Analysis of the Contribution of the Competence-Based Agriculture Curriculum towards Promoting Innovative Agri-preneurship Among Junior Secondary School Students in Kenya

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Abstract

The continued rise in youth unemployment evident from the surging cases of rural-urban migration culminating to social crimes, mushrooming of slums, HIV/AIDS and the never- ending vicious poverty cycle prompted the Kenyan government to change its education system from the 8-4-4 to the current 2-6-3-3-3 which is considered to take a more pragmatic approach to the teaching of vocational subjects such as Agriculture. With the 2-6-3-3-3 system being deemed fit to produce skillful youth who will significantly contribute to the economic development of the country, this study narrowed down to analyze the possible contribution of the competence-based agriculture curriculum towards promoting innovative agripreneurship among junior secondary school students. The study heavily relied on reviewing the most current and relevant literature linking competence based agricultural education to youth innovation and agripreneurship conducted for a 7-month duration between February and September 2024. Scholarly databases such as Google Scholar, PubMed, Scopus, Science Direct, John and Wiley, Taylor and Francis were used as the sources of secondary data for the study. The journal articles selected for the study were first verified to meet specified criteria such as written in English, have empirical data, focus on Competence-Based Education, agripreneurship and innovation among students and published in peer-reviewed journals. A total of 47 articles were used as sources of secondary data. In addition, content analysis of the grades 7 and 8 Agriculture and nutrition curriculum was also used as a source of data. The study established that Competency Based Agriculture promotes innovation and agripreneurship among learners. The study also established that the Junior Secondary Agriculture and Nutrition Curriculum covers much content promoting innovative agripreneurship. The study therefore recommends that teachers of Agriculture as the curriculum implementers should make efforts to implement CBA agriculture in a practical manner.

Keywords: Innovative Agriprenureship; Agriculture Subject; Curriculum Implementation; Junior Secondary School; Competence Based Curriculum

Introduction

The agriculture sector has been for centuries and still remains to be the most important economic sector to the human race. Civilization of humankind began when our nomadic ancestors abandoned their nomadic way of life characterized by hunting and gathering and began to domesticate animals and cultivate crops use of simple hand-held tools (Fuseini, 2020). Over time, as the human population grew and technological advancement in agriculture improved to meet the dietary needs of the rising human population, some of these settlements ostensibly morphed into towns, cities and later into formidable kingdoms (Otache, 2017). Notable examples of such ancient settlements that thrived from engaging in agriculture and stood the test of time to epoch human history include the much-fabled ancient Egypt whose inhabitants made use of the fertile silt along the Nile River for farming and Mesopotamia that benefitted from the fertile soils between the rivers Euphrates and Tigris.

Even up to this current 21st century not much has changed as the agriculture sector remains a crucial catalyst to the economic development especially among nations in Sub-Saharan Africa (SSA) that according to Karani et. al. (2024) are considered less industrialized and haven't yet achieved much in terms of technological advancement thus majorly rely on agriculture. Approximately 60 percent of the African population derive their livelihoods from the Agriculture sector (Giwu et al., 2024). Just like in majority of the African nations, the sector is considered the cornerstone of the Kenyan economy as it is the largest source of income for both poor and middle-income households in rural areas where it contributes about 31.4% to poverty reduction (Ouko et al., 2022). Furthermore, it accounts for 26% of the Gross Domestic Product (GDP) and engages over 40% of the total population and about 70% of rural people in employment (FAO, 2019).

Despite the prospects and opportunities in agriculture, its potential has not been fully realized especially in Sub-Saharan Africa (SSA). It is quite ironic that despite being endowed with a vast fertile agricultural land constituting to around 60% of the world's uncultivated arable land coupled with favorable climatic conditions and several permanent rivers suitable for irrigation during the dry seasons, SSA still remains to be a net importer of food. According to Ogemah (2017), Africa's annual food imports are predicted to reach USD 110 billion in 2025 and this will almost have to be doubled by the year 2050 when the continent's population will have reached the two billion mark. Kenya, just like other developing African nations is grappling with the food insecurity menace. According to the global food security index of 2017, the country is food insecure and was ranked position 86 out of 113 countries based on the International Food Research Policy, [IFPRI], (2017). This was confirmed by findings from the Parliamentary Budget office (2018) and the Integrated Food Security Phase (2024) which revealed that the country has become a major importer of basic food commodities such as maize, milk, wheat, sugar, potatoes, rice and beans. The government tends to spend much on food importation rather than investing in other income generating projects (RoK, 2017).

Several studies have attributed this menace to several factors such as lack of capital among farmers, lack of extension services, climate change and variability and low levels of technological uptake (Ouko et al, 2022; Sebotsa et al., 2021; Wale & Chipfupa, 2021). However, the most outstanding obstacle to ending food insecurity, vicious poverty cycle and rampant youth unemployment in Kenya and SSA in general is the poor education systems which pay less emphasis to agricultural education. Mukembo et al. (2020) argue that these education systems which are mostly characterized by obsolete curricular and poor pedagogical

approaches lay much emphasis on theoretical aspects at the expense of practical teaching, generally encouraging rote learning whose aftermath has been churning out of unskilled youth who cannot actively participate in the agricultural value chain.

Agriculture in this 21st century is characterized by dynamic changes such as globalization and market liberisation, changing patterns of production and consumption, changing demographic characteristics among the consumers, food price crises, climate change, soil degradation, pollution, technological advancement among many other factors. All these changes call for a skillful workforce in agriculture which demands for a practical approach to agricultural education fostering creativity and an innovative approach to agripreneurship (Chand, 2019). Anabaraonye et al. (2021) defined agripreneurship as the integration of entrepreneurial and innovative business ideas and skills into agriculture to produce better results. The scholars further pointed out that it involves innovative ways of cultivation, planting, application of fertilizer, processing of harvested farm produce and converting such into finished products and conveying them to the point of sales with the use of unique promotional efforts. It is without any doubt that the future of agriculture rests on sound knowledge and skills in innovative agripreneurship.

Though the youth are expected to replace the aging farmers, they are less engaged in farming as they do not perceive farming as a profitable and dignified venture as they lack innovative agripreneurship skills (Sebotsa et al., 2021; Ninson & Brobbey, 2023). To try and avert this looming danger, most African states are shifting to the Competence Based Education (CBE) to accommodate practical teaching of vocational subjects such as Agriculture. Notable examples of countries that have successfully adopted the CBE include; Tanzania, Zambia, Zimbabwe, Rwanda, South Africa, Mozambique and Ethiopia (Nkya et al., 2021). Like other United Nations (UN) member states espoused to achieving the set Sustainable Development Goals (SDGs) whose attainment is exclusively hinged on a skillful populace by 2030, Kenya had to abruptly change her education system from the previous 8-4-4 version to the CBE with the hope of producing a skillful workforce (Ndambuki et al., 2024; Ajuoga & Keta, 2021). The 8-4-4 which was rolled out in 1985 with the aim of empowering students with vocational skills completely failed to live up to its expectation as it took a wrong turn by failing to prioritize the vocational subjects such as Agriculture (Kyule et al., 2016). The current austerity which has seen the rise in youth unemployment characterized by overwhelming rural-urban migration coupled with food insecurity in Kenya is a glaring emblem of the failure of the 8-4-4 system of education. With the CBE being rolled out in 2017, the long term sustainability with respect to implementation of Competence Based Agriculture (CBA) for acquisition of skills in agripreneurship remains uncertain. This study therefore aimed at probing into the contribution of the competence-based agriculture curriculum implementation towards promoting innovative agripreneurship among Junior Secondary School (JSS) students in Kenya.

Objectives of the Study

- Document the extent to which the Junior Secondary School Agriculture curriculum designs covers content promoting innovative agripreneurship
- Analyse the contribution of the Competence-Based Agriculture curriculum implementation towards promoting innovative agripreneurship among the Junior Secondary School students.

Research Questions

- To what extent does the Junior Secondary School Agriculture curriculum designs cover content promoting innovative agripreneurship?
- To what extent does the implementation of the Competence-Based Agriculture curriculum contribute towards promoting innovative agripreneurship among Junior Secondary School students?

Literature Review

Emerging Trends in Agriculture Necessitating Innovative Agripreneurship

The agriculture sector has evolved over the years. Unlike the traditional agriculture where farming was practiced mainly for subsistence purposes, currently, agriculture has become a stable source of income not only for individuals but nations at large through earning foreign exchange, especially those found in SSA. Additionally, modern agriculture has to deal with and possibly find amicable ways to either circumvent or incorporate emerging trends in farming. Digital marketing strategies, value addition and product development, depletion of natural resources and scarcity of agricultural land, climate change and environmental stress, post-harvest handling of produce among many others are some of the notable examples of prospects and quagmires to the agriculture sector (Adeyanju et al., 2021; Radeny et al., 2022; Recha & Dawit, 2022; Rao & Kumar, 2016). For this reason, Clark (2023) states that in order for the agriculture sector to achieve its role in ending poverty and hunger by 2030 as enshrined in the United Nations' Sustainable Development Goals, a creative and innovative workforce with a better knowledge base in agripreneurship is necessary, especially in SSA.

The emergence of digital marketing strategies in agriculture have resulted to the widespread adoption and use of Information and Communication Technology (ICT) tools along the agricultural value chain. ICT has been touted as a potential bait that can be used in attracting and retaining the youth in agribusiness as Sebotsa et al. (2021) assert that the young generation farmers are more receptive to ICT in comparison to the aged farmers. Okello et al. (2020) reiterated that the youth are receptive to ICT tools use, especially in accessing services and information on farm mapping, mobile banking, weather data, marketing, financial and credit support, input supply, and advice from extension workers. Sebotsa et al. (2021) observed that social media platforms that are familiar to the youth such as WhatsApp, facebook, twitter and many others are a source of vital information on the availability of market, animal and crop husbandry practices, agricultural inputs, value addition, and financial institutions. Over the last decade, agricultural productivity in Kenya has gained unprecedented growth partly due to the integration of ICT along the agricultural value chain. Dianga et al. (2020) affirmed that the use of Television programmes such as Seeds of Gold aired on NTV and Shamba Shape Up on Citizen TV have had a significant impact on improving agripreneurship skills among the youth who happen to be the majority viewers. It can therefore be conclusively judged that ICT has become an inseparable component of agriculture.

The need to feed growing populations cannot be overemphasized. It is estimated that the global food production will have to be increased by approximately 70 percent by the year 2050 (FAO, 2019). The demand is not only changing in terms of quantity but quality as well in terms of diversity and sophistication. Ogema (2017) points out for instance, where people simply ate sorghum, there come demands for low tannin sorghum, high nutrient sorghum and colour of preference which in turn complicates the production

since these demands have to be met in one variety. In addition to this, the need for value addition to improve the shelf-life and appeal to dynamic consumer tastes and preferences is further complicating the production process in agriculture. Dairy farming is one of the notable examples of an agricultural enterprise whose success entirely depends on proper technical know-how in value addition (Okello, 2020). The conversion of the raw milk into a variety of finished products such as yoghurt, cheese, skimmed milk and butter not only improves the shelf-life of the highly perishable product but also guarantees higher market prices due to the improved flavor. This calls for an innovative approach to agripreneurship.

The need to meet the dietary needs of the exponentially growing human population is rapidly plunging the agriculture sector into an inextricable snare of environmental degradation. The adoption of poor capitalistic farming practices aimed at generating maximum yields such as the excessive use of agro-chemicals, mono-cropping, continuous cropping and over-stocking have been outlined by Anabaraonye et al. (2021) as the key contributors to soil degradation and water pollution. Methane gas released by ruminant livestock such as cattle has been linked to be a significant contributor to the escalating global warming (Munywoki, 2021; Duval et al., 2021). Furthermore, the desire to have more land under cultivation has prompted encroachment into reserve areas such as natural forests and wetlands culminating to ecological instabilities and imbalances. In Kenya, the total area under natural forests has rapidly shrunk to below 10 percent over the last 3 decades (Akhter & Bushra, 2020). The rampant deforestation and ecological instabilities have in turn culminated in climate change which is considered to be one of the most devastating problems facing agriculture, especially in SSA. Increased incidences of crop pests such as aphids, livestock parasites such as tsetseflies and diseases such as rusts and smuts have been attributed to the changing climate (Radenyet.al.2020). Furthermore, Boulanger et al. (2018) affirmed that the frequent droughts and unpredictable rainfall patterns have posed threat to over-reliance on rain-fed agriculture which is still quite common among peasant farmers in SSA who lack the capital startup and innovativeness necessary for a venture into irrigation. To ensure long term sustainability, there is an urgent need for eco-innovations and green consumption, there is need to equip the agripreneurs with sufficient knowledge pertaining to agro-ecology. This will make it easier to achieve a green economy which is the agenda of the United Nations Environment Programme (UNEP) (Anabaraonye, Ewa et al., 2021).

Agricultural Education in the Competence-Based Education in Kenyan Schools

The shift from 8-4-4 to the current 2-6-3-3-3 was as an outcome of extensive stakeholder engagement, a national needs assessment study, deliberations from a national curriculum reform conference and several benchmarking studies (Wanjohi, 2017). The Presidential Working Party on Education Reform (PWPER) which was a 53-member committee chaired by Professor Raphael Munavu was very pivotal in shaping the CBE (Government of Kenya, 2023). The PWPER commenced its work when the implementation of CBE was completing the Primary School cycle (Grade 6). The stakeholders acknowledged the value of CBE in terms of skills acquisition, collaborative action among learners, new pedagogy, linking learning to the community, and parental involvement. PWPER collected data from the public including Kenyans in the diaspora by way of both physical and digital submissions; and listening to the stakeholders' views in Town hall meetings at county level. Submissions were received from learners, teachers, parents, faith-based organizations, youth, teachers' associations, workers' unions, civil society, academia, private sectors, elected leaders and development partners among others. Further, there were interviews and Focus Group Discussions with key stakeholders and relevant representatives of government ministries, departments and

agencies. The PWPER undertook national validation exercise involving representatives of stakeholders in compliance with the letter and spirit of the Constitution of Kenya.

According to the Republic of Kenya (2017), report, this system is in line with vision 2030 and basically entails; 2 years of pre-primary education, 3 years of lower primary education, 3 years of upper primary education, 3 years of lower secondary/junior secondary education, 3 years of senior secondary education and 3 years of tertiary education. During this 17-year study period, a learner is expected to have acquired sufficient hands-on skills in various areas such as product development, value addition, agripreneurship and many others necessary in the job market. However, during the initial implementation phase of the curriculum, stakeholders raised concerns on the high number of learning areas in Primary and Junior Secondary school; overloads and overlaps of the curriculum; high cost of actualizing CBE passed to parents; challenges of internet and electricity connectivity that negatively affected digital literacy; and low literacy and numeracy levels for foundational learning (Gok, 2023). One of the most amicable solutions recommended by the PWPER was to have the Kenya Institute of Curriculum Development (KICD) reduce the number of learning areas from 9 to 7 at Lower Primary; 12 to 8 at Upper Primary; 14 to 9 at Junior School in order to address overload and overlaps. The learning areas at Pre-Primary to be 5 and at Senior School to be 7. This saw the merging of some related learning areas, for instance, Agriculture was merged with Nutrition.

Innovative Agripreneurship

Despite the prospects and opportunities in agriculture, the sector faces a myriad of threats such as climate change, volatile market conditions, soil degradation, pollution, dynamism in consumer tastes and preferences among many other emerging challenges. Wale and Chipfupa (2021) suggested that one of the most amicable ways to circumventing these challenges to ensure long-term sustainability in agriculture is an innovative approach to agripreneurship. The term agripreneurship seems to be synonymous with agribusiness and has been defined differently by various scholars. Arumugam and Manida (2023) defined it as a combination of agriculture and entrepreneurship aimed at applying entrepreneurial tenets and innovative reasoning to various agricultural practices. Anabaraonye et al. (2021) defined it as the integration of business and entrepreneurial concepts into farming for higher productivity. Chand (2019) on the other hand defined it as entrepreneurial process in farming that facilitates the adoption of modern technologies in agriculture with the aim of bolstering productivity. Based on these definitions, it can conclusively be agreed that the bottom-line objective of agripreneurship is to boost agricultural productivity and bring out the profitability aspect of agriculture.

Arumugam and Manida (2023) outlined the following key elements of agripreneurship; (i) Diversification and value addition- this aims at prolonging the shelf-life of produce and fetching more income to the agripreneurs (ii) Innovation and technology- innovative technologies such as precision farming and use of ICT (iii) Market orientation- involves analysis of consumer tastes and preferences so as to fill the market gaps (iv) Risk management- Enlightens the agripreneurs on various types of risks and the most prudent means of controlling them (v) Environmental sustainability- highlights the need for adoption of sustainable farming practices such as organic farming, minimum tillage, mulching, bio-control of pests and parasites and many other practices that cause least harm to the natural ecosystem (vi) Agro-processing and food technology.

Agripreneurship is hinged on the principle of sustainability in agriculture and generally inclined towards establishing a long-term panacea to poverty alleviation and food insecurity. It encompasses sustainable agriculture which intertwines socio-economic and environmental sustainability (Adeyanju et al., 2021). It aims at revitalizing subsistence agriculture into the modern dynamic and market-oriented farming which is not only practiced for food security purposes but rather as an income generating unit for economic development (Arumugam & Manida 2023). With Agriculture being the backbone of Kenyan economy, agripreneurship can be used as a proactive strategy through increasing and diversifying income and providing entrepreneurial opportunities in both rural and urban areas thus crucial in promoting micro, small and medium enterprises (Gupta & Gupta, 2017).

The term agripreneurship is often interchangeably used with the term agribusiness. Though related, the two terms represent distinct concepts within the agricultural sector. Agripreneurship focuses on the entrepreneurial aspect of agriculture, emphasizing innovation, risk taking and value addition in agricultural business. Agribusiness on the other hand encompasses the entire spectrum of businesses involved in the production, processing and distribution of agricultural products (Nwibo et al., 2016). According to Anabaraonye et al. (2021), success in various agricultural operations such as land preparation, sorting and preparation of planting materials, sowing, fertilizer application, pest and disease control, handling of produce, processing and marketing of finished produce depends on the level of innovativeness of the agripreneur.

Innovative agripreneurship calls for a trade off balance between artistic and scientific knowledge since agriculture is an art and science of crop and livestock production. This can best be achieved through an objective formal training program with the aim of molding the youth who are considered as the livewire of the society (Asikhia, Binuyo, Adefulu & Odumosu., 2020). Through innovative agripreneurship, farmers, can be in a position to apply modern technologies in farming, predict weather trends and market patterns and therefore better placed to achieve much success in comparison to their counterparts lacking the same (Asikhia et al., 2020). Agricultural education has also been established to be an effective means of curbing rural-urban migration emanating from youth unemployment as Ninson and Brobey (2023) pointed out that the agripreneurship skills acquired during the program enables youth to engage in farming in the rural areas. It is in response to this that countries globally, especially in SSA are shifting to the Competence-Based Curriculum that tends to give a more practical approach to agricultural education (Nkya et al., 2021).

Methodology

Research Design

Content Analysis of the Junior Secondary School Agriculture curriculum designs which covers grades 7, 8 and 9 enabled the researcher to successfully analyze and deduce rational findings relating to the first objective which aimed at documenting the content of the Junior Secondary School Agriculture syllabi covering content on innovative agripreneurship. For the second objective which aimed at establishing the contribution of Competence-Based Agriculture towards promoting innovation and agripreneurship among the students, the researcher adopted desktop research design by use of a systematic literature review approach, guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. This method ensured a structured, transparent and comprehensive analysis of current scholarly discourse. Figure 1 presents a summary of the logical procedure followed in the PRISMA guidelines.

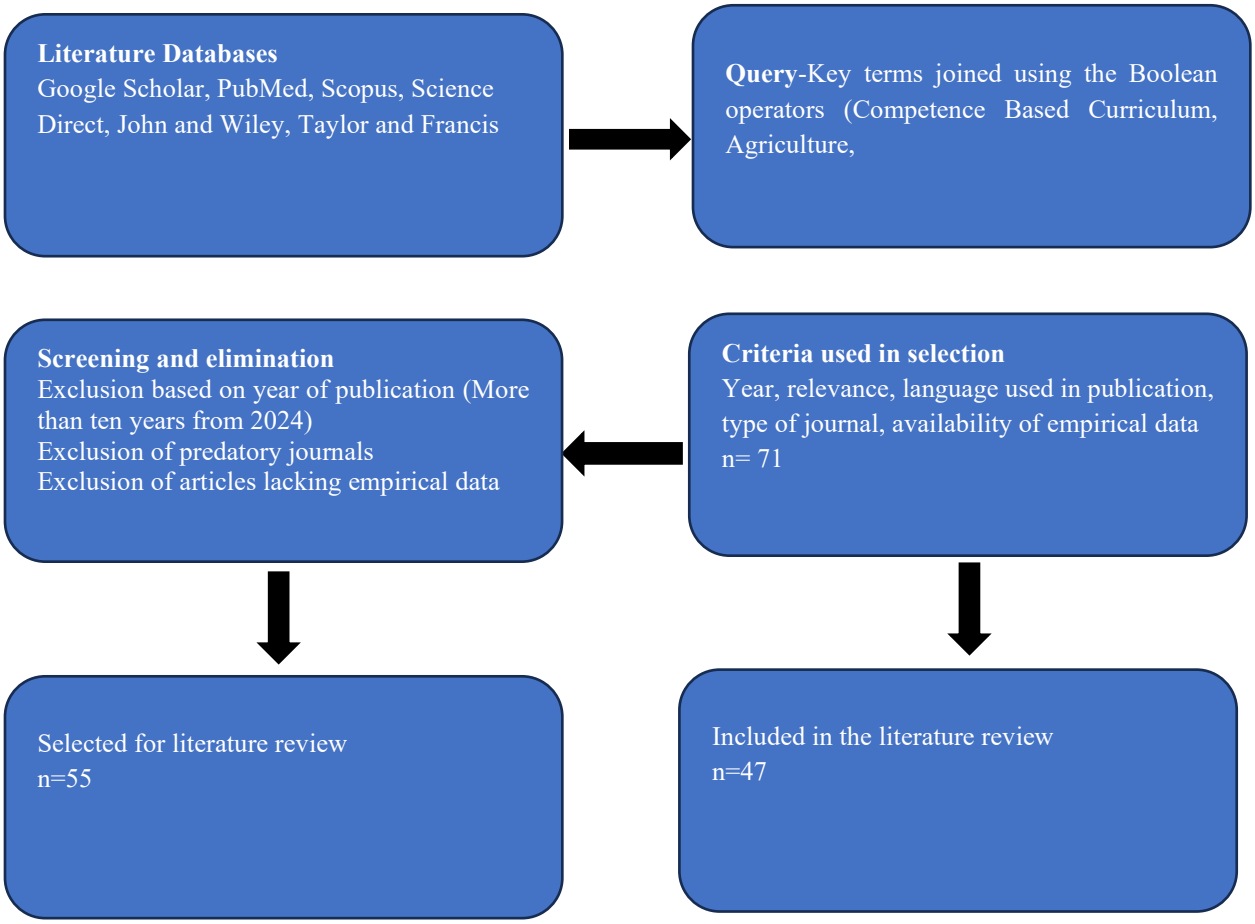

Figure 1: Logical Procedure for Sourcing Data from Secondary Sources.

Procedure

A systematic search for academic literature was conducted across various electronic databases such as Google Scholar, PubMed, Scopus, Science Direct, John and Wiley, Taylor and Francis. The terms used to source for the literature were keyed in separately and in combination. These key terms were "Competence Based Curriculum", "Agriculture", "Innovation" and "Agripreneurship". The Boolean operators 'AND' and 'OR' were used to combine these key terms so as to refine the search and ensure the inclusion of diverse yet relevant articles.

Sampling

The articles were first verified to meet the verified criteria. For an article to be selected, it had to be written in English language, have empirical data, focus on the study topic, journal and should have been published not more than ten years ago (2015). Studies were excluded if they did not center on innovative agripreneurship or Competence-Based Agriculture, were duplicate entries or preprints not peer-reviewed. Table 1 presents a summary of inclusion and exclusion criteria for study selection.

Table 1: Inclusion and Exclusion Criteria for Study Selection

Criteria	Inclusion	Exclusion
Focus Area	Articles focusing on Competence-Based Agriculture or innovative agripreneurship	Articles not centred on Competence-Based Agriculture or innovative agripreneurship
Study Type	Empirical research, theoretical discussions or systematic reviews	Opinions pieces, editorials, blog posts
Publication Status	Published in peer-reviewed academic journals	Preprints, duplicates or unpublished manuscripts
Language	English	Other languages
Time Frame	Published between 2015-2025	Published before 2015
Content Relevance	Competence-Based Agriculture and innovative agripreneurship	General aspects of Agriculture education
Population/Setting	Studies involving teachers and learners in agripreneurship	Studies focusing on other participants in agripreneurship

Data Collection and Analysis

Content Analysis of the Junior Secondary School Agriculture curriculum designs which covers grades 7, 8 and 9 was used to analyze the first objective. All strands and sub-stands promoting innovative were analyzed. For the second objective, the review process began with an initial screening of journal article titles and abstracts to determine their relevance to the research objective. Full-text articles of past studies that met the specified criteria were retrieved and saved to zotero and later subjected to detailed evaluation. Data extraction was conducted systematically, focusing on key aspects such as year of publication, availability of empirical data, peer-review and language. A total of 71 articles were retrieved as they addressed the study objective. However, after analysis, 16 articles were excluded based on the year of publication, another 6 articles lacked empirical data and two were published in predatory journals. Only a total of 47 articles met all the specified criteria. In addition to this, non-scientific articles such as policy papers, student papers, theses and working papers, and reports from authoritative sources were used to justify the argument of the paper. Information, facts, evidence, or key messages were extracted from these papers and included within the review.

Results and Discussion

Extent To Which JSS Agriculture Subject Curriculum Designs Cover Innovative Agriprenuership

This section dealt with the first objective which aimed at determining the extent to which the Junior Secondary School (JSS) agriculture curriculum covers content promoting innovative agripreneurship. The JSS agriculture curriculum presents its content in form of strands which are further sub-divided into sub-strands. The study established that there are 4 similar strands across the three grades which include Conservation of resources, Food production processes, Hygiene practices and Production techniques. These strands are further divided into 36 sub-strands. However, analysis on the curriculum design's content was done to filter those sub-strands which cover innovative enterprenuership on each strand across the three grades. Time allocated to teach each sub-strand was also included to also inform on the extent on contribution to innovative enterprenuership. Table 2 below gives a summary of the findings.

Table 2: Summary of the JSS Agriculture Curriculum

Grade	Strands	Sub-Strands	Specific Learning Outcomes (Objectives)	Lessons
7	Conservation of Resources	Constructing Water Retention Structures	3	8
	Food Production Processes	Selected Crop Management Practices	3	8
		Preparing Animal Products	3	9
		Cooking Food	3	9
	Hygiene Practices	None	N/A	N/A
	Production Techniques	Knitting Skills	3	10
		Constructing Framed Suspended Garden	3	10
		Adding Value to Crop Produce	3	8
		Making home-made soap	3	8
8	Conservation of Resources	Water Harvesting and Storage	3	9
	Food Production Processes	Kitchen and Backyard Gardening	3	9
		Poultry Rearing in a Fold	4	11
		Preparation of Animal Products	4	9
		Preserving Animal Products	4	9
		Cooking: Preparing a Balanced Meal	4	11
	Hygiene Practices	None	N/A	N/A
	Production Techniques	Sewing Skill: Constructing Household Items	4	14
		Constructing Innovative animal Waterer	3	10
		ICT Support Services	3	9
9	Conservation of Resources	Conservation of Animal Feed (Hay)	3	12
		Integrated Farming	3	12
	Food Production Processes	Organic Gardening	3	10
		Storage of Crop Produce	4	14
		Cooking using Flour Mixtures	4	9
	Hygiene Practices	None	N/A	N/A
	Production Techniques	Grafting in Plants	4	13
		Homemade Sun-Dryer	3	13
Total	12	24 out of a total of 36 sub-strands	80 out of 116	253 out of 360

Source: MoE (2021)

From the findings in Table 1, it was noted that most of the strands and sub-strands in JSS agriculture subject addressed innovative agriprenureship. This is by including content that would lead learners to acquisition of agriprenuership skills. In addition, the study established that sufficient time was allocated in teaching each sub-strand addressing innovative agriprenuership. However, this contradicts views by Ndambuki et al

(2024) in that there is little time allocated for teaching agriculture subject at JSS which has led to poor mastery of skills to be learned by the individual learners.

The researchers also analysed all the 80 specific learning outcomes (objectives) which learners should meet on each sub-strand found to address innovative agriprenureship with aim of determining those which lead learners to develop agriprenuership skills. The outcomes were therefore categorized under four main sub themes considered to be the main elements of innovative agripreneurship. These included product development and value addition, use of digital platforms in farm operations, post-harvest handling and storage and improvisation of locally available materials in raising crops and livestock. The focus on specific learning outcomes was key since they specify what the learner is expected to achieve and be able to do after the learning process. General content on innovative agripreneurship may be meaningless unless the objectives of including it in the curriculum are clear. Table 3 gives a summary of the results on data codification.

Table 3: Data Codification in Terms of the Elements of Innovative Agripreneurship Codes and Frequency

Element of innovative Agripreneurship	**Code**	**Frequency of Specific Learning Outcomes**	**Percentage of Specific Learning Outcomes**
Product development and value addition	A1	25	31.2%
Use of digital platforms in farm operations	A2	3	3.8%
Post-harvest handling and storage	A3	14	17.5%
Improvisation of locally available materials for use in raising crops and livestock	A4	24	30.0%

From the findings in Table 3, it was noted that 31.2% of the learning outcomes directly led agriculture learners at JSS to either develop a product or add value to an existing agricultural produce. For example, the strands on food production processes and techniques gave much considerable emphasis to this aspect. The Sub-Strands on cooking aim at equipping learners with skills on various cooking methods such as grilling, roasting, steaming and baking which enhances the palatability of the foods. The Sub-Strands on knitting skills and sewing skills aim at guiding the learners on how to knit various household articles. Despite the country having a great potential to produce cotton, textile companies such as Kikomi and Rivatex collapsed due to the over-reliance on imported fabrics and textile products (Boulanger et al. 2018). The introduction of this vital innovative skill in agripreneurship in the CBA is likely to revamp the textile industry. The Sub-Strand on Adding value to crops produce in grade 7 aims at instilling food processing skills to the learners. Preparation of animal products on the other hand guides the learners through processing fish and dressing of poultry. Poultry farming has become a very popular enterprise among many small-scale farmers as it requires relatively less space especially when done on an intensive basis (Mathiu et al., 2021). Equipping learners with hands-on skill on processing poultry will place them in a better position to join the agriculture food chain as food processors. It was therefore concluded that, CBA curriculum has made laudable efforts in championing product development and value addition in an effort to equip the learners who are considered as future agripreneurs with this vital skill.

On use of digital platforms in farm operations it was found that only 3.8% of the learning outcomes directly led learners to directly embrace ICT in farming operations. However, according to Kenya Institute of

Curriculum Development (KICD) (2017), ICT should be embraced across all the learning areas. Further examination of the curriculum designs showed that use of digital devices when learning is much emphasized on the learning experiences section. This was evident with over 80% of learning experiences in different sub-strands demanding learners to use ICT or digital tools to conduct various learning activities. This is in line with findings by MoE (2023) that competency-based agriculture demands for ICT integration in different learning areas. In relation to the learning outcomes, at grade 8, the Sub-Strand on ICT support services guides learners at how to access online platforms for ICT support services such as weather forecast, veterinary, supply, market information, banking and cleaning. Based on the findings it is worth noting that although most of the learning outcomes stated at the JSS agriculture curriculum design do not directly mention use of digital devices in carrying out farm operations, much emphasis on use of ICT tools in learning have been made in the learning experiences section.

On post-harvest handling and storage of agricultural produce 17.5% of the learning outcomes led learners to acquire skills in this area. For example, in grade 7 and 8 the Sub-Strand on preparing animal products focuses on preparation and storage of honey and eggs. This is likely to improve the youth involvement in poultry and apiculture sectors. The Sub-Strand on preserving animal products takes the learners through a practical guide on preservation of milk and meat. Emphasis has been laid on cost-effective methods that are deemed suitable for small scale farming such as boiling, fermenting and home-cooling techniques for milk and salting, boiling, drying and smoking for fish. The Sub-Strand on conservation of hay aims at equipping learners with hands-on skills on preparation and conservation of this type of animal feed through various methods such as baled hay making, standing forage and stacking. Munywoki (2021) points out that with majority of the landmass in Kenya being considered as ASAL, livestock farming forms an integral part of the country's economy thus skills on proper feeding of livestock need to be prioritized. The Sub-Strand on Storage of Crop Produce introduces the learners to preparation of storage structures in readiness for storage. The learners are further taken through ways of managing the stored produce such as checking on moisture content, ensuring ventilation, controlling rodents and disposing off spoilt produce.

Improvisation is a very vital skill in agriculture since the use of locally improvised materials can help in reducing production costs. From the findings in Table 2, 30% of the learning outcomes led learners to improvisation. For example, the Sub-Strand on constructing water retention structures guides the learners on the procedure of constructing various water retention structures and making use of the surface run-off water. With irrigation replacing rain-fed agriculture, use of stored surface run-off water can be an ultimate panacea to achieving food security (Yersaw & Lohani, 2022). This practice will also go a long way in mitigating the negative impacts associated with surface run-off water such as causing erosion. Closely related to this is the Sub-strand on Water Harvesting and Storage. The Sub-Strands on Constructing Framed Suspended Garden and Kitchen and Backyard Gardening aim at inducing innovation to help in maximum space utilization amid the rapid shrinking of agricultural land brought about by the exponential growth in human population and the rapid urbanization and infrastructural development. The Sub-Strand on Poultry Rearing in a Fold also aims at equipping learners with skills on raising poultry in limited space. The Sub-Strand on Constructing Innovative Animal Waterer takes the learners through the logical procedure of designing and constructing equipment for availing water to animals using locally available materials. The Sub-Strand on Organic Gardening guides the learners on how to prepare and make use of organic manure and organic pesticides using locally available materials such as animal wastes and wood ash. The adoption

of Sustainable Farming Practices will guarantee improved yields without compromising the quality of the environment and also reduce on costs incurred in purchasing agro-chemicals such as fertilizers. The Sub-Strands on Making Home-made Soap and Homemade Sun-Dryer guides the learners on the logical steps of making these two products which are useful on the farm.

Contribution of Competence Based Agriculture Curriculum Implementation to Innovative Agripreneurship by JSS Students

This section dealt with the second objective which was made to determine the extent of the CBA curriculum implementation to students' acquisition of innovative entrepreneurial skills. The study gathered the results in this section from desktop research which involved carrying out systematic literature review from documents sourced from various scholarly databases as described in section 3.0. From the reviewed literature, it was noted that agriculture offered under the CBC aims at imparting relevant skills among the learners thus technically referred to as Competence Based Agriculture (CBA). The Kenya Institute of Curriculum Development [KICD] (2023) outlines that the CBA at the Junior Secondary School level aims at enabling the learners to;

Participate actively in agricultural and household activities in conservation of resources, use scarce resources through innovative practices to contribute towards food and nutrition security, engage in food production processes for self-sustainability, health and economic development, adopt personal and environmental hygiene practices for healthy living, apply the use of appropriate production techniques, innovative technologies, digital and media resources to enhance sustainable agricultural and household practices and appreciate agricultural and household skills as a worthy niche for hobby, career development, further education and training''.

It can conclusively be agreed that the CBA is geared towards promoting innovative agripreneurship.

The structure and design of the CBA curriculum resonates with its aim of imparting innovative agripreneurship among the learners. Analytically, the agriculture syllabus for the JSS level comprises of four similar topics/learning areas at each grade. These topics are; Conservation of Resources, Food Production Processes and Hygiene Practices and Production Techniques. In comparison to the previous education system where Agriculture comprised of 33 topics unevenly distributed across the four-year period, it is generally evident that the CBA offers much reprieve to both the teachers and learners in terms of content coverage.

Furthermore, there has been more time allocated to the subject. In the previous education system, the subject had been allocated three lessons per week for the junior classes (Form 1 and 2) which translates to 120 minutes and four lessons per week for the senior classes (Form 3 and 4) which translates to 160 minutes since each lesson is forty minutes. To make matters worse, there were no double lessons. In comparison to the core subjects such as Mathematics which had been allocated 7 lessons (240 minutes) at the senior secondary school level, it can be conclusively judged that Agriculture was denied the much-deserved time owing to its vocational nature. Kyule (2017) points out that with inadequate time allocation on the timetable following the 2002 educational reforms which saw time reduction and scrapping off of double lessons, teachers of Agriculture had no option but to resort to theoretical teaching methods so as to complete the wide syllabus on time. The aftermath of this was rampant rote learning resulting to channeling out of

unskilled workforce (Waiganjo, 2021). The CBE, however, seems to take a different dimension with respect to time allocation. According to the KICD (2023) report, CBA at the JSS level has been allocated 4 lessons per week with a double lesson scheduled on a weekly basis. Table 4 presents a summary of the time allocated to the various learning areas at the JSS level based on the KICD (2023) report.

Table 4: Lesson Allocation of Different Subjects and Learning Areas at JSS Including Agriculture Subject

Learning Areas	Number of lessons per week (40 Minutes per lesson)
English	5
Kiswahili/Kenya Sign Language	4
Mathematics	5
Religious Studies	4
Social Studies	4
Integrated Science	5
Pre-Technical Studies	4
Agriculture and Nutrition	4
Creative Arts and Sports	5

With such a comparative advantage in terms of both time allocation and content coverage, there is a high feasibility of implementing both the practical and theoretical aspects of the subject in the CBA. This is likely to improve on the level of innovative agripreneurship among the students.

Owing to the vocational nature of Agriculture, the CBA has given precedence to the use of learner centered teaching approaches. KICD (2023) recommends the use of Project-Based Learning (PBL), Community Service Learning (CSL) and resource personnel in the implementation of CBA curriculum. Waiganjo and Waweru (2018) associated the use of learner-centered methods to various benefits such as active learner engagement, reduced boredom and improvement of crucial skills such as communication, collaboration, creativity, innovation and critical thinking. CSL aims to acquaint the learners to their locale. Since agriculture entails the rearing of livestock and growing of crops, background knowledge pertaining to the existing agro-ecological conditions is very important when it comes to selecting the most adaptable livestock breeds and crop varieties as well as circumventing environmental challenges such as changes in weather patterns (Aare et al., 2021). This is more likely to be achieved through the use of CSL. The use of resource personnel entails inviting specialists in various agricultural fields such as agronomists, crop pathologists, agricultural entomologists, ecologists, soil scientists, agricultural economists and many others to educate the learners on matters pertaining to their respective field. Involvement of resource personnel either through formal or informal learning platforms greatly benefits learners as Iyer and Rao (2024) specify that they tend to have a deeper and broader understanding of their field of specialization thus more informative when compared to teachers. PBL on the other hand improves learners' psychomotor and communication skills which goes a long way in shaping their out of school life (Recha & Ndambuki, 2024).

Digitalisation in education is rapidly gaining mileage making Information and Communication Technology (ICT) an integral part of the teaching-learning process. Vocational subjects, Agriculture inclusive are characterized by numerous technological advancements that must be passed on to the learners (Da Silveira et al., 2021). According to Muchiri et al. (2018), integration of ICT in the teaching of Agriculture not only makes the subject interesting but also goes a long way in equipping learners with life-long skills necessary

in the world of work. In this 21st century, the teacher is no longer the main source of knowledge as there is plenty of information available on the internet which can easily be accessed by use of ICT resources. An array of information on various innovative agricultural practices such as post-harvest handling and marketing of produce, soil and water conservation, control of pests and parasites among many others can be made available to the learners through use of videos and photographs from the internet (Adeyanju et al., 2023). Pehin and Pg (2023) established a positive correlation between ICT integration in school agriculture and the level of skills in agro-technology and agribusiness among youth farmers. Integration of ICT in the implementation of the CBA curriculum is another milestone towards the improvement of innovative agripreneurship among learners in Kenya. At the start of each sub-strand, KICD (2023) recommends the teacher to guide the learners through a digital session where they are supposed to be exposed to relevant videos and photographs by use of laptops and mobile phones. With such emphasis on ICT integration in the implementation of CBA, then it is most certain that an innovative workforce will be channeled into the agricultural value chain.

Conclusions

Based on the findings, this study concluded that the JSS curriculum designs sufficiently address innovative agriprenureship. This is by including a number of strands, sub-strands and stating learning outcomes that lead learners to conduct activities which would lead them in mastering innovative agriprenureship skills. However, despite the curriculum designs addressing innovative agriprenureship, it was noted that during the actual implementation of the JSS agriculture subject curriculum innovative agriprenureship is not sufficiently addressed among learners. This is because the schools are still short of resources and facilities to help in enhancing innovative agriprenureship among learners. In addition, practical teaching of the competency-based agriculture subject has not been fully adopted by teachers and therefore innovative agriprenureship skills are not efficiently passed to the learners.

Recommendations

Based on the conclusions this study recommends that.

- The Kenya Institute of Curriculum Development (KICD) to review the Agriculture and Nutrition curriculum designs to ensure more use of digital platforms during the instructional process so as to expose the learners to a wide range of practical activities promoting innovative agripreneurship.
- Government of Kenya through the Ministry of Education to provide resources and facilities in Junior Secondary Schools to facilitate practical teaching and learning of innovative agriprenureship.
- Agriculture teachers at JSS to embrace practical teaching of agriculture to facilitate effective learner's acquisition of innovative agriprenureship skills.

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