The Human Centered Design (HCD) approach rooted in the semi-scientific field of ergonomics was introduced into the software development process to increase the software usability and quality by focusing on the software use and applying human factors/ergonomics and usability knowledge and techniques. In the progress the Human Centered Software Engineering (HCSE) was developed more than a decade ago. HCSE is the framework for integrating the human centered design philosophy and usability engineering into traditional systems development method. Despite its importance, HCD adoption among software practitioners remains low, as reflected in the result of the preliminary study conducted among the Malaysian software development organizations. This research argues that to encourage the HCD adoption among software practitioners a path for HCD adoption needs to be prescribed. This research also argues that an organizational approach and not individual advocates of human-centered design must be used to facilitate the adoption of HCD in systems development. Following this argument of this research embarks on the strategizing of HCD adoption through the development of an adoption model that can inform the readiness of adopting HCD based on technological and organizational capability. The research was carried out in three phases. In the first phase a comprehensive literature analysis on HCD was conducted and the conceptual model has been developed. By integrating HCD from management perspectives into the conceptual model has contributed to the development of an initial model for HCD adoption. This initial model was used as a probe to elicit knowledge of its correctness and suitability with two renowned academic experts in HCI. In the next phase the initial model was revised. The integration of the feedback obtained from the first phase with the constructs obtained from adoption and capability maturity models, the HCD Adoption Model has been developed. The HCD Adoption Model prescribes five levels of adoption and the related key processes of each level. This new adoption model later verified through expert reviews with two HCI academic experts and five software development practitioners in the last phase. The novelty of this research lies on its strategy of taking an organizational and managerial perspective of HCD. The main contribution of this research is a new HCD Adoption Model. This new model contributes to the theoretical knowledge of the managerial aspects of HCI. In terms of practical contribution, the HCD Adoption Model will be a useful tool to inform the readiness for adopting HCD in the software development organization.

Energy deficiency is one of the most critical aspects of Wireless Sensor Network (WSN). The network performance can be affected when a small network grows larger, and this is related to the energy deficiency of WSN. Therefore, it is essential to manage sensor node energy efficiently, so as to ensure that it would be sufficient to complete WSN applications. Clustering is an established approach which emphasized on cluster head to prolong the lifetime of WSN. However, there is still a lack of effective techniques to determine and select the cluster head. Currently, the selection of cluster head is based on residual energy and several parameters. The data routing to the base station is solely relying on cluster head. These have resulted ineffective of energy usage of sensor node which causes restrict on a lifetime of the sensor network. Hence, this study proposes a new algorithm called Multi-Tier Protocol (MAP). MAP introduced clustering scheme to reduce the energy consumption of wireless sensor network in which, Fuzzy Logic used as tools to select the cluster head and multi-hop communication is used to route the data from the cluster head to the base station. Initially, the combinations of parameters which are residual energy, centrality and communication cost are determined for cluster head selection and utilized in MAP. Also, two types of principle nodes applied which called cluster head and primary node. The cluster head (CH) is responsible to gathered and compressed the data send by the sensor node, while primary node acts as a relay node for the respective cluster head at each tier to execute the routing process and sent the data to the base station. Two simulations based on 100 sensor nodes with 1 Joule and random energy are carried out. Simulation based on 200 sensor nodes with 1 Joule energy deployed for testing the reliability of MAP. The performances of MAP are evaluated through comparing its energy usage for data transmission against Low Energy Adaptive Clustering Hierarchy (LEACH) and Stable Election Protocol (SEP). It found that the three parameters’ combination gave the most promising results in improving the lifetime of a network. The results indicated that MAP significantly extends the lifetime of wireless sensor network 48.25% longer than LEACH and SEP. This thesis concludes that the proposed protocol MAP with effective combinations of parameters for selecting cluster heads and cluster primary nodes as a relay node for data routing can effectively improve the efficiency of WSN network.