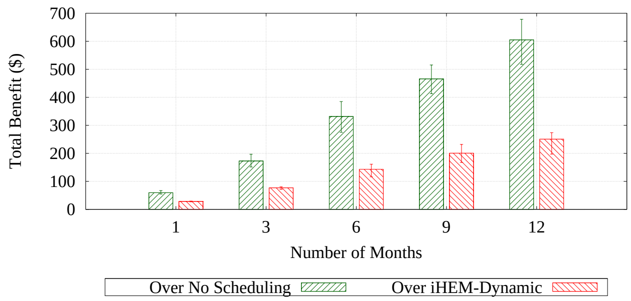

Fig. 10: Benefit of the customers

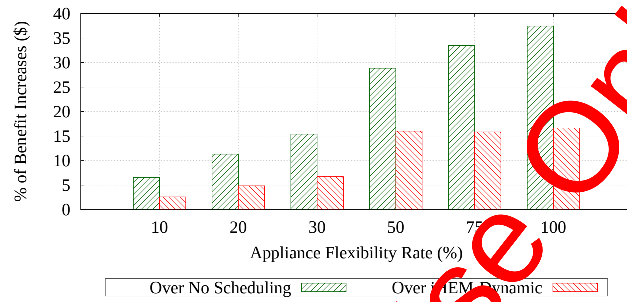

Fig. 11: Benefit increases with different flexibility rate

change in the benefit value is moderate with the proposed scheme, D2S, with higher flexibility rates over the existing scheme, iHEM.

VI. Discussions: Practical Perspective

In this section, we briefly present different applications of the proposed scheme, D2S, from a practical perspective. The main objective of the proposed scheme is home energy management (HEM) in the smart grid environment. Therefore, the primary application of the proposed scheme is residential energy management in a cost-effective manner, which is reflected in the simulation results. Additionally, with the dynamic demand scheduling facility, the peak-load on the grid is also relieved, which, in turn, helps to maintain supply-demand curve. Therefore, the proposed scheme is also capable of implementing the demand response mechanism. In a practical scenario, different customers may have different appliance flexibility rates, i.e., number of flexible appliances, which can be scheduled in different time-slots, varies from one customer to other customers. To address such practical issues, energy cost to the customers is evaluated with different appliance flexibility rates. Therefore, it is evident that the proposed scheme, D2S, is useful in the practical applications.

VII. Conclusion

In this paper, we proposed a dynamic appliance scheduling scheme, D2S, using the theory of *Optimal Portfolio Selection Strategy*. The proposed scheme schedules appliances dynamically in different time periods, while considering the expected profit return and risk factors. The day-ahead energy requirement of a customer is generated in different time-slots using the history of demands, and it is termed as the *weight graph* of energy. After computing the *weight graph*, the scheduler schedules the appliances dynamically in different time-slots, for which the utility of the customer is increased. The simulation results show that D2S always outperforms the existing one with dynamic pricing policy. The average utility of the customer increases approximately 28.2% over the iHEM [6] and "no scheduling" schemes.

In this work, we considered rational customers with different appliances, which may not be true in real-life scenarios. Therefore, we plan to incorporate heterogeneity of the customers' behaviors as the future extension of this work. Additionally, the imbibing of cooperation among customers to improve the reliability of energy supply is also a future extension of this work.

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