Mobile Android APP Proposal Using an Inventor Platform Applied to Energy Efficiency and Sustainability

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Abstract

This paper reports on the implementation of the efficient Manaus project, with the objective of developing a mobile application that expires on energy saving, related to environmental issues, since energy production, advanced natural resources. This application is designed to be used in a residential unit to provide residents with information on formula applications that explain the generation and energy expenditure of household electrical appliances, use or usage tests, and usage of the device. lowering values and minimizing the use of environmental resources. Thus, through a process of raising awareness of the knowledge gained from research in recent years, as well as providing quality content and ease of access, use the Google platform "APP INVENTOR" as a framework for testing results. Therefore, compile information on the best use of energy from a variety of information, including the elaboration of a Quiz, which addresses questions such as: where does electricity come from; tariff flags; efficient equipment; and electricity security, implemented in the application where they were supported by tools such as cartridges, and information from the agencies that reference each of these themes. This mode generates positive expectations for the future, which can create numerous other applications with information that helps to understand products, processes, changes in the sustainability context, to minimize impacts by new technologies.

Keywords: APP INVENTOR; Technological development; Natural resources;

1. Introduction

Human evolution proceeded rapidly, changing the ways of man, who stopped the habit of hunting during the day and sleeping at night soon after discovering fire, the first artificial way to produce lighting and air conditioning systems. However, this mode of illumination has brought great benefits.

Various types of handcrafted inventions that made life easier were hand-held, today they have become complex equipment that works by means of electricity. In this way there was an increase in electricity consumption and to meet the needs there was also an increase in the use of fossil fuels to generate energy, world crises that reduced this consumption and consequently world crises that showed the sensitivity of production and forced to reduce consumption. .

This was only possible with environmental awareness projects, energy efficiency, ABNT NBR standards, and ISO, PROCEL, INMETRO certifications, where without technical and scientific monitoring in the elaboration of such items, it would not be possible to obtain an improvement in the projects, current products and services.

Due to the growing demand of the population for many products and processes even with interventions, the lack of supervision causes urban centers to grow irregularly.

The energy crisis that occurred in 2001 caused the population and the government to look for alternatives that would be beneficial and consequently reduce their expenses in the generation and consumption of electricity. Thus, it seeks to reduce consumption, increase the appreciation of real estate and safety against: shocks, short circuits and bad weather. Therefore, through this information is justified the creation of an application to facilitate access to information, which is often difficult to access or understand, to monitor all consumption of energy use.

Thus, given the current need for effective energy efficiency in the residential sector, proven by the lower investment cost and less polluting when compared to the generation of energy obtained from fossil fuels (current matrix) can be diagnosed and created mechanisms for the planning of power generation and equipment, economically viable in order to collaborate with the environment.

We cannot talk about sustainability without presenting the whole process of change that began in the eighteenth century with the industrial revolution, replacing such crafts with machines. It is currently undergoing new changes, replacing the man who complemented the work, linked to the reduction, indicating a new change of habit.

This change in habit, given sustainability, arose in Stockholm in 1972, at the UN conference on the environment, in which Brazil participated, based on contrary ideas from international demands, for new methods to mitigate the environmental damage caused. However, the scenario of the time was alarming and generated protests and news on journalistic pages, such as the change in the color of the sky, waters outside of potability standards, crisis in public health, damage to fauna and flora (DUARTE, 2015).

Between sustainability and profit the Brazilian industry, the country always aimed at profit without caring about sustainability, indicating a process of returns. However, the population, especially those who lived around the industries, felt harmed and the industry was forced to change its practices, reinforced by the Brundtland report of 1987, which at the time was innovative, thus showing the first signs. of the economic tripod, which characterized the economy, the environment and society, presenting a perfect symbiosis for

industrial evolution as a whole.

With the increase in the life expectancy of the population came the exponential increase in the value of energy, food and environmental impacts, as well as the technological dependency of developed countries, generating indebtedness that keeps underdeveloped countries without credit, reducing investments and innovations, highlighting the chaos in the economy, tending to slow growth. In this context, the world must revise its model of unbridled consumerism habits that generates increase in production and reduction of natural resources (MARTINE; ALVES, 2015).

In the 1950s, research was already being done on the population's consumption habits, mainly coming from the family itself. However, what really influenced and impacted the change in behavior was the massive dissemination in the media, in which there was exposure of products that facilitated manual labor, highlighting the need to obtain that product in past decades, which lasted for years. However, they have been replaced by increasingly less resilient products with a shorter shelf life, forcing society to consume increasingly using limited resources.

This formation of the consumption habit begins in childhood, which regardless of social class, impacted by the media, the society that teaches how to consume and the family that has been influenced by other generations, generating a vicious cycle between different times (PASDIORA; BREI , 2014)

It should be noted that the great and impacting destruction of natural resources is increasingly being done in the same condition in current history and by applying it we will have less than 1% of human history, which is already questioning: if we have the same From time to time, will we be depleted of resources or evolve to positive technological development? Thus, the favorable prospects towards sustainability should be targeted, even if gradually.

The joining of several notable inventors has generally contributed by making a specific technological leap, playing an important role in today's society. This technological impulse has changed the perspective in the social and marketing areas, either through the rush of new development techniques or the change in society's habit associated with products and services, which occurs surprisingly and quickly (LARA, 2017).

Massive industrialization in the nineteenth and twentieth centuries, with still little related research, and the lack of technology in the twenty-first century brought about an unpleasant reality of the inherited impacts of the past two centuries. However, in recent years, with the increase in sustainable technologies and practices that the industry has been adopting including the valorization of companies that use these means, it is possible to critically observe companies that do not follow these standards and that are basically obliged to plan change to reduce impacts, generating expectations of change.

However, many midsize and small businesses fail to follow these environmental practices, due to the cost of implementation, and the reliance on larger companies seeking certification, especially suppliers of raw materials, service providers that are forced to obtain these standards. to enter the international market, indirectly causing the search for standardization to ensure in the market.

Importantly, in order to contribute to competitiveness, as well as to receive economic benefits and favorable results for an efficient environmental management, it is necessary to produce good “eco-innovation” strategies and to list the factors arising from these decisions and organizational objectives (CROTTI; MACANEIRO, 2017).

The main changes evidenced occurred more frequently in large companies, such as standard procedures for

systematic quality control, quality management and environmental management (TAHIM; DAMACENO; ARAÚJO, 2019).

Not only has industry been standing out as a sustainable practitioner, but society is aware that it has an important role to play in the changes that have taken place over the last decades, not only by trying to have environmental practices, but by highlighting the possibilities for savings, especially in the electricity sector, one has the biggest expense and one of the biggest technology developers. Today, man is becoming more and more energy-dependent, and able to have good practices and efficient product development to ensure the use of resources for future generations.

However, Brazil suffers major difficulties in research and technology development, making it less and less competitive, weakening the industrial sector in this development process, making the evolutionary and competitive process in the international scenario difficult (LOPES, 2018).

Brazil awoke to the real importance of energy efficiency in the 1980s where exactly in 1981 the CONSERVE program was created and the following year the energy mobilization program; In 1985, the National Electricity Conservation Program was implemented. in 1991 the national program to ration the use of petroleum derivatives and natural gas; and finally, the national energy policy in 1997.

Even with the national energy policy came the 2001 crisis, which originated Law 10295/01 that deals with the conservation and rational use of energy and soon after the decree that indicated the maximum levels of energy consumption and the minimum of efficiency. energetic.

To encourage practice in 2009, commercial, public and service buildings could be certified through the energy efficiency certification program. The electricity sector made a significant advance in 2012, which with the electric power compensation system was able to generate its own clean and renewable energy, releasing a fraction of the system and favoring incentives in micro generation, which through resolution 687, No. 482 , updated in 2015, increased this generation and the duration of the credits.

Almost five decades after the introduction of energy efficiency laws and incentive programs, Brazil is far from being an example to be followed. To avoid the risk of a possible suppression of supply, priority should be given to the development of stricter energy conservation laws, encouraging rational use with a primary focus on industry modernization and policies to combat waste (ALTOE, 2017).

One of the main focuses on reducing environmental impacts, which encompasses a wide range of practices that can be evidenced in modern society, culminates in the process of energy efficiency, becoming one of the most economically viable means for current solutions.

Another reason observed in this process, given that there is an increasing concern about the rational use of electricity, given that government funds are becoming smaller in the electricity sector and that are in opposite flow to population growth, becoming dependent on the means. energy sources (SALVATERRA, 2016).

In a residence, several items can be pointed out so that a good practice of energy efficiency can be worked on, and become solutions for a better efficiency to adapt such measures.

According to COPEL (2019), the three largest consumers of electricity in a residence in 2011 were electric shower, lighting and the refrigerator, highlighting these items, comparing them with the changes that occurred from this period to the current one. such as air conditioners, which relatively have a significant portion in a residence.

Current data provided by the Climate Observatory website (2019); it is noted that air conditioners currently top the list of the largest consumers. With warmer summers, the use of this device is increasing, its demand is expected to triple by 2050 as well as the use of new technologies such as computers, video games, SMART TVs, facilitating the use and installation of these devices, adding more and more load. in domestic demand.

What can be changed quickly and safely without any third-party workmanship are LED bulbs, which are increasingly present in the market, and where most come with socket pattern E27 that can be easily replaced by removing the higher consumption value, such as incandescent and fluorescent, as stated by Santos et al. (2015). The LED provides an absolutely cost effective duration, lasting in hours that can reach 50 thousand hours, and a consumption of up to 82%, greater than an incandescent one.

Currently LED lamps are becoming more and more viable, a few years ago a lamp with a poor lighting was around 150 reais, currently a lamp with a very good efficiency around 810 lumens costs an average of 10 reais (free market). , 2019), this is positively beneficial, as increases in the brands that make the lamps generate competition and low prices, thus helping ease of purchase, contributing to the energy efficiency of a home.

Another highlight, due to the increasing artificial demands, are the air conditioners, which obtained an exponential increase due to the high temperatures, mainly due to the heat islands as evidenced by Correa (2016) in studies that report the temperature differences in urban environments. , contributing to the increased use of these devices.

Demand for artificially acclimatized environments causes a large external impact that due to heat exchanges increases the volume of temperatures outside controlled environments (Kruger and Drach, 2017), this increase decreases energy efficiency in less efficient environments around them, because as stated by Brugnera (2019), depending on the variation of external temperature, high indices, and an increase in energy consumption.

Evidencing this fact we can mention several programs, websites and methodologies that help in the assessment of consumption, energy efficiency, methods and habits that reduce the impact on the environment, however often these technological resources are scattered and are hardly in one model, in this In this context, we sought to create from the “APP inventor” a web platform that creates applications via android (ANDROIDPRO, 2019), which reports on the ease of producing applications that help people's lives, knowledge about energy efficiency and their understanding. from the environmental need, where it can be predicted expenses.

2. Materials and Method

An exploratory analysis was used to elaborate an application, where from the data collection, mechanisms were created for the use of energy production information, characterizing the quality of electric energy per device, addressing the themes of energy efficiency. , power generation, interactive quiz, safety tips.

We used the program "APP inventor", a platform from Google, which compares an irregular residence with one that follows the efficiency standards, addressed in the mobile application.

The choice of the “inventor APP” was due to the ease of programming, where you do not need to have

experience with programming language, because it works with assembly of blocks, including the option of interaction of assembly in real time, with the Smartphone via USB or QR-code, for easy layout of the application interface.

Information has been implemented based on regulatory standards that may highlight the real importance of installations in ABNT NBR 5410 standards and the correct management of energy using ISO 50001 energy efficiency and booklets.

3. Results and Discussion

To create in the "inventor APP" there are four main tabs that showed you step by step: the first is the main palette, where you can find all the content that can be added to a screen: how to insert screen image, subtitles, lists, buttons , among others; All of these items are attached on the viewer tab, where you have a simulating screen, on a smartphone. All created content stays on this screen to make adjustments. As needed, the remaining two tabs correspond to components and properties, where you can insert the images contained in your gallery, change letters, colors and sizes of the selected items.

The programmable main part is in the block part, where clicking on it changes the screen layout, without this part you cannot “run” the application on an android system. In computing several commands are used to program, however in the "APP inventor" to be didactically effective separates the main content, control, logic, math, text, lists, colors, variables and procedures, where the entire application revolves around these items.

For the creation of the application, the main items will be the organizers, images, captions, buttons, creating several screens with educational and technical content, and in the programmable part, will be used a set of controls and texts, in which the main controls will be the buttons where clicking will direct the user to other content screens, and the text to specify the selected screens. All content will be programmed automatically with the help of logic blocks.

Finally, upon application completion, what will be learned from the information available when using the application from a quiz with questions related to energy efficiency to know if the application will have a positive effect on the social and environmental.

The present generation lives immersed in the technological world, and increasingly moves away from the physical means of obtaining information. Based on this precept, the creation of digital content focused on a topic of relevant importance, energy efficiency, to indicate the impact on the use of natural resources.

Currently, the energy issue is in the opposite direction of the environmental area, where it is necessary to implement means to educate, aiming at the interests, which seeks the reduction through tools that facilitate the conscious use of this resource, reducing its impacts on the environment (BALLESTEROS-BALLESTEROS; GALLEGO-TOWERS 2019).

To this end, the application entitled “Manaus Efficient” becomes a useful tool for reducing the impact on the environment, where it seeks to guide users to have practices in the digital environment, leading to the physical reality, the relationship of rational use of energy with the environment. use of natural resources and financial losses if this does not occur (Figure 1).

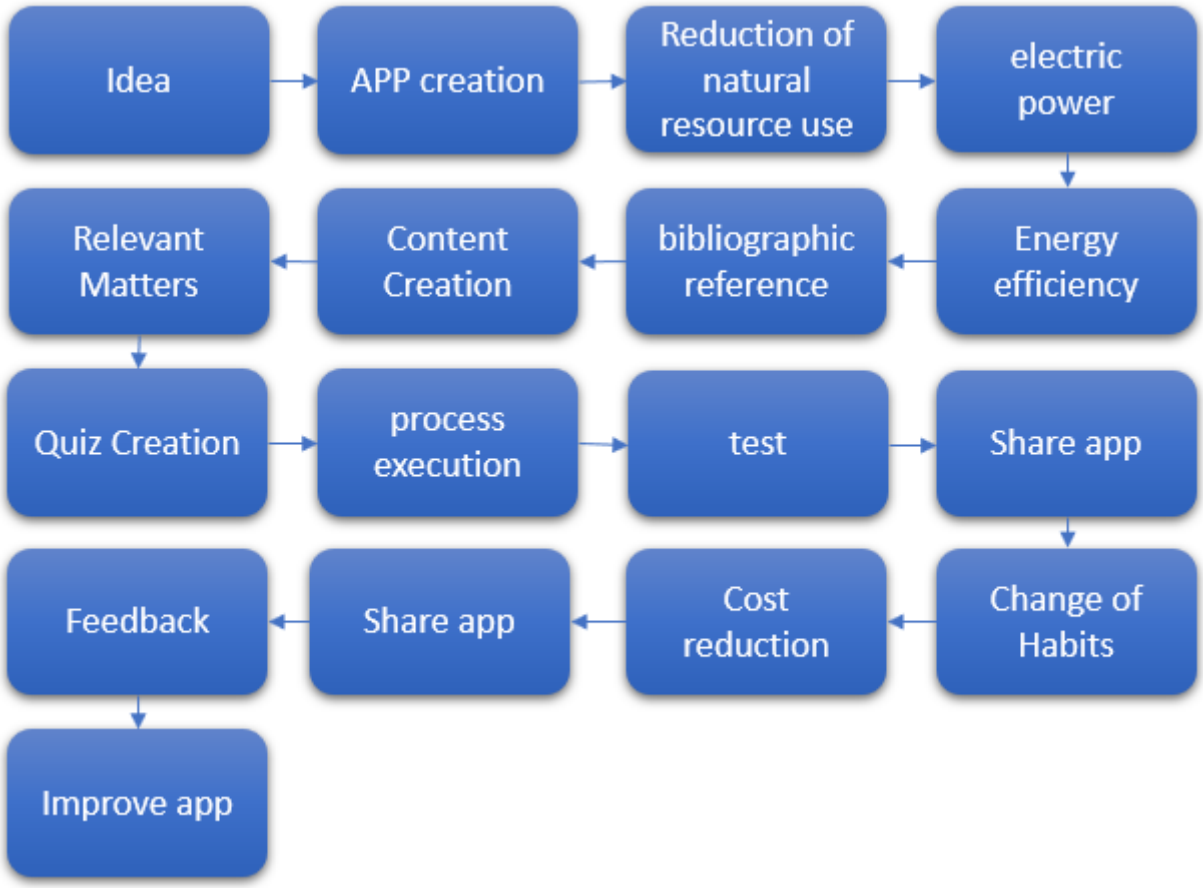

Figure 1. Efficient Manaus APP Creation Flowchart.
SOURCE: CASTRO (2019)

According to Rodriguez-Gomez (2019), the speed with which new technologies are advancing and with an increasingly connected world, where acceleration is faster than our thoughts. We must harness these resources for sustainable development, where we can face the world's high progressivity without impacting resources.

Thus the “Manaus efficient” application was developed in the middle and with digital reference, seeking to benefit its users through the mobile platform, benefiting from the internet of things (IOT), especially given the great use of this medium, which is currently had. as essential.

Increasingly we must look for ways to facilitate the processes, being able to highlight any and all areas, the ease and quantity of platforms that help to put ideas into practice, and each one should develop these practices, especially in the environmental area, where One can highlight the environment of the playstore, which even with few tools that help in the issue of energy efficiency, where the theme is directly related to the use of natural resources, can create new creative tools and make it available in the market quickly. and efficient.

4. Conclusion

The development of the present study made it possible to analyze the different contents about the tools for using energy efficiency, the facilities and obstacles found in developing this content, and the use of didactic

resources to assess its learning. In general, there are many difficulties in addressing important topics, besides the lack of interest and even the difficulty of obtaining these tools contributes to this statement.

The elaboration of this tool facilitates the interest on the subject and adds up to the few contents available in digital media, helping in the development of best practices and collaborating for new ideas that reduce impacts.

Given the importance of these models and / or tools generated, it is necessary to continuously update the theme and other contents, which can guarantee the quality and advances without impairing the efficiency of the model, in accordance with the need for understanding the consumption and energy demand and the use of natural resources, benefiting society.

5. References

ALTOE, Leandra; COSTA, José Márcio; OLIVEIRA FILHO, Delly; MARTINEZ, Francisco Javier Rey; FERRAREZ, Adriano Henrique, & VIANA, Lucas de Arruda. Políticas públicas de incentivo à eficiência energética. Estud. av., São Paulo, v. 31, n. 89, p. 285-297, 2017.

ALTOE, Leandra; OLIVEIRA FILHO, Delly; CARLO, Joyce Correna. Análise energética de sistemas solares térmicos para diferentes demandas de água em uma residência unifamiliar. Ambient. constr., Porto Alegre, v. 12, n. 3, p. 75-87, Sept. 2012.

ANDROIDPRO, App inventor: guia de criação de Apps. Disponível em <https://www.androidpro.com.br/blog/desenvolvimento-android/app-inventor/>. Acesso em 14 de jun. 2019.

BALLESTEROS-BALLESTEROS, Vladimir Alfonso; GALLEGO-TORRES, Adriana Patricia. Modelo de educación en energías renovables desde el compromiso público y la actitud energética. Rev. Fac. ing., Tunja. v. 28, n. 52, p. 27-42, Dec. 2019.

BRUGNERA, Rosilene Regolão; MATEUS, Ricardo; ROSSIGNOLO, João Adriano; CHVATAL, Karin Maria Soares. Escritórios de planta livre: o impacto de diferentes soluções de fachada na eficiência energética. Ambient. constr., Porto Alegre, v. 19, n. 3, p. 295-315, Sept. 2019.

COPEL. Uso eficiente de energia na sua casa. Companhia Paranaense de Energia. 2011. Disponível em <http://www.copel.com/hpcopel/root/nivel2.jsp?
endereco=%2Fhpcopel%2Fresidencial%2Fpagcopel2.nsf%2Fdocs%2F9C83B5131AF54B1B032573EC005D8B0D>. Acesso em 10 jun. 2019.

CORREA, Polari Batista; CANDIDO, Luiz Antonio; SOUZA, Rodrigo Augusto Ferreira de; ANDREOLI, Rita Valéria; KAYANO, Mary Toshie. Estudo do Fenômeno da Ilha de Calor na Cidade de Manaus/AM: Um Estudo a Partir de Dados de Sensoriamento Remoto, Modelagem e Estações Meteorológicas. Rev. bras. meteorol., São Paulo, v. 31, n. 2, p. 167-176, June. 2016.

CROTTI, Katiane; MACANEIRO, Marlete Beatriz. IMPLANTAÇÃO DA ISO 14001:2004: ESTUDO DE CASO DE UMA INDÚSTRIA DE PAPEL DA REGIÃO CENTRO-SUL DO PARANÁ. READ. Rev. eletrôn. adm. (Porto Alegre), Porto Alegre, v. 23, n. 2, p. 274-305, Aug. 2017.

DISCUTINDO SUSTENTABILIDADE. Disponível em <http://discutindo sustentabilidade.blogspot.com.br/2014/07/economia-de-nergialampadas.html>. Acessado em 10 jun. 2019.

DUARTE, Regina Horta. "Transforme-se em poluir": Aterro de energia e modelo de desenvolvimento não "milagre" brasileiro (1967-1973). Tempo, Niterói, v. 21, n. 37, p. 64-87, junho de 2015.

KRUGER, Eduardo; DRACH, Patricia. Quantificação dos impactos da climatização artificial na sensação térmica de transeuntes em termos de alterações no microclima. Urbe, Rev. Bras. Gest. Urbana, Curitiba, v. 9, supl. 1, p. 301-312, Oct. 2017.

LARA, Jose Edson; LOCATELLI, Ronaldo Lamounier; SANTOS FILHO, José Olímpio; BAHIA, Eduardo Trindade. Do encanto à vingança: o processamento e o comportamento do consumidor sobre informações de atributos de produtos tecnológicos. Perspect. ciênc. inf., Belo Horizonte, v. 22, n. 4, p. 157-176, Dec. 2017.

LOPES, Herton Castiglioni. O Brasil não novo milênio: ajuste, progresso técnico e novo desenvolvimentismo. Econ. soc. Campinas, v. 27, n. 3, p. 1029-1052, dezembro de 2018.

MARTINE, George; ALVES, José Eustáquio Diniz. Economia, sociedade e meio ambiente no século 21: tripé ou trilema da sustentabilidade? Rev. bras. estud. popul., São Paulo, v. 32, n. 3, p. 433-460, Dec. 2015.

MERCADOLIVRE, Lâmpadas LED e27, 2019. Disponível em <https://lista.mercadolivre.com.br/lampada-led-e27#DA:lampada%20led%227>. Acesso em 12 de jun. 2019.

Observatório do clima. Ar condicionado deve triplicar a demanda por energia até 2050, 2018. Disponível em <http://www.observatoriodoclima. eco.br/consumo-de-energia-partir-de-modelos-de-ar-condicionado-deve-triplicar -ate-2015/>. Acesso em 08 out. 2019.

PASDIORA, Maria Alice; BREI, Vinicius Andrade. A formação do hábito de consumo infantil: uma análise crítica da Teoria de Consumo de Status aplicada às classes sociais altas e baixas no Brasil. Organ. Soc., Salvador, v. 21, n. 68, p. 789-813, Mar. 2014.

RODRIGUEZ-GOMEZ, Rodolfo. Internet de las cosas: Futuro y desafío para la epidemiología y la salud pública. Univ. Salud, Pasto, v. 21, n. 3, p. 253-260,Dec. 2019.

SALVATERRA, Guilherme; SANTOS, Ângelo; MORAES. Roberto; MORAES, RONAN; LIMA, Honório Capistrano. Eficiência Energética Residencial. Rev. Científica Semana Acadêmica. Fortaleza, ano MMXVI, Nº. 000079, 27/01/2016.

Disponível em: https://semanaacademica.org.br/monografia/eficiencia-energetica-residencial. Acessado em: 10/06/2019.

SANTOS, Talía Simões dos; BATISTA, Marília Carone, POZZA, Simone Andréa; ROSSI, Luciana Savoi. Análise da eficiência energética, ambiental e econômica entre lâmpadas de LED e convencionais. Eng. Sanit. Ambient., Rio de Janeiro, v. 20, n. 4, p. 595-602, Dec. 2015.

TAHIM, Elda Fontinele; DAMACENO, Marlene Nunes; ARAUJO, Inácio Fernandes de. Trajetória Tecnológica e Sustentabilidade Ambiental na Cadeia de Produção da Carcinicultura no Brasil. Rev. Econ. Sociol. Rural, Brasília, v. 57, n. 1, p. 93-108, Jan. 2019.