Over 1 billion people in the developing countries are suffering from poverty, with a substantial majority of them living in rural areas. The development of agriculture can play a direct role in rural poverty alleviation. However, during the last several decades, there has been an increasing frequency and severity of extreme weather events such as prolonged drought, floods, severe storms, heat waves, and untimely freezes which can have severe detrimental effects on crop yield, and therefore, agricultural production.

At this scenario, our team answered IBM 2021 call for code aiming to reduce the risk of agricultural production and achieve 'zero hunger' by new tech and innovative financial instrument. We developed a new system named after ancient Greek goddess of the harvest. We hope our 'Demeter' can save the living of the small-scale farmers so that no children die of hunger anymore.

For the financial innovation point, our team persuaded commercial bank and insurance company to issue Insurance-Linked Agriculture Credit Loan. The commercial banks benefit from lower bad loan ratio related to agriculture. Besides, this financial instrument assists insurance to solve the insurance fraud problem. From the farmers' perspective, they can received the credit loan and insurance thanks to this financial instruments so they will be more resilient in face of extreme weather.

For the technical point, our team utilized Hot-New technology such as IOT service, blockchain, machine leaning, big data and AI to reduce small-scale farmers' production risk, commercial bank and insurance companies' capital risk. The technical detail is shown in Demeter's three main functions.

The first one is the consulting service. We change the traditional way the small-scale farmers manage plants, soil, water and temperature which is completely done by experience. Based on the real-time data collected by the IOT sensors, our AI module will automatically and scientifically inform farmers what need to be done to keep crops healthy, when to fertilize etc. It can help them better engage agricultural activities. In addition, the instructions are informed by icons and animations, which means people who are not well-educated can easily follow the instruments.

Another function of Demeter is the automated claims settlement. we use a series of sensors, cameras and meteorological satellites to monitor health status of crops and livestock. The collected data together with the smart contract will be uploaded to the IBM blockchain platform. Once the claims conditions recorded in the smart contract are met, our users will be automatically compensated. No more fiddly insurance claims settlement needed. Farmers can get their deserved compensation quickly and the insurance company don not have to worry about insurance fraud anymore.

The third highlights is the forecast function. We have built different prediction models for each kind of crops or livestock. After setting up geographic location and selecting the type of the crops they plant, farmers can estimate the yield of crops before they mature. Meanwhile, farmers can change the yield prediction simulator's input factors manually to see how the potential profits

change. Relying on this function, farmers can easily decide whether to invest more funds on means of agriculture production such as fertilizer.

In sum, ‘Demeter’ combines both financial and technical approach to help small-scale farmers make a better living. We sincerely wish nobody in the world starve to death because of poverty.