EXECUTIVE SUMMARY

B | L | U | E | P | R | I | N | T

FOOD SECURITY

UNIVERSITI PUTRA MALAYSIA

PUTRA
PERTANIAN UNTUK RAKYAT

UPM
UNIVERSITI PUTRA MALAYSIA
BERILMU BERBAKTI

EXECUTIVE SUMMARY

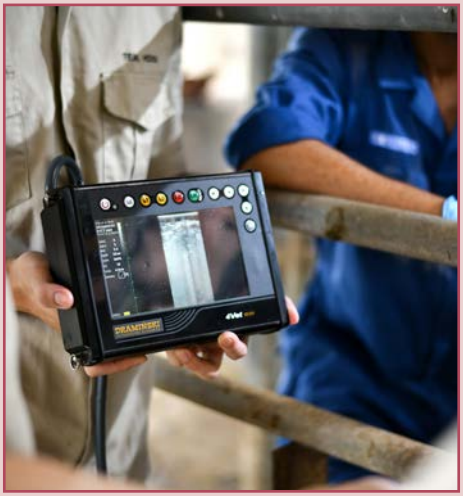
Food security is defined by FAO as a situation where every individual has continuous access to food that is safe, nutritious and meets their nutritional needs and tastes for an active and healthy life. This has become an important agenda globally and nationally. Malaysia, through the National Agrofood Policy 2.0 and the Food Security Policy Action Plan (2021-2025), has outlined several strategies to mobilise natural resources, human capital, research and development, and technology towards the development of the agrofood industry, in line with UNESCO's Sustainable Development Goals including "Zero Hunger".

Universiti Putra Malaysia (UPM), with a long history in the discipline of agriculture, outcomes to strategically contribute towards to ensuring food security amid challenges such as climate change and disruptive technology.

UPM defined its role in food security through several strategic thrusts, Core thrusts include Academic Excellence, Impactful Research and Innovation, as well as Community and Industry Engagement. Meanwhile, the Enabling Advancement covers Governance Efficiency, Financial Sustainability, Talent Availability, Infrastructure Sophistication, Global Collaboration, and Networking and Strategic Communications. Success outcomes, i.e. the Excellence of Graduates and Agricultural Entrepreneurs, the Applicability of Technology and Innovation, and the Empowerment of the Farming Community are targeted at the positive impact of UPM's sustainability as a leading university in food security.

The main purpose of this Blueprint is to serve as a reference and guide for UPM to increase their contribution to national and global food security. This will in turn increase UPM's capacity in advancing innovation and research that has an impact on food security in Malaysia. The implementation of the Blueprint will contribute to building a sustainable, competitive, and equitable food system, further solidifying UPM's role in facing global challenges in the 21st century.

This blueprint translates UPM's commitment to improving food security through innovation, collaboration and academic excellence. UPM not only contributes to the development of agriculture and food in Malaysia but also supports the improvement of the quality of life and well-being of the global community.



UPM FOOD SECURITY BLUEPRINT APPROACH

At UPM, we approach food security through a collaborative process involving cooperation and support from various UPM members. The document writing process began with brainstorming sessions through multiple workshops involving various UPM entities and experts, followed by the analysis of sources and related reference materials as well as documentation. This process involves three (3) phases:

PHASE 1	Examining the country's food security scenario, unravelling stakeholder expectations, and determining UPM's role in contributing to food security
PHASE 2	Working on the UPM Food Security Framework
PHASE 3	Developing the UPM Food Security Blueprint

FULL FRAMEWORK OF THE UPM FOOD SECURITY BLUEPRINT

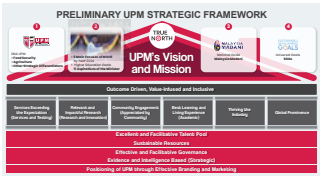
Vision

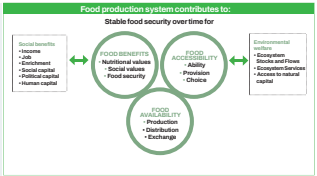
UPM as a Leading University for National Food Security with International Reputation.

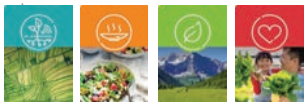
Mision

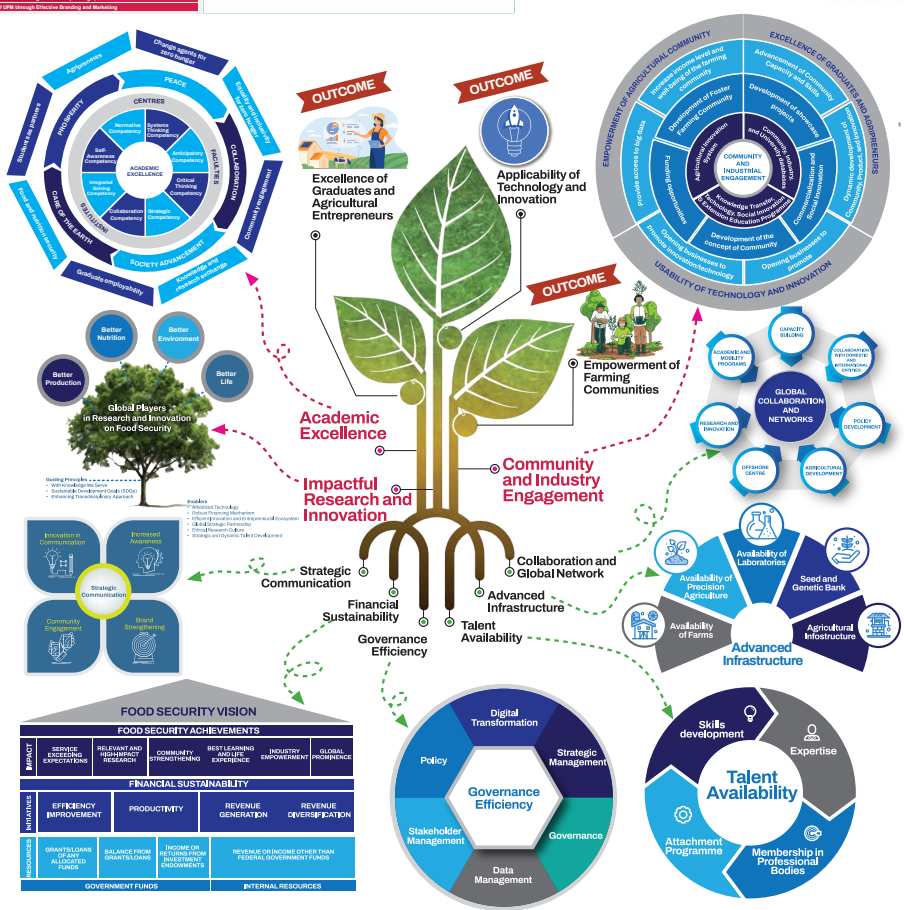
Making meaningful contributions to food security through academic excellence, impactful research and innovation, community and industry engagement for the wellbeing of humanity.

Motivation and Justification









INTRODUCTION

Food	Food is a human right and is legally recognised by the International Covenant on Economic, Social, and Cultural Rights (FAO, 1966).
Food Security	Food security is defined as “a situation where everyone, at all times, have physical, social and economic access to sufficient, safe, and nutritious food that meets their dietary needs and preferences for an active and healthy life” (FAO, 1996, 2003).
Dimension of Food Assurance	The goals of food security are achieved through four main dimensions: • Availability: The amount of food in a country or region, encompassing production, imports, stocks, and food aid. • Accessibility: Access to food in terms of physical, economic, and social aspects. • Usability: Safe and nutritious food that meets dietary needs. • Stability: Sustainable and continuous availability, accessibility, and usability without disruption.
UPM’s Role	As a university rooted in the disciplines of agriculture and food since 1971, UPM possesses trained experts and diverse resources to contribute to food security through academic programs, research and innovation, and development services.
Food Security Blueprint	**Rationale:** UPM needs to recognised its contribution to food security through well-trained human capital, innovation to enhance productivity, and advanced technology transfer to farming communities. **Objective:** To serve as a reference and guide for UPM members towards enhancing contributions to national and global food security.

NATIONAL FOOD SECURITY LANDSCAPE

AVAILABILITY

- Low Self-Sufficiency Level (SSL) for staple foods
- Increase in trade deficit

ACCESSIBILITY

- Large food expenditure share (29.5%)
- Price fluctuations due to supply and demand imbalances

USEFULNESS

- Changes in food consumption patterns due to the growth in per capita income
- Consumption trends have shifted from carbohydrate-based to protein-based

STABILITY

- High import dependency
- Exposure to natural disasters

Global Food Security Index 2022

41/113

Policy Evolution

- National Agricultural Policy I (1984 – 1991)
- National Agricultural Policy II (1992 – 2010)
- National Agricultural Policy III (1998 – 2020)
- National Food Security Policy (2008 – 2020)
- National Agri-Food Policy (2011 – 2020)
- National Agri-Food Policy 2.0 (2021 – 2030)
- Action Plan for Food Security Policy (2021 – 2025)

CHALLENGES AND OPPORTUNITIES

Challenges in Global Food Security	a. Climate change affects the ecosystem of food production; b. Global population dynamics effect food consumption; c. Conflicts and wars impact food security; and d. Climate change, population dynamics, and war conflicts pose risks to macroeconomic stability.

National Food Security Issues, Challenges, and Opportunities

DIMENSION	ISSUES AND CHALLENGES	OPPORTUNITIES
Availability	Low SSL (Self-Sufficiency Level) increases the food trade imbalance.	Productivity increases private sector involvement, support investment, and development of local inputs.
	Low productivity is caused by a lack of technology adoption, aging farmers, and non-commercial farming practices.	Development of agribusiness, technological innovation in agricultural systems in production and post-harvest, R&D empowerment, and strengthening the role of cooperatives.
	Inefficient marketing.	Cooperatives, e-business, improve the quality and diversity of products.
	Reduced land area	Food policy that encompasses sustainability. Climate-smart agriculture. Technology-smart agriculture.
Accessibility	The average household food expenditure is 29.5% of the income.	• Stabilise food supply and • Food security network programme.
	Urbanisation: 70% of the population lives in cities.	Promote urban agriculture.
	High food waste.	• Introduce the concept of a circular economy. • Zero Food Waste Policy. • Technology to utilise food waste and biomass.
Usefulness	Average household expenditure is 25.9% of income – easily affected when prices increase.	• Stabilise food supply. • Food security network programme.
	Urbanisation: 70% of the population resides in cities which leads to urban poverty.	Urban farming.
Stability	High risk and uncertainty. The food production sector is exposed to natural disasters and climate change, price instability, conflicts, or pandemics.	• Development of Big Data. • Establishment of an early warning system. • Development of smart-climate and smart-technology agriculture.

Government

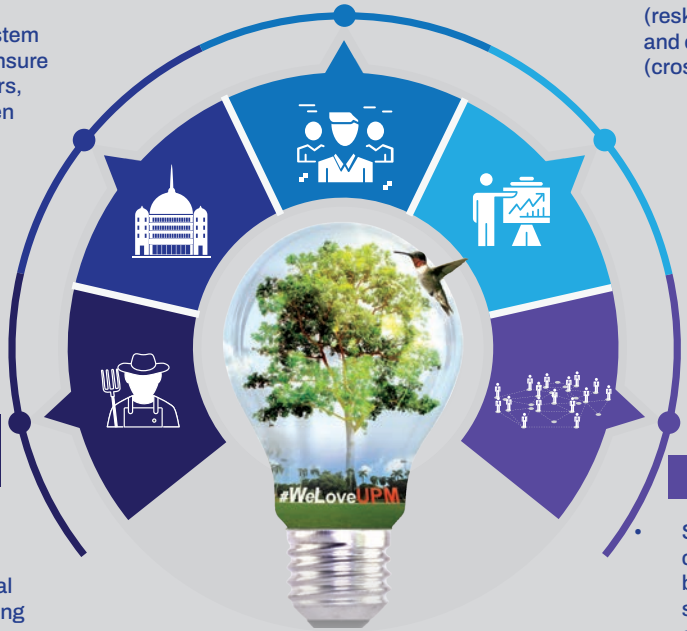
- Modernization of the smart agriculture sector,
- Approach based on modern technology and sustainable development; and
- Promote RDCE ecosystem - agrifood sector and ensure the skills of local farmers, breeders, and fishermen remain relevant and competitive.

Society

- Reduce the costs of increasingly expensive basic food items.
- Increase programs to shorten the chain of wholesale and retail market from farms to consumers.

Students

- Develop new skills (upskilling), strengthen existing skills (reskilling), and diversify skills and cross-skills (cross-skilling).



EXPECTATIONS

STAKEHOLDERS

Farming Communities

- Encourage individual farmer entrepreneurs, cooperatives, associations, and local companies in cultivating abandoned land.
- Enhance agricultural development services by integrating science and technology.
- Improving farmers' agricultural business knowledge to make them more effective market producers.

Strategic Partner

- Strengthen the coordination platform between relevant strategic partners such as UPM, MARDI, and the Ministry of Agriculture and Food Security for the implementation of a meaningful Food Security Blueprint.

UPM CURRENT PERFORMANCE

Faculty - 15	**School** – 2
Institute - 11	Higher Institution Centres of Excellence (HICoE) focusing on agriculture and food security • Institute of Tropical Agriculture and Food Security (ITAFoS) • Institute of Bioscience (IBS) • Institute Of Tropical Forestry and Forest Product (INTROP)
Farm – 1,284.14 ha (Serdang, Puchong dan Bintulu)	**Academic Staff** – 1,752 **Non-Academic Staff** – 1,656

2023 Ratings	Ratings
QS World University Rankings	158
QS Asia University Rankings	25
QS World University Rankings by Subjects (Agriculture and Forestry)	74
Ui Greenmetric World University Rankings	25
US Best Global Universities Rankings by Subjects (Agricultural Sciences)	36

Talent and Graduates

A total of 30,090 UPM students, including local and international students from over 75 countries around the world, provides a unique ethnic community with diverse cultures and experiences that are valuable and interesting for all. Thirty-seven percent enrolment of undergraduate students in programmes related to agriculture and agribio.

Student Enrolment 2024	Local	International	Total
Undergraduate	15,693	2,210	17,903
Postgraduate	6,475	5,712	12,187
Overall Total	22,168	7,922	30,090

RESEARCH AND INNOVATION IMPACT

UPM, as a comprehensive and excellent research university in this country, has attracted scientists, researchers, and scholars from all over the world. Over the past few decades, the university has achieved global recognition through outstanding research, publishing and commercialisation innovation in the field of food security.

Research Components	Value
Agricultural and Food Security Research Grants	Grant value : RM13.6 million (2023) Number: 149 projects at local and international levels (2023)
Journals Related to Agriculture and Food Security	2023 - 940 manuscripts
Commercialised Agricultural-Based Products	39 products (as of March 2024)
Awards and Inventions Related to Agriculture and Food Security	154 - Domestic and international design exhibitions (2013-2023)
National and international MoAs related to Agriculture and Food Security	44 (2013-2023)

Networking and Collaboration

UPM's network and collaboration with the industry are measured by adopted technologies, agricultural innovation projects, and UPM staff becoming reference experts for local and international agencies. Involvement includes serving as advisors, technical committee members, consultants, reference experts, and policy paper developers.

Number of UPM technologies adopted by industry and society	Number of agricultural innovation programmes carried out with industry and society	Number of experts
39 (2023)	79 (2023)	274 (2023)

Industrial and Community Networking Programme

UPM continues to strengthen its industrial and community collaborations as a pillar through knowledge transfer programmes and development programmes in various fields of expertise, such as community, agricultural, entrepreneurship, and professional developments. These programmes have successfully met the country's human capital needs. UPM has also secured RM35 million from the Ministry of Economy for the Initiative People's Income Programme (IPR) Agricultural Entrepreneur (IPR-INTAN) to increase people's income through agricultural technology.

Topic	Industry		Community	
	Total	Funding	Total	Funding
Local Projects (2019-2023)	2737	RM587,087,402	876	RM19,917,684
International Projects (2019-2023)	808	RM143,638,469	113	RM2,497,695

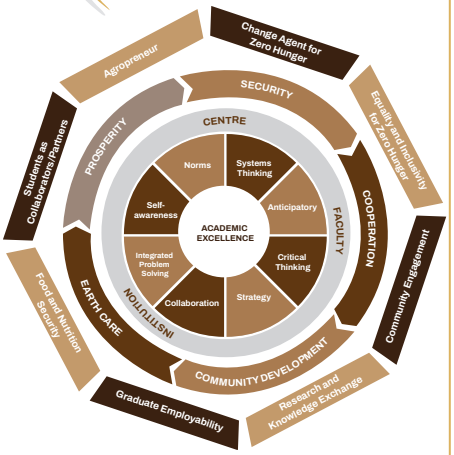
Media Coverage

UPM's agriculture and food security experts have shared their expertise in various medium such as print and online media, as well as radio and TV broadcast. The impact of this media release is measured through AD value and PR value. AD value refers to the price of a news column based on advertising rate UPM needs to pay for the news placement. On the other hand, PR value refers to the financial value of reaching clients when using paid advertising.

No.	Area	Total in 2023	AD Value (RM) 2023	PR Value (RM) 2023
1	Online Media	216	16,217,818	48,659,137
2	TV and Radio	71	6,468,001	19,404,034
3	Article Writing & Interviews	205	3,339,847	10,0343,393

ADVANCEMENT FOR CORE AREA 1:

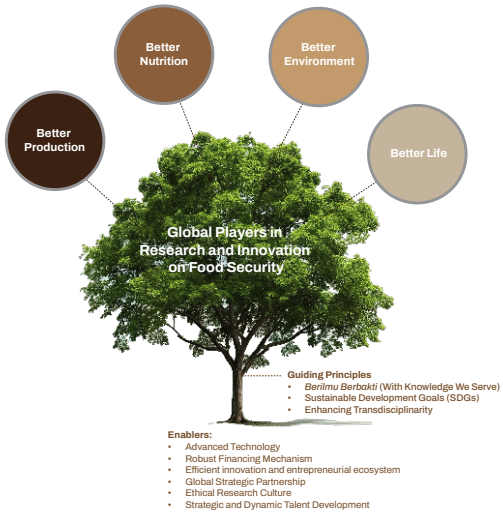
ACADEMIC EXCELLENCE

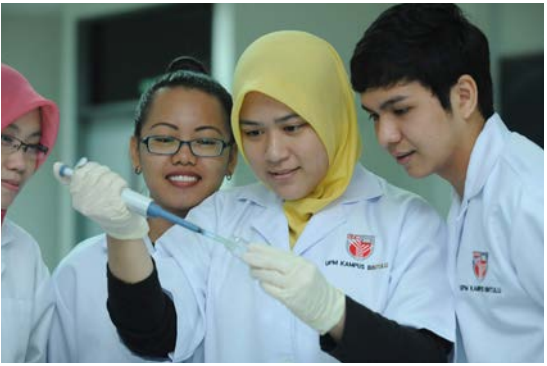


Why is it needed?	Academic excellence includes a curriculum designed to foster critical thinking, problem solving, innovative research skills, and a strong foundation in systems thinking developed through learning for sustainable development. This enables students to acquire the knowledge, skills, attitudes, and values needed to make decisions and implement the right actions to ensure food availability in the future.
What is the expected impact?	Academic excellence in food security through Education for Sustainable Development (ESD) can bring together various important aspects of education to shape individuals who are not only marketable but also aware of societal health and well-being. The impact includes: 1. Agropreneurs who can use technology and innovation as well as provide competitive market by producing high quality agricultural products 2. Employability of graduates who have skills in food security 3. Health and well-being of the global community 4. Civic engagement and awareness 5. Entrepreneurship and enterprise geared towards well-being of the people through food security 6. Equality, diversity, and inclusiveness
What are the initiatives to achieve this?	Academic excellence initiatives for food security that provide teaching and learning experiences involving students and lecturers include the following components: 1. Interdisciplinary knowledge that includes agriculture, nutrition, and social sciences 2. Systems thinking as an attribute of graduates who can identify patterns and impact of interventions as well as develop comprehensive strategies 3. Critical thinking and problem-solving skills to generate innovative solutions 4. Practical application in the development of a sustainable food system 5. Ethical and sustainability considerations in promoting equality in all aspects of the food system 6. Global and local engagement in food security, combining local solutions with international cooperation

ADVANCEMENT FOR CORE AREA 2:

RESEARCH AND INNOVATION IMPACT





Why is it needed?	Research encompasses development, innovation, commercialisation and entrepreneurship as an effort to address current challenges in food security to ensure the well-being of future generations.
What is the expected impact?	Impact that can be generated through research and innovation activities: 1. Efficient and optimal food production 2. Improvement of socio-economic status 3. Zero poverty and hunger 4. Increased nutritional security 5. Sufficient food for all 6. Purposeful, economic and effective innovation that solves community and industry problems 7. Cyclical economic approach 8. Sustainable ecosystem capable of attracting and retaining talent 9. Strengthening the country as a global *halal* hub
What are the initiatives to achieve this?	There are four (4) initiatives to achieve the expected impact of research and innovation, namely the improvement of production, nutritional quality, environmental quality, and quality of life supported by the enablers as follows: 1. Advanced technologies that support smart, sustainable, precise agriculture, and adaptable to climate change 2. Strong and sustainable financing mechanism from governments, industries, and international organisations 3. Sustainable and cost-effective innovation, and entrepreneurial ecosystem to enhance rural life and economic development 4. Global Strategic Partnership to further strengthen the research and innovation ecosystem, and the visibility of the University 5. Ethical research culture and excellence oriented "mind-set" 6. Strategic and dynamic talent development to enhance skills and professionalism

BREAKTHROUGH FOR CORE AREA 3:

COMMUNITY AND INDUSTRY ENGAGEMENT

Why is it needed?	Strengthening relationships and synergies between public-industry-university-community-philanthropic agencies to be more sustainable, integrated, meaningful, and productive, thus, successfully meeting the aspirations and needs of the community and industry.
What is the expected impact?	To enable the farming community through agricultural innovations introduced by the university with the cooperation of agricultural/ public agencies, and fully supported by the industry. Strong relationships and synergies will transform agriculture and communities to a better level.
What are the initiatives to achieve this?	Various initiatives have been identified for the actions of institutes, faculties and centres at UPM to prepare action plans and strategies that are in line with their strength. Among them are: 1. Provide a platform to add value to agriculture and food security with the application of new knowledge, such as artificial intelligence, easy-to-own applications, automation and others 2. Professional advisory services to the farming community and the public on agriculture, standalone agriculture, gardening, food security, public health, nutrition, loss and waste of food, transparent and competitive markets and trade 3. Transfer of agricultural technology directly from UPM to the farming community 4. Community Adoption Projects for technology transfer and good Agriculture Practices 5. Young Agriculture Entrepreneur Development Programme 6. Development of UPM's big data that includes expertise, alumni, industry, and community information

ENABLER THRUSTS

The advancement of enablers plays a role in ensuring the effectiveness and efficiency of governance, strategy development, talent development, application of corporate culture, sustainable financial resources, infrastructure, digital technology, strategic communication, branding and others that can be enabled to drive the success of food security.

The following will indicate the success of enablers:

- Best inclusive governance
- Optimal use of resources
- Effective and efficient distribution, investment, and generation of financial resources
- Development of talents who are aware and sensitive to food security issues
- Access to expertise and collaboration in improving new technological knowledge
- Improvement and diversification of agricultural products through research and commercial value
- Enhancement of UPM'S reputation and brand

The expected impact of enablers on UPM's food security is as follows:

- Service beyond expectations, i.e., Quality delivery and effective food assurance initiatives that exceed expectations
- UPM'S collective collaboration with domestic and foreign institutions
- Relevant and high-impact research
- Community strengthening, which is the empowerment of farming community through the development and empowerment of expertise
- The best learning and life experiences, namely the excellence of upm graduates and agricultural entrepreneurs in food security industry empowerment, i.e., UPM as an industry reference in globally recognised food security and an internationally reputable university in playing its role for food security at the national and international levels.

31 SCOPES & 108 INITIATIVES

FOOD GUARANTEE

OUTCOME THRUSTS

Universiti Putra Malaysia (UPM) aims to be a leader among higher education institutions as a leader in food security through the implementation of this Food Security Blueprint. The achievement of this goal is identified by:

1

Outcome Thrusts 1: Excellence of Graduates and Agricultural Entrepreneurs

UPM is committed to producing graduates who not only have knowledge and skills in the field of agriculture but also have excellent and competitive entrepreneurial attributes. With a multidisciplinary approach in UPM's academic programme, this Food Security Blueprint aims to ensure that UPM graduates who choose to become agricultural entrepreneurs can use their knowledge to face and solve the country's food security challenges by applying the latest technology and creating innovative ideas in the food supply chain. This is expected to increase food production effectively and competitively.

2

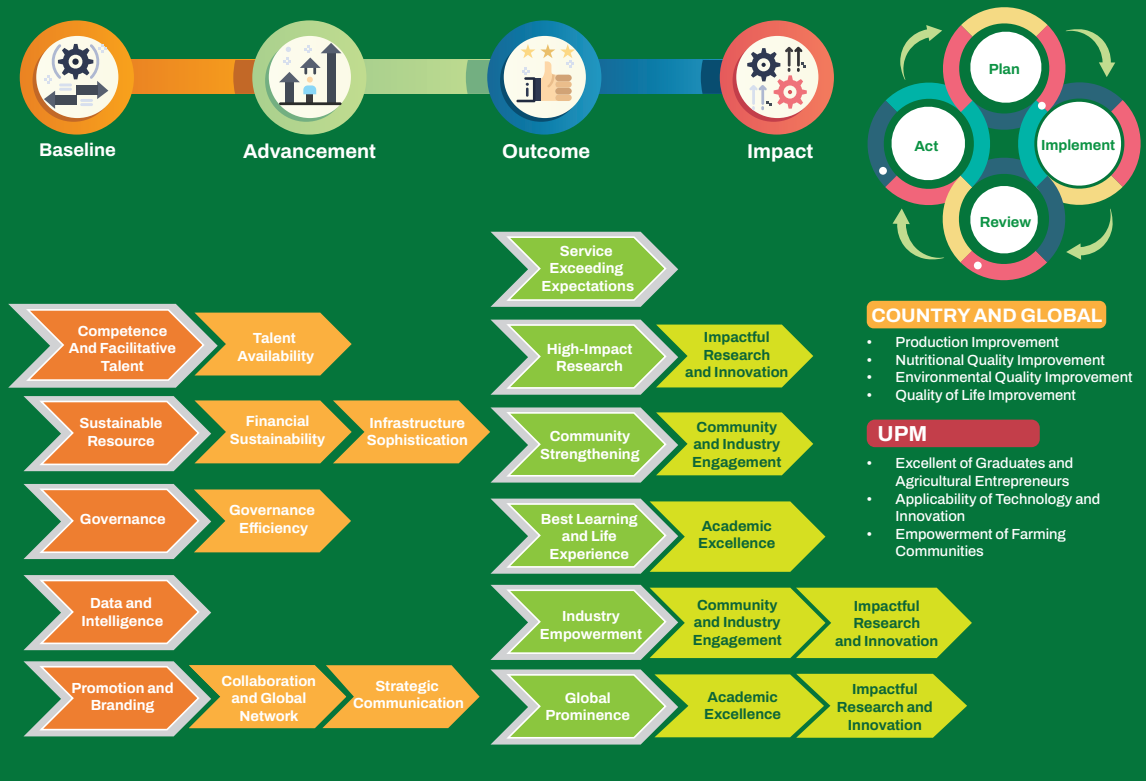
Outcome Thrusts 2: Applicability of Technology and Innovation

The use of technology and innovation in all aspects of agriculture will be accelerated. By using precision agriculture technology, the application of data analytics in agriculture, the development of digital education applications, artificial intelligence, biotechnology to nanotechnology, UPM provides solutions based on the latest technology that increases crop yields, reduces production costs, and improves the stability and safety of food more effectively and efficiently. The use of Internet of Things (IoT) Technology and the big data approach in agriculture enables the optimisation of resource use and promotes sustainable agricultural practices.

3

Outcome Thrusts 3: Empowerment of Farming Communities

This initiative focuses on expanding the capacity of the farming community to become more self-sufficient, dynamic, and competitive. Through collaboration between universities, industry, and community, UPM strives to position Malaysia as a leading nation in sustainable agriculture and drive the application of advanced technology in agriculture. The farming community is empowered with new skills and cutting-edge technology, together with UPM and the industry that will enable them to contribute more effectively to national food security. This blueprint is not only focused on quantitative but also qualitative improvement, creating an effective ecosystem for improving the society's quality of life and preserving natural resources. UPM sets a clear goal to produce sustainable innovation that supports the achievement of the Sustainable Development Goals and makes Malaysia a global model in food security and agricultural sustainability.

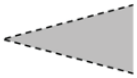
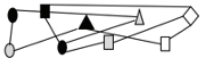


Food Security Blueprint is the university's strategic approach based on the University's Strategic Framework. Several Core and Enabler elements related to the university's food security initiative are given focus to enable a leap from the current baseline performance to the desired impact to achieve the objectives and targets of this Blueprint.

UPM's Food Security Blueprint targets the impact of success at the national and university levels, namely Increased Production, Improved Nutritional Quality, Improved Environmental Quality, Improved Quality of Life and Excellence of Graduates and Agricultural Entrepreneurs, Applicability of Technology and Innovation, and Empowerment of Agricultural Communities. The efficiency and success of the Blueprint is strengthened through important aspects involving monitoring, evaluation, and continuous improvement which are necessary for effective evaluation. The Blueprint also emphasizes a comprehensive monitoring system to assess and monitor key performance indicators, lead assessments of weaknesses and appropriate interventions as well as strengthening implementation strategies to achieve objectives.

UNCERTAINTIES AND DISRUPTIVE FACTORS

In addition to the fundamental market imbalances, particularly supply and demand, the future landscape of food security will also be challenged by VUCA and BANI.

Low uncertainty	High uncertainty
	
Low unpredictability	**High unpredictability**
	
Low complexity	**High complexity**
	
Low ambiguity	**High ambiguity**
	

VUCA	Meaning
V	**Volatility** refers to situations where challenges or problems change rapidly and are difficult to predict, often reaching a serious level.
U	**Uncertainty** refers to situations where information about an issue is limited, making it difficult to make predictions or find solutions regarding the issue.
C	**Complexity** refers to the pattern of behaviour in a system or model, where components within the system are interrelated and interact with each other in various ways and directions.
A	**Ambiguity** refers to situations that have more than one meaning, which can sometimes lead to confusion.

BANI: Brittle, Anxious, Nonlinear and Incomprehensible

Brittle: The vulnerability of the food system to sudden disruptions. Strategies to reduce vulnerability include diversifying food production sources and enhancing local food systems.

Anxious: Uncertainty about food security creates widespread social anxiety. To address this issue, strong social security networks need to be established and community-based support systems should be fostered.

Non-linear: Unforeseen and unpredictable consequences that arise disproportionately from small changes in the global food system demand for flexible and adaptive management strategies. This highlights the importance of leveraging the latest technology to develop or obtain a clearer and comprehensive understanding and anticipation.

Incomprehensible: The complexity and interconnectedness of the global food system often present challenges that are difficult to fully understand, especially considering the uncertainties of climate change. An interdisciplinary approach and lifelong learning are crucial for addressing this complexity.

Conclusion

Universiti Putra Malaysia (UPM) is committed to leading the nation's food security initiatives through a holistic approach that encompasses education, research, and industry-community collaboration. With a focus on advanced research and innovative academic programs, UPM not only enhances its capacity as a centre of excellence but also serves as a catalyst for social transformation and innovation in the agri-food sector. Through this strategy, UPM strengthens its collaborative network with stakeholders, including the government and communities, to implement food security initiatives effectively and inclusively. These initiatives aim to raise awareness and responsibility among all UPM members in contributing to food security at the national and global levels, making UPM a model for other higher education institutions in addressing the global challenges of the 21^{z} century.

EXECUTIVE SUMMARY

B | L | U | E | P | R | I | N | T

FOOD SECURITY

UNIVERSITI PUTRA MALAYSIA

Universiti Putra Malaysia
43400 UPM Serdang
Selangor Darul Ehsan
Malaysia

Agriculture • Innovation • Life

With Knowledge We Serve

upm.edu.my