in the retail food is: refrigeration - 48%, heating, ventilation and air-conditioning - 20% lighting - 18% and other 14% (Jamieson, 2014). Therefore, the higher energy consumption goes on refrigeration regarding the nature of assortment in the food retail sector. It could be significantly reduced by replacing existing ones with new energy efficient refrigeration systems. According to the same study, the percentage of energy consumption by segment in the non-food retail is: lighting - 50%, heating, ventilation and air-conditioning - 40% and other 10% (Jamieson, 2014).

Substantial energy savings could be generated by development of appropriate energy program in relation to heating, ventilation and air-conditioning and by using renewable energy sources. In the non-food retail primary source of energy is natural gas / other up to 33% and 67% electricity. Average consumption per square meter is 16.1 kWh (Jamieson, 2014). In terms of size, the average energy consumption per square meter in the so-called “big box stores” are: small (up to 5,000 square meters) - $ 1.42, medium (up to 50000 square meters) - $ 0.90 and large (over 50,000 square meters) - $ 1.40 (Jamieson, 2014). Significant energy savings can therefore be made for the small and large retailers, respectively. Among other factors, the electricity consumption in retail is also influenced by age and location of buildings in relation to the primary energy sources (Jamieson, 2014). Airfreight used for transportation in e-commerce for the transport of ordered products positively affects the energy efficiency of the logistics chain (Wang, 2014).

The share of trade in energy consumption differs among countries. So, for example, in the United States in 2006 commercial services sector participated in energy consumption as follows: 13% retail, service 13%, wholesale and storage 12%, offices 7%, other 18% (public assembly, food service, religious worship, education 37%) (Liu et al., 2011). Therefore, the share of total trade in energy consumption in the United States is significant. In the United States the average annual electricity consumption in retail is 14 kilowatt hours (kWh) and 31 cubic meters of natural gas per square meter of sales area (Business Energy Advisor). Structurally observed the percentage of energy use in retail buildings in the United States in 2006 amounted to: 35% heating, cooling 8%, ventilation 5%, lighting 35%, water heating 1%, cooking 1%, refrigeration 7% , office equipment 1%, computers 1%, others 8% (Liu et al., 2011). According to another study, the percentage of electricity consumption by end use in retail in the United States is as follows: lighting 53%, refrigeration 9%, cooling 13% ventilation 8%, heating 3%, computer equipment 1%, office

equipment 1%, water heating 1%, other 11%; and consumption of natural gas: 91% heating, cooking 3%, water heating 3%, other 3% note: the categories with a value of less than 1 percent are not shown (Business Energy Advisor). According to this data, lighting, cooling and heating participate in total energy consumption up to around 60% in retail. Energy costs participate in food stores with 15% of the operating budget. In these stores 1% of energy savings increases sales for $ 0.59 (Business Energy Advisor). All in all, despite the different results of particular studies, the improvement of energy efficiency is an important factor in increasing the profitability of trade, especially retail in the United States.

In the context of sustainable development, the issue of energy management in the retail sector is very important (Dangana et al., 2012; Schönberger et al., 2013; Dong et al., 2013). Thus, for example, "*off the almost 5 million commercial buildings in the U.S., retail buildings account for the largest energy costs – nearly $20 billion each year – and are also responsible for the second largest percentage of greenhouse gas emissions, leading to global climate change. By becoming more energy efficient, retailer s can increase the comfort of customers and productivity of employees, and achieve cost savings that enhance corporate profitability. By using the Environmental Protection Agency's (EPA) ENERGY STAR tools and resources, retailers can save money and fight global climate change by reducing their energy use through energy efficiency measures*" (ENERGY STAR). In the United States retail energy costs make up approximately 70% goes for lighting and heating (ENERGY STAR). All in all, by improving energy efficiency retailers can reduce costs, increase customer satisfaction and profitability, as well as reduce emissions of carbon dioxide in stores. The reduction of energy costs by 10% affects the operational income and increase sales by an average of 1.25% in the store (PEPCO) In retail, energy and services costs amount less than 5% of the total business cost. Their size is considerably affected by the nature of the retailer's business (i.e. type of store and goods which are traded). Given the nature of the business, they (energy costs) range between 5-10% of total operating expenses in retail of beverages, supermarkets, ironware and food shops (Australian Government 2014). Therefore, product category affects energy consumption in retail. In other words, the share of service costs or energy costs in total sales revenue differs among product categories.

"*With industry average net profit margins at less than 1%, it's critical for companies to take advantage of every opportunity to cut costs. In addition to refrigeration solutions, choosing more energy efficient solutions for HVAC and lighting can be a very cost-effective way for grocery*

store chains to expand margins and increase profitability" (LG Electronics U.S.A., Inc., 2011). According to the data presented in Table 6, they participate with 1.3% (in % of sales) in the food retail.

Table 6. 8 Firms Industry Income Statement (P&L)

	% of sales
Net sales	100%
Merchandise costs	74,4
Gross margin	25,6%
Operating, G&A costs	20,2%
Utility costs	1,3%
Adj. operating profit	2,7%
Net profit	0,4%
CapEx	2,2%

Note: FMI (Food Marketing Institute) net margin estimate: 0.95%. Industry P & L includes 8 companies: Kroger, Safeway, Supervalu, Whole Foods, Winn Dixie, Harris Teeter, Weis Markets, Spartan. Assessment of the services cost is based on FMI data.
Source: LG Electronics USA, Inc., 2011.

Similar participation is also in other studies. So, for example, energy costs participate in sales revenue with 1% in food retailing in Canada (Government of Canada).

In the United Kingdom, retail is a significant consumer of energy. Energy costs in retail in 2013 amounted to 3.3 billion pounds. According to a survey (conducted by the Carbon Trust) it is established that with reduction of energy costs by 20% retailers increase sales by 5% (Blake, 2015). This is achieved by replacing existing ones with new energy efficient equipment, improvement of energy efficiency (in existing and new constructed buildings) in retail outlets, as well as the total transition to a business under the principles of "green economy".

The share of trade in the structure of energy consumption in the service sector of Australia is also very significant. According to estimates, used energy in commercial sector in Australia in 2020 (in % of total) should be as follows: retail 28%, offices 20%, education 11%, community 8%, accommodation 8%, health 8%, wholesale 6%, food service 6% and other 6% (ClimateWorks Australia, 2011). In that, total participation of retail trade is 28% and wholesale trade is 6%, 34% total trade respectively. According to the estimates, the percentage of energy consumption by segment in the retail trade of Australia, in 2020 will be: heating, ventilation and air-conditioning 37%, lighting 23%, refrigeration 16%, appliances 9%, electronics 7%, water heating 6% and

cooking 2% (ClimateWorks Australia, 2011). Significant savings can, therefore, be achieved in the areas of heating and cooling by replacing the existing with the new energy-efficient technology and using renewable energy sources. Expected energy savings in the retail sector in Australia in 2020 in non-food retailing will be: energy waste reduction 10%, cooking 12%, refrigeration 13%, appliances 15%, insulation 16%, heating, ventilation and air-conditioning 16%, lighting 17%, heating, ventilation and air-conditioning positive interaction 20%, electronics 37% and water heating 48% and in food retail: heating, ventilation and air-conditioning 3%, cooking 4%, energy waste reduction 10%, refrigeration 13%, appliances 15%, lighting 16%, heating, ventilation air-conditioning positive interaction 20%, insulation 21%, electronics 37% and water heating 45% (ClimateWorks Australia, 2011). It will definitely have a positive impact on the overall performance of retail sales in Australia.

Efficient management of energy costs affects the profitability of trading companies. It is quite understandable given the significant share of energy costs in total sales, and total costs of trading companies, respectively. As an illustration, Table 7 shows a percentage share of expenditures on fuel and energy in the total costs of trade in Russia for the period 2005 - 2013.

Table 7. Percentage share of expenditures of fuel and energy in overall trade costs in Russia, 2005 – 2013

	2005	2011	2012	2013
Motor vehicle trade and repair	19,8	21,6	23,4	21,1
Wholesale, except motor vehicle	15,8	11,6	12,8	13,5
Retail, except motor vehicles	9,8	7,6	6,9	7,9

Source: Russian Statistical Yearbook, 2014.

According to the data presented in the table, percentage of expenditures of fuel and energy in total costs of trade in Russia is, therefore, significantly higher for motor vehicles and wholesale than in retail trade. It ranges from: motor vehicles trade 19.8-23.4%, wholesale trade 11.6-15.8%, and retail trade 6.9% - 9.8%. Given the importance and size of expenditures of fuel and energy is very important to establish a centre of responsibility for managing the energy costs in commercial enterprises in Russia in order to optimize them. This will certainly have a positive impact on increasing their profitability.

The share of energy costs in the cost of trade certainly differs among countries. This is affected by numerous controlled and uncontrolled factors. Table 8 shows the percentage share of materials, fuel and energy costs in operating income and operating expenditures of trade in Serbia in 2013 and 2014.

Table 8. Percentage share of material, fuel and energy costs in total operating revenues and operating expenditures of trade in Serbia, in 2013 and 2014

	2013	2014
Share in business revenues, %	3,77	3,91
Share in business expenditures, %	3,88	4,03

Note: Calculation performed by the Author
Source: Annual Agency for Business Registers, 2015.

According to the data presented in the table, cost of materials, fuel and power participated in total business revenue with 3.91% and operating expenses with 4.03% in 2014. It slightly increased compared to the previous year. As to optimize them in the future it is necessary therefore to increase the efficiency of management, in particular the formation of a special centre for energy management.

6. Energy efficiency in the food retail

Energy consumption, carbon dioxide emissions and loss of food in the food supply chain (agricultural production, processing, distribution, retail and consumption) is significant. For example, in the UK energy consumption (in % of the total) in the food chain is 18%, carbon dioxide emissions is 176 $MtCO_2e$ and 15 Mt of food loss (Tassou et al., 2014). In food chain, retail is significant consumer of energy and producer of carbon dioxide emissions. In developed countries it participates between 3 and 5% of total energy consumption. In the UK, retail food sale participates with 3% in total energy consumption (Tassou et al., 2014). According to estimates, the carbon dioxide emissions, arising from retail operations, ranges between 6 and 9.5 $MtCO_2e$ (Tassou et al., 2014). The reduction of energy consumption and carbon dioxide emissions is therefore a significant factor in increasing profitability in food retailing. In the United Kingdom, major supermarkets, such as Tesco, ASDA, Sainsbury's and Morrisons, achieved in 2005 lower operating margin of 4.2% on average based on the reduction in energy consumption (Spyrou et al., 2014).

The primary sources of energy in the food retail are electricity and gas. On the research on hypermarkets it is established that in the structure of energy consumption gas accounts for 20% (Spyrou et al., 2014).

In the food retail, carbon dioxide emission is very significant seen from the standpoint of energy consumption. Thus, for example, the total annual CO_2 emissions related to the consumption of energy in major food stores in the United Kingdom is about 4.0 $MtCO_2$ (Tassou et al., 2011). In the United Kingdom food retail sector accounts for more than 3% of the total energy consumption and approximately 1% of the total emission of carbon dioxide (Spyrou et al., 2014). The research on the case in 2570 food retailers which account for about 30% of the total number in the United Kingdom has found that 10% of energy savings contributes to reducing 355,000 tons of CO_2 emissions (Tassou et al., 2011, 2014).

It is estimated that the retail sector in Australia will produce about 2,52% of the total carbon dioxide emissions of greenhouse gases in 2020. It is associated with the consumption of energy (gas, wood, fuel and electricity) for heating, cooling, lighting and appliances (ClimateWorks Australia, 2011).

Energy consumption and carbon dioxide emissions are significantly higher in the wholesale and retail trade sector in China than in Japan (Yokoo et al., 2015). In Japan, retail sales participate with about 40% of total energy consumption in the commercial sector. Primary consumption of energy in food retail in Japan is 6,000 MJ / (m^2 per year) (Suzuki et al., 2011).

In any case, in order to efficiently manage the energy costs in the retail food it is necessary to know their size - the percent of their participation in sale. Thus, for example, energy costs in Canadian supermarkets are around 1% of sales (Government of Canada).

As in other countries, trade in Serbia has very significant energy costs. Table 9 shows the energy costs of selected trading companies in 2013. The first three deal with food products selling, and the remaining two with fuels and petroleum derivatives.

Table 9. Energy costs of selected trading companies in Serbia, 2013

	Sales revenue (in 000 dinars)	Fuel and energy costs (in 000 dinars)	Share of fuel and energy costs in sales revenue, (%)*
Delhaize Serbia	75,817,380	840,390	1,24
Mercator-S	59,252,435	930,213	1,56
IDEA	55,072,112	770,036	1,49
Knez Petrol	37,289,281	320,250	0,85
OMV Srbija	30,937,667	156,577	9,50

Note: * Calculation performed by the Author
Source: Business Registers Agency.

According to the data presented in the table, the costs of fuel and energy are much higher in the retail chains that sell food (ranging from 1.24% to 1.56%) compared to ones that sell fuel and petroleum products (in which it is less than 1 percent). Based on these data we can conclude that the energy cost in Serbian trade are higher than in countries with developed market economy. The reasons for this are very low energy management efficiency, insufficient use of modern energy-efficient technology and equipment, unsatisfactory improvement of energy efficiency in existing and slowed construction of new energy-efficient office buildings and retail facilities, as well as a slight use of renewable energy sources.

All global food retailers devote considerable attention to the reduction of carbon dioxide emissions related to energy consumption in order to improve their overall efficiency. We will illustrate this on the example of the famous retailer Tesco, which devotes significant attention to sustainable development and environmental protection.

In Tesco company food losses in the retail and distribution centres in the United Kingdom amounted to 55,400 tons, or 0.9% of total sales in the stores in 2014. Compared to the previous year they were reduced for 1,180 tons (Tesco, 2015).

Table 10 shows the dynamics of carbon dioxide emissions in the company Tesco for the period 2006 - 2014.

Table 10 . Emissions of carbon dioxide in Tesco company, 2006 - 2014

	2006	2013	2014
Global net carbon dioxide intensity (total net emissions kg CO_2e/m^2)	64,33	39,71	37,99

Source: Tesco, 2015.

The Tesco company total carbon dioxide emissions in 2014 amounted to 5.6 million tons of CO_2e. That same year, global net carbon dioxide intensity in stores and distribution centres in the Tesco decreased by 4.3% compared to the previous year, and by 40.9% in comparison to 2006 (Tesco, 2015).

Thus, the objective to reduce the carbon dioxide in this company is accomplished and the situation in this company is similar with its competition, such as Wal-Mart.

Energy consumption and carbon dioxide emissions depend on many factors, such as: type and size of store, business manner, assortment and interlinked cooling, climate zones and environment control system. Due to its economic importance, the majority of global retailers developed their own models of energy efficiency (Allcott, 2014), power management strategies and established special centres responsible for energy management. On this basis, they accomplish significant energy savings, lower energy costs, what positively affects their overall performance (Määttänen et al., 2014).

Special system of indicators of energy performance is developed for retailers. These are: specific energy generators expressed in kWh/m^2 per year, primary energy use expressed in kWh/m^2 per year, specific energy consumption expressed in kWh/m^2 per year, consumption of green energy %, and carbon dioxide emission (expressed in appropriate measure unit, for example, kg). Also, internal energy performance indicators in retail are developed (such as, monitoring of power consumption by purpose: heating/cooling surface, cooling, lighting, etc., with detailed control of each energy segments, such as heating/cooling surface - heating loss in office building and shop, W/m^2) (Martos-Galvey et al., 2013).

There are a number of actions to improve energy efficiency in the context of sustainable development in retail. These are: energy efficiency of operations; use of renewable energy sources in business; increase of product portfolio within the energy efficiency; collaboration with suppliers to improve energy efficiency of the supply chain; and reduction of packaging and packaging waste (Accenture, 2012). Integral application of these measures contributes significantly to improving energy efficiency in retail sales, which had a positive impact on its overall performance.

In order to improve energy efficiency in retail stores, at the closing of the research of treated issues, we should know the following: retail companies spend up to $ 20 billion of energy every year; reduction of energy costs by 10% may increase: net profit by 1.55% and sales per square meter for $ 25 in discount retail stores, net profit by 4% and sales per square meter for $ 17 in restaurants, net profit by 16% and sales per square meter for $ 44 in supermarkets (U.S. Small Business Administration).

7. Conclusion

Energy efficiency has recently become a major factor of profitability in all sectors of the economy, including service sector. Given that, many theoretical, methodological and empirical ways are being continually explored to improve it. There are significant opportunities to improve energy efficiency in all sectors of the economy so as to improve their profitability. The research of the service sector of the European Union and Serbia in this paper has shown that energy efficiency is much higher in the EU than in Serbia. Therefore, it is necessary to take all relevant measures in the framework of sustainable development in Serbia in the future so as to improve energy efficiency in the service sector, including trade. Primarily, these include: use of modern energy efficient technology, renewable energy sources, improving energy efficiency of office buildings and stores, the reduction of carbon dioxide emissions related to energy, defining the purpose and plan adequate power management strategies, business based on the principle of "green economy", and others.

In food trade, energy costs participate in sales with around 1%. In this respect, there are differences from country to country. They are, according to the analyzed empirical data, much higher in the food trade in Serbia than in countries with developed market economy. In order to increase profitability, reduction of energy costs should be implemented. This can be achieved by replacement of existing heating, refrigeration and cooling systems with new energy efficient, and improving energy efficiency by better insulation in existing and new office buildings and food stores. All in all, greater application of the concept of sustainable development in trade Serbia also results in increasing energy efficiency.

Because of the importance of energy costs in the retail food, it is important to take appropriate measures to ensure their reduction as a very important factor in increasing profits. These measures may be of a different nature. Thus, for example, sustainable ways to save energy

costs in the retail food are: efficient lighting, cooling, heating, energy management and initiative for increasing the renewable energy sources use. This certainly includes the use of new energy efficient technologies and construction of energy efficient office buildings and stores in food retail sector (with continual improvement of existing ones).

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Wpływ wydajności energetycznej na kondycję sektora usług

Streszczenie

W niniejszym artykule nacisk położono na specyfikę oddziaływania wydajności energetycznej na rentowność w sektorze usług, a zwłaszcza handlu. Zagadnienia teoretyczne i metodologiczne są prezentowane poprzez podejście komparatywne, przy wykorzystaniu oryginalnych empirycznych danych Unii Europejskiej i Serbii. Do pewnego stopnia, aby dokładnie przeanalizować poruszany problem, wykorzystano dane z badań ankietowych przeprowadzonych w Stanach Zjednoczonych Ameryki, w Kanadzie i Rosji. Wyniki badań empirycznych wskazują, że wydajność energetyczna w sektorze usług w Serbii jest relatywnie niższa aniżeli w Unii Europejskiej i innych krajach z rozwiniętą gospodarką rynkową. Mając to na uwadze, należy przedsięwziąć odpowiednie kroki, aby podnieść wydajność energetyczną w serbskim sektorze usług w przyszłości. Sugerowanymi środkami są: nowoczesne technologie energetyczne, wzrost udziału odnawialnych energii w całkowitej konsumpcji energii, ograniczanie zużycia energii w całych łańcuchach logistycznych, redukcja emisji dwutlenku węgla wynikającej z konsumpcji energii, tworzenie nowych, wydajnych energetycznie oraz modernizacja już istniejących budynków. Końcowym rezultatem tych działań ma być poprawa rentowności sektora usług w Serbii.

***Słowa kluczowe**:* natężenie energii, odnawialne źródła energii, zarządzanie energią, zielona energia, ostateczne zużycie energii.