The goal of this thesis is to determine the contributing factors affecting severe traffic crashes (severe: incapacitating and fatal - non-severe: no injury, possible injury, and non-incapacitating), and in particular those factors influencing crashes involving large vehicles (heavy trucks, truck tractors, RVs, and buses). Florida Department of Highway Safety and Motor Vehicles (DHSMV) crash reports of 2008 have been used. The data included 352 fatalities and 9,838 injuries due to large vehicle crashes.

Using the crashes involving large vehicles, a model comparison between binary logit model and a Chi-squared Automatic Interaction Detection (CHAID) decision tree model is provided. There were 13 significant factors (i.e. crash type with respect to vehicle types, residency of driver, DUI, rural-urban, etc.) found significant in the logistic procedure while 7 factors found (i.e. posted speed limit, intersection, etc.) in the CHAID model. The model comparison results indicate that the logit analysis procedure is better in terms of prediction power.

The following analysis is a modeling structure involving three binary logit models. The first model was conducted to estimate the crash severity of crashes that involved only personal vehicles (PV). Second model uses the crashes that involved (LV) and passenger vehicles (PV). The final model estimated the severity level of crashes involving only LV's. Significant differences with respect to various risk factors including driver, vehicle, environmental, road geometry and traffic characteristics were found to exist between those crash types and models. For example, driving under the influence of Alcohol (DUI) has positive effect on the severity of PV vs. PV and LV vs. PV while it has no effect on PV vs. PV.

As a result, 4 of the variables found to be significant were similar in all three models (although often with quite different impact) and there were 11 variables that significantly influenced crash injury severity in PV vs. PV crashes, and 9 variables that significantly influenced crash injury severity in LV vs. PV crashes.

Based on the significant variables, maximum posted speed, number of vehicles involved, and intersections are among the factors that have major impact on injury severity. These results could be used to identify potential countermeasures to reduce crash severity in general, and for LVs in particular. For example, restricting the speed limits and enforcing it for large vehicles could be a suggested countermeasure based on this study.