



Integration of SDGs in

- ☐ Institutional governance/strategic level
- ☐ **SDGs in research**
- ☐ SDGs in campus operations
- ☐ SDGs in curriculum development
- ☐ SDGs in student engagement activities
- ☐ SDGs into community activities
- ☐ SDGs at a whole-institution level

Focus on

- ☐ Goal 1 - No poverty
- ☐ Goal 2 - Zero hunger
- ☐ Goal 3 - Good health and wellbeing
- ☐ Goal 4 - Quality education
- ☐ Goal 5 - Gender equality
- ☐ Goal 6 - Clean water and sanitation
- ☐ Goal 7 - Affordable and clean energy
- ☐ Goal 8 - Decent work and economic growth
- ☐ **Goal 9 - Industry, innovation and infrastructure**
- ☐ Goal 10 - Reduced inequalities
- ☐ Goal 11 - Sustainable cities and communities
- ☐ **Goal 12 - Responsible consumption and production**
- ☐ Goal 13 - Climate action
- ☐ Goal 14 - Life below water
- ☐ Goal 15 - Life on land
- ☐ Goal 16 - Peace, justice and strong institutions
- ☐ **Goal 17 - Partnerships for the goals**

Biomaterial Innovations

Summary

Substitution of material use from non-renewable resources to biomaterial is a vital innovation aspect of the Sustainable Development Goals (SDGs) Agenda. IPB University, as a research-based university, is committed to developing various innovations from biomaterials, such as Fiber Helmet and Bulletproof Crash-resistant Empty Palm Oil Bunch. Siti Nikmatin, from the Faculty of Mathematics and Natural Sciences at IPB University, processed the empty palm fruit bunches into natural fiber that can be used as the raw material to produce the bulletproof vest and helmet. The natural fiber from the empty palm bunches has several advantages compared to synthetic fiber, namely its abundant availability in Indonesia, sustainable, renewable, and biodegradable, cheap price, can be processed with simple technology and has good mechanical and thermal properties. The palm oil empty fruit bunches are also potential for making bio-composite for the production of helmets, polyester, bio-plastics, bio-oil/biogas, and dimethyl-ether (DME) for substitution of LPG. The palm tree trunks can be used as raw material to produce plywood, starch glucose, and lactic acid. Innovative products from IPB University resulting from the palm oil waste research include organic hand sanitizer, helmets, clothes, and others.

Benefits:

1. Processing empty fruit bunches create added value
2. Utilizing palm oil waste thereby reducing waste problems
3. It also reduces the the use of non-renewable resource as materials for various products
4. The main advantage of biomaterials is that they are strong while being lightweight and low density.
5. Can be processed with simple technology, renewable and biodegradable

Barriers or challenges:

1. To date the use of biomaterial based products in daily life is still limited. It requires the change in consumer preference to promote environmentally friendly products.
2. Competition among food, feed, biomaterial and bioenergy production keep increasing due global demand. It may limit the input to produce biomaterials
3. High cost involved in the manufacture of composites

Conclusions and recommendations – max 200 words

Biomaterial innovation can bring unique competitive advantages as well as create products that are better for people and the environment. Our biomaterial innovation can be defined as circular economy principle, and offers a helpful framework for solutions that benefit business, society, and nature.



Fig 1. Bullet-Proof Vest from Oil Palm Empty Fruit Bunch



Fig 2. Anti-Crash Helmet from Oil Palm Empty Fruit Bunch