

eigenvalues and eigenvectors of a weighting matrix were calculated and suitability of land was detected using GIS (Elsheikh et al. 2013). In 2010 Astee L.Y discussed viability of rooftop farming by considering several factors in his study. They concerned several design constraints for existing block typologies and rain water harvesting and was able to increase the production by 30.5% (Astee & Kishnani, 2010).

In order to achieve high quality cultivation products, Gruda shows that indoor production is more profitable than outdoor production for vegetables based on quality of the product. The reason was mentioned as; indoor productions do not expose directly to the rapid climatic changes (Gruda, 2005). Geographical changes like availability of slopes, mountains and urbanization is challenging to the horizontal farming in most agrarian countries and one of the most suitable solution proposed by Besthorn is vertical farming (Besthorn, 2013). Further ALSE can be used for selecting suitable type of crop to cultivation in selected lands (Elsheikh, 2013).

Climatic changes have a significant impact on smallholder and farmer's profitability. Using Mann-Kendall statistical analysis, Nikhil, identified the characteristic of seasonal and monthly rainfall. Kendal's rank correlation statistics and wavelet analysis can be used to find trend of rainfall (Nikhil & Azeez, 2012). Seasonal variation is important as different crops require water at different times. Erratic pattern can be identified via trend analysis on temperature data. A time series forecasting model called Seasonal ARIMA model was proposed by Abdul to forecast rainfall with minimum Bayesian Information Criterion (BIC) (Abdul-Aziz et al., 2013). Developing a linear programming model for water resources planning and management to cultivation regions can optimize the exploitation from surface water resources and decision makers to determine suitable cultivation pattern (Daghighi, Nahvi & Kim, 2017). To build a sustainable cultivation plan, optimization models can be used to recommend a crop type, suitable time period and land.

## **Final remarks**

Worldwide trend toward standardization of the agricultural process with optimal cultivation strategy was observed, especially concerning the influential factors of the cultivation in the literatures. For selected crop's cultivation, mathematical models were developed for selecting arable lands. By developing an optimization problem for water resource management system for farmlands have increased 8% of the net profit. Further, this water management model can be implemented by considering all other factors which are basic needs of cultivation.

## **Conclusion**

Suitability of land for cultivation, optimal land allocation and crop type identification can be done with linear programming or by introduced method of ALSE by Elsheikh. Using time series models, climatic conditions of the cultivating period can be forecast by considering climatic factors effect on selected crops. Through investigating various optimization