$[\lambda_{13}^{(2)}(3)]^{(2)} = 0.05$, $[\lambda_{13}^{(2)}(4)]^{(2)} = 0.055$,

$[\lambda_{14}^{(2)}(1)]^{(2)} = 0.033$, $[\lambda_{14}^{(2)}(2)]^{(2)} = 0.04$,

$[\lambda_{14}^{(2)}(3)]^{(2)} = 0.05$, $[\lambda_{14}^{(2)}(4)]^{(2)} = 0.055$,

$[\lambda_{21}^{(2)}(1)]^{(2)} = 0.066$, $[\lambda_{21}^{(2)}(2)]^{(2)} = 0.07$,

$[\lambda_{21}^{(2)}(3)]^{(2)} = 0.075$, $[\lambda_{21}^{(2)}(4)]^{(2)} = 0.08$,

$[\lambda_{22}^{(2)}(1)]^{(2)} = 0.066$, $[\lambda_{22}^{(2)}(2)]^{(2)} = 0.07$,

$[\lambda_{22}^{(2)}(3)]^{(2)} = 0.075$, $[\lambda_{22}^{(2)}(4)]^{(2)} = 0.08$,

$[\lambda_{31}^{(2)}(1)]^{(2)} = 0.066$, $[\lambda_{31}^{(2)}(2)]^{(2)} = 0.07$,

$[\lambda_{31}^{(2)}(3)]^{(2)} = 0.075$, $[\lambda_{31}^{(2)}(4)]^{(2)} = 0.08$,

$[\lambda_{41}^{(2)}(1)]^{(2)} = 0.033$, $[\lambda_{41}^{(2)}(2)]^{(2)} = 0.04$,

$[\lambda_{41}^{(2)}(3)]^{(2)} = 0.045$, $[\lambda_{41}^{(2)}(4)]^{(2)} = 0.05$,

$[\lambda_{51}^{(2)}(1)]^{(2)} = 0.033$, $[\lambda_{51}^{(2)}(2)]^{(2)} = 0.04$,

$[\lambda_{51}^{(2)}(3)]^{(2)} = 0.045$, $[\lambda_{51}^{(2)}(4)]^{(2)} = 0.05$,

$[\lambda_{61}^{(2)}(1)]^{(2)} = 0.033$, $[\lambda_{61}^{(2)}(2)]^{(2)} = 0.04$,

$[\lambda_{61}^{(2)}(3)]^{(2)} = 0.045$, $[\lambda_{61}^{(2)}(4)]^{(2)} = 0.05$,

$[\lambda_{71}^{(2)}(1)]^{(2)} = 0.033$, $[\lambda_{71}^{(2)}(2)]^{(2)} = 0.04$,

$[\lambda_{71}^{(2)}(3)]^{(2)} = 0.045$, $[\lambda_{71}^{(2)}(4)]^{(2)} = 0.05$.

The subsystem S_5 consist of components $E_{11}^{(5)}$, $E_{21}^{(5)}$, $E_{31}^{(5)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}, \{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(5)}(1)]^{(2)} = 0.033$, $[\lambda_{11}^{(5)}(2)]^{(2)} = 0.04$,

$[\lambda_{11}^{(5)}(3)]^{(2)} = 0.045$, $[\lambda_{11}^{(5)}(4)]^{(2)} = 0.05$,

$[\lambda_{21}^{(5)}(1)]^{(2)} = 0.033$, $[\lambda_{21}^{(5)}(2)]^{(2)} = 0.04$,

$[\lambda_{21}^{(5)}(3)]^{(2)} = 0.05$, $[\lambda_{21}^{(5)}(4)]^{(2)} = 0.055$,

$[\lambda_{31}^{(5)}(1)]^{(2)} = 0.033$, $[\lambda_{21}^{(5)}(2)]^{(2)} = 0.04$,

$[\lambda_{21}^{(5)}(3)]^{(2)} = 0.05$, $[\lambda_{21}^{(5)}(4)]^{(2)} = 0.06$.

At the operation states z_3, i.e. at the leaving Gdynia Port state the ferry is built of $n_3 = 2$ subsystems S_1 and S_2 forming a series structure shown in *Figure 15*.

The subsystem S_1 consist of component $E_{11}^{(1)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}, \{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(1)}(1)]^{(3)} = 0.033$, $[\lambda_{11}^{(1)}(2)]^{(3)} = 0.04$,

$[\lambda_{11}^{(1)}(3)]^{(3)} = 0.045$, $[\lambda_{11}^{(1)}(4)]^{(3)} =0.05$.

The subsystem S_2 consist of components $E_{11}^{(2)}$, $E_{12}^{(2)}$, $E_{13}^{(2)}$, $E_{14}^{(2)}$, $E_{21}^{(2)}$, $E_{22}^{(2)}$, $E_{31}^{(2)}$, $E_{41}^{(2)}$, $E_{51}^{(2)}$, $E_{61}^{(2)}$, $E_{71}^{(2)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}, \{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(2)}(1)]^{(3)} = 0.033$, $[\lambda_{11}^{(2)}(2)]^{(3)} = 0.04$,

$[\lambda_{11}^{(2)}(3)]^{(3)} =0.05$, $[\lambda_{11}^{(2)}(4)]^{(3)} = 0.055$,

$[\lambda_{12}^{(2)}(1)]^{(3)} = 0.033$, $[\lambda_{12}^{(2)}(2)]^{(3)} = 0.04$,

$[\lambda_{12}^{(2)}(3)]^{(3)} = 0.05$, $[\lambda_{12}^{(2)}(4)]^{(3)} = 0.055$,

$[\lambda_{13}^{(2)}(1)]^{(3)} = 0.033$, $[\lambda_{13}^{(2)}(2)]^{(3)} = 0.04$,

$[\lambda_{13}^{(2)}(3)]^{(3)} = 0.05$, $[\lambda_{13}^{(2)}(4)]^{(3)} = 0.055$,

$[\lambda_{14}^{(2)}(1)]^{(3)} = 0.033$, $[\lambda_{14}^{(2)}(2)]^{(3)} = 0.04$,

$[\lambda_{14}^{(2)}(3)]^{(3)} = 0.05$, $[\lambda_{14}^{(2)}(4)]^{(3)} = 0.055$,

$[\lambda_{21}^{(2)}(1)]^{(3)} = 0.033$, $[\lambda_{21}^{(2)}(2)]^{(3)} = 0.04$,

$[\lambda_{21}^{(2)}(3)]^{(3)} = 0.045$, $[\lambda_{21}^{(2)}(4)]^{(3)} = 0.05$,

$[\lambda_{22}^{(2)}(1)]^{(3)} = 0.033$, $[\lambda_{22}^{(2)}(2)]^{(3)} = 0.04$,

$[\lambda_{22}^{(2)}(3)]^{(3)} = 0.045$, $[\lambda_{22}^{(2)}(4)]^{(3)} = 0.05$,

$[\lambda_{31}^{(2)}(1)]^{(3)} = 0.033$, $[\lambda_{31}^{(2)}(2)]^{(3)} = 0.04$,

$[\lambda_{31}^{(2)}(3)]^{(3)} = 0.045$, $[\lambda_{31}^{(2)}(4)]^{(3)} = 0.05$,

$[\lambda_{41}^{(2)}(1)]^{(3)} = 0.033,\ [\lambda_{41}^{(2)}(2)]^{(3)} = 0.04,$

$[\lambda_{41}^{(2)}(3)]^{(3)} = 0.045,\ [\lambda_{41}^{(2)}(4)]^{(3)} = 0.05,$

$[\lambda_{51}^{(2)}(1)]^{(3)} = 0.033,\ [\lambda_{51}^{(2)}(2)]^{(3)} = 0.04,$

$[\lambda_{51}^{(2)}(3)]^{(3)} = 0.045,\ [\lambda_{51}^{(2)}(4)]^{(3)} = 0.05,$

$[\lambda_{61}^{(2)}(1)]^{(3)} = 0.033,\ [\lambda_{61}^{(2)}(2)]^{(3)} = 0.04,$

$[\lambda_{61}^{(2)}(3)]^{(3)} = 0.045,\ [\lambda_{61}^{(2)}(4)]^{(3)} = 0.05,$

$[\lambda_{71}^{(2)}(1)]^{(3)} = 0.033,\ [\lambda_{71}^{(2)}(2)]^{(3)} = 0.04,$

$[\lambda_{71}^{(2)}(3)]^{(3)} = 0.045,\ [\lambda_{71}^{(2)}(4)]^{(3)} = 0.05.$

At the operation states z_4, i.e. at the navigation at restricted waters state the ferry is built of $n_4 = 3$ subsystems S_1, S_2 and S_4 forming a series structure shown in *Figure 16*.
The subsystem S_1 consist of component $E_{11}^{(1)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(1)}(1)]^{(4)} = 0.033,\ [\lambda_{11}^{(1)}(2)]^{(4)} = 0.04,$

$[\lambda_{11}^{(1)}(3)]^{(4)} = 0.045,\ [\lambda_{11}^{(1)}(4)]^{(4)} =0.05.$

The subsystem S_2 consist of components $E_{11}^{(2)}$, $E_{12}^{(2)}$, $E_{13}^{(2)}$, $E_{14}^{(2)}$, $E_{41}^{(2)}$, $E_{51}^{(2)}$, $E_{61}^{(2)}$, $E_{71}^{(2)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(2)}(1)]^{(4)} = 0.033,\ [\lambda_{11}^{(2)}(2)]^{(4)} = 0.04,$

$[\lambda_{11}^{(2)}(3)]^{(4)} =0.05,\ [\lambda_{11}^{(2)}(4)]^{(4)} = 0.055,$

$[\lambda_{12}^{(2)}(1)]^{(4)} = 0.033,\ [\lambda_{12}^{(2)}(2)]^{(4)} = 0.04,$

$[\lambda_{12}^{(2)}(3)]^{(4)} = 0.05,\ [\lambda_{12}^{(2)}(4)]^{(4)} = 0.055,$

$[\lambda_{13}^{(2)}(1)]^{(4)} = 0.033,\ [\lambda_{13}^{(2)}(2)]^{(4)} = 0.04,$

$[\lambda_{13}^{(2)}(3)]^{(4)} = 0.05,\ [\lambda_{13}^{(2)}(4)]^{(4)} = 0.055,$

$[\lambda_{14}^{(2)}(1)]^{(4)} = 0.033,\ [\lambda_{14}^{(2)}(2)]^{(4)} = 0.04,$

$[\lambda_{14}^{(2)}(3)]^{(4)} = 0.05,\ [\lambda_{14}^{(2)}(4)]^{(4)} = 0.055,$

$[\lambda_{41}^{(2)}(1)]^{(4)} = 0.033,\ [\lambda_{41}^{(2)}(2)]^{(4)} = 0.04,$

$[\lambda_{41}^{(2)}(3)]^{(4)} = 0.045,\ [\lambda_{41}^{(2)}(4)]^{(4)} = 0.05,$

$[\lambda_{51}^{(2)}(1)]^{(4)} = 0.033,\ [\lambda_{51}^{(2)}(2)]^{(4)} = 0.04,$

$[\lambda_{51}^{(2)}(3)]^{(4)} = 0.045,\ [\lambda_{51}^{(2)}(4)]^{(4)} = 0.05,$

$[\lambda_{61}^{(2)}(1)]^{(4)} = 0.033,\ [\lambda_{61}^{(2)}(2)]^{(4)} = 0.04,$

$[\lambda_{61}^{(2)}(3)]^{(4)} = 0.045,\ [\lambda_{61}^{(2)}(4)]^{(4)} = 0.05,$

$[\lambda_{71}^{(2)}(1)]^{(4)} = 0.033,\ [\lambda_{71}^{(2)}(2)]^{(4)} = 0.04,$

$[\lambda_{71}^{(2)}(3)]^{(4)} = 0.045,\ [\lambda_{71}^{(2)}(4)]^{(4)} = 0.05.$

The subsystem S_4 consist of component $E_{11}^{(4)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(4)}(1)]^{(4)} = 0.05,\ [\lambda_{11}^{(4)}(2)]^{(4)} = 0.055,$

$[\lambda_{11}^{(4)}(3)]^{(4)} = 0.06,\ [\lambda_{11}^{(4)}(4)]^{(4)} = 0.065.$

At the operation state z_5, i.e. at the navigation at open waters state the ferry is built of $n_5 = 3$ subsystems S_1, S_2 and S_4 forming a series structure shown in *Figure 17*.
The subsystem S_1 consist of component $E_{11}^{(1)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(1)}(1)]^{(5)} = 0.033,\ [\lambda_{11}^{(1)}(2)]^{(5)} = 0.04,$

$[\lambda_{11}^{(1)}(3)]^{(5)} = 0.045,\ [\lambda_{11}^{(1)}(4)]^{(5)} =0.05.$

The subsystem S_2 consist of components $E_{11}^{(2)}$, $E_{12}^{(2)}$, $E_{13}^{(2)}$, $E_{14}^{(2)}$, $E_{41}^{(2)}$, $E_{51}^{(2)}$, $E_{61}^{(2)}$, $E_{71}^{(2)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(2)}(1)]^{(5)} = 0.033,\ [\lambda_{11}^{(2)}(2)]^{(5)} = 0.04,$

$[\lambda_{11}^{(2)}(3)]^{(5)} =0.05,\ [\lambda_{11}^{(2)}(4)]^{(5)} = 0.055,$

$[\lambda_{12}^{(2)}(1)]^{(5)} = 0.033,\ [\lambda_{12}^{(2)}(2)]^{(5)} = 0.04,$

$[\lambda_{12}^{(2)}(3)]^{(5)} = 0.05,\ [\lambda_{12}^{(2)}(4)]^{(5)} = 0.055,$

$[\lambda_{13}^{(2)}(1)]^{(5)} = 0.033$, $[\lambda_{13}^{(2)}(2)]^{(5)} = 0.04$,

$[\lambda_{13}^{(2)}(3)]^{(5)} = 0.05$, $[\lambda_{13}^{(2)}(4)]^{(5)} = 0.055$,

$[\lambda_{14}^{(2)}(1)]^{(5)} = 0.033$, $[\lambda_{14}^{(2)}(2)]^{(5)} = 0.04$,

$[\lambda_{14}^{(2)}(3)]^{(5)} = 0.05$, $[\lambda_{14}^{(2)}(4)]^{(5)} = 0.055$,

$[\lambda_{41}^{(2)}(1)]^{(5)} = 0.033$, $[\lambda_{41}^{(2)}(2)]^{(5)} = 0.04$,

$[\lambda_{41}^{(2)}(3)]^{(5)} = 0.045$, $[\lambda_{41}^{(2)}(4)]^{(5)} = 0.05$,

$[\lambda_{51}^{(2)}(1)]^{(5)} = 0.033$, $[\lambda_{51}^{(2)}(2)]^{(5)} = 0.04$,

$[\lambda_{51}^{(2)}(3)]^{(5)} = 0.045$, $[\lambda_{51}^{(2)}(4)]^{(5)} = 0.05$,

$[\lambda_{61}^{(2)}(1)]^{(5)} = 0.033$, $[\lambda_{61}^{(2)}(2)]^{(5)} = 0.04$,

$[\lambda_{61}^{(2)}(3)]^{(5)} = 0.045$, $[\lambda_{61}^{(2)}(4)]^{(5)} = 0.05$,

$[\lambda_{71}^{(2)}(1)]^{(5)} = 0.033$, $[\lambda_{71}^{(2)}(2)]^{(5)} = 0.04$,

$[\lambda_{71}^{(2)}(3)]^{(5)} = 0.045$, $[\lambda_{71}^{(2)}(4)]^{(5)} = 0.05$.

The subsystem S_4 consist of component $E_{11}^{(4)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(4)}(1)]^{(5)} = 0.05$, $[\lambda_{11}^{(4)}(2)]^{(5)} = 0.055$,

$[\lambda_{11}^{(4)}(3)]^{(5)} = 0.06$, $[\lambda_{11}^{(4)}(4)]^{(5)} = 0.065$.

At the operation state z_6, i.e. at the navigation at restricted waters state the ferry is built of $n_6 = 3$ subsystems S_1, S_2 and S_4 forming a series-parallel structure shown in *Figure 18*.
The subsystem S_1 consist of component $E_{11}^{(1)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(1)}(1)]^{(6)} = 0.033$, $[\lambda_{11}^{(1)}(2)]^{(6)} = 0.04$,

$[\lambda_{11}^{(1)}(3)]^{(6)} = 0.045$, $[\lambda_{11}^{(1)}(4)]^{(6)} =0.05$.

The subsystem S_2 consist of components $E_{11}^{(2)}$, $E_{12}^{(2)}$, $E_{13}^{(2)}$, $E_{14}^{(2)}$, $E_{21}^{(2)}$, $E_{22}^{(2)}$, $E_{31}^{(2)}$, $E_{41}^{(2)}$, $E_{51}^{(2)}$, $E_{61}^{(2)}$, $E_{71}^{(2)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(2)}(1)]^{(6)} = 0.033$, $[\lambda_{11}^{(2)}(2)]^{(6)} = 0.04$,

$[\lambda_{11}^{(2)}(3)]^{(6)} =0.05$, $[\lambda_{11}^{(2)}(4)]^{(6)} = 0.055$,

$[\lambda_{12}^{(2)}(1)]^{(6)} = 0.033$, $[\lambda_{12}^{(2)}(2)]^{(6)} = 0.04$,

$[\lambda_{12}^{(2)}(3)]^{(6)} = 0.05$, $[\lambda_{12}^{(2)}(4)]^{(6)} = 0.055$,

$[\lambda_{13}^{(2)}(1)]^{(6)} = 0.033$, $[\lambda_{13}^{(2)}(2)]^{(6)} = 0.04$,

$[\lambda_{13}^{(2)}(3)]^{(6)} = 0.05$, $[\lambda_{13}^{(2)}(4)]^{(6)} = 0.055$,

$[\lambda_{14}^{(2)}(1)]^{(6)} = 0.033$, $[\lambda_{14}^{(2)}(2)]^{(6)} = 0.04$,

$[\lambda_{14}^{(2)}(3)]^{(6)} = 0.05$, $[\lambda_{14}^{(2)}(4)]^{(6)} = 0.055$,

$[\lambda_{21}^{(2)}(1)]^{(6)} = 0.033$, $[\lambda_{21}^{(2)}(2)]^{(6)} = 0.04$,

$[\lambda_{21}^{(2)}(3)]^{(6)} = 0.045$, $[\lambda_{21}^{(2)}(4)]^{(6)} = 0.05$,

$[\lambda_{22}^{(2)}(1)]^{(6)} = 0.033$, $[\lambda_{22}^{(2)}(2)]^{(6)} = 0.04$,

$[\lambda_{22}^{(2)}(3)]^{(6)} = 0.045$, $[\lambda_{22}^{(2)}(4)]^{(6)} = 0.05$,

$[\lambda_{31}^{(2)}(1)]^{(6)} = 0.033$, $[\lambda_{31}^{(2)}(2)]^{(6)} = 0.04$,

$[\lambda_{31}^{(2)}(3)]^{(6)} = 0.045$, $[\lambda_{31}^{(2)}(4)]^{(6)} = 0.05$,

$[\lambda_{41}^{(2)}(1)]^{(6)} = 0.033$, $[\lambda_{41}^{(2)}(2)]^{(6)} = 0.04$,

$[\lambda_{41}^{(2)}(3)]^{(6)} = 0.045$, $[\lambda_{41}^{(2)}(4)]^{(6)} = 0.05$,

$[\lambda_{51}^{(2)}(1)]^{(6)} = 0.033$, $[\lambda_{51}^{(2)}(2)]^{(6)} = 0.04$,

$[\lambda_{51}^{(2)}(3)]^{(6)} = 0.045$, $[\lambda_{51}^{(2)}(4)]^{(6)} = 0.05$,

$[\lambda_{61}^{(2)}(1)]^{(6)} = 0.033$, $[\lambda_{61}^{(2)}(2)]^{(6)} = 0.04$,

$[\lambda_{61}^{(2)}(3)]^{(6)} = 0.045$, $[\lambda_{61}^{(2)}(4)]^{(6)} = 0.05$,

$[\lambda_{71}^{(2)}(1)]^{(6)} = 0.033$, $[\lambda_{71}^{(2)}(2)]^{(6)} = 0.04$,

$[\lambda_{71}^{(2)}(3)]^{(6)} = 0.045$, $[\lambda_{71}^{(2)}(4)]^{(6)} = 0.05$.

The subsystem S_4 consist of component $E_{11}^{(4)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(4)}(1)]^{(6)} = 0.05$, $[\lambda_{11}^{(4)}(2)]^{(6)} = 0.055$,

$[\lambda_{11}^{(4)}(3)]^{(6)} = 0.06$, $[\lambda_{11}^{(4)}(4)]^{(6)} = 0.065$.

At the operation state z_7, i.e. at the mooring operations state the ferry is built of $n_7 = 3$ subsystems S_1, S_2 and S_5 forming a series structure shown in *Figure 19*.

The subsystem S_1 consist of component $E_{11}^{(1)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(1)}(1)]^{(7)} = 0.033$, $[\lambda_{11}^{(1)}(2)]^{(7)} = 0.04$,

$[\lambda_{11}^{(1)}(3)]^{(7)} = 0.045$, $[\lambda_{11}^{(1)}(4)]^{(7)} =0.05$.

The subsystem S_2 consist of components $E_{11}^{(2)}$, $E_{12}^{(2)}$, $E_{13}^{(2)}$, $E_{14}^{(2)}$, $E_{21}^{(2)}$, $E_{22}^{(2)}$, $E_{31}^{(2)}$, $E_{41}^{(2)}$, $E_{51}^{(2)}$, $E_{61}^{(2)}$, $E_{71}^{(2)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(2)}(1)]^{(7)} = 0.033$, $[\lambda_{11}^{(2)}(2)]^{(7)} = 0.04$,

$[\lambda_{11}^{(2)}(3)]^{(7)} =0.05$, $[\lambda_{11}^{(2)}(4)]^{(7)} = 0.055$,

$[\lambda_{12}^{(2)}(1)]^{(7)} = 0.033$, $[\lambda_{12}^{(2)}(2)]^{(7)} = 0.04$,

$[\lambda_{12}^{(2)}(3)]^{(7)} = 0.05$, $[\lambda_{12}^{(2)}(4)]^{(7)} = 0.055$,

$[\lambda_{13}^{(2)}(1)]^{(7)} = 0.033$, $[\lambda_{13}^{(2)}(2)]^{(7)} = 0.04$,

$[\lambda_{13}^{(2)}(3)]^{(7)} = 0.05$, $[\lambda_{13}^{(2)}(4)]^{(7)} = 0.055$,

$[\lambda_{14}^{(2)}(1)]^{(7)} = 0.033$, $[\lambda_{14}^{(2)}(2)]^{(7)} = 0.04$,

$[\lambda_{14}^{(2)}(3)]^{(7)} = 0.05$, $[\lambda_{14}^{(2)}(4)]^{(7)} = 0.055$,

$[\lambda_{21}^{(2)}(1)]^{(7)} = 0.066$, $[\lambda_{21}^{(2)}(2)]^{(7)} = 0.07$,

$[\lambda_{21}^{(2)}(3)]^{(7)} = 0.075$, $[\lambda_{21}^{(2)}(4)]^{(7)} = 0.08$,

$[\lambda_{22}^{(2)}(1)]^{(7)} = 0.066$, $[\lambda_{22}^{(2)}(2)]^{(7)} = 0.07$,

$[\lambda_{22}^{(2)}(3)]^{(7)} = 0.075$, $[\lambda_{22}^{(2)}(4)]^{(7)} = 0.08$,

$[\lambda_{31}^{(2)}(1)]^{(7)} = 0.066$, $[\lambda_{31}^{(2)}(2)]^{(7)} = 0.07$,

$[\lambda_{31}^{(2)}(3)]^{(7)} = 0.075$, $[\lambda_{31}^{(2)}(4)]^{(7)} = 0.08$,

$[\lambda_{41}^{(2)}(1)]^{(7)} = 0.033$, $[\lambda_{41}^{(2)}(2)]^{(7)} = 0.04$,

$[\lambda_{41}^{(2)}(3)]^{(7)} = 0.045$, $[\lambda_{41}^{(2)}(4)]^{(7)} = 0.05$,

$[\lambda_{51}^{(2)}(1)]^{(7)} = 0.033$, $[\lambda_{51}^{(2)}(2)]^{(7)} = 0.04$,

$[\lambda_{51}^{(2)}(3)]^{(7)} = 0.045$, $[\lambda_{51}^{(2)}(4)]^{(7)} = 0.05$,

$[\lambda_{61}^{(2)}(1)]^{(7)} = 0.033$, $[\lambda_{61}^{(2)}(2)]^{(7)} = 0.04$,

$[\lambda_{61}^{(2)}(3)]^{(7)} = 0.045$, $[\lambda_{61}^{(2)}(4)]^{(7)} = 0.05$,

$[\lambda_{71}^{(2)}(1)]^{(7)} = 0.033$, $[\lambda_{71}^{(2)}(2)]^{(7)} = 0.04$,

$[\lambda_{71}^{(2)}(3)]^{(7)} = 0.045$, $[\lambda_{71}^{(2)}(4)]^{(7)} = 0.05$.

The subsystem S_5 consist of components $E_{11}^{(5)}$, $E_{21}^{(5)}$, $E_{31}^{(5)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(5)}(1)]^{(7)} = 0.033$, $[\lambda_{11}^{(5)}(2)]^{(7)} = 0.04$,

$[\lambda_{11}^{(5)}(3)]^{(7)} = 0.045$, $[\lambda_{11}^{(5)}(4)]^{(7)} = 0.05$,

$[\lambda_{21}^{(5)}(1)]^{(7)} = 0.033$, $[\lambda_{21}^{(5)}(2)]^{(7)} = 0.04$,

$[\lambda_{21}^{(5)}(3)]^{(7)} = 0.05$, $[\lambda_{21}^{(5)}(4)]^{(7)} = 0.055$,

$[\lambda_{31}^{(5)}(1)]^{(7)} = 0.033$, $[\lambda_{21}^{(5)}(2)]^{(7)} = 0.04$,

$[\lambda_{21}^{(5)}(3)]^{(7)} = 0.05$, $[\lambda_{21}^{(5)}(4)]^{(7)} = 0.06$.

At the operation state z_8, i.e. at the unloading at Karlskrona Port state the ferry is built of $n_8 = 2$ subsystems S_3 and S_4 forming a series structure shown in *Figure 20*.

The subsystem S_3 consist of components $E_{11}^{(3)}$, $E_{21}^{(3)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(3)}(1)]^{(8)} = 0.2$, $[\lambda_{11}^{(3)}(2)]^{(8)} = 0.3$,

$[\lambda_{11}^{(3)}(3)]^{(8)} = 0.35$, $[\lambda_{11}^{(3)}(4)]^{(8)} = 0.4$,

$[\lambda_{21}^{(3)}(1)]^{(8)} = 0.033$, $[\lambda_{21}^{(3)}(2)]^{(8)} = 0.04$,

$[\lambda_{21}^{(3)}(3)]^{(8)} = 0.045$, $[\lambda_{21}^{(3)}(4)]^{(8)} = 0.05$.

The subsystem S_4 consist of component $E_{11}^{(4)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(4)}(1)]^{(8)} = 0.05$, $[\lambda_{11}^{(4)}(2)]^{(8)} = 0.06$,

$[\lambda_{11}^{(4)}(3)]^{(8)} = 0.065$, $[\lambda_{11}^{(4)}(4)]^{(8)} = 0.07$.

At the operation state z_9, i.e. at the unloading at Karlskrona Port state the ferry is built of $n_9 = 2$ subsystems S_3 and S_4 forming a series structure shown in *Figure 21*.

The subsystem S_3 consist of components $E_{11}^{(3)}$, $E_{21}^{(3)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(3)}(1)]^{(9)} = 0.2$, $[\lambda_{11}^{(3)}(2)]^{(9)} = 0.3$,

$[\lambda_{11}^{(3)}(3)]^{(9)} = 0.35$, $[\lambda_{11}^{(3)}(4)]^{(9)} = 0.4$,

$[\lambda_{21}^{(3)}(1)]^{(9)} = 0.033$, $[\lambda_{21}^{(3)}(2)]^{(9)} = 0.04$,

$[\lambda_{21}^{(3)}(3)]^{(9)} = 0.045$, $[\lambda_{21}^{(3)}(4)]^{(9)} = 0.05$.

The subsystem S_4 consist of component $E_{11}^{(4)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(4)}(1)]^{(9)} = 0.05$, $[\lambda_{11}^{(4)}(2)]^{(9)} = 0.06$,

$[\lambda_{11}^{(4)}(3)]^{(9)} = 0.065$, $[\lambda_{11}^{(4)}(4)]^{(9)} = 0.07$.

At the operation state z_{10}, i.e. at the unmooring operations state the ferry is built of $n_{10} = 3$ subsystems S_1, S_2 and S_5 forming a series structure shown in *Figure 22*.

The subsystem S_1 consist of component $E_{11}^{(1)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(1)}(1)]^{(10)} = 0.033$, $[\lambda_{11}^{(1)}(2)]^{(10)} = 0.04$,

$[\lambda_{11}^{(1)}(3)]^{(10)} = 0.045$, $[\lambda_{11}^{(1)}(4)]^{(10)} =0.05$.

The subsystem S_2 consist of components $E_{11}^{(2)}$, $E_{12}^{(2)}$, $E_{13}^{(2)}$, $E_{14}^{(2)}$, $E_{21}^{(2)}$, $E_{22}^{(2)}$, $E_{31}^{(2)}$, $E_{41}^{(2)}$, $E_{51}^{(2)}$, $E_{61}^{(2)}$, $E_{71}^{(2)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(2)}(1)]^{(10)} = 0.033$, $[\lambda_{11}^{(2)}(2)]^{(10)} = 0.04$,

$[\lambda_{11}^{(2)}(3)]^{(10)} =0.05$, $[\lambda_{11}^{(2)}(4)]^{(10)} = 0.055$,

$[\lambda_{12}^{(2)}(1)]^{(10)} = 0.033$, $[\lambda_{12}^{(2)}(2)]^{(10)} = 0.04$,

$[\lambda_{12}^{(2)}(3)]^{(10)} = 0.05$, $[\lambda_{12}^{(2)}(4)]^{(10)} = 0.055$,

$[\lambda_{13}^{(2)}(1)]^{(10)} = 0.033$, $[\lambda_{13}^{(2)}(2)]^{(10)} = 0.04$,

$[\lambda_{13}^{(2)}(3)]^{(10)} = 0.05$, $[\lambda_{13}^{(2)}(4)]^{(10)} = 0.055$,

$[\lambda_{14}^{(2)}(1)]^{(10)} = 0.033$, $[\lambda_{14}^{(2)}(2)]^{(10)} = 0.04$,

$[\lambda_{14}^{(2)}(3)]^{(10)} = 0.05$, $[\lambda_{14}^{(2)}(4)]^{(10)} = 0.055$,

$[\lambda_{21}^{(2)}(1)]^{(10)} = 0.066$, $[\lambda_{21}^{(2)}(2)]^{(10)} = 0.07$,

$[\lambda_{21}^{(2)}(3)]^{(10)} = 0.075$, $[\lambda_{21}^{(2)}(4)]^{(10)} = 0.08$,

$[\lambda_{22}^{(2)}(1)]^{(10)} = 0.066$, $[\lambda_{22}^{(2)}(2)]^{(10)} = 0.07$,

$[\lambda_{22}^{(2)}(3)]^{(10)} = 0.075$, $[\lambda_{22}^{(10)}(4)]^{(7)} = 0.08$,

$[\lambda_{31}^{(2)}(1)]^{(10)} = 0.066$, $[\lambda_{31}^{(2)}(2)]^{(10)} = 0.07$,

$[\lambda_{31}^{(2)}(3)]^{(10)} = 0.075$, $[\lambda_{31}^{(2)}(4)]^{(10)} = 0.08$,

$[\lambda_{41}^{(2)}(1)]^{(10)} = 0.033$, $[\lambda_{41}^{(2)}(2)]^{(10)} = 0.04$,

$[\lambda_{41}^{(2)}(3)]^{(10)} = 0.045$, $[\lambda_{41}^{(2)}(4)]^{(10)} = 0.05$,

$[\lambda_{51}^{(2)}(1)]^{(10)} = 0.033$, $[\lambda_{51}^{(2)}(2)]^{(10)} = 0.04$,

$[\lambda_{51}^{(2)}(3)]^{(10)} = 0.045$, $[\lambda_{51}^{(2)}(4)]^{(10)} = 0.05$,

$[\lambda_{61}^{(2)}(1)]^{(10)} = 0.033$, $[\lambda_{61}^{(2)}(2)]^{(10)} = 0.04$,

$[\lambda_{61}^{(2)}(3)]^{(10)} = 0.045,\ [\lambda_{61}^{(2)}(4)]^{(10)} = 0.05,$

$[\lambda_{71}^{(2)}(1)]^{(10)} = 0.033,\ [\lambda_{71}^{(2)}(2)]^{(10)} = 0.04,$

$[\lambda_{71}^{(2)}(3)]^{(10)} = 0.045,\ [\lambda_{71}^{(2)}(4)]^{(10)} = 0.05.$

The subsystem S_5 consist of components $E_{11}^{(5)}$, $E_{21}^{(5)}$, $E_{31}^{(5)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(5)}(1)]^{(10)} = 0.033,\ [\lambda_{11}^{(5)}(2)]^{(10)} = 0.04,$

$[\lambda_{11}^{(5)}(3)]^{(10)} = 0.045,\ [\lambda_{11}^{(5)}(4)]^{(10)} = 0.05,$

$[\lambda_{21}^{(5)}(1)]^{(10)} = 0.033,\ [\lambda_{21}^{(5)}(2)]^{(10)} = 0.04,$

$[\lambda_{21}^{(5)}(3)]^{(10)} = 0.05,\ [\lambda_{21}^{(5)}(4)]^{(10)} = 0.055,$

$[\lambda_{31}^{(5)}(1)]^{(10)} = 0.033,\ [\lambda_{21}^{(5)}(2)]^{(10)} = 0.04,$

$[\lambda_{21}^{(5)}(3)]^{(10)} = 0.05,\ [\lambda_{21}^{(5)}(4)]^{(10)} = 0.06.$

At the operation states z_{11}, i.e. at the ship turning state the ferry is built of $n_{11} = 2$ subsystems S_1 and S_2 forming a series structure shown in *Figure 23*.

The subsystem S_1 consist of component $E_{11}^{(1)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(1)}(1)]^{(11)} = 0.033,\ [\lambda_{11}^{(1)}(2)]^{(11)} = 0.04,$

$[\lambda_{11}^{(1)}(3)]^{(11)} = 0.045,\ [\lambda_{11}^{(1)}(4)]^{(11)} =0.05.$

The subsystem S_2 consist of components $E_{11}^{(2)}$, $E_{12}^{(2)}$, $E_{13}^{(2)}$, $E_{14}^{(2)}$, $E_{21}^{(2)}$, $E_{22}^{(2)}$, $E_{31}^{(2)}$, $E_{41}^{(2)}$, $E_{51}^{(2)}$, $E_{61}^{(2)}$, $E_{71}^{(2)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(2)}(1)]^{(11)} = 0.033,\ [\lambda_{11}^{(2)}(2)]^{(11)} = 0.04,$

$[\lambda_{11}^{(2)}(3)]^{(11)} =0.05,\ [\lambda_{11}^{(2)}(4)]^{(11)} = 0.055,$

$[\lambda_{12}^{(2)}(1)]^{(11)} = 0.033,\ [\lambda_{12}^{(2)}(2)]^{(11)} = 0.04,$

$[\lambda_{12}^{(2)}(3)]^{(11)} = 0.05,\ [\lambda_{12}^{(2)}(4)]^{(11)} = 0.055,$

$[\lambda_{13}^{(2)}(1)]^{(11)} = 0.033,\ [\lambda_{13}^{(2)}(2)]^{(11)} = 0.04,$

$[\lambda_{13}^{(2)}(3)]^{(11)} = 0.05,\ [\lambda_{13}^{(2)}(4)]^{(11)} = 0.055,$

$[\lambda_{14}^{(2)}(1)]^{(11)} = 0.033,\ [\lambda_{14}^{(2)}(2)]^{(11)} = 0.04,$

$[\lambda_{14}^{(2)}(3)]^{(11)} = 0.05,\ [\lambda_{14}^{(2)}(4)]^{(11)} = 0.055,$

$[\lambda_{21}^{(2)}(1)]^{(11)} = 0.066,\ [\lambda_{21}^{(2)}(2)]^{(11)} = 0.07,$

$[\lambda_{21}^{(2)}(3)]^{(11)} = 0.075,\ [\lambda_{21}^{(2)}(4)]^{(11)} = 0.08,$

$[\lambda_{22}^{(2)}(1)]^{(11)} = 0.066,\ [\lambda_{22}^{(2)}(2)]^{(11)} = 0.07,$

$[\lambda_{22}^{(2)}(3)]^{(11)} = 0.075,\ [\lambda_{22}^{(2)}(4)]^{(11)} = 0.08,$

$[\lambda_{31}^{(2)}(1)]^{(11)} = 0.066,\ [\lambda_{31}^{(2)}(2)]^{(11)} = 0.07,$

$[\lambda_{31}^{(2)}(3)]^{(11)} = 0.075,\ [\lambda_{31}^{(2)}(4)]^{(11)} = 0.08,$

$[\lambda_{41}^{(2)}(1)]^{(11)} = 0.033,\ [\lambda_{41}^{(2)}(2)]^{(11)} = 0.04,$

$[\lambda_{41}^{(2)}(3)]^{(11)} = 0.045,\ [\lambda_{41}^{(2)}(4)]^{(11)} = 0.05,$

$[\lambda_{51}^{(2)}(1)]^{(11)} = 0.033,\ [\lambda_{51}^{(2)}(2)]^{(11)} = 0.04,$

$[\lambda_{51}^{(2)}(3)]^{(11)} = 0.045,\ [\lambda_{51}^{(2)}(4)]^{(11)} = 0.05,$

$[\lambda_{61}^{(2)}(1)]^{(11)} = 0.033,\ [\lambda_{61}^{(2)}(2)]^{(11)} = 0.04,$

$[\lambda_{61}^{(2)}(3)]^{(11)} = 0.045,\ [\lambda_{61}^{(2)}(4)]^{(11)} = 0.05,$

$[\lambda_{71}^{(2)}(1)]^{(11)} = 0.033,\ [\lambda_{71}^{(2)}(2)]^{(11)} = 0.04,$

$[\lambda_{71}^{(2)}(3)]^{(11)} = 0.045,\ [\lambda_{71}^{(2)}(4)]^{(11)} = 0.05.$

At the operation states z_{12}, i.e. at the leaving Karlskrona Port state the ferry is built of $n_{12} = 3$ subsystems S_1, S_2 and S_4 forming a series structure shown in *Figure 24*.

The subsystem S_1 consist of component $E_{11}^{(1)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(1)}(1)]^{(12)} = 0.033,\ [\lambda_{11}^{(1)}(2)]^{(12)} = 0.04,$

$[\lambda_{11}^{(1)}(3)]^{(12)} = 0.045,\ [\lambda_{11}^{(1)}(4)]^{(12)} =0.05.$

The subsystem S_2 consist of components $E_{11}^{(2)}$, $E_{12}^{(2)}$, $E_{13}^{(2)}$, $E_{14}^{(2)}$, $E_{41}^{(2)}$, $E_{51}^{(2)}$, $E_{61}^{(2)}$, $E_{71}^{(2)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(2)}(1)]^{(12)} = 0.033$, $[\lambda_{11}^{(2)}(2)]^{(12)} = 0.04$,

$[\lambda_{11}^{(2)}(3)]^{(12)} = 0.05$, $[\lambda_{11}^{(2)}(4)]^{(12)} = 0.055$,

$[\lambda_{12}^{(2)}(1)]^{(12)} = 0.033$, $[\lambda_{12}^{(2)}(2)]^{(12)} = 0.04$,

$[\lambda_{12}^{(2)}(3)]^{(12)} = 0.05$, $[\lambda_{12}^{(2)}(4)]^{(12)} = 0.055$,

$[\lambda_{13}^{(2)}(1)]^{(12)} = 0.033$, $[\lambda_{13}^{(2)}(2)]^{(12)} = 0.04$,

$[\lambda_{13}^{(2)}(3)]^{(12)} = 0.05$, $[\lambda_{13}^{(2)}(4)]^{(12)} = 0.055$,

$[\lambda_{14}^{(2)}(1)]^{(12)} = 0.033$, $[\lambda_{14}^{(2)}(2)]^{(12)} = 0.04$,

$[\lambda_{14}^{(2)}(3)]^{(12)} = 0.05$, $[\lambda_{14}^{(2)}(4)]^{(12)} = 0.055$,

$[\lambda_{41}^{(2)}(1)]^{(12)} = 0.033$, $[\lambda_{41}^{(2)}(2)]^{(12)} = 0.04$,

$[\lambda_{41}^{(2)}(3)]^{(12)} = 0.045$, $[\lambda_{41}^{(2)}(4)]^{(12)} = 0.05$,

$[\lambda_{51}^{(2)}(1)]^{(12)} = 0.033$, $[\lambda_{51}^{(2)}(2)]^{(12)} = 0.04$,

$[\lambda_{51}^{(2)}(3)]^{(12)} = 0.045$, $[\lambda_{51}^{(2)}(4)]^{(12)} = 0.05$,

$[\lambda_{61}^{(2)}(1)]^{(12)} = 0.033$, $[\lambda_{61}^{(2)}(2)]^{(12)} = 0.04$,

$[\lambda_{61}^{(2)}(3)]^{(12)} = 0.045$, $[\lambda_{61}^{(2)}(4)]^{(12)} = 0.05$,

$[\lambda_{71}^{(2)}(1)]^{(12)} = 0.033$, $[\lambda_{71}^{(2)}(2)]^{(12)} = 0.04$,

$[\lambda_{71}^{(2)}(3)]^{(12)} = 0.045$, $[\lambda_{71}^{(2)}(4)]^{(12)} = 0.05$.

The subsystem S_4 consist of component $E_{11}^{(4)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(4)}(1)]^{(12)} = 0.05$, $[\lambda_{11}^{(4)}(2)]^{(12)} = 0.055$,

$[\lambda_{11}^{(4)}(3)]^{(12)} = 0.06$, $[\lambda_{11}^{(4)}(4)]^{(12)} = 0.065$.

At the operation states z_{13}, i.e. at the navigation at open waters state the ferry is built of $n_{13} = 3$ subsystems S_1, S_2 and S_4 forming a series structure shown in *Figure 25*.

The subsystem S_1 consist of component $E_{11}^{(1)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(1)}(1)]^{(13)} = 0.033$, $[\lambda_{11}^{(1)}(2)]^{(13)} = 0.04$,

$[\lambda_{11}^{(1)}(3)]^{(13)} = 0.045$, $[\lambda_{11}^{(1)}(4)]^{(13)} = 0.05$.

The subsystem S_2 consist of components $E_{11}^{(2)}$, $E_{12}^{(2)}$, $E_{13}^{(2)}$, $E_{14}^{(2)}$, $E_{41}^{(2)}$, $E_{51}^{(2)}$, $E_{61}^{(2)}$, $E_{71}^{(2)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(2)}(1)]^{(13)} = 0.033$, $[\lambda_{11}^{(2)}(2)]^{(13)} = 0.04$,

$[\lambda_{11}^{(2)}(3)]^{(13)} = 0.05$, $[\lambda_{11}^{(2)}(4)]^{(13)} = 0.055$,

$[\lambda_{12}^{(2)}(1)]^{(13)} = 0.033$, $[\lambda_{12}^{(2)}(2)]^{(13)} = 0.04$,

$[\lambda_{12}^{(2)}(3)]^{(13)} = 0.05$, $[\lambda_{12}^{(2)}(4)]^{(13)} = 0.055$,

$[\lambda_{13}^{(2)}(1)]^{(13)} = 0.033$, $[\lambda_{13}^{(2)}(2)]^{(13)} = 0.04$,

$[\lambda_{13}^{(2)}(3)]^{(13)} = 0.05$, $[\lambda_{13}^{(2)}(4)]^{(13)} = 0.055$,

$[\lambda_{14}^{(2)}(1)]^{(13)} = 0.033$, $[\lambda_{14}^{(2)}(2)]^{(13)} = 0.04$,

$[\lambda_{14}^{(2)}(3)]^{(13)} = 0.05$, $[\lambda_{14}^{(2)}(4)]^{(13)} = 0.055$,

$[\lambda_{41}^{(2)}(1)]^{(13)} = 0.033$, $[\lambda_{41}^{(2)}(2)]^{(13)} = 0.04$,

$[\lambda_{41}^{(2)}(3)]^{(13)} = 0.045$, $[\lambda_{41}^{(2)}(4)]^{(13)} = 0.05$,

$[\lambda_{51}^{(2)}(1)]^{(13)} = 0.033$, $[\lambda_{51}^{(2)}(2)]^{(13)} = 0.04$,

$[\lambda_{51}^{(2)}(3)]^{(13)} = 0.045$, $[\lambda_{51}^{(2)}(4)]^{(13)} = 0.05$,

$[\lambda_{61}^{(2)}(1)]^{(13)} = 0.033$, $[\lambda_{61}^{(2)}(2)]^{(13)} = 0.04$,

$[\lambda_{61}^{(2)}(3)]^{(13)} = 0.045$, $[\lambda_{61}^{(2)}(4)]^{(13)} = 0.05$,

$[\lambda_{71}^{(2)}(1)]^{(13)} = 0.033$, $[\lambda_{71}^{(2)}(2)]^{(13)} = 0.04$,

$[\lambda_{71}^{(2)}(3)]^{(13)} = 0.045$, $[\lambda_{71}^{(2)}(4)]^{(13)} = 0.05$.

The subsystem S_4 consist of component $E_{11}^{(4)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(4)}(1)]^{(13)} = 0.05$, $[\lambda_{11}^{(4)}(2)]^{(13)} = 0.055$,

$[\lambda_{11}^{(4)}(3)]^{(13)} = 0.06$, $[\lambda_{11}^{(4)}(4)]^{(13)} = 0.065$.

At the operation states z_{14}, i.e. at the navigation at restricted waters state the ferry is built of $n_{14} = 3$ subsystems S_1, S_2 and S_4 forming a series structure shown in *Figure 26*.

The subsystem S_1 consist of component $E_{11}^{(1)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(1)}(1)]^{(14)} = 0.033$, $[\lambda_{11}^{(1)}(2)]^{(14)} = 0.04$,

$[\lambda_{11}^{(1)}(3)]^{(14)} = 0.045$, $[\lambda_{11}^{(1)}(4)]^{(14)} =0.05$.

The subsystem S_2 consist of components $E_{11}^{(2)}$, $E_{12}^{(2)}$, $E_{13}^{(2)}$, $E_{14}^{(2)}$, $E_{41}^{(2)}$, $E_{51}^{(2)}$, $E_{61}^{(2)}$, $E_{71}^{(2)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(2)}(1)]^{(14)} = 0.033$, $[\lambda_{11}^{(2)}(2)]^{(14)} = 0.04$,

$[\lambda_{11}^{(2)}(3)]^{(14)} =0.05$, $[\lambda_{11}^{(2)}(4)]^{(14)} = 0.055$,

$[\lambda_{12}^{(2)}(1)]^{(14)} = 0.033$, $[\lambda_{12}^{(2)}(2)]^{(14)} = 0.04$,

$[\lambda_{12}^{(2)}(3)]^{(14)} = 0.05$, $[\lambda_{12}^{(2)}(4)]^{(14)} = 0.055$,

$[\lambda_{13}^{(2)}(1)]^{(14)} = 0.033$, $[\lambda_{13}^{(2)}(2)]^{(14)} = 0.04$,

$[\lambda_{13}^{(2)}(3)]^{(14)} = 0.05$, $[\lambda_{13}^{(2)}(4)]^{(14)} = 0.055$,

$[\lambda_{14}^{(2)}(1)]^{(14)} = 0.033$, $[\lambda_{14}^{(2)}(2)]^{(14)} = 0.04$,

$[\lambda_{14}^{(2)}(3)]^{(14)} = 0.05$, $[\lambda_{14}^{(2)}(4)]^{(14)} = 0.055$,

$[\lambda_{41}^{(2)}(1)]^{(14)} = 0.033$, $[\lambda_{41}^{(2)}(2)]^{(14)} = 0.04$,

$[\lambda_{41}^{(2)}(3)]^{(14)} = 0.045$, $[\lambda_{41}^{(2)}(4)]^{(14)} = 0.05$,

$[\lambda_{51}^{(2)}(1)]^{(14)} = 0.033$, $[\lambda_{51}^{(2)}(2)]^{(14)} = 0.04$,

$[\lambda_{51}^{(2)}(3)]^{(14)} = 0.045$, $[\lambda_{51}^{(2)}(4)]^{(14)} = 0.05$,

$[\lambda_{61}^{(2)}(1)]^{(14)} = 0.033$, $[\lambda_{61}^{(2)}(2)]^{(14)} = 0.04$,

$[\lambda_{61}^{(2)}(3)]^{(14)} = 0.045$, $[\lambda_{61}^{(2)}(4)]^{(14)} = 0.05$,

$[\lambda_{71}^{(2)}(1)]^{(14)} = 0.033$, $[\lambda_{71}^{(2)}(2)]^{(14)} = 0.04$,

$[\lambda_{71}^{(2)}(3)]^{(14)} = 0.045$, $[\lambda_{71}^{(2)}(4)]^{(14)} = 0.05$.

The subsystem S_4 consist of component $E_{11}^{(4)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(4)}(1)]^{(14)} = 0.05$, $[\lambda_{11}^{(4)}(2)]^{(14)} = 0.055$,

$[\lambda_{11}^{(4)}(3)]^{(14)} = 0.06$, $[\lambda_{11}^{(4)}(4)]^{(14)} = 0.065$.

At the operation states z_{15}, i.e. at the navigation to turning area state the ferry is built of $n_{15} = 2$ subsystems S_1 and S_2 forming a series structure shown in *Figure 27*.

The subsystem S_1 consist of component $E_{11}^{(1)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(1)}(1)]^{(15)} = 0.033$, $[\lambda_{11}^{(1)}(2)]^{(15)} = 0.04$,

$[\lambda_{11}^{(1)}(3)]^{(15)} = 0.045$, $[\lambda_{11}^{(1)}(4)]^{(15)} =0.05$.

The subsystem S_2 consist of components $E_{11}^{(2)}$, $E_{12}^{(2)}$, $E_{13}^{(2)}$, $E_{14}^{(2)}$, $E_{21}^{(2)}$, $E_{22}^{(2)}$, $E_{31}^{(2)}$, $E_{41}^{(2)}$, $E_{51}^{(2)}$, $E_{61}^{(2)}$, $E_{71}^{(2)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(2)}(1)]^{(15)} = 0.033$, $[\lambda_{11}^{(2)}(2)]^{(15)} = 0.04$,

$[\lambda_{11}^{(2)}(3)]^{(15)} =0.05$, $[\lambda_{11}^{(2)}(4)]^{(15)} = 0.055$,

$[\lambda_{12}^{(2)}(1)]^{(15)} = 0.033$, $[\lambda_{12}^{(2)}(2)]^{(15)} = 0.04$,

$[\lambda_{12}^{(2)}(3)]^{(15)} = 0.05$, $[\lambda_{12}^{(2)}(4)]^{(15)} = 0.055$,

$[\lambda_{13}^{(2)}(1)]^{(15)} = 0.033$, $[\lambda_{13}^{(2)}(2)]^{(15)} = 0.04$,

$[\lambda_{13}^{(2)}(3)]^{(15)} = 0.05$, $[\lambda_{13}^{(2)}(4)]^{(15)} = 0.055$,

$[\lambda_{14}^{(2)}(1)]^{(15)} = 0.033$, $[\lambda_{14}^{(2)}(2)]^{(15)} = 0.04$,

$[\lambda_{14}^{(2)}(3)]^{(15)} = 0.05$, $[\lambda_{14}^{(2)}(4)]^{(15)} = 0.055$,

$[\lambda_{21}^{(2)}(1)]^{(15)} = 0.033,\ [\lambda_{21}^{(2)}(2)]^{(15)} = 0.04,$

$[\lambda_{21}^{(2)}(3)]^{(15)} = 0.045,\ [\lambda_{21}^{(2)}(4)]^{(15)} = 0.05,$

$[\lambda_{22}^{(2)}(1)]^{(15)} = 0.033,\ [\lambda_{22}^{(2)}(2)]^{(15)} = 0.04,$

$[\lambda_{22}^{(2)}(3)]^{(15)} = 0.045,\ [\lambda_{22}^{(2)}(4)]^{(15)} = 0.05,$

$[\lambda_{31}^{(2)}(1)]^{(15)} = 0.033,\ [\lambda_{31}^{(2)}(2)]^{(15)} = 0.04,$

$[\lambda_{31}^{(2)}(3)]^{(15)} = 0.045,\ [\lambda_{31}^{(2)}(4)]^{(15)} = 0.05,$

$[\lambda_{41}^{(2)}(1)]^{(15)} = 0.033,\ [\lambda_{41}^{(2)}(2)]^{(15)} = 0.04,$

$[\lambda_{41}^{(2)}(3)]^{(15)} = 0.045,\ [\lambda_{41}^{(2)}(4)]^{(15)} = 0.05,$

$[\lambda_{51}^{(2)}(1)]^{(15)} = 0.033,\ [\lambda_{51}^{(2)}(2)]^{(15)} = 0.04,$

$[\lambda_{51}^{(2)}(3)]^{(15)} = 0.045,\ [\lambda_{51}^{(2)}(4)]^{(15)} = 0.05,$

$[\lambda_{61}^{(2)}(1)]^{(15)} = 0.033,\ [\lambda_{61}^{(2)}(2)]^{(15)} = 0.04,$

$[\lambda_{61}^{(2)}(3)]^{(15)} = 0.045,\ [\lambda_{61}^{(2)}(4)]^{(15)} = 0.05,$

$[\lambda_{71}^{(2)}(1)]^{(15)} = 0.033,\ [\lambda_{71}^{(2)}(2)]^{(15)} = 0.04,$

$[\lambda_{71}^{(2)}(3)]^{(15)} = 0.045,\ [\lambda_{71}^{(2)}(4)]^{(15)} = 0.05.$

At the operation states z_{16}, i.e. at the ship turning state the ferry is built of $n_{16} = 2$ subsystems S_1 and S_2 forming a series structure shown in *Figure 28.*
The subsystem S_1 consist of component $E_{11}^{(1)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(1)}(1)]^{(16)} = 0.033,\ [\lambda_{11}^{(1)}(2)]^{(16)} = 0.04,$

$[\lambda_{11}^{(1)}(3)]^{(16)} = 0.045,\ [\lambda_{11}^{(1)}(4)]^{(16)} = 0.05.$

The subsystem S_2 consist of components $E_{11}^{(2)}$, $E_{12}^{(2)}$, $E_{13}^{(2)}$, $E_{14}^{(2)}$, $E_{21}^{(2)}$, $E_{22}^{(2)}$, $E_{31}^{(2)}$, $E_{41}^{(2)}$, $E_{51}^{(2)}$, $E_{61}^{(2)}$, $E_{71}^{(2)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(2)}(1)]^{(16)} = 0.033,\ [\lambda_{11}^{(2)}(2)]^{(16)} = 0.04,$

$[\lambda_{11}^{(2)}(3)]^{(16)} = 0.05,\ [\lambda_{11}^{(2)}(4)]^{(16)} = 0.055,$

$[\lambda_{12}^{(2)}(1)]^{(16)} = 0.033,\ [\lambda_{12}^{(2)}(2)]^{(16)} = 0.04,$

$[\lambda_{12}^{(2)}(3)]^{(16)} = 0.05,\ [\lambda_{12}^{(2)}(4)]^{(16)} = 0.055,$

$[\lambda_{13}^{(2)}(1)]^{(16)} = 0.033,\ [\lambda_{13}^{(2)}(2)]^{(16)} = 0.04,$

$[\lambda_{13}^{(2)}(3)]^{(16)} = 0.05,\ [\lambda_{13}^{(2)}(4)]^{(16)} = 0.055,$

$[\lambda_{14}^{(2)}(1)]^{(16)} = 0.033,\ [\lambda_{14}^{(2)}(2)]^{(16)} = 0.04,$

$[\lambda_{14}^{(2)}(3)]^{(16)} = 0.05,\ [\lambda_{14}^{(2)}(4)]^{(16)} = 0.055,$

$[\lambda_{21}^{(2)}(1)]^{(16)} = 0.066,\ [\lambda_{21}^{(2)}(2)]^{(16)} = 0.07,$

$[\lambda_{21}^{(2)}(3)]^{(16)} = 0.075,\ [\lambda_{21}^{(2)}(4)]^{(16)} = 0.08,$

$[\lambda_{22}^{(2)}(1)]^{(16)} = 0.066,\ [\lambda_{22}^{(2)}(2)]^{(16)} = 0.07,$

$[\lambda_{22}^{(2)}(3)]^{(16)} = 0.075,\ [\lambda_{22}^{(2)}(4)]^{(16)} = 0.08,$

$[\lambda_{31}^{(2)}(1)]^{(16)} = 0.066,\ [\lambda_{31}^{(2)}(2)]^{(16)} = 0.07,$

$[\lambda_{31}^{(2)}(3)]^{(16)} = 0.075,\ [\lambda_{31}^{(2)}(4)]^{(16)} = 0.08,$

$[\lambda_{41}^{(2)}(1)]^{(16)} = 0.033,\ [\lambda_{41}^{(2)}(2)]^{(16)} = 0.04,$

$[\lambda_{41}^{(2)}(3)]^{(16)} = 0.045,\ [\lambda_{41}^{(2)}(4)]^{(16)} = 0.05,$

$[\lambda_{51}^{(2)}(1)]^{(16)} = 0.033,\ [\lambda_{51}^{(2)}(2)]^{(16)} = 0.04,$

$[\lambda_{51}^{(2)}(3)]^{(16)} = 0.045,\ [\lambda_{51}^{(2)}(4)]^{(16)} = 0.05,$

$[\lambda_{61}^{(2)}(1)]^{(16)} = 0.033,\ [\lambda_{61}^{(2)}(2)]^{(16)} = 0.04,$

$[\lambda_{61}^{(2)}(3)]^{(16)} = 0.045,\ [\lambda_{61}^{(2)}(4)]^{(16)} = 0.05,$

$[\lambda_{71}^{(2)}(1)]^{(16)} = 0.033,\ [\lambda_{71}^{(2)}(2)]^{(16)} = 0.04,$

$[\lambda_{71}^{(2)}(3)]^{(16)} = 0.045,\ [\lambda_{71}^{(2)}(4)]^{(16)} = 0.05.$

At the operation states z_{17}, i.e. at the mooring operations state the ferry is built of $n_{17} = 3$ subsystems S_1, S_2 and S_5 forming a series structure shown in *Figure 29*.
The subsystem S_1 consist of component $E_{11}^{(1)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(1)}(1)]^{(17)} = 0.033$, $[\lambda_{11}^{(1)}(2)]^{(17)} = 0.04$,

$[\lambda_{11}^{(1)}(3)]^{(17)} = 0.045$, $[\lambda_{11}^{(1)}(4)]^{(17)} = 0.05$.

The subsystem S_2 consist of components $E_{11}^{(2)}$, $E_{12}^{(2)}$, $E_{13}^{(2)}$, $E_{14}^{(2)}$, $E_{21}^{(2)}$, $E_{22}^{(2)}$, $E_{31}^{(2)}$, $E_{41}^{(2)}$, $E_{51}^{(2)}$, $E_{61}^{(2)}$, $E_{71}^{(2)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(2)}(1)]^{(17)} = 0.033$, $[\lambda_{11}^{(2)}(2)]^{(17)} = 0.04$,

$[\lambda_{11}^{(2)}(3)]^{(17)} = 0.05$, $[\lambda_{11}^{(2)}(4)]^{(17)} = 0.055$,

$[\lambda_{12}^{(2)}(1)]^{(17)} = 0.033$, $[\lambda_{12}^{(2)}(2)]^{(17)} = 0.04$,

$[\lambda_{12}^{(2)}(3)]^{(17)} = 0.05$, $[\lambda_{12}^{(2)}(4)]^{(17)} = 0.055$,

$[\lambda_{13}^{(2)}(1)]^{(17)} = 0.033$, $[\lambda_{13}^{(2)}(2)]^{(17)} = 0.04$,

$[\lambda_{13}^{(2)}(3)]^{(17)} = 0.05$, $[\lambda_{13}^{(2)}(4)]^{(17)} = 0.055$,

$[\lambda_{14}^{(2)}(1)]^{(17)} = 0.033$, $[\lambda_{14}^{(2)}(2)]^{(17)} = 0.04$,

$[\lambda_{14}^{(2)}(3)]^{(17)} = 0.05$, $[\lambda_{14}^{(2)}(4)]^{(17)} = 0.055$,

$[\lambda_{21}^{(2)}(1)]^{(17)} = 0.066$, $[\lambda_{21}^{(2)}(2)]^{(17)} = 0.07$,

$[\lambda_{21}^{(2)}(3)]^{(17)} = 0.075$, $[\lambda_{21}^{(2)}(4)]^{(17)} = 0.08$,

$[\lambda_{22}^{(2)}(1)]^{(17)} = 0.066$, $[\lambda_{22}^{(2)}(2)]^{(17)} = 0.07$,

$[\lambda_{22}^{(2)}(3)]^{(17)} = 0.075$, $[\lambda_{22}^{(2)}(4)]^{(17)} = 0.08$,

$[\lambda_{31}^{(2)}(1)]^{(17)} = 0.066$, $[\lambda_{31}^{(2)}(2)]^{(17)} = 0.07$,

$[\lambda_{31}^{(2)}(3)]^{(17)} = 0.075$, $[\lambda_{31}^{(2)}(4)]^{(17)} = 0.08$,

$[\lambda_{41}^{(2)}(1)]^{(17)} = 0.033$, $[\lambda_{41}^{(2)}(2)]^{(17)} = 0.04$,

$[\lambda_{41}^{(2)}(3)]^{(17)} = 0.045$, $[\lambda_{41}^{(2)}(4)]^{(17)} = 0.05$,

$[\lambda_{51}^{(2)}(1)]^{(17)} = 0.033$, $[\lambda_{51}^{(2)}(2)]^{(17)} = 0.04$,

$[\lambda_{51}^{(2)}(3)]^{(17)} = 0.045$, $[\lambda_{51}^{(2)}(4)]^{(17)} = 0.05$,

$[\lambda_{61}^{(2)}(1)]^{(17)} = 0.033$, $[\lambda_{61}^{(2)}(2)]^{(17)} = 0.04$,

$[\lambda_{61}^{(2)}(3)]^{(17)} = 0.045$, $[\lambda_{61}^{(2)}(4)]^{(17)} = 0.05$,

$[\lambda_{71}^{(2)}(1)]^{(17)} = 0.033$, $[\lambda_{71}^{(2)}(2)]^{(17)} = 0.04$,

$[\lambda_{71}^{(2)}(3)]^{(17)} = 0.045$, $[\lambda_{71}^{(2)}(4)]^{(17)} = 0.05$.

The subsystem S_5 consist of components $E_{11}^{(5)}$, $E_{21}^{(5)}$, $E_{31}^{(5)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(5)}(1)]^{(17)} = 0.033$, $[\lambda_{11}^{(5)}(2)]^{(17)} = 0.04$,

$[\lambda_{11}^{(5)}(3)]^{(17)} = 0.045$, $[\lambda_{11}^{(5)}(4)]^{(17)} = 0.05$,

$[\lambda_{21}^{(5)}(1)]^{(17)} = 0.033$, $[\lambda_{21}^{(5)}(2)]^{(17)} = 0.04$,

$[\lambda_{21}^{(5)}(3)]^{(17)} = 0.05$, $[\lambda_{21}^{(5)}(4)]^{(17)} = 0.055$,

$[\lambda_{31}^{(5)}(1)]^{(17)} = 0.033$, $[\lambda_{21}^{(5)}(2)]^{(17)} = 0.04$,

$[\lambda_{21}^{(5)}(3)]^{(17)} = 0.05$, $[\lambda_{21}^{(5)}(4)]^{(17)} = 0.06$.

At the operation states z_{18}, i.e. at the unloading state the ferry is built of $n_{18} = 2$ subsystems S_3 and S_4 forming a series structure shown in *Figure 29*.

The subsystem S_3 consist of components $E_{11}^{(3)}$, $E_{21}^{(3)}$, $E_{31}^{(3)}$ with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(3)}(1)]^{(18)} = 0.2$, $[\lambda_{11}^{(3)}(2)]^{(18)} = 0.3$,

$[\lambda_{11}^{(3)}(3)]^{(18)} = 0.35$, $[\lambda_{11}^{(3)}(4)]^{(18)} = 0.4$,

$[\lambda_{21}^{(3)}(1)]^{(18)} = 0.2$, $[\lambda_{21}^{(3)}(2)]^{(18)} = 0.25$,

$[\lambda_{21}^{(3)}(3)]^{(18)} = 0.3$, $[\lambda_{21}^{(3)}(4)]^{(18)} = 0.4$,

$[\lambda_{31}^{(3)}(1)]^{(18)} = 0.033$, $[\lambda_{31}^{(3)}(2)]^{(18)} = 0.04$,

$[\lambda_{31}^{(3)}(3)]^{(18)} = 0.045$, $[\lambda_{31}^{(3)}(4)]^{(18)} = 0.05$.

The subsystem S_4 consist of component $E_{11}^{(4)}$, with the intensities of departure from the safety states subsets $\{1,2,3,4\}$, $\{2,3,4\}$, $\{3,4\}$, $\{4\}$, respectively

$[\lambda_{11}^{(4)}(1)]^{(18)} = 0.05$, $[\lambda_{11}^{(4)}(2)]^{(18)} = 0.06$,

$[\lambda_{11}^{(4)}(3)]^{(18)} = 0.065$, $[\lambda_{11}^{(4)}(4)]^{(18)} = 0.07$.

5.1.4.1. Statistical identification of the Stena Baltica ferry technical system components safety on the basis of data coming from their safety states changing processes

The exact evaluation of the Stena Baltica ferry is not possible at the moment because of the complete lack of statistical data about the changes the safety state subsets by the ferry components and subsystems. Currently, we have only one information about the change from the reliability state subset $\{1, 2\}$ into the worst safety state $z = 0$ (a failure), i.e. into the safety state subset $\{0, 1, 2\}$, one of two stern loading platforms loading containers on to the ferry main deck. This departure happened after its good working for around 22 years. The remaining components and subsystems of the ferry under considerations are high reliable and none of them failed during the observation time $\tau = 22.5$ years.
The estimation of this failed component intensity of departure from the safety states subset $\{1, 2\}$ to the safety state subset $\{0, 1, 2\}$ can be done by the formula (11) derived in *Case 2* in Section 3.4.2. Substituting in this formula $\tau = 22.5$, $u = 1$, $n = 2$, $m_1 = 1$ and $t_1^{(b)}(1) = 22$, we get the maximum likelihood evaluation of the unknown component intensity of departure $[\lambda_{ij}^{(3)}(1)]^{(b)}$ $i = 1,2$, $j = 1$, from the safety states subset $\{1, 2\}$ is

$$[\tilde{\lambda}_{ij}^{(3)}(1)]^{(b)} = \frac{1}{22 + 22.5(2-1)} \cong 0.0225,$$
$$i = 1,2, \quad j = 1.$$

The estimation of this failed component intensity of departure from the safety states subset $\{1, 2\}$ can also be done by the formula (17) derived in *Case 5* in Section 3.2.2.1. Substituting in this formula $\tau = 22.5,$, $u = 1$, $n = 2$, $m_1 = 1$ and $t_1^{(b)}(1) = 22$, we get the maximum likelihood evaluation of the unknown component intensity of departure $[\lambda_{ij}^{(3)}(1)]^{(b)}$ from the safety states subset $\{1, 2\}$ is

$$[\tilde{\lambda}_{ij}^{(3)}(1)]^{(b)} = \frac{1+0}{2 \cdot 22.5} \cong 0.0222, \quad i = 1,2, \quad j = 1.$$

The unknown intensities of departures from the safety state subsets for the components that have not changed the safety state subsets during the observation time can be evaluated using so called pessimistic estimation , derived in Section 3.4.2. For instance, in our case, using the formula (12), we get the evaluation

$$[\tilde{\lambda}_{ij}^{(3)}(1)]^{(b)} = \frac{2}{0 + 22.5(2-0)} = 0.044,$$
$$i = 1,2, \quad j = 1.$$

and similarly, after applying (18), we have

$$[\tilde{\lambda}_{ij}^{(3)}(1)]^{(b)} = \frac{0+2}{22.5 \cdot 2} = 0.044, \quad i = 1,2, \quad j = 1.$$

The above evaluations of the unknown intensity of departure from the safety state subset may suggest that the evaluations of order 0.2 – 0.4 of the intensities $[\lambda_{11}^{(3)}]^{(b)}$ and $[\lambda_{21}^{(3)}]^{(b)}$ of the considered loading platforms coming from expert opinions and existing in the co-ordinates of their safety functions $[s_{11}^{(3)}(t, u)]^{(b)}$ and $[s_{21}^{(3)}(t, u)]^{(b)}$ are too large. This fact may lead us to very pessimistic evaluation of the considered ferry technical system safety. Therefore, an additional discussion with experts is needed and a final decision on changing these and perhaps other intensities values have to be taken.

5.1.5. Identifying the Stena Baltica ferry technical system components conditional multistate exponential safety functions

As there are no data collected from the Stena Baltica ferry technical system components safety states changing processes, then it is not possible to verify the hypotheses on the exponential forms of the Stena Baltica ferry technical system components conditional safety functions. We arbitrarily assume that these safety functions are exponential and using the results of the Section 5.1.4.1 and the relationships given in Section 5.1.2 we fix heir forms.
At the operation states z_1, i.e. at the cargo loading and un-loading state the ferry is built of $n_1 = 2$ subsystems S_3 and S_4 forming a series structure shown in *Figure 13*.
The subsystem S_3 consist of components $E_{11}^{(3)}$, $E_{21}^{(3)}$, $E_{31}^{(3)}$ with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(3)}(t,1)]^{(1)} = \exp[-0.2t]$, $[s_{11}^{(3)}(t,2)]^{(1)} = \exp[-0.3t]$,

$[s_{11}^{(3)}(t,3)]^{(1)} = \exp[-0.35t]$, $[s_{11}^{(3)}(t,4)]^{(1)} = \exp[-0.4t]$,

$[s_{21}^{(3)}(t,1)]^{(1)} = \exp[-0.2t]$, $[s_{21}^{(3)}(t,2)]^{(1)} = \exp[-0.25t]$,

$[s_{21}^{(3)}(t,3)]^{(1)} = \exp[-0.3t],\ [s_{21}^{(3)}(t,4)]^{(1)} = \exp[-0.4t],$

$[s_{31}^{(3)}(t,1)]^{(1)} = \exp[-0.033t], [s_{31}^{(3)}(t,2)]^{(1)} = \exp[-0.04t],$

$[s_{31}^{(3)}(t,3)]^{(1)} = \exp[-0.045t], [s_{31}^{(3)}(t,4)]^{(1)} = \exp[-0.05t].$

The subsystem S_4 consist of component $E_{11}^{(4)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(4)}(t,1)]^{(1)} = \exp[-0.05t],\ [s_{11}^{(3)}(t,2)]^{(1)} = \exp[-0.06t],$

$[s_{11}^{(3)}(t,3)]^{(1)} = \exp[-0.065t], [s_{11}^{(3)}(t,4)]^{(1)} = \exp[-0.07t].$

At the operation states z_2, i.e. at the unmooring operations state the ferry is built of $n_2 = 3$ subsystems S_1, S_2 and S_5 forming a series structure shown in *Figure 14*.

The subsystem S_1 consist of component $E_{11}^{(1)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(1)}(t,1)]^{(2)} = \exp[-0.033t], [s_{11}^{(1)}(t,2)]^{(2)} = \exp[-0.04t],$

$[s_{11}^{(1)}(t,3)]^{(2)} = \exp[-0.045t], [s_{11}^{(1)}(t,4)]^{(2)} = \exp[-0.05t].$

The subsystem S_2 consist of components $E_{11}^{(2)}$, $E_{12}^{(2)}$, $E_{13}^{(2)}$, $E_{14}^{(2)}$, $E_{21}^{(2)}$, $E_{22}^{(2)}$, $E_{31}^{(2)}$, $E_{41}^{(2)}$, $E_{51}^{(2)}$, $E_{61}^{(2)}$, $E_{71}^{(2)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(2)}(t,1)]^{(2)} = \exp[-0.033t], [s_{11}^{(2)}(t,2)]^{(2)} = \exp[-0.04t],$

$[s_{11}^{(2)}(t,3)]^{(2)} = \exp[-0.05t], [s_{11}^{(2)}(t,4)]^{(2)} = \exp[-0.055t],$

$[s_{12}^{(2)}(t,1)]^{(2)} = \exp[-0.033t], [s_{12}^{(2)}(t,2)]^{(2)} = \exp[-0.04t],$

$[s_{12}^{(2)}(t,3)]^{(2)} = \exp[-0.05t], [s_{12}^{(2)}(t,4)]^{(2)} = \exp[-0.055t],$

$[s_{13}^{(2)}(t,1)]^{(2)} = \exp[-0.033t], [s_{13}^{(2)}(t,2)]^{(2)} = \exp[-0.04t],$

$[s_{13}^{(2)}(t,3)]^{(2)} = \exp[-0.05t], [s_{13}^{(2)}(t,4)]^{(2)} = \exp[-0.055t],$

$[s_{14}^{(2)}(t,1)]^{(2)} = \exp[-0.033t], [s_{14}^{(2)}(t,2)]^{(2)} = \exp[-0.04t],$

$[s_{14}^{(2)}(t,3)]^{(2)} = \exp[-0.05t], [s_{14}^{(2)}(t,4)]^{(2)} = \exp[-0.055t],$

$[s_{21}^{(2)}(t,1)]^{(2)} = \exp[-0.066t], [s_{21}^{(2)}(t,2)]^{(2)} = \exp[-0.07t],$

$[s_{21}^{(2)}(t,3)]^{(2)} = \exp[-0.075t], [s_{21}^{(2)}(t,4)]^{(2)} = \exp[-0.08t],$

$[s_{22}^{(2)}(t,1)]^{(2)} = \exp[-0.066t], [s_{22}^{(2)}(t,2)]^{(2)} = \exp[-0.07t],$

$[s_{22}^{(2)}(t,3)]^{(2)} = \exp[-0.075t], [s_{22}^{(2)}(t,4)]^{(2)} = \exp[-0.08t],$

$[s_{31}^{(2)}(t,1)]^{(2)} = \exp[-0.066t], [s_{31}^{(2)}(t,2)]^{(2)} = \exp[-0.07t],$

$[s_{31}^{(2)}(t,3)]^{(2)} = \exp[-0.075t], [s_{31}^{(2)}(t,4)]^{(2)} = \exp[-0.08t],$

$[s_{41}^{(2)}(t,1)]^{(2)} = \exp[-0.033t], [s_{41}^{(2)}(t,2)]^{(2)} = \exp[-0.04t],$

$[s_{41}^{(2)}(t,3)]^{(2)} = \exp[-0.045t], [s_{41}^{(2)}(t,4)]^{(2)} = \exp[-0.05t],$

$[s_{51}^{(2)}(t,1)]^{(2)} = \exp[-0.033t], [s_{51}^{(2)}(t,2)]^{(2)} = \exp[-0.04t],$

$[s_{51}^{(2)}(t,3)]^{(2)} = \exp[-0.045t], [s_{51}^{(2)}(t,4)]^{(2)} = \exp[-0.05t],$

$[s_{61}^{(2)}(t,1)]^{(2)} = \exp[-0.033t], [s_{61}^{(2)}(t,2)]^{(2)} = \exp[-0.04t],$

$[s_{61}^{(2)}(t,3)]^{(2)} = \exp[-0.045t], [s_{61}^{(2)}(t,4)]^{(2)} = \exp[-0.05t],$

$[s_{71}^{(2)}(t,1)]^{(2)} = \exp[-0.033t], [s_{71}^{(2)}(t,2)]^{(2)} = \exp[-0.04t],$

$[s_{71}^{(2)}(t,3)]^{(2)} = \exp[-0.045t], [s_{71}^{(2)}(t,4)]^{(2)} = \exp[-0.05t].$

The subsystem S_5 consist of components $E_{11}^{(5)}$, $E_{21}^{(5)}$, $E_{31}^{(5)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(5)}(t,1)]^{(2)} = \exp[-0.033t], [s_{11}^{(5)}(t,2)]^{(2)} = \exp[-0.04t],$

$[s_{11}^{(5)}(t,3)]^{(2)} = \exp[-0.045t], [s_{11}^{(5)}(t,4)]^{(2)} = \exp[-0.05t],$

$[s_{21}^{(5)}(t,1)]^{(2)} = \exp[-0.033t], [s_{21}^{(5)}(t,2)]^{(2)} = \exp[-0.04t],$

$[s_{21}^{(5)}(t,3)]^{(2)} = \exp[-0.05t], [s_{21}^{(5)}(t,4)]^{(2)} = \exp[-0.055t],$

$[s_{31}^{(5)}(t,1)]^{(2)} = \exp[-0.033t], [s_{31}^{(5)}(t,2)]^{(2)} = \exp[-0.04t],$

$[s_{31}^{(5)}(t,3)]^{(2)} = \exp[-0.05t],\ [s_{31}^{(5)}(t,4)]^{(2)} = \exp[-0.06t].$

At the operation states z_3, i.e. at the leaving Gdynia Port state the ferry is built of $n_3 = 2$ subsystems S_1 and S_2 forming a series structure shown in *Figure 15*.

The subsystem S_1 consist of component $E_{11}^{(1)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(1)}(t,1)]^{(3)}$ =exp[−0.033*t*],$[s_{11}^{(1)}(t,2)]^{(3)}$ = exp[−0.04*t*],

$[s_{11}^{(1)}(t,3)]^{(3)}$ =exp[−0.045*t*],$[s_{11}^{(1)}(t,4)]^{(3)}$ = exp[−0.05*t*].

The subsystem S_2 consist of components $E_{11}^{(2)}$, $E_{12}^{(2)}$, $E_{13}^{(2)}$, $E_{14}^{(2)}$, $E_{21}^{(2)}$, $E_{22}^{(2)}$, $E_{31}^{(2)}$, $E_{41}^{(2)}$, $E_{51}^{(2)}$, $E_{61}^{(2)}$, $E_{71}^{(2)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(2)}(t,1)]^{(3)}$ =exp[−0.033*t*],$[s_{11}^{(2)}(t,2)]^{(3)}$ =exp[−0.04*t*],

$[s_{11}^{(2)}(t,3)]^{(3)}$ =exp[−0.05*t*],$[s_{11}^{(2)}(t,4)]^{(3)}$ =exp[−0.055*t*],

$[s_{12}^{(2)}(t,1)]^{(3)}$ =exp[−0.033*t*],$[s_{12}^{(2)}(t,2)]^{(3)}$ =exp[−0.04*t*],

$[s_{12}^{(2)}(t,3)]^{(3)}$ =exp[−0.05*t*],$[s_{12}^{(2)}(t,4)]^{(3)}$ =exp[−0.055*t*],

$[s_{13}^{(2)}(t,1)]^{(3)}$ =exp[−0.033*t*],$[s_{13}^{(2)}(t,2)]^{(3)}$ =exp[−0.04*t*],

$[s_{13}^{(2)}(t,3)]^{(3)}$ =exp[−0.05*t*],$[s_{13}^{(2)}(t,4)]^{(3)}$ =exp[−0.055*t*],

$[s_{14}^{(2)}(t,1)]^{(3)}$ =exp[−0.033*t*],$[s_{14}^{(2)}(t,2)]^{(3)}$ =exp[−0.04*t*],

$[s_{14}^{(2)}(t,3)]^{(3)}$ =exp[−0.05*t*],$[s_{14}^{(2)}(t,4)]^{(3)}$=exp[−0.055*t*],

$[s_{21}^{(2)}(t,1)]^{(3)}$ =exp[−0.033*t*],$[s_{21}^{(2)}(t,2)]^{(3)}$ =exp[−0.04*t*],

$[s_{21}^{(2)}(t,3)]^{(3)}$ =exp[−0.045*t*],$[s_{21}^{(2)}(t,4)]^{(3)}$ =exp[−0.05*t*],

$[s_{22}^{(2)}(t,1)]^{(3)}$ =exp[−0.033*t*],$[s_{22}^{(2)}(t,2)]^{(3)}$ =exp[−0.04*t*],

$[s_{22}^{(2)}(t,3)]^{(3)}$ =exp[−0.045*t*],$[s_{22}^{(2)}(t,4)]^{(3)}$ =exp[−0.05*t*],

$[s_{31}^{(2)}(t,1)]^{(3)}$ =exp[−0.033*t*],$[s_{31}^{(2)}(t,2)]^{(3)}$ =exp[−0.04*t*],

$[s_{31}^{(2)}(t,3)]^{(3)}$ =exp[−0.045*t*],$[s_{31}^{(2)}(t,4)]^{(3)}$ =exp[−0.05*t*],

$[s_{41}^{(2)}(t,1)]^{(3)}$ =exp[−0.033*t*],$[s_{41}^{(2)}(t,2)]^{(3)}$ =exp[−0.04*t*],

$[s_{41}^{(2)}(t,3)]^{(3)}$ =exp[−0.045*t*],$[s_{41}^{(2)}(t,4)]^{(3)}$ =exp[−0.05*t*],

$[s_{51}^{(2)}(t,1)]^{(3)}$ =exp[−0.033*t*],$[s_{51}^{(2)}(t,2)]^{(3)}$ =exp[−0.04*t*],

$[s_{51}^{(2)}(t,3)]^{(3)}$ =exp[−0.045*t*],$[s_{51}^{(2)}(t,4)]^{(3)}$ =exp[−0.05*t*],

$[s_{61}^{(2)}(t,1)]^{(3)}$ =exp[−0.033*t*],$[s_{61}^{(2)}(t,2)]^{(3)}$ =exp[−0.04*t*],

$[s_{61}^{(2)}(t,3)]^{(3)}$ =exp[−0.045*t*],$[s_{61}^{(2)}(t,4)]^{(3)}$ =exp[−0.05*t*],

$[s_{71}^{(2)}(t,1)]^{(3)}$ =exp[−0.033*t*],$[s_{71}^{(2)}(t,2)]^{(3)}$ =exp[−0.04*t*],

$[s_{71}^{(2)}(t,3)]^{(3)}$ =exp[−0.045*t*],$[s_{71}^{(2)}(t,4)]^{(3)}$ =exp[−0.05*t*].

At the operation states z_4, i.e. at the navigation at restricted waters state the ferry is built of $n_4 = 3$ subsystems S_1, S_2 and S_4 forming a series structure shown in *Figure 16*.

The subsystem S_1 consist of component $E_{11}^{(1)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(1)}(t,1)]^{(4)}$ =exp[−0.033*t*],$[s_{11}^{(1)}(t,2)]^{(4)}$ = exp[−0.04*t*],

$[s_{11}^{(1)}(t,3)]^{(4)}$ =exp[−0.045*t*],$[s_{11}^{(1)}(t,4)]^{(4)}$ = exp[−0.05*t*].

The subsystem S_2 consist of components $E_{11}^{(2)}$, $E_{12}^{(2)}$, $E_{13}^{(2)}$, $E_{14}^{(2)}$, $E_{41}^{(2)}$, $E_{51}^{(2)}$, $E_{61}^{(2)}$, $E_{71}^{(2)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(2)}(t,1)]^{(4)}$ =exp[−0.033*t*],$[s_{11}^{(2)}(t,2)]^{(4)}$ =exp[−0.04*t*],

$[s_{11}^{(2)}(t,3)]^{(4)}$ =exp[−0.05*t*],$[s_{11}^{(2)}(t,4)]^{(4)}$ =exp[−0.055*t*],

$[s_{12}^{(2)}(t,1)]^{(4)}$ exp[−0.033*t*], $[s_{12}^{(2)}(t,2)]^{(4)}$ = exp[−0.04*t*],

$[s_{12}^{(2)}(t,3)]^{(4)}$ =exp[−0.05*t*],$[s_{12}^{(2)}(t,4)]^{(4)}$ =exp[−0.055*t*],

$[s_{13}^{(2)}(t,1)]^{(4)}$ =exp[−0.033*t*],$[s_{13}^{(2)}(t,2)]^{(4)}$ =exp[−0.04*t*],

$[s_{13}^{(2)}(t,3)]^{(4)}$ =exp[−0.05*t*],$[s_{13}^{(2)}(t,4)]^{(4)}$ =exp[−0.055*t*],

$[s_{14}^{(2)}(t,1)]^{(4)}$ =exp[−0.033*t*],$[s_{14}^{(2)}(t,2)]^{(4)}$ =exp[−0.04*t*],

$[s_{14}^{(2)}(t,3)]^{(4)}$ =exp[−0.05*t*],$[s_{14}^{(2)}(t,4)]^{(4)}$ =exp[−0.055*t*],

$[s_{41}^{(2)}(t,1)]^{(4)}$ =exp[−0.033*t*],$[s_{41}^{(2)}(t,2)]^{(4)}$ =exp[−0.04*t*],

$[s_{41}^{(2)}(t,3)]^{(4)}$ =exp[−0.045*t*],$[s_{41}^{(2)}(t,4)]^{(4)}$ =exp[−0.05*t*],

$[s_{51}^{(2)}(t,1)]^{(4)}$ =exp[−0.033*t*],$[s_{51}^{(2)}(t,2)]^{(4)}$ =exp[−0.04*t*],

$[s_{51}^{(2)}(t,3)]^{(4)}$ =exp[−0.045*t*],$[s_{51}^{(2)}(t,4)]^{(4)}$=exp[−0.05*t*],

$[s_{61}^{(2)}(t,1)]^{(4)}$ =exp[$-0.033t$],$[s_{61}^{(2)}(t,2)]^{(4)}$ =exp[$-0.04t$],

$[s_{61}^{(2)}(t,3)]^{(4)}$ =exp[$-0.045t$],$[s_{61}^{(2)}(t,4)]^{(4)}$ =exp[$-0.05t$],

$[s_{71}^{(2)}(t,1)]^{(4)}$ =exp[$-0.033t$],$[s_{71}^{(2)}(t,2)]^{(4)}$ =exp[$-0.04t$],

$[s_{71}^{(2)}(t,3)]^{(4)}$ =exp[$-0.045t$],$[s_{71}^{(2)}(t,4)]^{(4)}$=exp[$-0.05t$].

The subsystem S_4 consist of component $E_{11}^{(4)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(4)}(t,1)]^{(4)}$ =exp[$-0.05t$], $[s_{11}^{(3)}(t,2)]^{(4)}$ = exp[$-0.06t$],

$[s_{11}^{(3)}(t,3)]^{(4)}$ =exp[$-0.065t$],$[s_{11}^{(3)}(t,4)]^{(4)}$ = exp[$-0.07t$].

At the operation state z_5, i.e. at the navigation at open waters state the ferry is built of $n_5 = 3$ subsystems S_1, S_2 and S_4 forming a series structure shown in *Figure 17*.
The subsystem S_1 consist of component $E_{11}^{(1)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(1)}(t,1)]^{(5)}$ =exp[$-0.033t$],$[s_{11}^{(1)}(t,2)]^{(5)}$ = exp[$-0.04t$],

$[s_{11}^{(1)}(t,3)]^{(5)}$ =exp[$-0.045t$],$[s_{11}^{(1)}(t,4)]^{(5)}$ = exp[$-0.05t$].

The subsystem S_2 consist of components $E_{11}^{(2)}$, $E_{12}^{(2)}$, $E_{13}^{(2)}$, $E_{14}^{(2)}$, $E_{41}^{(2)}$, $E_{51}^{(2)}$, $E_{61}^{(2)}$, $E_{71}^{(2)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(2)}(t,1)]^{(5)}$ =exp[$-0.033t$],$[s_{11}^{(2)}(t,2)]^{(5)}$ =exp[$-0.04t$],

$[s_{11}^{(2)}(t,3)]^{(5)}$ =exp[$-0.05t$],$[s_{11}^{(2)}(t,4)]^{(5)}$ =exp[$-0.055t$],

$[s_{12}^{(2)}(t,1)]^{(5)}$ =exp[$-0.033t$],$[s_{12}^{(2)}(t,2)]^{(5)}$ =exp[$-0.04t$],

$[s_{12}^{(2)}(t,3)]^{(5)}$ =exp[$-0.05t$],$[s_{12}^{(2)}(t,4)]^{(5)}$ =exp[$-0.055t$],

$[s_{13}^{(2)}(t,1)]^{(5)}$ =exp[$-0.033t$],$[s_{13}^{(2)}(t,2)]^{(5)}$ =exp[$-0.04t$],

$[s_{13}^{(2)}(t,3)]^{(5)}$ =exp[$-0.05t$],$[s_{13}^{(2)}(t,4)]^{(5)}$ =exp[$-0.055t$],

$[s_{14}^{(2)}(t,1)]^{(5)}$ =exp[$-0.033t$],$[s_{14}^{(2)}(t,2)]^{(5)}$ =exp[$-0.04t$],

$[s_{14}^{(2)}(t,3)]^{(5)}$ =exp[$-0.05t$],$[s_{14}^{(2)}(t,4)]^{(5)}$ =exp[$-0.055t$],

$[s_{41}^{(2)}(t,1)]^{(5)}$ =exp[$-0.033t$],$[s_{41}^{(2)}(t,2)]^{(5)}$ =exp[$-0.04t$],

$[s_{41}^{(2)}(t,3)]^{(5)}$ =exp[$-0.045t$],$[s_{41}^{(2)}(t,4)]^{(5)}$ =exp[$-0.05t$],

$[s_{51}^{(2)}(t,1)]^{(5)}$ =exp[$-0.033t$],$[s_{51}^{(2)}(t,2)]^{(5)}$ =exp[$-0.04t$],

$[s_{51}^{(2)}(t,3)]^{(5)}$ =exp[$-0.045t$],$[s_{51}^{(2)}(t,4)]^{(5)}$ =exp[$-0.05t$],

$[s_{61}^{(2)}(t,1)]^{(5)}$ =exp[$-0.033t$],$[s_{61}^{(2)}(t,2)]^{(5)}$ =exp[$-0.04t$],

$[s_{61}^{(2)}(t,3)]^{(5)}$ =exp[$-0.045t$],$[s_{61}^{(2)}(t,4)]^{(5)}$ =exp[$-0.05t$],

$[s_{71}^{(2)}(t,1)]^{(5)}$ =exp[$-0.033t$],$[s_{71}^{(2)}(t,2)]^{(5)}$ =exp[$-0.04t$],

$[s_{71}^{(2)}(t,3)]^{(5)}$ =exp[$-0.045t$],$[s_{71}^{(2)}(t,4)]^{(5)}$ =exp[$-0.05t$].

The subsystem S_4 consist of component $E_{11}^{(4)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(4)}(t,1)]^{(5)}$ =exp[$-0.05t$], $[s_{11}^{(3)}(t,2)]^{(5)}$ = exp[$-0.06t$],

$[s_{11}^{(3)}(t,3)]^{(5)}$ =exp[$-0.065t$],$[s_{11}^{(3)}(t,4)]^{(5)}$ = exp[$-0.07t$].

At the operation state z_6, i.e. at the navigation at restricted waters state the ferry is built of $n_6 = 3$ subsystems S_1, S_2 and S_4 forming a series-parallel structure shown in *Figure 18*.
The subsystem S_1 consist of component $E_{11}^{(1)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(1)}(t,1)]^{(6)}$ =exp[$-0.033t$],$[s_{11}^{(1)}(t,2)]^{(6)}$ = exp[$-0.04t$],

$[s_{11}^{(1)}(t,3)]^{(6)}$ =exp[$-0.045t$],$[s_{11}^{(1)}(t,4)]^{(6)}$ = exp[$-0.05t$].

The subsystem S_2 consist of components $E_{11}^{(2)}$, $E_{12}^{(2)}$, $E_{13}^{(2)}$, $E_{14}^{(2)}$, $E_{21}^{(2)}$, $E_{22}^{(2)}$, $E_{31}^{(2)}$, $E_{41}^{(2)}$, $E_{51}^{(2)}$, $E_{61}^{(2)}$, $E_{71}^{(2)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(2)}(t,1)]^{(6)}$ =exp[$-0.033t$],$[s_{11}^{(2)}(t,2)]^{(6)}$ =exp[$-0.04t$],

$[s_{11}^{(2)}(t,3)]^{(6)}$ =exp[$-0.05t$],$[s_{11}^{(2)}(t,4)]^{(6)}$ =exp[$-0.055t$],

$[s_{12}^{(2)}(t,1)]^{(6)}$ =exp[$-0.033t$],$[s_{12}^{(2)}(t,2)]^{(6)}$ =exp[$-0.04t$],

$[s_{12}^{(2)}(t,3)]^{(6)}$ =exp[$-0.05t$],$[s_{12}^{(2)}(t,4)]^{(6)}$ =exp[$-0.055t$],

$[s_{13}^{(2)}(t,1)]^{(6)}$ =exp[$-0.033t$],$[s_{13}^{(2)}(t,2)]^{(6)}$ =exp[$-0.04t$],

$[s_{13}^{(2)}(t,3)]^{(6)}$ =exp[$-0.05t$],$[s_{13}^{(2)}(t,4)]^{(6)}$ =exp[$-0.055t$],

$[s_{14}^{(2)}(t,1)]^{(6)}$ =exp[$-0.033t$],$[s_{14}^{(2)}(t,2)]^{(6)}$ =exp[$-0.04t$],

$[s_{14}^{(2)}(t,3)]^{(6)}$ =exp[$-0.05t$],$[s_{14}^{(2)}(t,4)]^{(6)}$ =exp[$-0.055t$],

$[s_{21}^{(2)}(t,1)]^{(6)}$ =exp[$-0.033t$],$[s_{21}^{(2)}(t,2)]^{(6)}$ =exp[$-0.04t$],

$[s_{21}^{(2)}(t,3)]^{(6)}$ =exp[$-0.045t$],$[s_{21}^{(2)}(t,4)]^{(6)}$ =exp[$-0.05t$],

$[s_{22}^{(2)}(t,1)]^{(6)}$ =exp[$-0.033t$],$[s_{22}^{(2)}(t,2)]^{(6)}$=exp[$-0.04t$],

$[s_{22}^{(2)}(t,3)]^{(6)}$ =exp[$-0.045t$],$[s_{22}^{(2)}(t,4)]^{(6)}$ =exp[$-0.05t$],

$[s_{31}^{(2)}(t,1)]^{(6)}$ =exp[$-0.033t$],$[s_{31}^{(2)}(t,2)]^{(6)}$ =exp[$-0.04t$],

$[s_{31}^{(2)}(t,3)]^{(6)}$ =exp[$-0.045t$],$[s_{31}^{(2)}(t,4)]^{(6)}$ =exp[$-0.05t$],

$[s_{41}^{(2)}(t,1)]^{(6)}$ =exp[$-0.033t$],$[s_{41}^{(2)}(t,2)]^{(6)}$ =exp[$-0.04t$],

$[s_{41}^{(2)}(t,3)]^{(6)}$ =exp[$-0.045t$],$[s_{41}^{(2)}(t,4)]^{(6)}$ =exp[$-0.05t$],

$[s_{51}^{(2)}(t,1)]^{(6)}$ =exp[$-0.033t$],$[s_{51}^{(2)}(t,2)]^{(6)}$ =exp[$-0.04t$],

$[s_{51}^{(2)}(t,3)]^{(6)}$ =exp[$-0.045t$],$[s_{51}^{(2)}(t,4)]^{(6)}$ =exp[$-0.05t$],

$[s_{61}^{(2)}(t,1)]^{(6)}$ =exp[$-0.033t$],$[s_{61}^{(2)}(t,2)]^{(6)}$ =exp[$-0.04t$],

$[s_{61}^{(2)}(t,3)]^{(6)}$ =exp[$-0.045t$],$[s_{61}^{(2)}(t,4)]^{(6)}$ =exp[$-0.05t$],

$[s_{71}^{(2)}(t,1)]^{(6)}$ =exp[$-0.033t$],$[s_{71}^{(2)}(t,2)]^{(6)}$ =exp[$-0.04t$],

$[s_{71}^{(2)}(t,3)]^{(6)}$ = xp[$-0.045t$],$[s_{71}^{(2)}(t,4)]^{(6)}$ = exp[$-0.05t$].

The subsystem S_4 consist of component $E_{11}^{(4)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(4)}(t,1)]^{(6)}$ =exp[$-0.05t$], $[s_{11}^{(3)}(t,2)]^{(6)}$ = exp[$-0.06t$],

$[s_{11}^{(3)}(t,3)]^{(6)}$ =exp[$-0.065t$],$[s_{11}^{(3)}(t,4)]^{(6)}$ = exp[$-0.07t$].

At the operation state z_7, i.e. at the mooring operations state the ferry is built of $n_7 = 3$ subsystems S_1, S_2 and S_5 forming a series structure shown in *Figure 19*.

The subsystem S_1 consist of component $E_{11}^{(1)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(1)}(t,1)]^{(7)}$ =exp[$-0.033t$],$[s_{11}^{(1)}(t,2)]^{(7)}$ = exp[$-0.04t$],

$[s_{11}^{(1)}(t,3)]^{(7)}$ =exp[$-0.045t$],$[s_{11}^{(1)}(t,4)]^{(7)}$ = exp[$-0.05t$].

The subsystem S_2 consist of components $E_{11}^{(2)}$, $E_{12}^{(2)}$, $E_{13}^{(2)}$, $E_{14}^{(2)}$, $E_{21}^{(2)}$, $E_{22}^{(2)}$, $E_{31}^{(2)}$, $E_{41}^{(2)}$, $E_{51}^{(2)}$, $E_{61}^{(2)}$, $E_{71}^{(2)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(2)}(t,1)]^{(7)}$ =exp[$-0.033t$],$[s_{11}^{(2)}(t,2)]^{(7)}$ =exp[$-0.04t$],

$[s_{11}^{(2)}(t,3)]^{(7)}$ =exp[$-0.05t$],$[s_{11}^{(2)}(t,4)]^{(7)}$ =exp[$-0.055t$],

$[s_{12}^{(2)}(t,1)]^{(7)}$ =exp[$-0.033t$],$[s_{12}^{(2)}(t,2)]^{(7)}$ =exp[$-0.04t$],

$[s_{12}^{(2)}(t,3)]^{(7)}$ =exp[$-0.05t$],$[s_{12}^{(2)}(t,4)]^{(7)}$ =exp[$-0.055t$],

$[s_{13}^{(2)}(t,1)]^{(7)}$ =exp[$-0.033t$],$[s_{13}^{(2)}(t,2)]^{(7)}$ =exp[$-0.04t$],

$[s_{13}^{(2)}(t,3)]^{(7)}$ =exp[$-0.05t$],$[s_{13}^{(2)}(t,4)]^{(7)}$ =exp[$-0.055t$],

$[s_{14}^{(2)}(t,1)]^{(7)}$ =exp[$-0.033t$],$[s_{14}^{(2)}(t,2)]^{(7)}$ =exp[$-0.04t$],

$[s_{14}^{(2)}(t,3)]^{(7)}$ =exp[$-0.05t$],$[s_{14}^{(2)}(t,4)]^{(7)}$ =exp[$-0.055t$],

$[s_{21}^{(2)}(t,1)]^{(7)}$ =exp[$-0.066t$],$[s_{21}^{(2)}(t,2)]^{(7)}$ =exp[$-0.07t$],

$[s_{21}^{(2)}(t,3)]^{(7)}$ =exp[$-0.075t$],$[s_{21}^{(2)}(t,4)]^{(7)}$ =exp[$-0.08t$],

$[s_{22}^{(2)}(t,1)]^{(7)}$ =exp[$-0.066t$],$[s_{22}^{(2)}(t,2)]^{(7)}$ =exp[$-0.07t$],

$[s_{22}^{(2)}(t,3)]^{(7)}$ =exp[$-0.075t$],$[s_{22}^{(2)}(t,4)]^{(7)}$ =exp[$-0.08t$],

$[s_{31}^{(2)}(t,1)]^{(7)}$ =exp[$-0.066t$],$[s_{31}^{(2)}(t,2)]^{(7)}$ =exp[$-0.07t$],

$[s_{31}^{(2)}(t,3)]^{(7)}$ =exp[$-0.075t$],$[s_{31}^{(2)}(t,4)]^{(7)}$ =exp[$-0.08t$],

$[s_{41}^{(2)}(t,1)]^{(7)}$ =exp[$-0.033t$],$[s_{41}^{(2)}(t,2)]^{(7)}$ =exp[$-0.04t$],

$[s_{41}^{(2)}(t,3)]^{(7)}$ =exp[$-0.045t$],$[s_{41}^{(2)}(t,4)]^{(7)}$ =exp[$-0.05t$],

$[s_{51}^{(2)}(t,1)]^{(7)}$ =exp[$-0.033t$],$[s_{51}^{(2)}(t,2)]^{(7)}$ =exp[$-0.04t$],

$[s_{51}^{(2)}(t,3)]^{(7)}$ =exp[$-0.045t$],$[s_{51}^{(2)}(t,4)]^{(7)}$ =exp[$-0.05t$],

$[s_{61}^{(2)}(t,1)]^{(7)}$ =exp[−0.033*t*],$[s_{61}^{(2)}(t,2)]^{(7)}$ =exp[−0.04*t*],

$[s_{61}^{(2)}(t,3)]^{(7)}$ =exp[−0.045*t*],$[s_{61}^{(2)}(t,4)]^{(7)}$ =exp[−0.05*t*],

$[s_{71}^{(2)}(t,1)]^{(7)}$ =exp[−0.033*t*],$[s_{71}^{(2)}(t,2)]^{(7)}$ =exp[−0.04*t*],

$[s_{71}^{(2)}(t,3)]^{(7)}$ =exp[−0.045*t*],$[s_{71}^{(2)}(t,4)]^{(7)}$ =exp[−0.05*t*].

The subsystem S_5 consist of components $E_{11}^{(5)}$, $E_{21}^{(5)}$, $E_{31}^{(5)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(5)}(t,1)]^{(7)}$ =exp[−0.033*t*],$[s_{11}^{(5)}(t,2)]^{(7)}$ = exp[−0.04*t*],

$[s_{11}^{(5)}(t,3)]^{(7)}$ =exp[−0.045*t*],$[s_{11}^{(5)}(t,4)]^{(7)}$ = exp[−0.05*t*],

$[s_{21}^{(5)}(t,1)]^{(7)}$ =exp[−0.033*t*],$[s_{21}^{(5)}(t,2)]^{(7)}$ = exp[−0.04*t*],

$[s_{21}^{(5)}(t,3)]^{(7)}$ =exp[−0.05*t*],$[s_{21}^{(5)}(t,4)]^{(7)}$ = exp[−0.055*t*],

$[s_{31}^{(5)}(t,1)]^{(7)}$ =exp[−0.033*t*],$[s_{31}^{(5)}(t,2)]^{(7)}$ = exp[−0.04*t*],

$[s_{31}^{(5)}(t,3)]^{(7)}$ = exp[−0.05*t*], $[s_{31}^{(5)}(t,4)]^{(7)}$ = exp[−0.06*t*].

At the operation state z_8, i.e. at the unloading at Karlskrona Port state the ferry is built of $n_8 = 2$ subsystems S_3 and S_4 forming a series structure shown in *Figure 20*.
The subsystem S_3 consist of components $E_{11}^{(3)}$, $E_{21}^{(3)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(3)}(t,1)]^{(8)}$ = exp[−0.2*t*], $[s_{11}^{(3)}(t,2)]^{(8)}$ = exp[−0.3*t*],

$[s_{11}^{(3)}(t,3)]^{(8)}$ = exp[−0.35*t*], $[s_{11}^{(3)}(t,4)]^{(8)}$ = exp[−0.4*t*],

$[s_{21}^{(3)}(t,1)]^{(8)}$ =exp[−0.033*t*],$[s_{21}^{(3)}(t,2)]^{(8)}$ = exp[−0.04*t*],

$[s_{21}^{(3)}(t,3)]^{(8)}$ = exp[−0.045*t*],$[s_{21}^{(3)}(t,4)]^{(8)}$ =exp[−0.05*t*],

The subsystem S_4 consist of component $E_{11}^{(4)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(4)}(t,1)]^{(8)}$ =exp[−0.05*t*], $[s_{11}^{(3)}(t,2)]^{(8)}$ = exp[−0.06*t*],

$[s_{11}^{(3)}(t,3)]^{(8)}$ =exp[−0.065*t*],$[s_{11}^{(3)}(t,4)]^{(8)}$ = exp[−0.07*t*].

At the operation state z_9, i.e. at the unloading at Karlskrona Port state the ferry is built of $n_9 = 2$ subsystems S_3 and S_4 forming a series structure shown in *Figure 21*.
The subsystem S_3 consist of components $E_{11}^{(3)}$, $E_{21}^{(3)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(3)}(t,1)]^{(9)}$ = exp[−0.2*t*], $[s_{11}^{(3)}(t,2)]^{(9)}$ = exp[−0.3*t*],

$[s_{11}^{(3)}(t,3)]^{(9)}$ = exp[−0.35*t*], $[s_{11}^{(3)}(t,4)]^{(9)}$ = exp[−0.4*t*],

$[s_{21}^{(3)}(t,1)]^{(9)}$ =exp[−0.033*t*],$[s_{21}^{(3)}(t,2)]^{(9)}$ = exp[−0.04*t*],

$[s_{21}^{(3)}(t,3)]^{(9)}$ =exp[−0.045*t*], $[s_{21}^{(3)}(t,4)]^{(9)}$ =exp[−0.05*t*].

The subsystem S_4 consist of component $E_{11}^{(4)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(4)}(t,1)]^{(9)}$ =exp[−0.05*t*], $[s_{11}^{(3)}(t,2)]^{(9)}$ = exp[−0.06*t*],

$[s_{11}^{(3)}(t,3)]^{(9)}$ =exp[−0.065*t*],$[s_{11}^{(3)}(t,4)]^{(9)}$ = exp[−0.07*t*].

At the operation state z_{10}, i.e. at the unmooring operations state the ferry is built of $n_{10} = 3$ subsystems S_1, S_2 and S_5 forming a series structure shown in *Figure 22*.
The subsystem S_1 consist of component $E_{11}^{(1)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(1)}(t,1)]^{(10)}$ =exp[−0.033*t*],

$[s_{11}^{(1)}(t,2)]^{(10)}$ =exp[−0.04*t*],

$[s_{11}^{(1)}(t,3)]^{(10)}$ =exp[−0.045*t*],

$[s_{11}^{(1)}(t,4)]^{(10)}$=exp[−0.05*t*].

The subsystem S_2 consist of components $E_{11}^{(2)}$, $E_{12}^{(2)}$, $E_{13}^{(2)}$, $E_{14}^{(2)}$, $E_{21}^{(2)}$, $E_{22}^{(2)}$, $E_{31}^{(2)}$, $E_{41}^{(2)}$, $E_{51}^{(2)}$, $E_{61}^{(2)}$, $E_{71}^{(2)}$, with the conditional multi-state safety functions co-ordinates

$[s_{11}^{(2)}(t,1)]^{(10)}$=exp[−0.033*t*],