FIRE LOAD SURVEY OF COMMERCIAL PREMISES IN FINLAND

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Introduction

*Fire load is an important parameter in performance based fire safety engineering (overall and structures)
*By using fire loads in design fires, temperatures in the vicinity of structures and further temperatures in structures can be calculated and the integrity determined
*In Finland and many other European countries the new Eurocodes (EN 1991-1-2, 2003) are being taking into account and fire load data especially for shopping malls and shops needed

Measurements

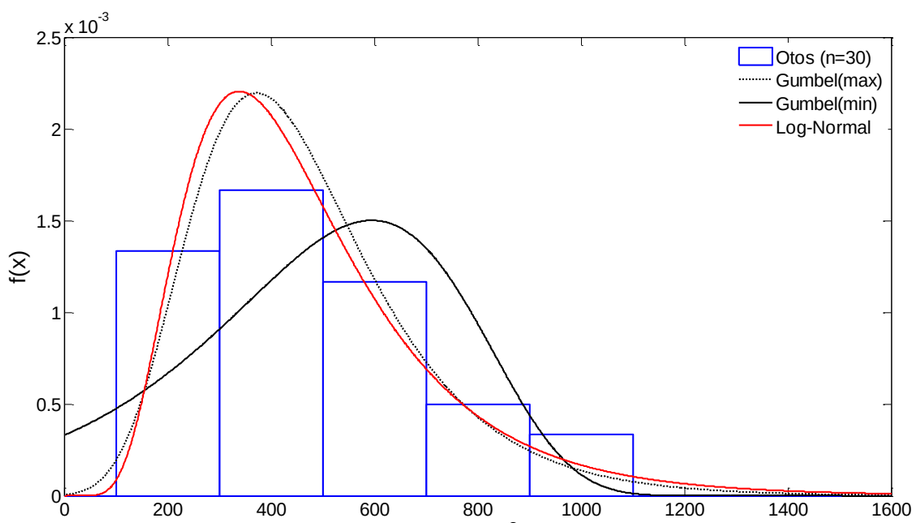
*Thirty shops and their relating spaces with different sizes and types in Seinäjoki and its surroundings were investigated
*The smallest shops typically special shops in shopping malls - the largest shops groceries, building material, household appliance and furniture shops
*Associated spaces mostly storages (17), social rooms (4) and offices (3)
*Investigated floor area almost 28000 m^2
*Smallest shops 54 m^2 – largest shop 4550 m^2 with a 800 m^2 storage

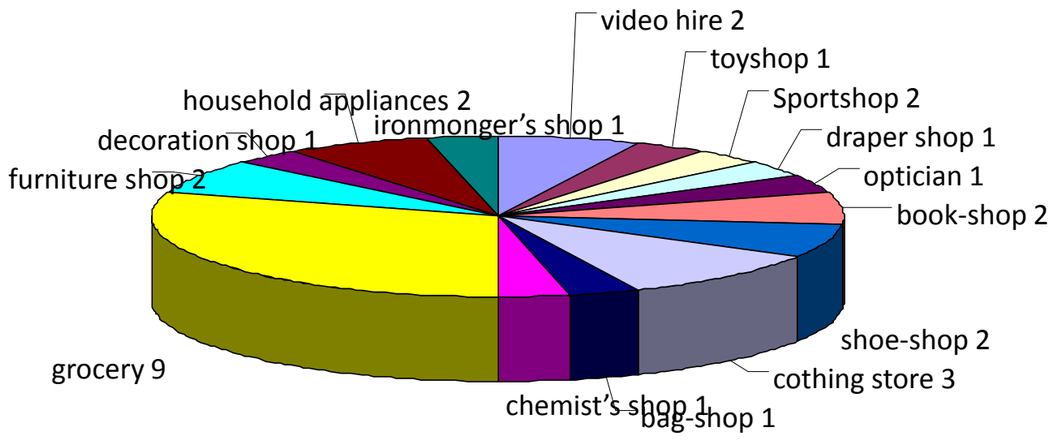
Methods (Theyvoyen et al 2008)

*Burning materials: wood, textiles, plastic, paper, miscellaneous
*Measuring devices: weighers, rulers, laser systems
*Masses were weighed or evaluated from the volume and density
*Fire load was calculated by multiplying the mass and the calorific value of the material
*Suitability of two stochastic models: lognormal and Gumbel –distribution to measured fire load density data was considered

Results

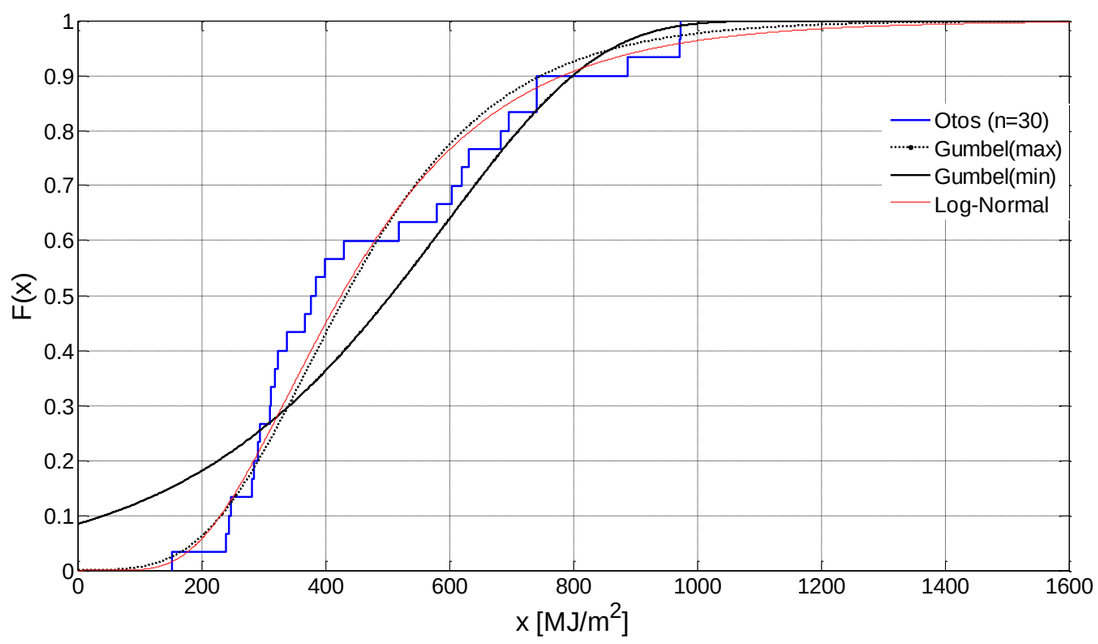
*Lognormal distribution and Gumbel (maximum) –distribution fit well with the fire load density histogram and the cumulative step curve
* The results are corresponding in the case of associated spaces





Conclusions

*Measured and fitted fire load density follows lognormal distribution significantly more reliably than the Gumbel (minimum) –distribution and slightly more reliably then the Gumbel (maximum) –distribution.
*This study and corresponding other studies strengten the idea that 80 % fractile of the Eurocode of 730 MJ/m2 is a suitable characteristic value for the fire safety design of commercial premises of shopping malls except for storages and associated rooms.
*Especially the fire loads in storages may vary a lot and should investigated in more detail



References

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